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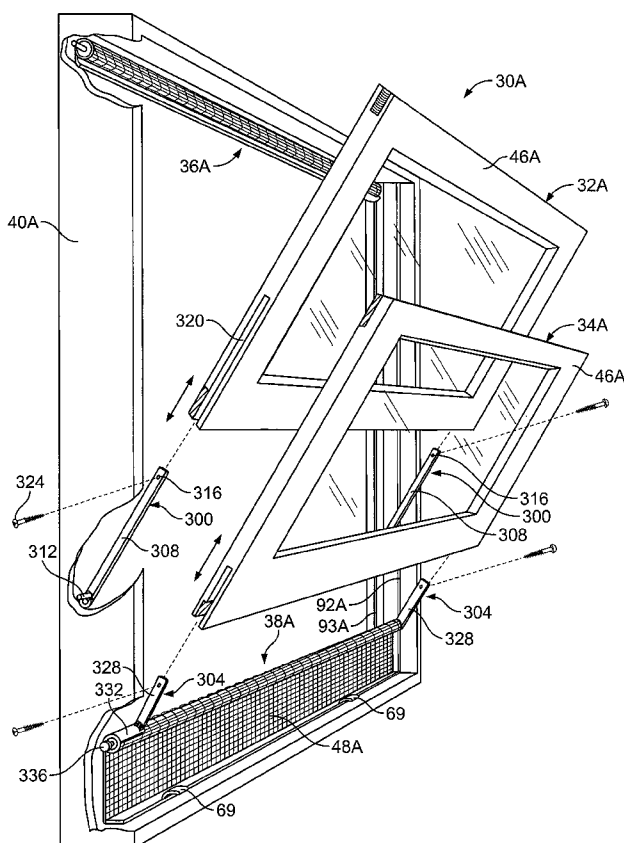
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(54) Title: FENESTRATION UNIT AND SCREENING ASSEMBLY



(57) Abstract: A fenestration unit and screening assembly are provided. The fenestration unit may be a window assembly for supporting a variety of windows such as a single-hung, a double hung or a bi-pass window. The window assembly may include a window screen assembly either manufactured with the window or as an after-market product. The screen assembly may include a spring-loaded screen roller for winding and unwinding a screen about the roller. The upper and lower windows may pivot into a residence when opened a certain amount. The windows may pivot about the same axis that the screen roller rotates, which minimizes the change in position and tension of the screen while the windows are tilted. A seal may be provided to seal space between windows when the windows are in any position. Also, a screen engaging member may be provided to inhibit undesirable unwinding of the screen from the roller.

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FENESTRATION UNIT AND SCREENING ASSEMBLY

RELATED APPLICATIONS

[0001] The present application claims the benefit of co-pending U.S. Patent Application No. 11/677,795, filed February 22, 2007, and U.S. Provisional Patent Application No. 60/776,704, filed February 24, 2006, the entire contents of both are hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to fenestration units such as windows and, more particularly, to window screens that screen a window opening when a window is opened and do not screen the window opening when the window is closed.

BACKGROUND

[0003] Residences include many fenestration units such as windows and doors. These fenestration units can be access corridors for insects and other debris into a residence. Typical fenestration units provide lackluster results for inhibiting insects and debris from entering the residence.

[0004] With particular reference to windows, typical window assemblies include a pair of double hung windows and a separate screen connected to the window frame or residence externally of the window in an attempt to inhibit insects and debris from entering the residence. When viewing through the window, the screen is always visible. The visible screen obstructs viewing capabilities and is a detriment to viewing quality. In addition, the screen is always exposed to the elements and insects, debris, dirt, or other contaminants can accumulate on the screen further deteriorating viewing quality. Further, screens are often removed and stored when not desired. During removal and storage of the screens, the screens can be damaged, thereby requiring costly and timely repair or replacement of the screens. Storage of the screens can also consume vast quantities of space that could otherwise be utilized.

[0005] In addition to these problems, many other problems exist with conventional fenestration units and, more particularly, with windows and screens.

SUMMARY

[0006] In some aspects, a fenestration unit such as a window assembly is provided. The window assembly provides an "all-in-one" window including a window screening assembly that does not substantially affect the exterior appearance of the window assembly and provides a glass-only view when the window is in a closed position. In fact, the window screening assembly is almost imperceptible from the interior of the window as well. Also, the window assembly eliminates the need to put-up and take-down screens. Further, the window assembly provides an insect barrier comparable to a typical whole-window screen. Further yet, the window assembly decreases the need to clean screens due to a self-cleaning function. In addition, due to the configuration of the window screening assembly, tilting of a window for glass cleaning purposes is not complicated by the addition of the window screening assembly. Life of the screen can be increased by the window screening assembly due to the storage of the screen away from the elements during non-use of the window screening assembly.

[0007] In some aspects, a double-hung window assembly is provided with similar upper and lower sliding windows. A spring-loaded screen roller is positioned in a window sash of each of the upper and lower windows. In other aspects, a spring-loaded screen roller is positioned in one of the window sashes, while the other screen roller is positioned in one of the window frame or a roller housing connected to the window frame. The spring-loaded screen roller has a window screen rotatably supported thereon and the screen is extendable from and retractable onto the screen roller as the window is opened and closed, respectively, to provide a glass only view when the window is closed and a screened window when the window is open. The upper and lower windows can be moved to a particular height to position them in a tilting position. When in the tilting position, the windows tilt about the same axis that the screen rollers rotate about, which minimizes the stress or tension of the screens and windows during this motion. Felt seals seal the gap between the upper and lower windows when the windows are closed and brushes seal the gap between the upper and lower windows when the windows are open.

[0008] In some aspects, a window assembly provides an after-market window screening assembly retrofittable to a large variety of previously installed windows. The after-market window screening assembly can assume a large variety of configurations to facilitate adaptation to the large variety of windows (e.g., single-hung windows, double-hung windows, bi-pass (slider) windows). This after-market window screening assembly operates in much the same manner as the previously described window screening assembly.

[0009] In some aspects, a seal for sealing a space between a first member and a second member of a fenestration unit is provided. The seal includes a base connectable to the first member of the fenestration unit, an arm supported by and movable relative to the base, and an engaging member supported by and movable with the arm, the engaging member being engageable with the second member of the fenestration unit to seal the space between the first member and the second member.

[0010] In some aspects, a window assembly is provided and includes a window frame defining an opening, a window supported by the window frame in the opening and being movable relative to the window frame, a screen roller assembly supported by one of the window frame and the window and including a roller and a screen wound around the roller, a first end of the screen being connected to the roller and a second end of the screen being connected to the other one of the window frame and the window, wherein the screen unwinds from the roller when the window is moved in a first direction and winds around the roller when the window is moved in a second direction different than the first direction, and a screen engaging member supported by one of the window frame and the window and is selectively engageable with the screen such that the screen engaging member does not engage the screen when the window is moved in the first and second directions and is engageable with the screen when a force is applied to the screen in a direction toward the screen engaging member.

[0011] In some aspects, a window assembly is provided and includes a window frame including a top, a bottom, and two sides together defining an opening, each side of the window frame having an interior surface and a first track defined in the interior surface, a second track being defined in the interior surface of one of the sides and intersecting the respective one of the first tracks, a first bracket and a second bracket, the first bracket including a first portion

positionable in and slideable within one of the first tracks and the second bracket including a second portion positionable in and slideable within the other one of the first tracks, one of the first and second brackets including a bracket member, and a window connected to and supported by the first and second brackets in the opening, the window being slideable within the opening relative to the window frame via the first and second brackets, wherein the window is pivotable away from the window frame to a pivoted position, and wherein during pivoting of the window, the first portion of the first bracket and the second portion of the second bracket remain in the respective first tracks and the bracket member interacts with the second track to secure the window in the pivoted position.

[0012] In some aspects, a fenestration unit is provided and includes a frame defining an opening, a fenestration member supported in the opening of the frame, the fenestration member being slideable in the opening relative to the frame, and a screen roller assembly supported by one of the frame and the fenestration member, the screen roller assembly including a roller rotatable about an axis and a screen wound around the roller, the screen having a first end connected to the roller and having a second end connected to the other one of the frame and the fenestration member, wherein the screen unwinds from the roller when the fenestration member moves in a first direction and winds around the roller when the fenestration member moves in a second direction different than the first direction, and wherein the fenestration member also pivots relative to the frame, the fenestration member pivoting about the axis.

[0013] In some aspects, a window assembly including a window frame including a top, a bottom, and two sides together defining an opening, each side of the window frame having an interior surface and a track defined in the interior surface, a first bracket and a second bracket, the first bracket including a portion positionable in and slideable within one of the first tracks and the second bracket including a portion positionable in and slideable within the other of the first tracks, and a window connected to and supported by the first bracket and the second bracket in the opening, the window being slideable within the opening relative to the window frame via the first bracket and the second bracket, and wherein the window is pivotable about the first and second brackets away from the window frame to a pivoted position, the portions of the first and second brackets remaining in the respective tracks during pivoting of the window.

[0014] Other aspects of the invention will become apparent by consideration of the detailed description and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Fig. 1 is a perspective view of a window assembly including a window and a window screening assembly.

[0016] Fig. 2 is a sectional view taken along line 2-2 in Fig. 1.

[0017] Fig. 3 is a sectional view similar to Fig. 2, shown with upper and lower windows partially open.

[0018] Fig. 4 is an elevation sectional view of a window assembly including a window and a window screening assembly.

[0019] Fig. 5 is a partial exploded view of the window assemblies of Figs. 1 and 4.

[0020] Fig. 5A is a sectional view taken along line 5A-5A in Fig. 5.

[0021] Fig. 6 is a sectional view taken along line 6-6 in Fig. 2, showing a partially broken away screen roller.

[0022] Fig. 7 is an elevation sectional view illustrating pivot brackets of the window of Figs. 1 and 4, section taken from exterior face of window.

[0023] Fig. 8 is a partial side view of the window assemblies of Figs. 1 and 4, illustrating the window moving from an upright position to a tilted position.

[0024] Fig. 9 is a partial side view of a recess in a jamb of the window assemblies of Figs. 1 and 4.

[0025] Fig. 10 is a partial sectional side view of the window assemblies of Fig. 4 illustrating brush inserts.

[0026] Fig. 11 is a partial elevation sectional view of a window assembly.

- [0027] Fig. 12 is a partial exploded view of the window assembly of Fig. 11.
- [0028] Fig. 13 is a partial elevation view of the window assembly of Fig. 11, view of the exterior face of the window assembly.
- [0029] Fig. 14 is a plan sectional view of the window assembly of Fig. 11, view looking down upon the window assembly.
- [0030] Fig. 15 is a side view of end caps of the window assembly of Fig. 11.
- [0031] Fig. 16 is an enlarged perspective view of a connecting member of a screen of the window assembly of Fig. 11.
- [0032] Fig. 17 is an enlarged section view of a portion of the connecting member of Fig. 16 and a portion of a roller housing of the window assembly of Fig. 11.
- [0033] Fig. 18 is a perspective view of a window assembly including a window and a screening assembly.
- [0034] Fig. 19 is a partially exploded view of the window assembly of Fig. 18.
- [0035] Fig. 20 is a front view of an upper window bracket of the window assembly of Figs. 18 and 19.
- [0036] Fig. 21 is a side view of the upper window bracket shown in Fig. 20.
- [0037] Fig. 22 is a sectional view taken along line 22-22 in Fig. 20.
- [0038] Fig. 23 is a perspective view of a lower window bracket of the window assembly of Figs. 18 and 19.
- [0039] Fig. 24 is a front view of the lower window bracket shown in Fig. 23.
- [0040] Fig. 25 is a left side view of the lower window bracket shown in Fig. 23.
- [0041] Fig. 26 is a right side view of the lower window bracket shown in Fig. 23.

[0042] Fig. 27 is a bottom view of the lower window bracket shown in Fig. 23.

[0043] Fig. 28 is a sectional view taken along line 28-28 in Fig. 24.

[0044] Fig. 29 is a front view of an alternative embodiment of a lower window bracket.

[0045] Fig. 30 is an elevation view of the lower window bracket of Fig. 29 and a corresponding window frame for accommodating the lower window bracket.

[0046] Fig. 31 is partial plan view of a window frame, a screen roller and a safety mechanism of the window assemblies shown in Figs. 1 and 4, view looking down from above.

[0047] Fig. 32 is an enlarged plan view of the safety mechanism shown in Fig. 31.

[0048] Fig. 33 is a side view of the safety mechanism shown in Figs. 31 and 32.

[0049] Fig. 34 is a partial sectional view of a sealing device of the window assemblies of Figs. 1, 4 and 18, windows shown in a closed position.

[0050] Fig. 35 is a partial sectional view of the sealing device shown in Fig. 34, the lower window shown in a partially open view and the sealing device shown in a partially deployed position.

[0051] Fig. 36 is a perspective view of a portion of the sealing device shown in Figs. 34 and 35, shown in a fully deployed position.

[0052] Before any embodiments of the invention are explained in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the following drawings. The invention is capable of other embodiments and of being practiced or of being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting.

DETAILED DESCRIPTION

[0053] Fig. 1 is a perspective view and Figs. 2-4 are elevation sectional views, all of which illustrate a fenestration unit such as a window assembly 30. The illustrated embodiments of the fenestration units are window assemblies. However, the concepts disclosed herein are applicable to other types of fenestration units, such as, doors or any other openings in a building structure. Accordingly, application of the concepts disclosed herein with other types of fenestration units is within the spirit and scope of the present invention. For purposes of description, only window assemblies will be illustrated and described herein.

[0054] Figs. 1-3 illustrate the window assembly as a wood constructed double-hung window assembly and Fig. 4 illustrates the window assembly as a vinyl double-hung window assembly. However, the window assembly 30 can be made of other materials, such as, for example metal, and can be a variety of other types of window assemblies, such as, for example single-hung, bi-pass (sliders), etc., and still be within the spirit and scope of the present invention. The window assembly 30 includes an upper window 32, a lower window 34, and a window screening assembly including an upper screen roller 36 and a lower screen roller 38. The windows 32, 34 are supported by a window frame 40 that substantially surrounds the windows 32, 34. The upper and lower windows 32, 34 slide vertically independent of each other. The upper and lower windows 32, 34 include an integrated handle 42 (see Fig. 4) or a finger pull 43 (see Fig. 4), for raising and lowering the windows 32, 34, and at least one pane of glass 44. A window sash 46 substantially surrounds the at least one pane of glass 44 in each of the upper and lower windows 32, 34. The upper and lower windows 32, 34 are substantially identical, and are supported in the window frame 40 in an opposing orientation such that the handle or pull 42, 43 of the lower window 34 is near the bottom of the window assembly 30, and the handle or pull 42, 43 of the upper window 32 is near the top of the window assembly 30.

[0055] In Fig. 4, the screen rollers 36, 38 are rotatably supported within a portion of the sash 46 in the upper and lower windows 32, 34. In Figs. 2 and 3, the upper screen roller 36 is supported within the window frame 40 and the lower screen roller 38 is positioned in the sash 46 of the lower window 34. Alternatively, the upper and lower screen rollers 36, 38 of the window assembly illustrated in Figs. 2 and 3 can both be located in the sash 46 of the upper and lower

windows 32, 34. Positioning the screen rollers 36, 38 in such manners protects them from weather and provides other benefits that will be obvious in view of the following description. When the windows 32, 34 are in a closed position, the screen rollers 36, 38 are stored away from the weather where they remain clean and dry. The screen rollers 36, 38 define a roller axis 37 about which the rollers 36, 38 rotate. The screening assembly also includes a length of screen 48 wrapped about the rollers 36, 38 and a three-sided fused rubber member 50 disposed on one end of the length of screen 48. The screen 48 of the upper roller 36 extends from the roller 36 and the rubber member 50 is received in a groove 52 in a screen holder 54, which is removably supported by the sash 46 (see Figs. 2, 3, and 5). Alternatively, the screen 48 can be connected to the sash 46 or window frame 40 in other manners. The lower screen roller 38 is configured substantially similar to the upper screen roller 36 (see Figs. 4 and 5). When the upper window 32 is pulled down, the screen 48 is unrolled from the upper roller 36 to substantially cover the area between the upper window 32 and the window frame 40. Likewise, when the lower window 34 is lifted up, the screen 48 is unrolled from the lower roller 38 to substantially cover the area between the lower window 34 and the window frame 40. The rollers 36, 38 are spring loaded (discussed below) such that when the upper and lower windows 32, 34 are slid back towards the window frame 40, the screen 48 is wound back onto the rollers 36, 38.

[0056] With continued reference to Fig. 5, the mounting arrangement of the lower screen roller 38 is illustrated. The mounting arrangement of the upper screen roller 36 is substantially similar to the lower screen roller 38. A tensioning rod 56 is substantially covered with a felt-like material (see Fig. 5A), and is rotatably supported within the window sash 46. As screen 48 is wound onto or unwound from the screen roller 38, the screen 48 is stretched over the tensioning rod 56, thereby forcibly rotating the tensioning rod 56. The felt-like material that covers the tensioning rod 56 includes bristles 59 (see Fig. 5A) that extend radially from the tensioning rod 56. As the tensioning rod 56 rotates, the bristles 59 extend through individual apertures in the screen 48 to clean debris from the screen 48. Accordingly, the screen 48 is cleaned any time the screen 48 is wound onto or unwound from the screen rollers 36, 38.

[0057] The screen holder 54 includes a beveled edge 60 and a plurality of apertures 62 for receiving fasteners. The screen holder 54 is received in a groove 64 in a window sill 66, which is part of the window frame 40. Alternatively, a similar groove 64 can be defined in the window

sash 46 for connecting the screen 48 to the window sash 46. The profile of the groove 64 substantially matches the profile of the screen holder 54. To install the screen holder 54, the beveled edge 60 of the screen holder 54 is angled into a matching bevel 68 in the groove 64 before dropping the remainder of the screen holder 54 into the groove 64. Fasteners may be inserted through the window sill 66 and into the screen holder 54 to prevent the screen holder 54 from lifting out of the groove 64. The fasteners may be screws, pins, nails, or any other type of fastener. In other embodiments, the screen holder 54 may snap into position and be held without the use of fasteners. The screen 48 can be connected to the window frame 40 in a variety of manners other than that described herein and still be within the spirit and scope of the present invention. For example, a quick-release mechanism 69 (see Figs. 2 and 19) that is actuable by fingers of a user can be included to quickly release the end of the screen 48 from the window frame 40. In any event, the end of the screen 48 can be removably attached to the window frame to allow retraction of the free end of the screen 48 into the window sash 46 to provide an unobstructed opening between the window and the window sill. This unobstructed opening allows a person to reach through the opening to clean the exterior of the top window or pass objects through the opening.

[0058] Fig. 6 is a partial plan sectional view of the screen roller 38 positioned within the window sash 46. The screen roller 38 includes a galvanized tube 70, a tapered torsion spring 72, a torsion bar 74, and an end grommet 76 inserted into an end of the tube 70. The galvanized tube 70 extends the length of the screen roller 38, and provides a rigid surface about which the screen 48 is wrapped. The torsion spring 72 is positioned within the galvanized tube 70 and about the torsion bar 74, and is rigidly supported by the torsion bar 74 at a first end and by the galvanized tube 70 at a second end such that as the galvanized tube 70 rotates about the roller axis 37, the torsion spring 74 provides a rotational force to the galvanized tube 70. The rotational force biases the galvanized tube 70 in the direction that facilitates winding of the screen 48 about the galvanized tube 70. One end of the torsion bar 74 extends from an end of the galvanized tube 70 and through the end grommet 76. The end of the torsion bar 74 includes flat sides (i.e., a rectangular shape or any other polygonal shape) and is supported in a slotted end cap 228 (see left end cap in Fig. 15) such that the torsion bar 74, and thus the first end of the torsion spring 72,

cannot rotate. The other end of the torsion bar 74 is round and is supported in a round slotted end cap 228 (see right end cap in Fig. 15) such that this end of the torsion bar 74 is rotatable.

[0059] The torsion spring 72 is preloaded by rotating it a specified distance about the torsion bar 74 before coupling the first end of the torsion spring 72 to the torsion bar 74. The preload on the torsion spring 72 varies between windows depending on the size of the window and the mass of any counterweights that are used to assist in lifting the window. The preload is set such that the biasing force provided by the torsion spring 72 will not pull the window closed, and will not make opening the window difficult.

[0060] Many double-hung windows include a mechanism that permits the upper and lower windows to tilt inward to allow the outside surfaces of the windows to be cleaned from inside a residence. Fig. 7 is a partial sectional view of the screen roller 38 positioned within the lower window sash 46 of the lower window 34. A tilting bracket 86 is positioned at each end of the screen roller 38. The tilting brackets 86 are adapted to be coupled to the window sash 46 via screws or other removable fasteners, and include a substantially cylindrical end 88 rotatably received in a window frame 40. The cylindrical ends 88 define a tilting axis 37, and include apertures adapted to rigidly receive an end of the torsion bar 74.

[0061] Fig. 8 illustrates the window 34 pivoting about the tilting axis 37 from a normal operational position (solid lines) to a tilted position (dashed lines) to accommodate cleaning. The tilted position is a tilted-in position to facilitate cleaning from the interior of a residence. Fig. 9 is an interior side view of a track 92 running along the interior of the window frame 40. The window frame 40 includes the track 92 and a recess 96 on each side of the frame 40. A portion 94 (see Fig. 7) of the tilting bracket 86 is received in the track 92 and slides within the track 92 when the window 34 is raised and lowered during normal operation. When the window 34 is raised to a height where the tilting bracket 86 is at substantially the same height as the recess 96, the tilting bracket 86 can leave the track 92 and rotate within the recess 96. Since the recess 96 is not movable, the tilting bracket 86 and the window 34 can only tilt when positioned at substantially the same height as the recess 96. In some embodiments, the window is moved to a standard height of six inches to enable the tilting feature. Alternatively, other heights can be used as the height for enabling the window tilting feature. In addition, multiple recesses 96 can

be defined in the window frame 40 to allow the window 34 to tilt at various heights. A safety locking mechanism can be used to selectively lock the window at the window tilting height. An example of a safety locking mechanism will be described in greater detail below with reference to Figs. 29-33.

[0062] When tilting the window 34, it is desirable to have minimal effect on the position and tension of the screen 48. This is accomplished when tilting the window 34 because ends of the torsion bar 74 are received in the cylindrical ends 88 of the tilting brackets 86, which place the screen roller 38 in coaxial alignment with the cylindrical ends 88 of the tilting brackets 86. Thus, the window 34 tilts about the roller axis 37 independent of the screen roller 38, and the screen roller 38 will only be forced to rotate as the window 34 tilts, minimizing change in position and tension of the screen roller 38 and the screen 48. Although the tilting feature above is described with respect to the lower window 34 and the lower screen roller 38, it should be understood that the tilting feature and associated components can be utilized with the upper window 32 and upper screen roller 36 to enable tilting thereof.

[0063] Fig. 10 is a partial sectional view of the upper window and lower windows 32, 34 in their respective closed positions. Felt seals 100 are positioned on the portions of the sash 46 opposite the portions of the sash 46 that contain the screen rollers 36, 38. When both upper and lower windows 32, 34 are closed, the felt seals 100 sealingly engage the sash 46 of the other window 32, 34. The seal that is formed keeps bugs and debris from passing between the windows 32, 34 that would have otherwise been stopped by a typical non-retractable screen. Brushes 102 with bristles longer than the felt seals 100 are also coupled to the sash 46 of both windows 32, 34. When either or both of the windows 32, 34 are in an open position, the bristles of the brushes 102 extend to contact the glass 44 of the other window 32, 34. When either or both the windows 32, 34 are in an open position, the brushes 102 keep bugs and debris from passing between the windows 32, 34 much like the felt seals 100 do when the windows 32, 34 are closed. The brushes 102 are mounted in recesses 104 in the window sash 46 to accommodate the longer bristles and to prevent the bristles from collapsing when the windows 32, 34 are in the closed position. Alternatively, with reference to Figs. 2 and 3, a single brush 102 is installed on the underside of the sash of the upper window and contacts the glass 44 of the lower window

when either or both of the windows are opened. The window assembly 30 of Figs. 2 and 3 may alternatively include multiple brushes similar to the embodiment of Fig. 10.

[0064] Figs. 11-17 illustrate an after-market window assembly 200. In the illustrated embodiment, the window assembly 200 includes a double-hung window 204 and a window screen assembly 208. Alternatively, the window assembly 200 can include a variety of types of windows other than a double-hung window, such as, for example a single-hung window, a bi-pass (slider) window, etc., and still be within the spirit and scope of the present invention. The window screen assembly 208 is manufactured separately from the window 204 and can be connected to a variety of windows 204 either upon installation of the window or sometime after installation of the window. The window screen assembly 208 easily connects to the window assembly 200. The window screen assembly 208 provides a glass-only view when the window 204 is closed and substantially covers the area between the window 204 and the window sill when the window 204 is opened.

[0065] With particular reference to Figs. 11 and 12, the window screen assembly 208 includes a roller cartridge 212, a pair of guide brackets 216, and a screen connecting member 220. The roller cartridge 212 is connected to the window sill on the exterior side of the window 204 with fasteners 224. Alternatively, the roller cartridge 212 may be connected on the interior side of the window 204 in a similar manner. The roller cartridge 212 includes a screen roller 238 and a screen 248 similar in construction to the screen rollers 36, 38 and screen 48 illustrated in and described with respect to Figs. 1-10. Accordingly, for the sake of brevity, the screen roller 238 and screen 248 will not be described in detail herein. With additional reference to Fig. 15, the roller cartridge 212 includes a pair of end caps 228 sealing the ends of the roller cartridge 212 and receiving ends of a torsion bar 274. The screen connecting member 220 is connected at the free end of the screen 248 and connects the screen 248 to a window sash 246 via fasteners 232. Alternatively, the screen connecting member 220 may be connected to the window sash 246 in a quick-release manner, such as, for example a snap connection, hook and loop type fastener connection, etc. The guide brackets 216 are connected via fasteners 236 to interior sides or jamb legs of a window frame 240 and include a guide channel 243 for receiving respective ends 245 of the screen connecting member 220 and respective edges 247 of the screen 248. The guide channels 243 guide the screen 248 along a proper path as the window 204 moves between open

and closed positions, and provides an effective seal with the edges 247 of the screen 248 to prevent insects, debris, and any other undesirable elements from traversing the screen 248 around the edges 247 thereof.

[0066] Referring to Figs. 16 and 17, the screen connecting member 220 has a tapered bottom 249 that is received in a complementarily shaped cavity 251 defined in a top surface of the roller cartridge 212. In the closed position of the window (as shown in Fig. 17), the interaction between the tapered bottom 249 and the cavity 251 inhibits insects, debris, or any other undesirable elements from traversing the screen 248 while the window 204 is closed. In addition to the complementarily engagement between the screen connecting member 220 and the roller cartridge 212, a seal 253 is connected to the top of the roller cartridge 212 and engages the screen connecting member 220 to provide a further seal. This seal 253 not only inhibits insects and debris from traversing the screen 248 while the window 204 is closed, but also inhibits water (i.e., rain, snow) from entering into the roller cartridge 212 through any possible gap between the roller cartridge 212 and the screen connecting member 220. The seal 253 can be made of a variety of materials including rubber, plastic, felt, other resilient materials, or any suitable material that provides an appropriate seal.

[0067] Referring to Figs. 18-28, an alternative embodiment of the window assembly is illustrated. Those elements of the widow assembly 30A illustrated in Figs. 18-28 similar to the elements of the window assemblies 30 illustrated in Figs. 1-17 are identified in the figures by the same reference number and an "A".

[0068] With reference to Fig. 18, the window assembly 30A is a friction balanced type window assembly. As is known in the art, a friction balanced type window assembly includes a friction balance mechanism, which enables the windows to be frictionally held in place when in any position along the tracks 92A, 93A. Also, the windows may be pivoted inwardly to allow cleaning or removal of the windows. Upon removal of the windows, the remaining components of the window assembly will remain frictionally held in place within the tracks 92A, 93A due to the friction balance mechanism. Such friction balanced window assemblies are well known in the art and will not be described in greater detail herein.

[0069] In Fig. 18, the window assembly 30A is shown with both windows 32A, 34A in the closed position. In Fig. 19, the windows 32A, 34A are shown exploded from the window frame 40A. The window assembly 30A includes a pair of upper window brackets 300 and a pair of lower window brackets 304.

[0070] With continued reference to Fig. 19 and additional reference to Figs. 20-22, the upper window brackets 300 are substantially identical to each other and each is pivotally mounted to a respective interior side of the window frame 40A. Since the upper window brackets 300 are substantially identical, only one upper window bracket 300 will be described. The upper window bracket 300 includes a body 308, a rod 312 extending from the body 308 near a lower end of the body 308, and an aperture 316 defined through the body 308 near an upper end of the body 308. The rod 312 is substantially cylindrical and is positioned in and slideable within a complementarily shaped track 93 defined in the interior side of the window frame 40A. The body 308 of the upper window bracket 300 is receivable within a complementarily shaped recess 320 defined in the upper window 32A. The upper window bracket 300 is secured to the upper window 32A by inserting a fastener 324 into the aperture 316 defined in the body 308 and fastening the fastener 324 to the window 32A. In the illustrated embodiment, the fastener 324 is a counter-sunk screw and the aperture 316 is appropriately shaped to receive the counter-sunk screw. Alternatively, the fastener 324 can be any type of fastener appropriate to secure the upper window bracket 300 to the upper window 32A. Also, the upper window bracket 300 can be secured to the window 32A in a variety of other manners than that described above, such as, for example, tongue and groove, snap fit, friction fit, etc.

[0071] Upon securing the upper window 32A to the upper window brackets 300, the upper window 32A can slide vertically relative to the window frame 40A. During vertical sliding, the rods 312 of the upper window brackets 300 slide within the tracks 93A defined in the interior sides of the window frame 40A. Pivoting of the window 32A will be described in greater detail below.

[0072] It should be understood that the upper screen roller 36A of the window assembly 30A can be connected to the upper window 32A in any of the manners described above in connection with connecting the upper screen roller 36 to the upper window 32 in Figs. 1-17.

[0073] With reference to Figs. 19 and 23-28, the lower window brackets 304 are substantially identical to each other and each is pivotally mounted to a respective interior side of the window frame 40A. Since the lower window brackets 304 are substantially identical, only one lower window bracket 304 will be described. The lower window bracket 304 includes a body 328, a roller connecting member 332, and a rod 336 extending from the roller connecting member 332. The body 328 and rod 336 of the lower window bracket 304 function in much the same manner as the body 308 and rod 312 of the upper window bracket 300. However, the rod 336 of the lower window bracket 304 is positionable in and slideable along a different track 92A than the rod 312 of the upper window bracket 300. The roller connecting member 332 is semi-circular in shape and includes an aperture 340 defined in an end thereof. The aperture 340 receives a complimentary shaped end of the torsion bar 74A. With particular reference to Figs. 23 and 25, the aperture 340 is rectangular shaped to receive the complimentary rectangular shaped end of the torsion bar 74A. The aperture 340 defined in the other lower bracket member 304 has a circular shape for receiving the complimentary circular shaped end of the torsion bar 74A. The reason for having rectangular shaped and round shaped apertures is clear in view of the description above relating to the end shapes of the torsion bar 74A. When the lower window bracket 304 is connected to the torsion bar 74A and, therefore, the lower screen roller 38A, the roller connecting member 332 surrounds a portion of the lower screen roller 38A.

[0074] Upon securing the lower window 34A to the lower window brackets 304, the lower window 34A can slide vertically relative to the window frame 40A. During vertical sliding, the rods 336 of the lower window brackets 304 slide within the tracks 92A defined within the interior sides of the window frame 40A. As described above, the window assembly 30A is of the friction balance type, thereby enabling a user to pivot the windows 32A, 34A at a variety of positions and the friction balance mechanism will maintain the windows 32A, 34A in the pivoted position.

[0075] Another type of window assembly is a spring loaded balance window assembly. Pivoting of the windows 32A, 34A is handled in a different manner for spring loaded balance window assemblies than for friction balanced window assembly. Such spring loaded window assemblies include a spring loaded mechanism for balancing the windows and are well known in the art. Accordingly, the spring loaded window assembly will not be described herein in greater

detail. With reference to Figs. 29 and 30, an alternative embodiment of the lower window brackets 304 is illustrated. This alternative embodiment is utilized with spring loaded type window assemblies. Those elements of the lower window brackets 304B illustrated in Figs. 29 and 30 similar to the elements of the lower window brackets 304 illustrated in Figs. 19 and 23-28 are identified in the figures by the same reference number and a "B".

[0076] It is desirable to clean both the interior and exterior sides of the windows 32B, 34B and sometimes remove the windows 32B, 34B. To access both sides of the windows 32B, 34B for cleaning purposes or to remove the windows 32B, 34B, the windows need to be pivoted relative to the window frame 40B. Preferably, the windows 32B, 34B are pivoted inward toward the interior of the residence. The lower window brackets 304B shown in Figs. 29 and 30 are designed to lock the lower window 34B in the pivoted position. The lower window brackets 304B of the type shown in Figs. 29 and 30 are substantially the same and, therefore, only one of the lower window brackets 304B will be described herein. The lower window bracket 304B includes a locking projection 344 extending outwardly from the body 328B at a location upwardly from and on the same side as the connecting member 332B. In the illustrated embodiment, the locking projection 344 is substantially cylindrical. Alternatively, the locking projection 344 can assume different shapes so long as the locking projection 344 appropriately performs the function of the illustrated locking projection 344. The lower window bracket 304B slides vertically similarly to the lower window bracket 304 illustrated in Figs. 19 and 23-28. Similar to the rod 336B of the lower window bracket 304B, the locking projection 344 slides within the track 92B defined in the interior side of the window frame 40B. With particular reference to Fig. 30, the track 92B includes a second track or a slot 348 extending therefrom for receiving the locking projection 344. In the illustrated embodiment, the slot 348 has a downwardly angled portion and an upward vertical portion. Alternatively, the slot 348 can take any shape appropriate for locking the window 34B in a pivoted position.

[0077] To pivot and lock the window 34B in the pivoted position, the lower window 34B is positioned relative to the window frame 40B such that the locking projection 344 aligns with the opening of the slot 348. Then, a user pivots the window 34B to position the locking projection 344 in the slot 348. Once in the slot 348, the locking projection 344 slides to the end of the slot 348 (see dashed lines in Fig. 30) and the spring force applied to the window from the spring

loaded balance mechanism of the spring loaded window assembly biases the locking projection 344 into the upper position of the slot 348. When the locking projection 348 is positioned in the upper position of the slot 348, the spring loaded mechanism is secured in place and inhibited from completely retracting into the top or bottom of the window frame 40 once the window is removed from the lower window brackets 304B.

[0078] It should be understood that the upper window brackets can include similar locking projections to those included on the lower window brackets for locking the upper window in a pivoted position. Accordingly, the track in which the rods and locking projections of the upper window brackets slide would include slots on each interior side of the window frame for receiving the locking projections.

[0079] It should also be understood that the windows can be locked in pivoted positions in various manners to that described above and still be within the spirit and scope of the present invention. Also, it should be understood that the interior sides of the window frames can include a plurality of slots defined at various heights along the interior sides of the window frames to facilitate a variety of positions at which the windows can be locked in a pivoted position.

[0080] With reference to Figs. 30-33, the window assembly 30A includes a safety mechanism or a screen engaging member 352 for preventing the screen 48A from undesirably unrolling upon outward impacts to an interior surface of the screen 48A. The screen 48A is the only item covering the opening when the upper and/or lower windows 32A, 34A are in the open position. Since the screen 48A is wound around a pivotal roller, the screen 48A can unroll from the roller if a force is applied to the screen 48A in an outward direction. As an example, a child may be playing inside the house and may stumble or otherwise fall toward the open window. The child may impact the screen 48A, thereby producing an outward force on the screen 48A, and unroll the screen 48A from the roller. If the screen 48A is allowed to unroll, the child may fall through the window opening and potentially fall completely through the window opening and out of the window. Obviously, this could have catastrophic results.

[0081] With continued reference to Figs. 30-33, the screen engaging member 352 is connected to the window frame 40A and extends vertically along the opening. Alternatively, the screen engaging member can be connected to the sash 46A of the window 34A. The screen

engaging member 352 includes a connecting member 356 and a plurality of projections 360. The connecting member 356 defines a cavity 364 for receiving a complimentary shaped portion of the window frame 40A for connecting the screen engaging member 352 to the window frame 40A. The plurality of projections 360 are engageable with the screen 48A and are shaped to be received within openings in the screen 48A, thereby gripping the screen 48A. In the illustrated embodiment, the projections 360 are a plurality of similarly sized pointed teeth. Alternatively, the projections 360 can assume different shapes and sizes appropriate for engaging and gripping the screen 48A. In the illustrated embodiment, the screen engaging member 352 extends vertically along a portion of the opening. The screen engaging member 352 can extend vertically along any portion of the opening or can extend completely along the opening. In some embodiments, the screen engaging member 352 is made of metal, such as, for example aluminum, steel, or any other metal sufficiently rigid to accommodate the forces applied to the screen engaging member 352 during operation.

[0082] The window assembly 30A can include one or two screen engaging members 352. Preferably, the window assembly 30A includes two screen engaging members 352, one on each side of the opening to engage both edges of the screen 48A. However, one screen engaging member 352 can be used to engage one edge of the screen 48A. In such embodiments where one screen engaging member 352 is used, the screen engaging member 352 grips the screen to adequately inhibit outward force on the screen 48A.

[0083] In the illustrated embodiment, the screen 48A engages the screen engaging member 352 when an outward force is applied to the screen 48A (e.g., a child falling into the screen from inside the residence). However, the screen 48A does not engage the screen engaging member 352 when an inward force is applied to the screen 48A. It should be understood that the screen engaging member 352 can be configured such that the screen 48A engages it when either an inward or outward force is applied to the screen 48A. Alternatively, a screen engaging member 352 can be connected to the window frame 40A on both sides of the screen 48A such that the screen 48A engages one of the screen engaging members 352 when an outward force is applied to the screen 48A and engages the other of the screen engaging members 352 when an inward force is applied to the screen 48A.

[0084] It should be understood that the screen engaging member 352 described and illustrated with respect to Figs. 30-33 can be used with any of the window assemblies described and illustrated herein.

[0085] With further reference to Figs. 30 and 31, the window assembly 30A includes a track brush 366 connected to the window frame 40A that laterally spans the track 92A substantially the entire height of the track 92A. Likewise, a track brush is connected to the window frame 40A and laterally spans the track 93 substantially the entire height of the track 93. The track brushes are provided to inhibit insects and debris from entering the tracks 92, 93. Contamination of the tracks 92, 93 with insects and debris can negatively affect the operation of the window assembly 30A.

[0086] Referring now to Figs. 34-36, the window assembly 30A includes a sealing device 368 that is an alternative to the seals 100 and brushes 102 illustrated in Figs. 2, 3, and 10. The sealing device 368 seals the space between the windows 32A, 34A when the windows 32A, 34A are at any position. It may be desirable to use the sealing device 368 rather than the seals 100 and brushes 102 for larger gaps between windows. The sealing device 368 includes a first sealing member or blank 372 connected to the sash 46A of the lower window 34A and a second sealing member or glazing brush 376 connected to the sash 46A of the upper window 32A. In the illustrated embodiment, the blank 372 and glazing brush 376 are connected to the lower and upper windows 32A, 34A by a press-fit connection. Alternatively, the blank 372 and glazing brush 376 can be connected to the lower and upper windows 32A, 34A in a variety of other manners, such as, for example fastening, adhering, bonding, etc., or can be unitarily formed with the windows 32A, 34A. The blank 372 is substantially rectangular in cross-section and extends the length of the sash 46A. In addition, the blank 372 can be internally hollow to reduce the cost and weight of the blank 372. The glazing brush 376 includes a base 380, an arm 384, a first living hinge 388 disposed between the base 380 and the arm 384, a window engaging member or brush 392 removably connected to the arm 384, a brace member 394, a second living hinge 395 in the bracing member 394, and a biasing member 396 disposed between the base 380 and the brace member 384 for biasing the brace member 394 away from the base 380, thereby biasing the arm 384 and the brush 392 away from the base 380 to a deployed condition (see Fig. 36). The base 380 is connected to the sash 46A of the upper window 32A similarly to the blank 372.

The arm 384 and brush 392 are pivotable about the living hinge 388 relative to the base 380, and the brace member 394 folds or bends at the second living hinge 395.

The glazing brush 376 moves between a closed condition (see Fig. 34) and a deployed condition (see Fig. 36) depending on the position of the upper and lower windows 32A, 34A relative to each other. As shown in Fig. 34, the upper and lower windows 32A, 34A are closed. When the windows are closed, the blank 372 engages the arm 384 and brush 392 of the glazing brush 376 and forces them downward, against the biasing member 396, toward the base 380. Fig. 35 shows the blank 372 engaging the arm 384 and shows the movement of the arm 384, the brush 392, the brace member 394, and the biasing member 396 between the deployed and closed conditions. The biasing member 396 always supplies a force on the brace member 394, which applies a force to the arm 384, in a direction away from the base 380 such that movement of the blank 372 away from the glazing brush 376 causes the biasing member 396 to force the arm 384 toward the deployed condition of the glazing brush 376. As shown in Fig. 36, the glazing brush 376 is in the deployed condition. When in the deployed condition, the brush 392 engages the lower window 34A to seal the space between the upper and lower windows 32A, 34A. The brush 392 wipes against the lower window 34A as the upper and lower windows 32A, 34A move relative to each other, but the arm 384 and brush 392 do not substantially move toward the base 380 until the blank 372 engages the arm 384. In some embodiments, the blank 372 and the glazing brush 376 are made of a polypropylene material. In other embodiments, the blank 372 and the glazing brush 376 are made of a polypropylene homopolymer with a melt index of twelve (12). As is understood in the art, the Melt Index is a measure of the ease of flow of the melt of a thermoplastic polymer. It is defined as the weight of polymer in grams flowing in 10 minutes through a capillary of specific diameter and length by a pressure applied via prescribed alternative gravimetric weights for alternative prescribed temperatures. The method is given in ASTM D1238 and ISO 1133. The melt flow rate is an indirect measure of molecular weight, high melt flow rate corresponding to low molecular weight. At the same time, the melt flow rate is a measure of the ability of the material's melt to flow under pressure. The melt flow rate is inversely proportional to the viscosity of the melt at the conditions of the test, though it should be born in mind that the viscosity for any such material depends on the applied force. Melt flow rate is very commonly used for polyolefins, polyethylene being measured at 190°C and polypropylene at 230 C.

[0087] Alternatively, the blank 372 and the glazing brush 376 can be made of other appropriate materials such that the blank 372 and the glazing brush 376 maintain their memory capabilities after many uses.

[0088] It should be understood that the blank 372 can alternatively be mounted on the upper window 32A and the glazing brush 376 can alternatively be mounted on the lower window 34A. When mounted in such an alternative manner, the sealing device 368 still functions in the same manner as the illustrated embodiment and appropriately seals the space between the upper and lower windows 32A, 34A.

[0089] It should also be understood that the concepts disclosed herein relating to a window screening assembly can be used with a large variety of window types and not just the window types described and illustrated herein. Accordingly, the window screening assemblies and their applications are not limited by the description herein.

[0090] It should further be understood that a large variety of alternatives and variations exist to the embodiments discussed above and illustrated in the drawings. One of ordinary skill in the art will be able to recognize such alternatives and variations from the disclosure herein and, therefore, such alternatives and variations are within the spirit and scope of the present invention.

CLAIMS

1. A seal for sealing a space between a first member and a second member of a fenestration unit, the seal comprising:
 - a base connectable to the first member of the fenestration unit;
 - an arm supported by and movable relative to the base; and
 - an engaging member supported by and movable with the arm, the engaging member being engageable with the second member of the fenestration unit to seal the space between the first member and the second member.
2. The seal of claim 1, wherein the base and the arm are formed as a unit.
3. The seal of claim 1, wherein the arm pivots relative to the base.
4. The seal of claim 1, further comprising a hinge between the base and the arm for facilitating movement of the arm relative to the base, and wherein the arm pivots relative to the base about the hinge.
5. The seal of claim 4, wherein the hinge is a living hinge.
6. The seal of claim 1, wherein the engaging member is a brush.
7. The seal of claim 1, wherein the seal is made of a polymer.
8. The seal of claim 1, wherein the seal is made of polypropylene homopolymer with a melt index of twelve.
9. The seal of claim 1, further comprising a biasing member at least partially supported by the base, the biasing member operable to bias the arm away from the base.
10. The seal of claim 9, wherein the base, the arm, and the biasing member are formed as a unit.

11. The seal of claim 10, wherein the base, the arm, and the biasing member are made of polypropylene homopolymer with a melt index of twelve.
12. The seal of claim 9, further comprising a seal member connected to the second member of the fenestration unit and being engageable with at least one of the engaging member and the arm to move the arm and the engaging member toward the base against the force of the biasing member.
13. The seal of claim 1, further comprising a seal member connected to the second member of the fenestration unit and being engageable with at least one of the engaging member and the arm to move the arm and the engaging member toward the base.
14. The seal of claim 13, wherein the seal member, the base, and the arm are made of polypropylene homopolymer with a melt index of twelve.
15. The seal of claim 1, wherein the fenestration unit is a window assembly, the first member is a first window, and the second member is a second window.

16. A window assembly comprising:
a window frame defining an opening;
a window supported by the window frame in the opening and being movable relative to the window frame;
a screen roller assembly supported by one of the window frame and the window and including a roller and a screen wound around the roller, a first end of the screen being connected to the roller and a second end of the screen being connected to the other one of the window frame and the window, wherein the screen unwinds from the roller when the window is moved in a first direction and winds around the roller when the window is moved in a second direction different than the first direction; and
a screen engaging member supported by one of the window frame and the window and is selectively engageable with the screen such that the screen engaging member does not engage the screen when the window is moved in the first and second directions and is engageable with the screen when a force is applied to the screen in a direction toward the screen engaging member.
17. The window assembly of claim 16, wherein the first direction and the second direction are substantially planar and opposite to each other, and wherein the direction of the force is non-parallel to the first and second directions.
18. The window assembly of claim 17, wherein the direction of the force is substantially perpendicular to the first and second directions.
19. The window assembly of claim 6, wherein the screen engaging member is metal.
20. The window assembly of claim 16, wherein the screen engaging member is aluminum.

21. The window assembly of claim 16, wherein the screen engaging member includes a plurality of projections sufficiently sized to insert into apertures defined in the screen, insertion of the plurality of projections into the apertures defined in the screen inhibits further unwinding of the screen from the roller when a force is applied to the screen in the direction toward the screen engaging member.

22. The window assembly of claim 16, wherein the screen engaging member includes a connecting member engageable with the one of the window frame and the window to connect the screen engaging member to the one of the window frame and the window.

23. The window assembly of claim 22, wherein the connecting member is engageable with the window frame to connect the screen engaging member to the window frame.

24. The window assembly of claim 16, wherein the screen engaging member is longitudinally vertically oriented to extend at least a portion of the height of the opening.

25. The window assembly of claim 24, wherein the screen engaging member extends the entire height of the opening.

26. The window assembly of claim 16, wherein the screen engaging member is a first screen engaging member, the window assembly including a second screen engaging member supported by one of the window frame and the window and is selectively engageable with the screen such that the second screen engaging member does not engage the screen when the window is moved in the first and second directions and is engageable with the screen when a force is applied to the screen in a direction toward the second screen engaging member.

27. The window assembly of claim 26, wherein the first screen engaging member is engageable with the screen near a first edge of the screen and the second screen engaging member is engageable with the screen near a second edge of the screen.

28. The window assembly of claim 26, wherein the first screen engaging member engages a first side of the screen and the second screen engaging member engages a second side of the screen opposite the first side.

29. A window assembly comprising:

a window frame including a top, a bottom, and two sides together defining an opening, each side of the window frame having an interior surface and a first track defined in the interior surface, a second track being defined in the interior surface of one of the sides and intersecting the respective one of the first tracks;

a first bracket and a second bracket, the first bracket including a first portion positionable in and slideable within one of the first tracks and the second bracket including a second portion positionable in and slideable within the other one of the first tracks, one of the first and second brackets including a bracket member; and

a window connected to and supported by the first and second brackets in the opening, the window being slideable within the opening relative to the window frame via the first and second brackets;

wherein the window is pivotable away from the window frame to a pivoted position, and wherein during pivoting of the window, the first portion of the first bracket and the second portion of the second bracket remain in the respective first tracks and the bracket member interacts with the second track to secure the window in the pivoted position.

30. The window assembly of claim 29, wherein the first portion of the first bracket and the second portion of the second bracket are cylindrical rods.

31. The window assembly of claim 29, wherein the bracket member is a projection and the second track is a slot, the projection inserting into the slot upon pivoting of the window toward the pivoted position.

32. The window assembly of claim 29, wherein a second track is defined in the interior surfaces of both sides and both second tracks intersect with a respective one of the first tracks, and wherein each of the first and second brackets include a bracket member.

33. The window assembly of claim 32, wherein during pivoting of the window, the bracket members interact with respective second tracks to secure the window in the pivoted position.

34. The window assembly of claim 33, wherein the bracket members are projections and the second tracks are slots, the projections inserting into the respective slots during pivoting of the window toward the pivoted position.

35. The window assembly of claim 29, wherein the first track is substantially vertical and the second track includes a first portion and a second portion, the first portion intersecting the first track at a first end of the first portion and the first portion angling downward and away from the first track, the second portion extending substantially vertically upward from a second end of the first portion.

36. A fenestration unit comprising:
a frame defining an opening;
a fenestration member supported in the opening of the frame, the fenestration member being slideable in the opening relative to the frame; and
a screen roller assembly supported by one of the frame and the fenestration member, the screen roller assembly including a roller rotatable about an axis and a screen wound around the roller, the screen having a first end connected to the roller and having a second end connected to the other one of the frame and the fenestration member;
wherein the screen unwinds from the roller when the fenestration member moves in a first direction and winds around the roller when the fenestration member moves in a second direction different than the first direction; and
wherein the fenestration member also pivots relative to the frame, the fenestration member pivoting about the axis.

37. The fenestration unit of claim 36, wherein the frame is a window frame and the fenestration member is a window.

38. A window assembly comprising:
- a window frame including a top, a bottom, and two sides together defining an opening, each side of the window frame having an interior surface and a track defined in the interior surface;
 - a first bracket and a second bracket, the first bracket including a portion positionable in and slideable within one of the first tracks and the second bracket including a portion positionable in and slideable within the other of the first tracks; and
 - a window connected to and supported by the first bracket and the second bracket in the opening, the window being slideable within the opening relative to the window frame via the first bracket and the second bracket, and wherein the window is pivotable about the first and second brackets away from the window frame to a pivoted position, the portions of the first and second brackets remaining in the respective tracks during pivoting of the window.
39. The window assembly of claim 38, wherein the first bracket and the second bracket are connected to the window with fasteners.
40. The window assembly of claim 38, wherein the portions of the first bracket and the second bracket positionable in and slideable within the first tracks are cylindrical rods, and wherein the first bracket and the second bracket each include a body connectable to the window.
41. The window assembly of claim 38, wherein the window is removable from the first and second brackets, and wherein the portions of the first and second brackets remain in the tracks after removal of the window.
42. The window assembly of claim 38, further comprising a screen roller assembly including a roller and a screen wound around the roller, the screen having a first end connected to the roller and a second end connected to the window frame, the roller having a first end supported by the first bracket and a second end supported by the second bracket, the screen roller assembly movable relative to the window frame with the first bracket and the second bracket.

43. The window assembly of claim 42, wherein the first bracket and the second bracket each include a bracket member at least partially surrounding the roller, the portions of the first and second brackets positionable in and slideable within the tracks extending from the bracket member, the first and second brackets each further including a body extending from the bracket member and being connected to the window.

44. The window assembly of claim 43, wherein the window is removable from the first and second brackets, and wherein the portions of the first and second brackets remain in the tracks after removal of the window.

45. The window assembly of claim 42, wherein the first end of the roller is substantially round and the second end of the roller is polygonal, and wherein the first bracket has a first hole that is substantially round to receive the substantially round shaped end of the roller and the second bracket has a second hole that is polygonal to receive the polygonal shaped end of the roller.

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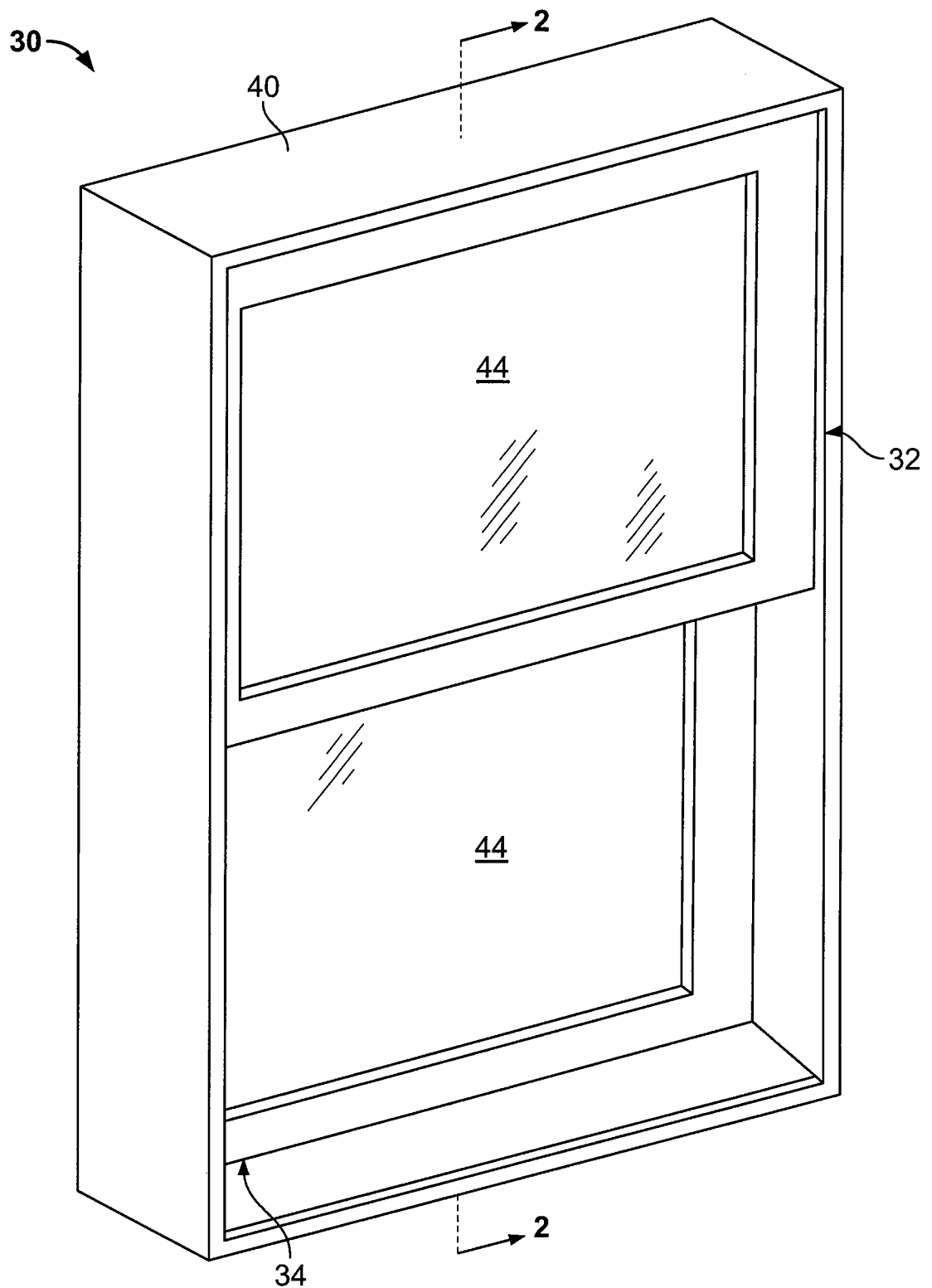


FIG. 1

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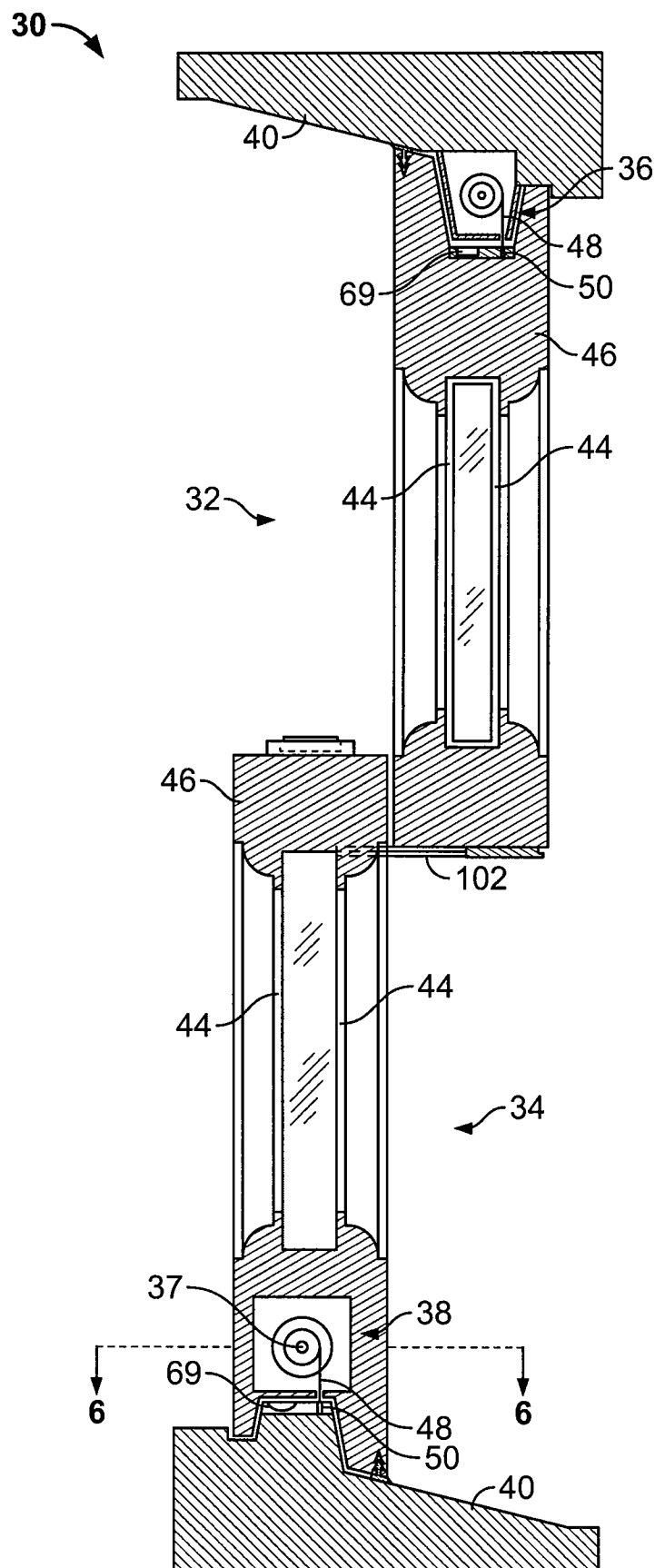


FIG. 2

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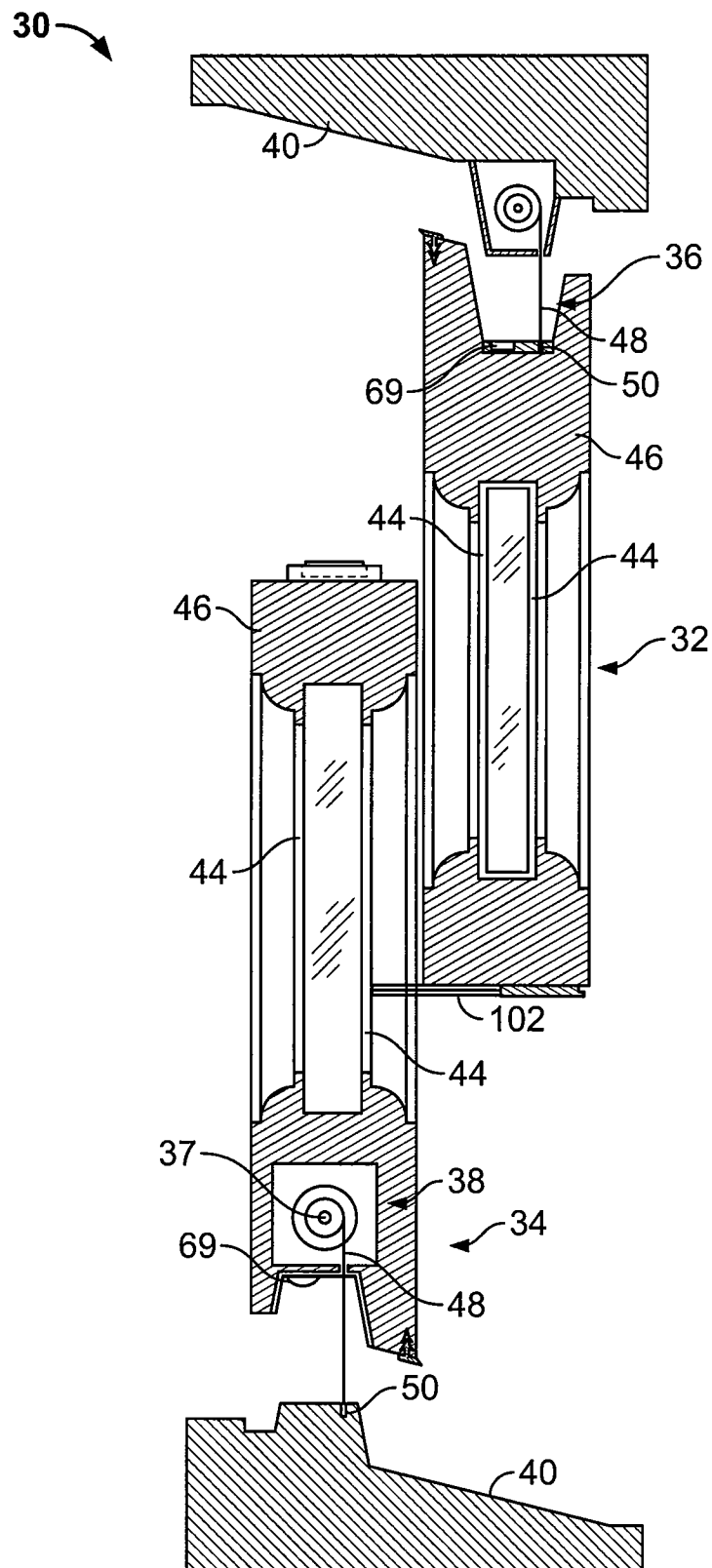


FIG. 3

SUBSTITUTE SHEET (RULE 26)

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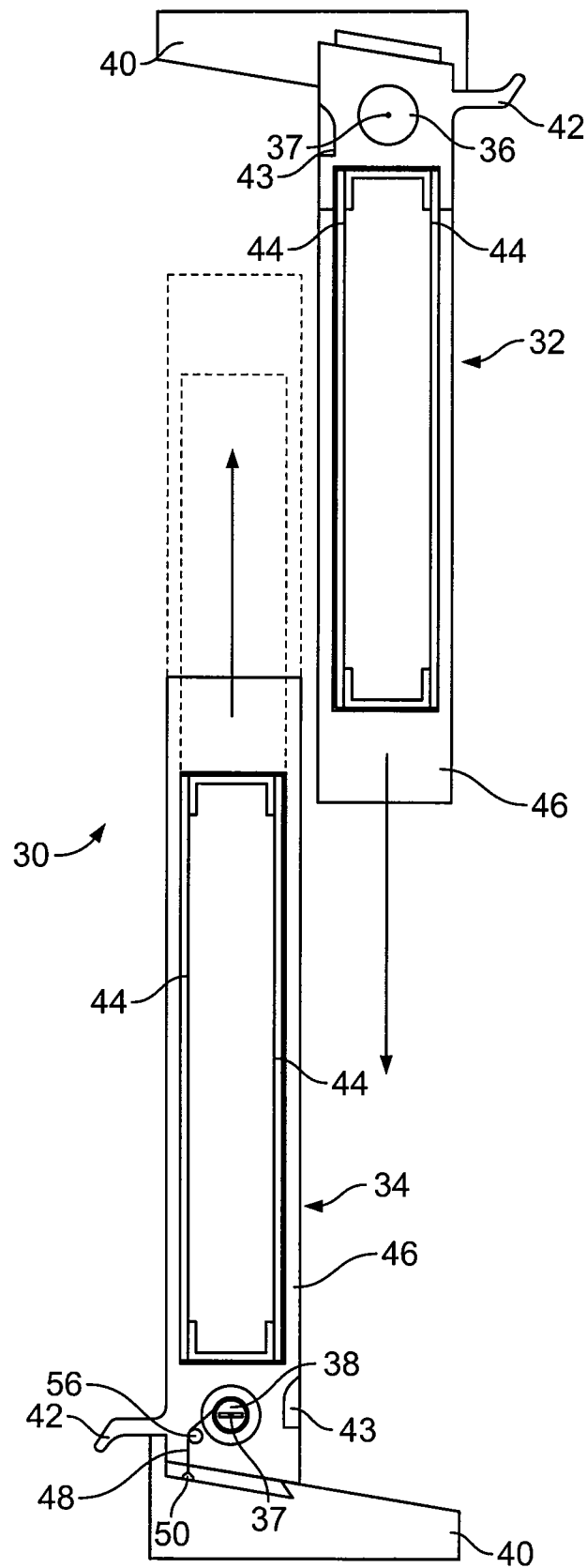


FIG. 4

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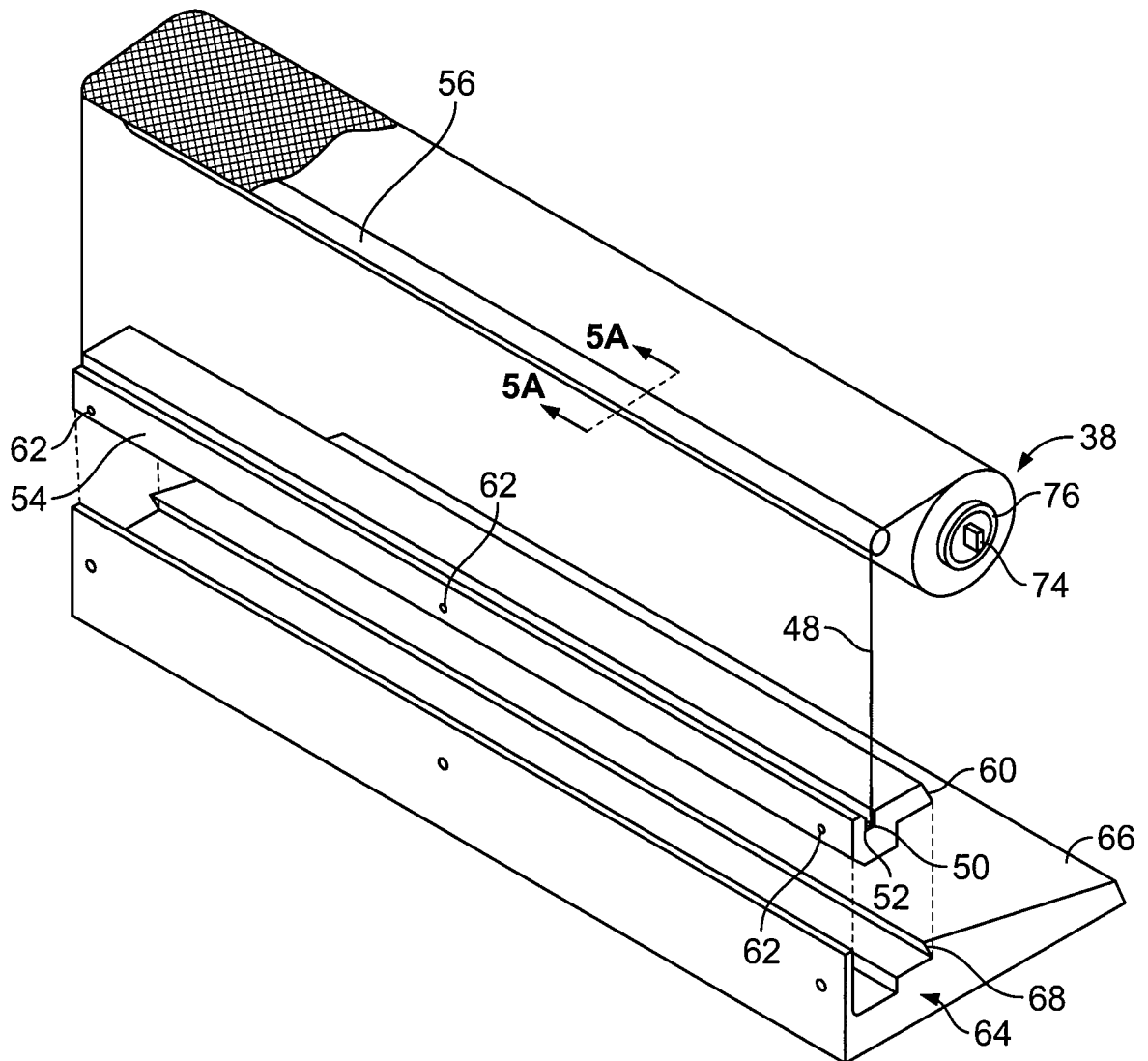


FIG. 5

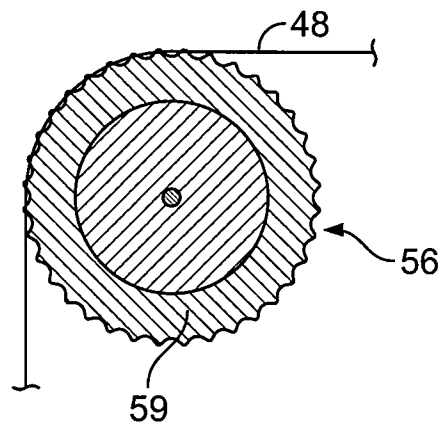


FIG. 5A

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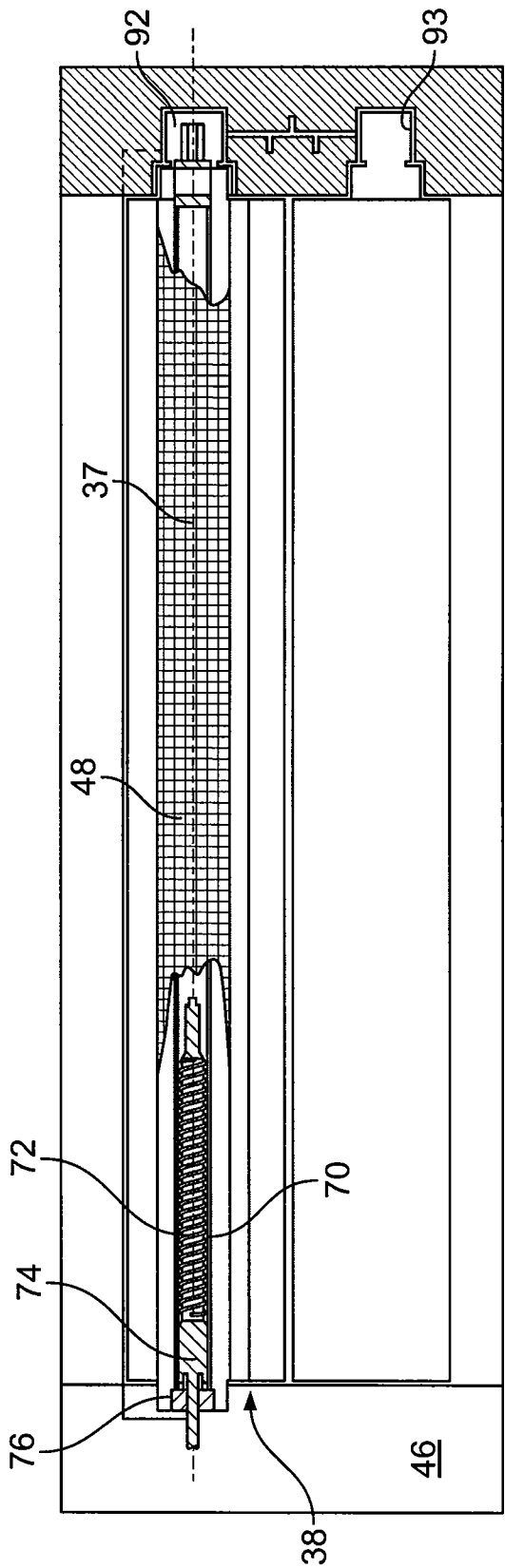


FIG. 6

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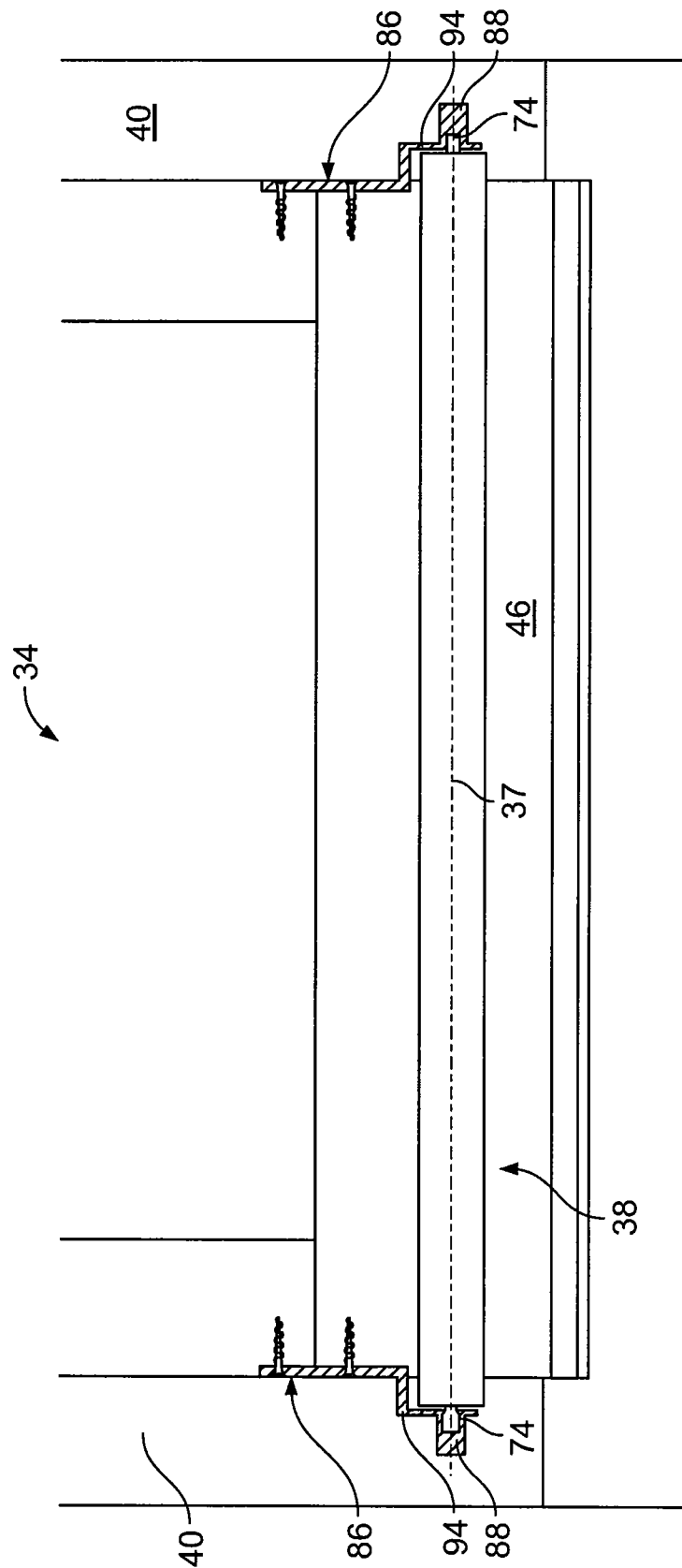


FIG. 7

SUBSTITUTE SHEET (RULE 26)

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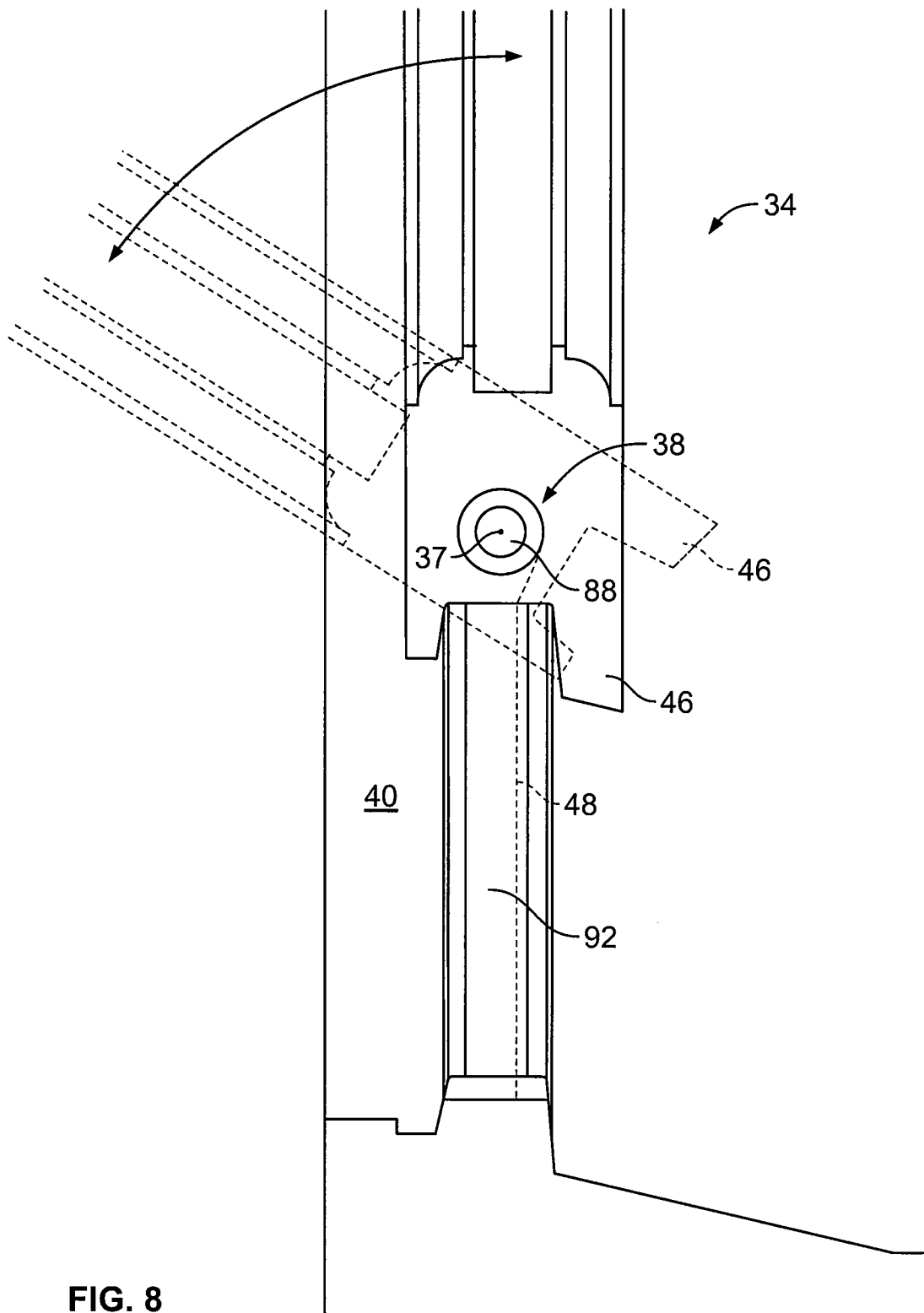


FIG. 8

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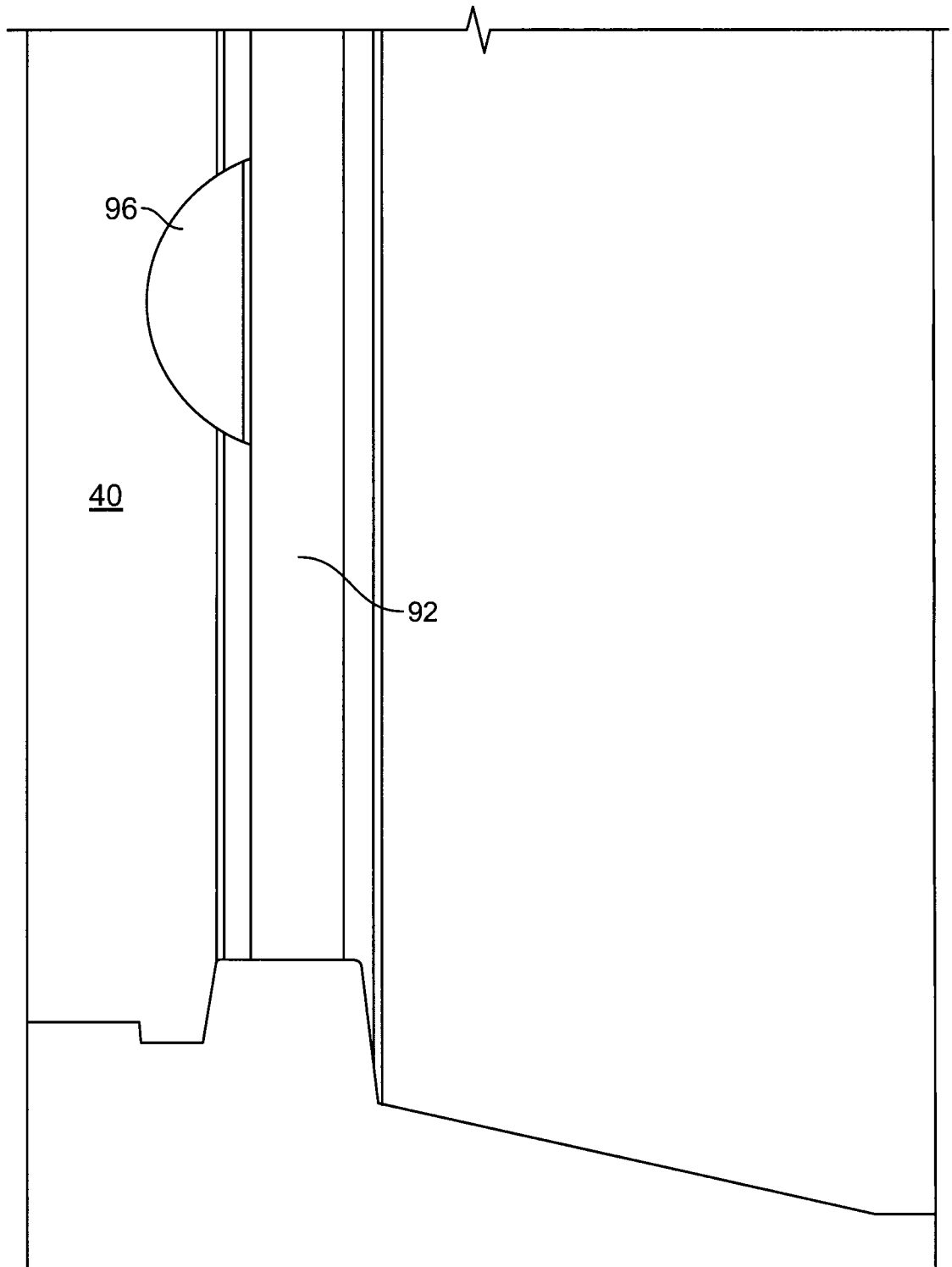


FIG. 9

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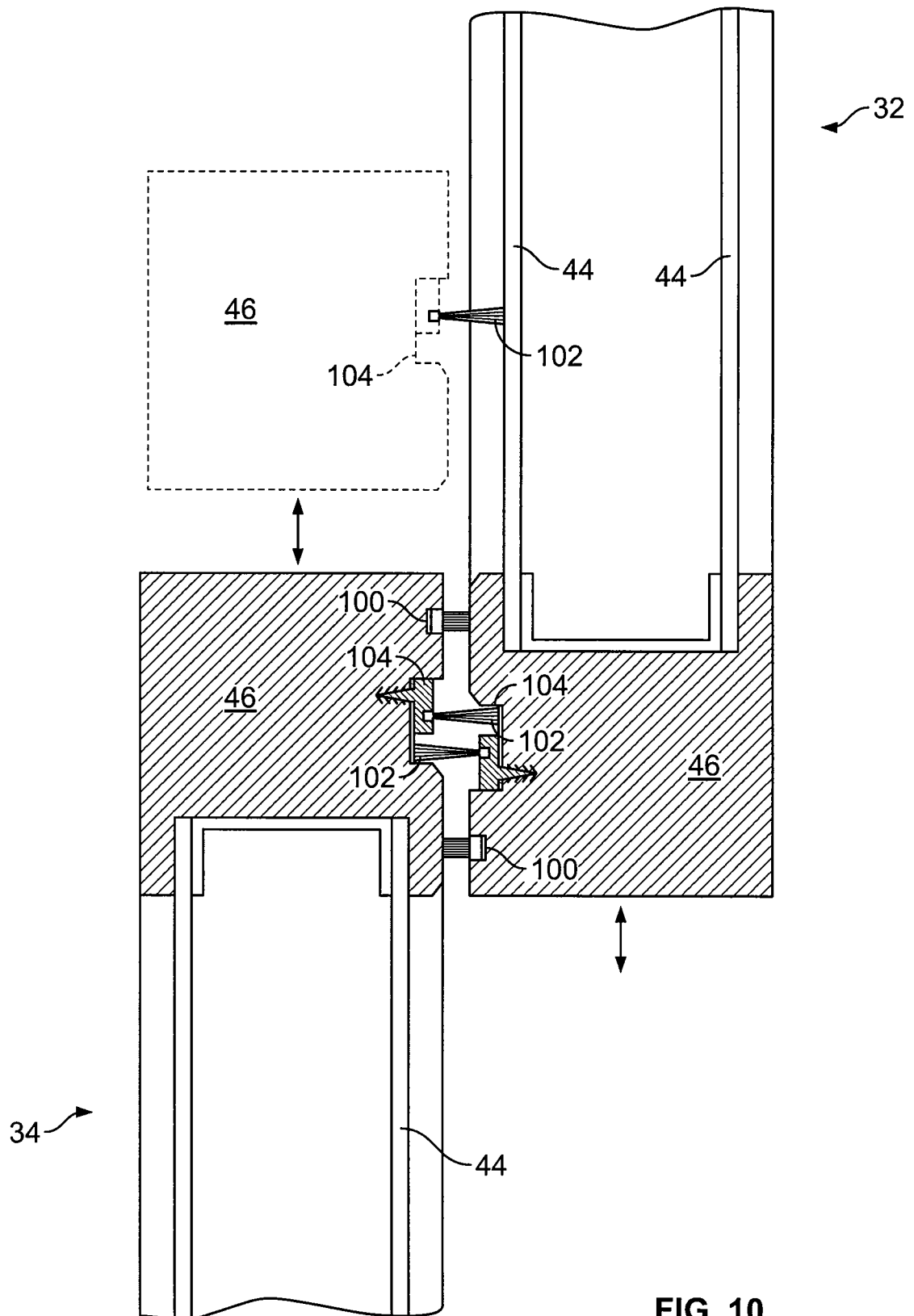


FIG. 10

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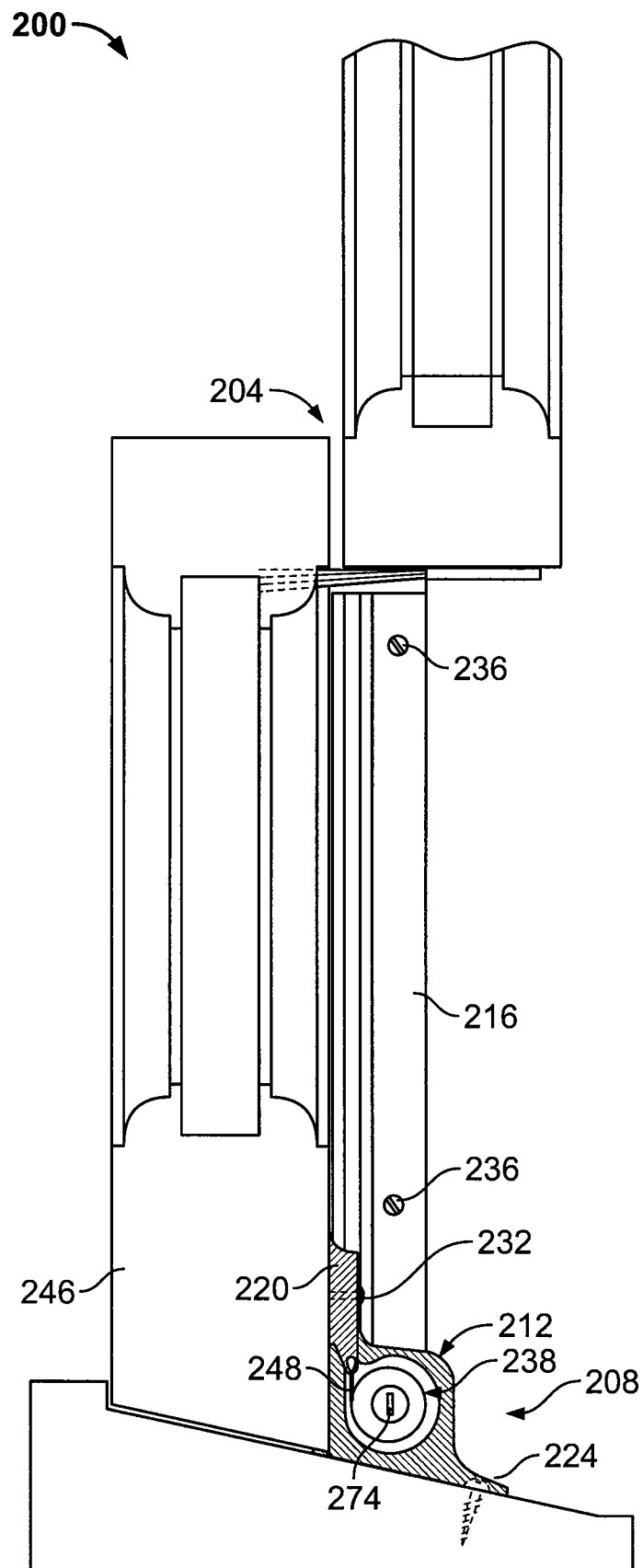


FIG. 11

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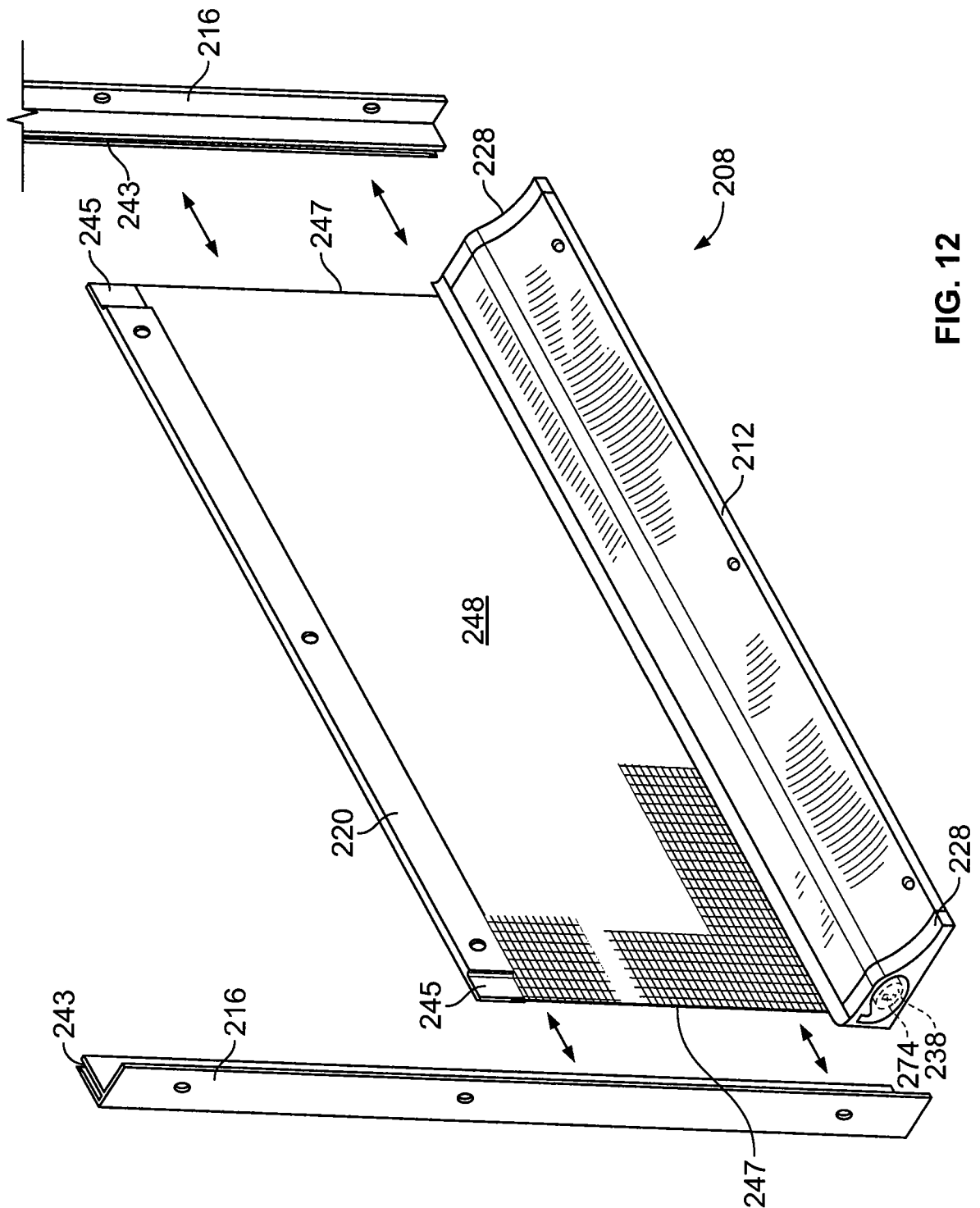


FIG. 12

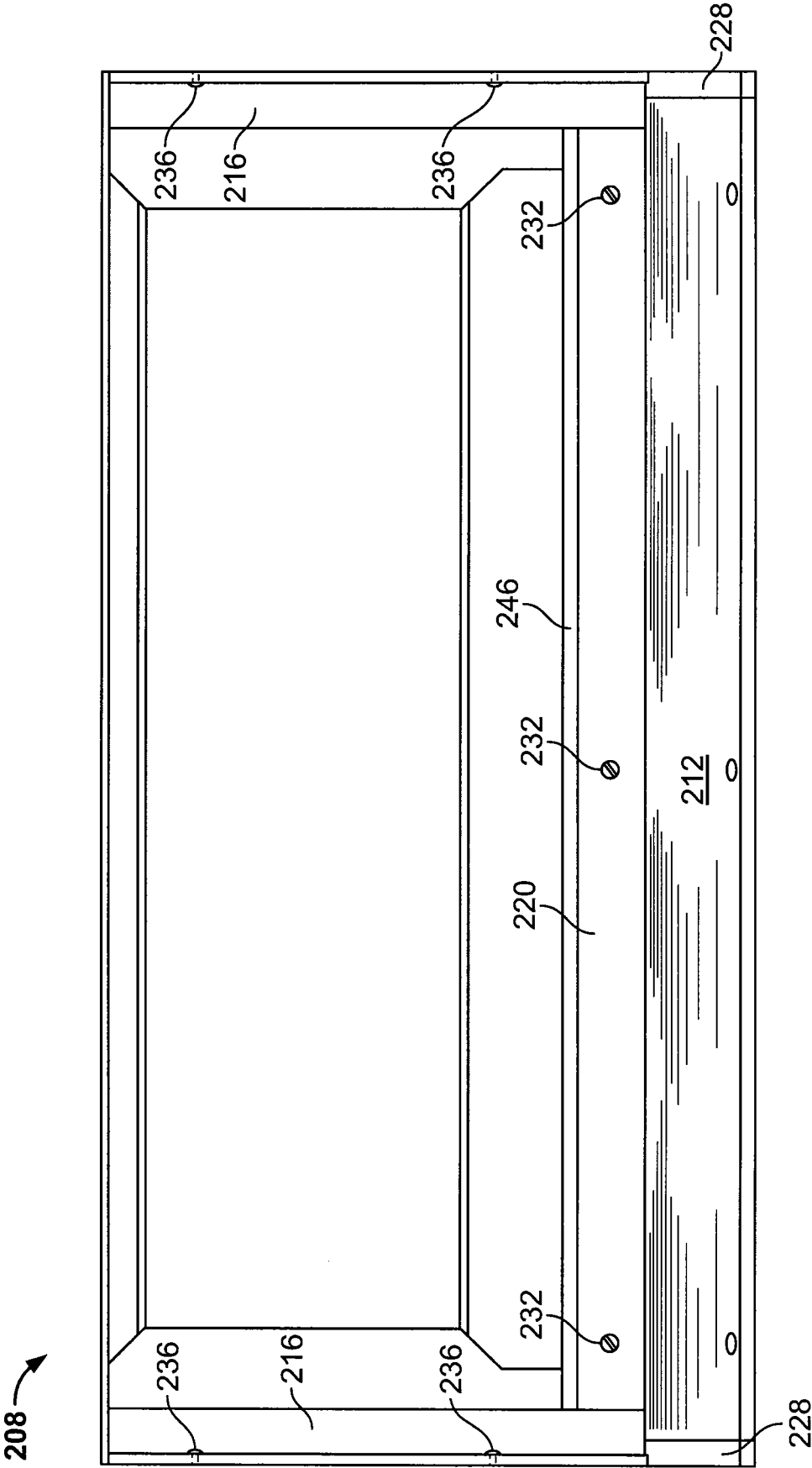


FIG. 13

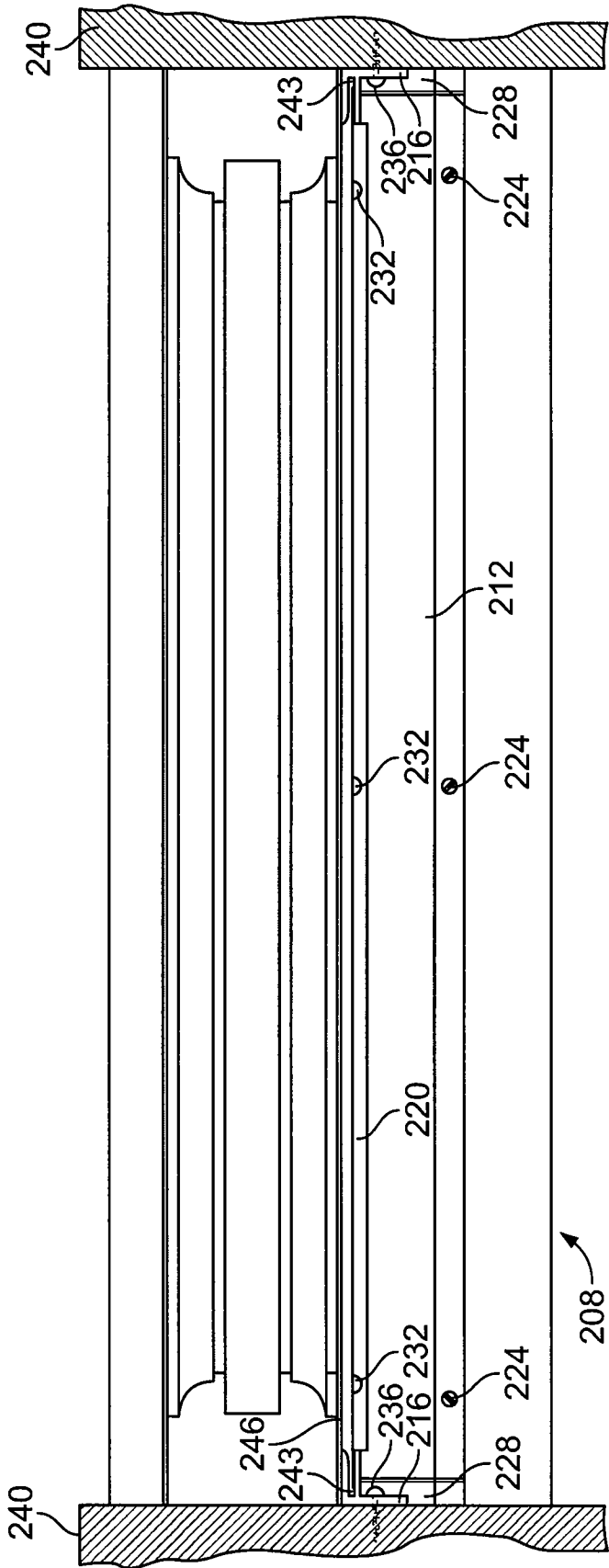


FIG. 14

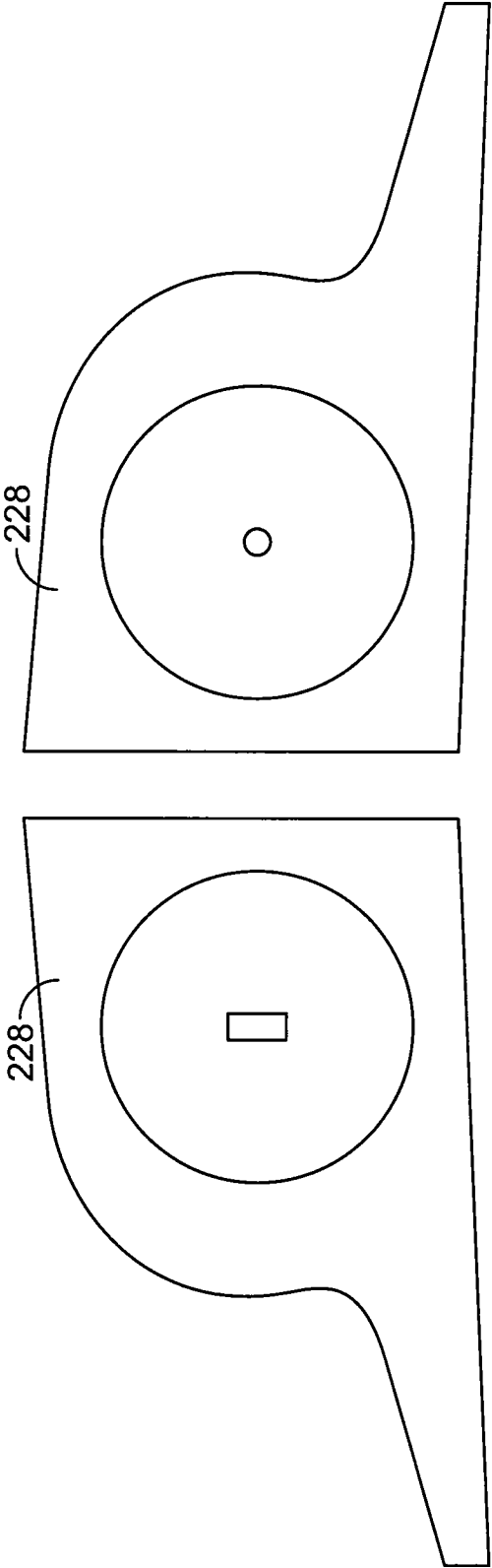


FIG. 15

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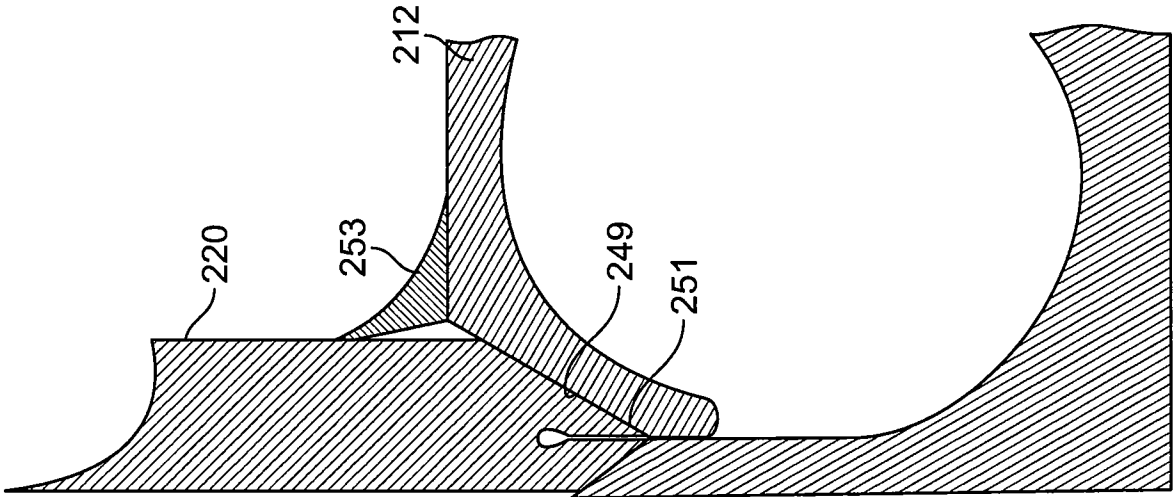


FIG. 17

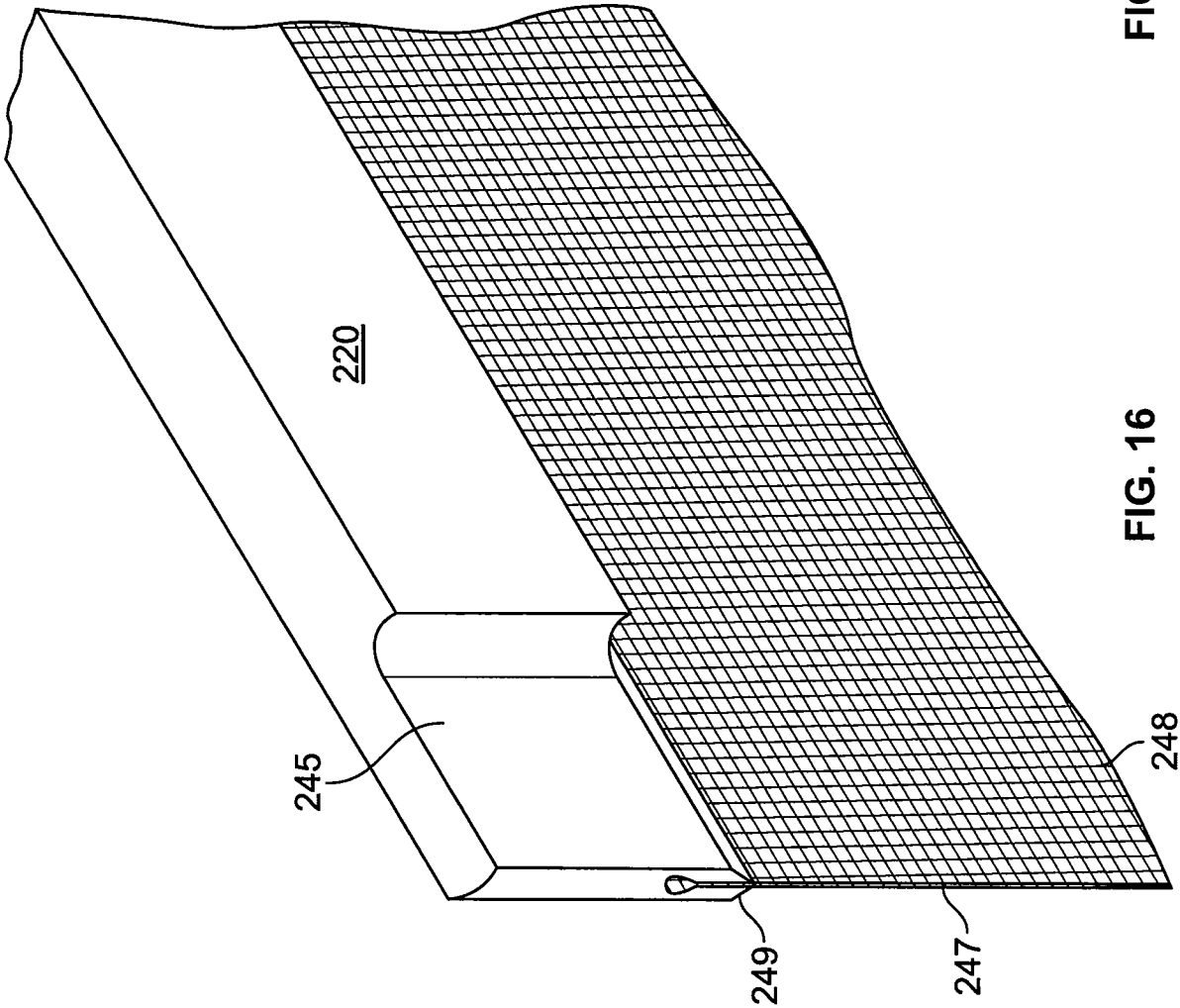


FIG. 16

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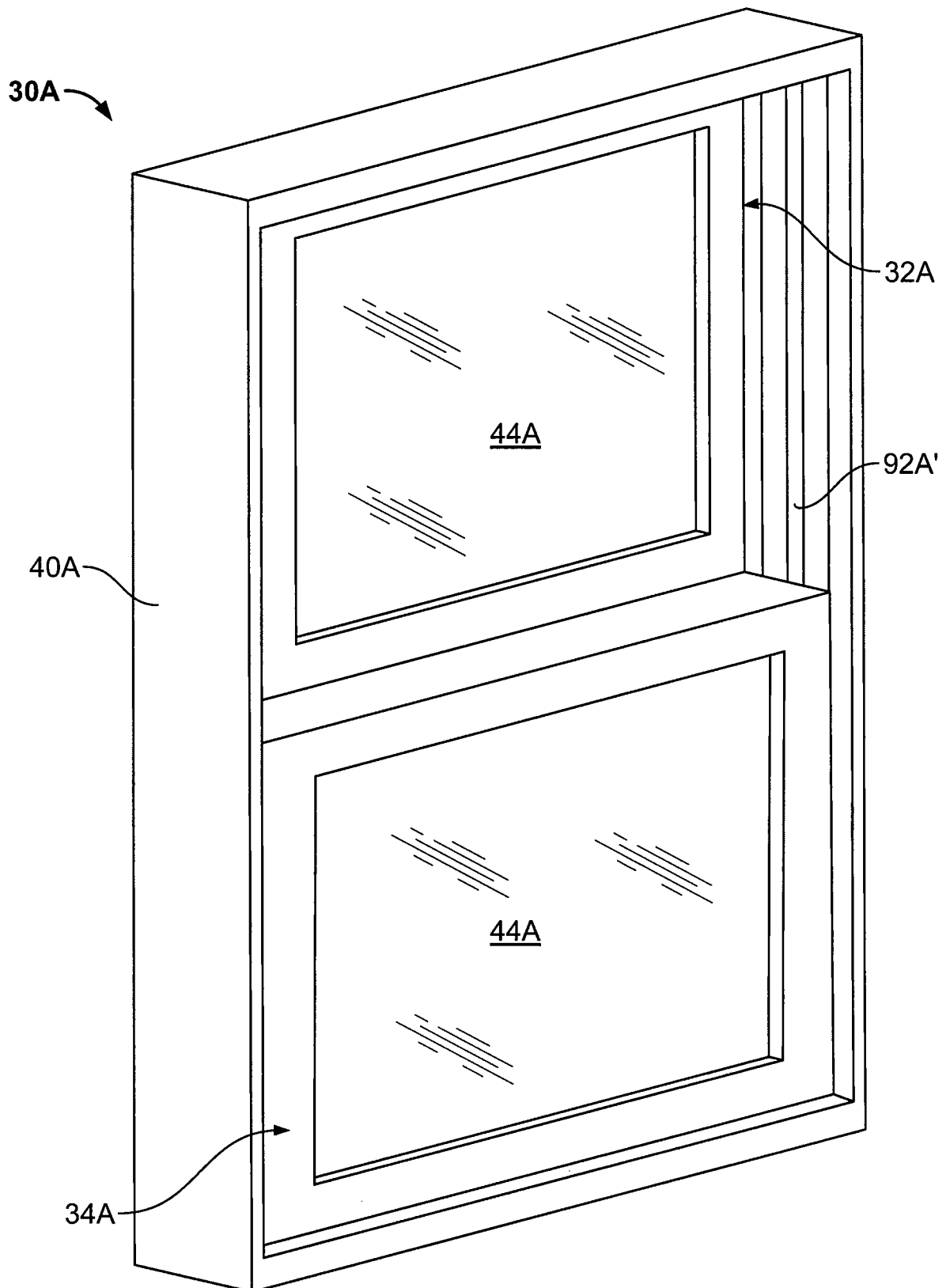


FIG. 18

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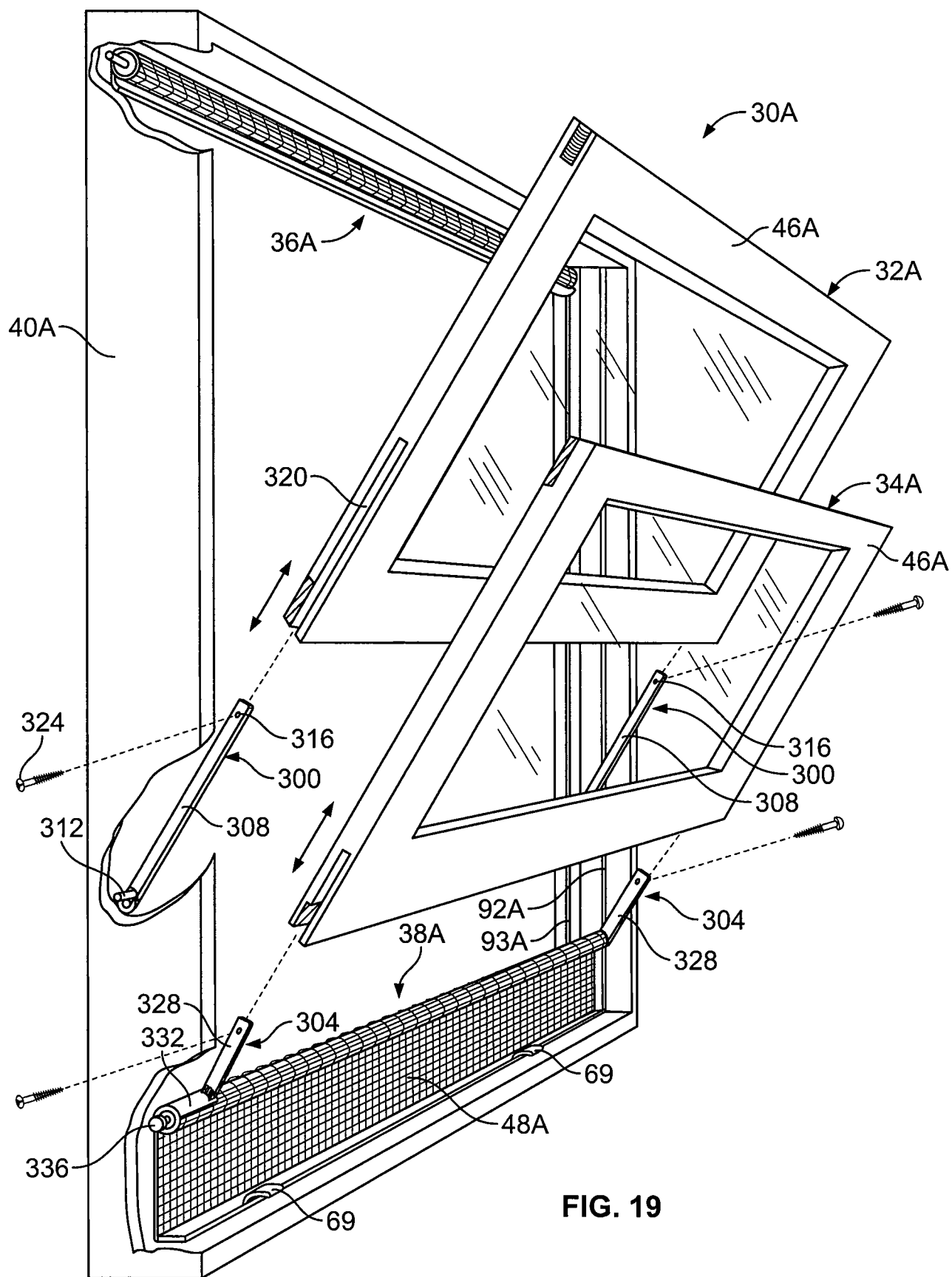


FIG. 19

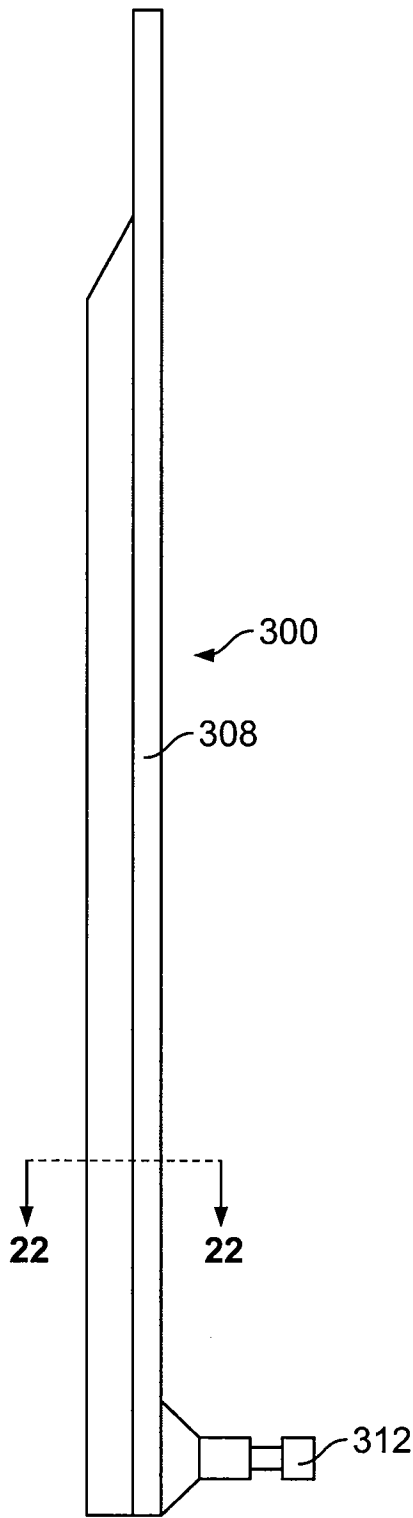


FIG. 20

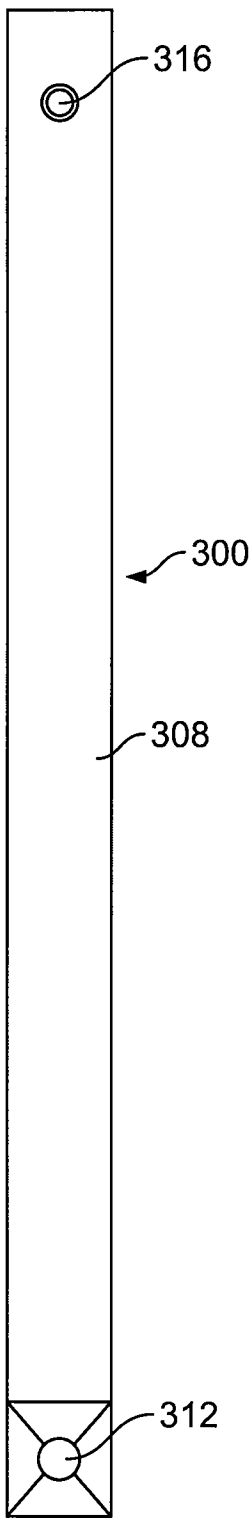


FIG. 21

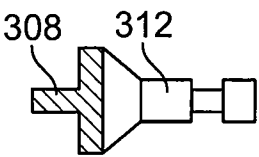


FIG. 22

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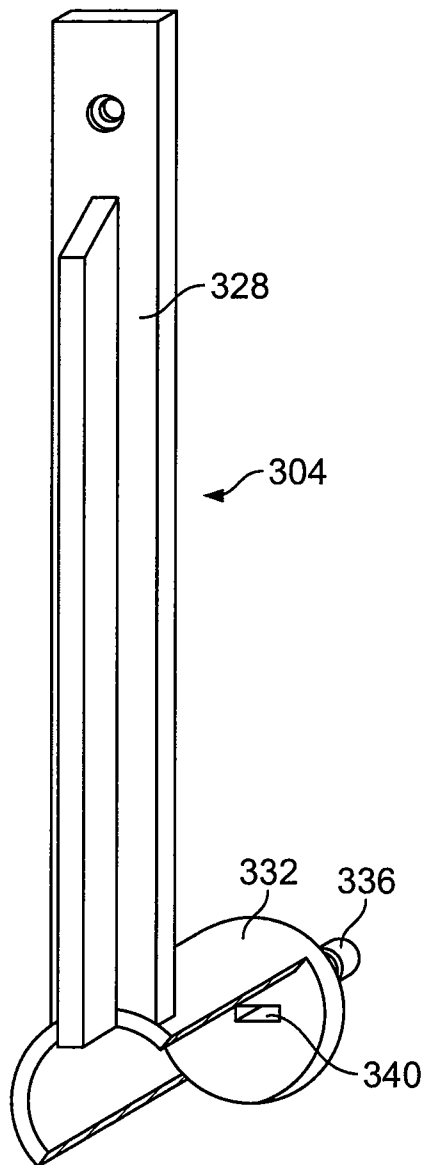


FIG. 23

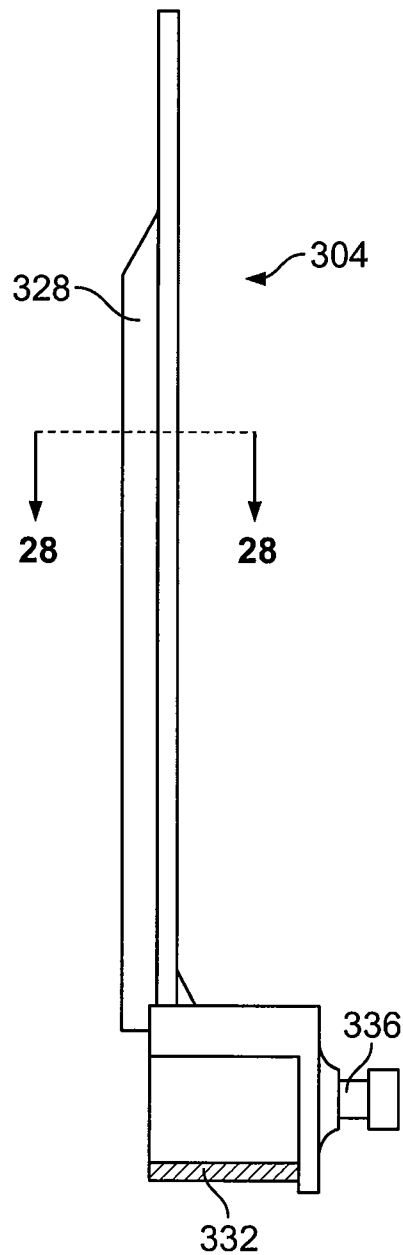


FIG. 24

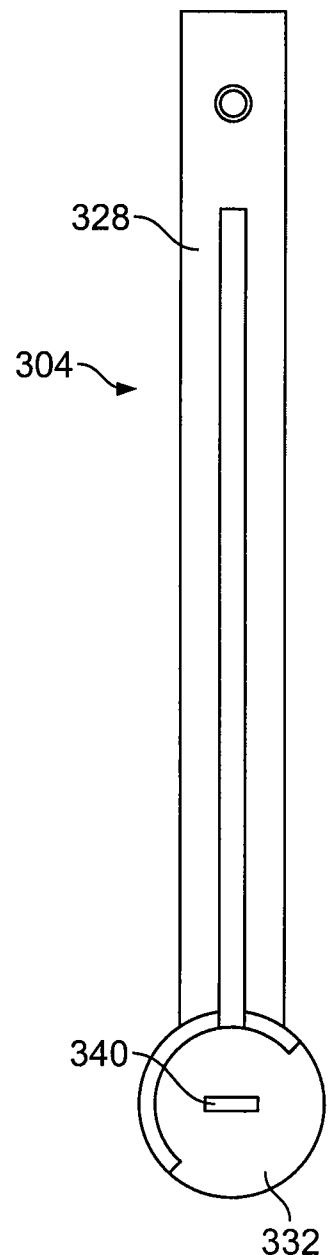


FIG. 25

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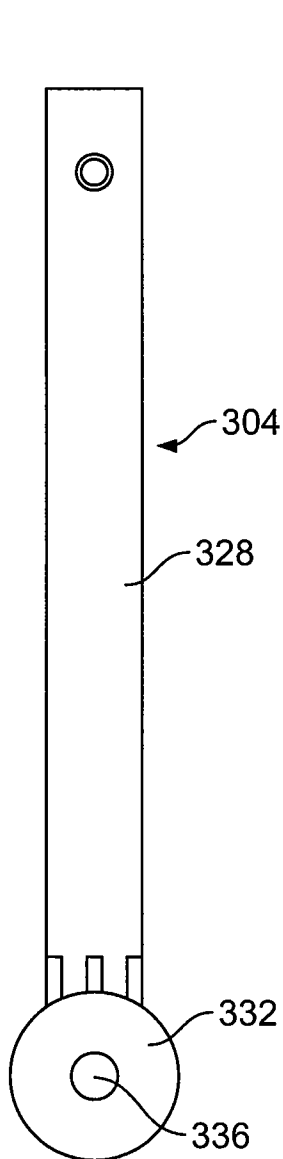


FIG. 26

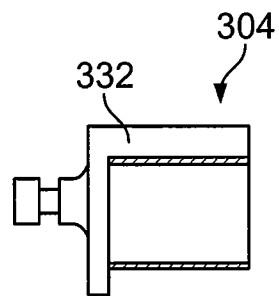


FIG. 27

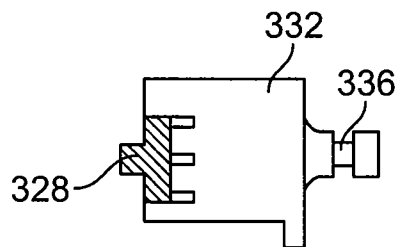


FIG. 28

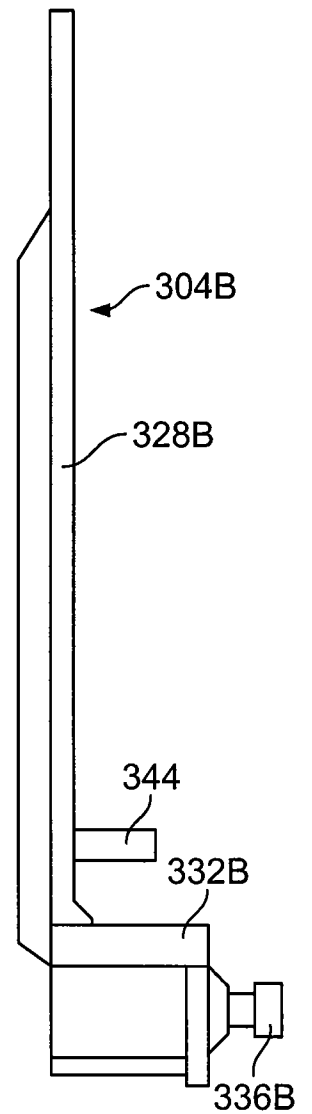


FIG. 29

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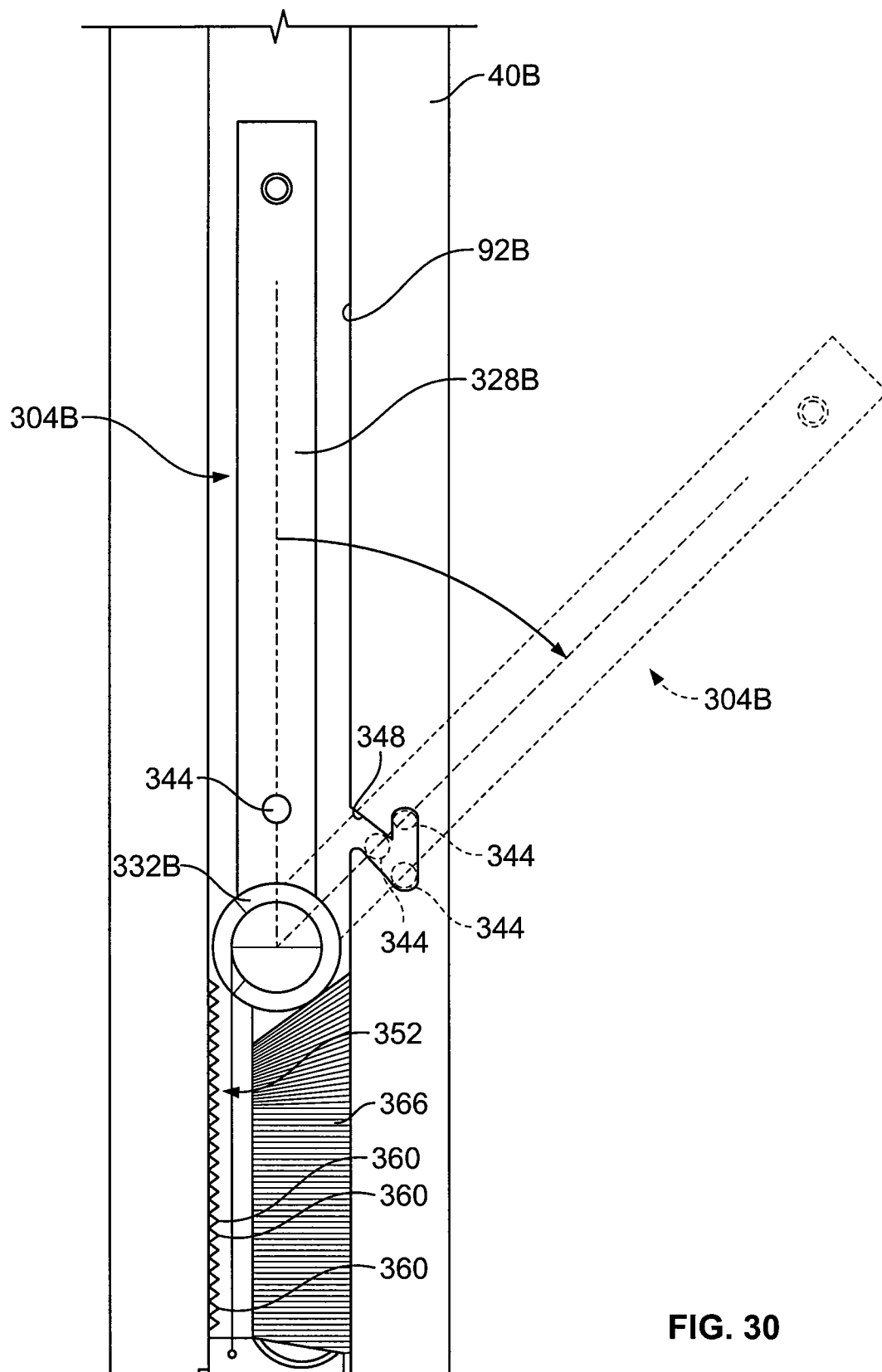
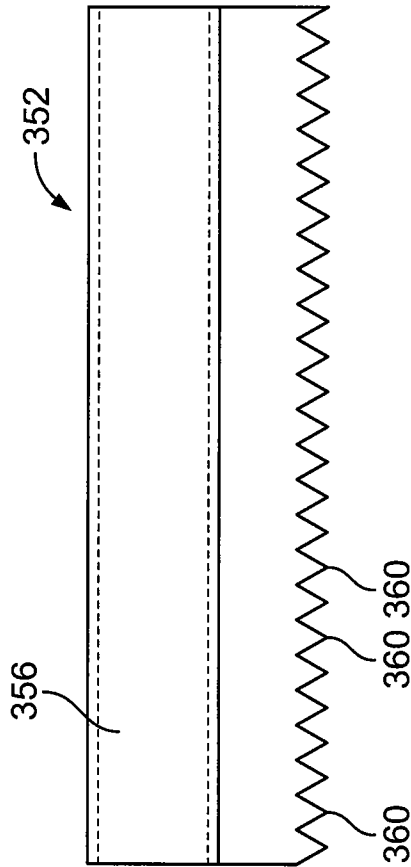
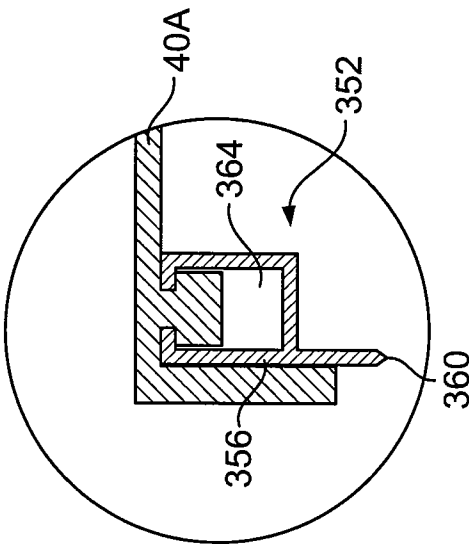
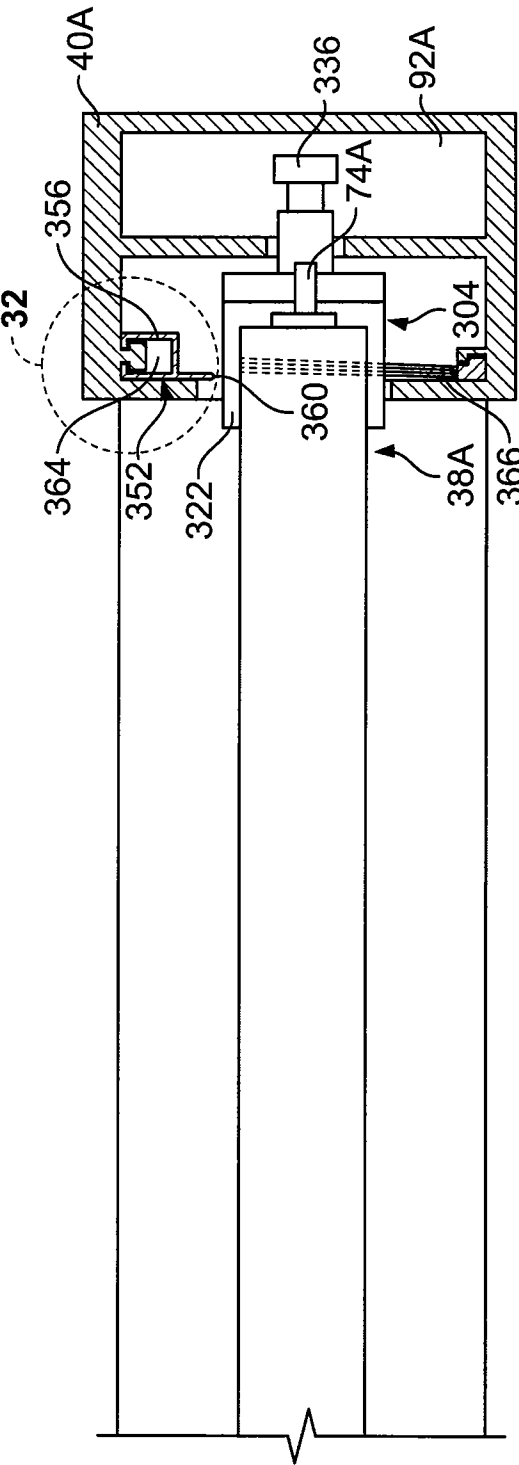


FIG. 30



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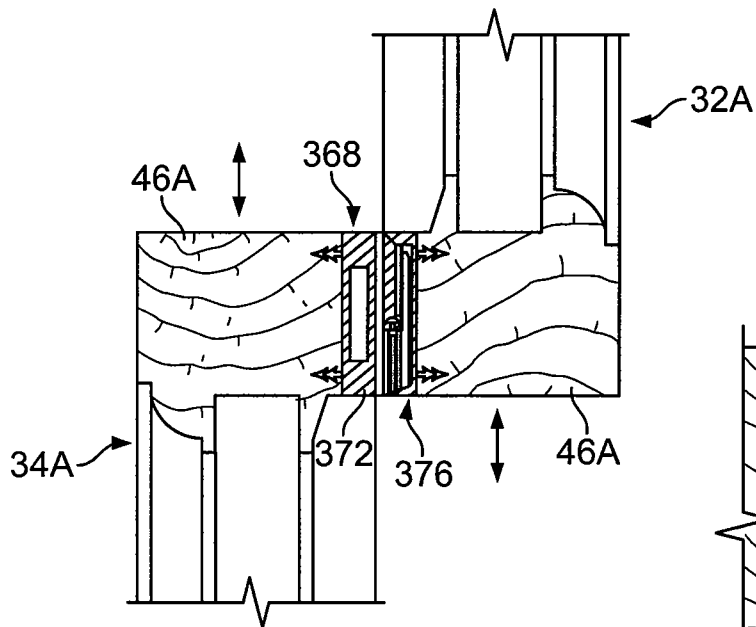


FIG. 34

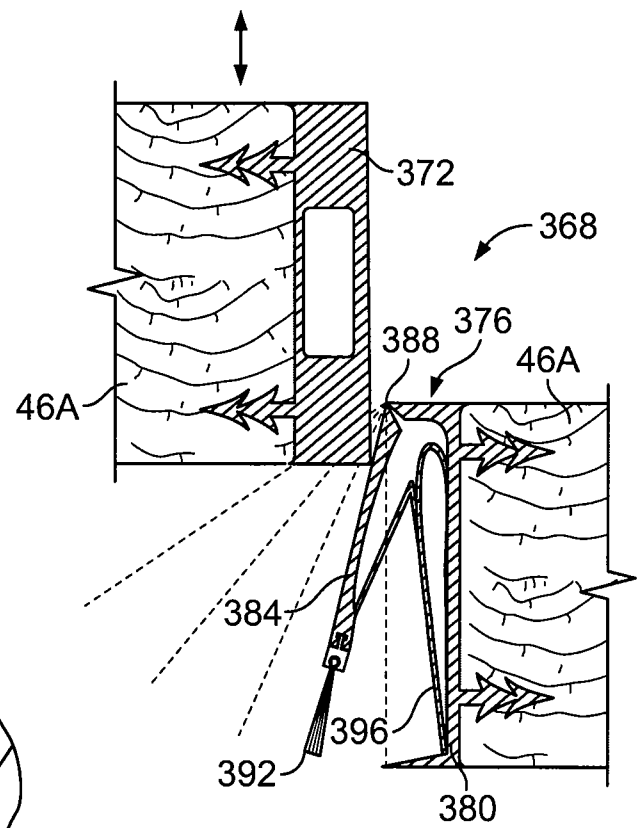


FIG. 35

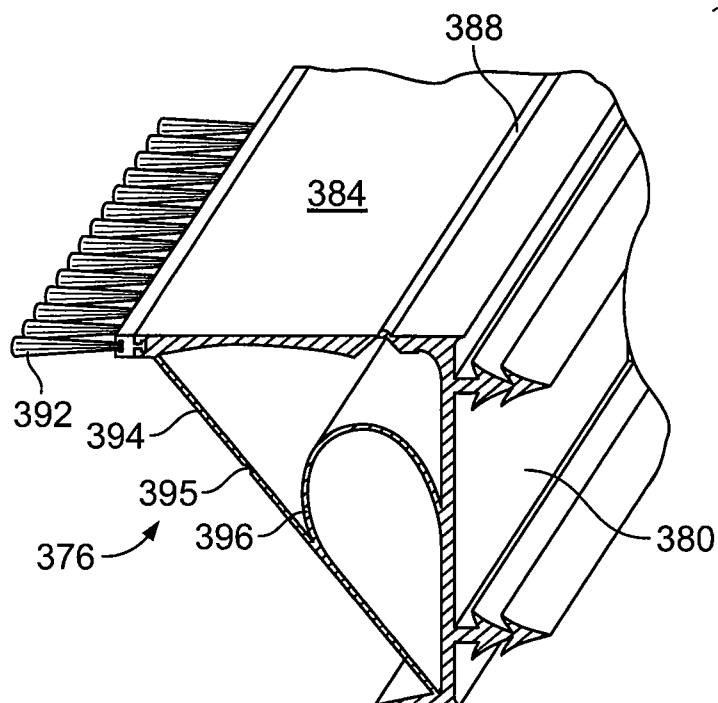


FIG. 36