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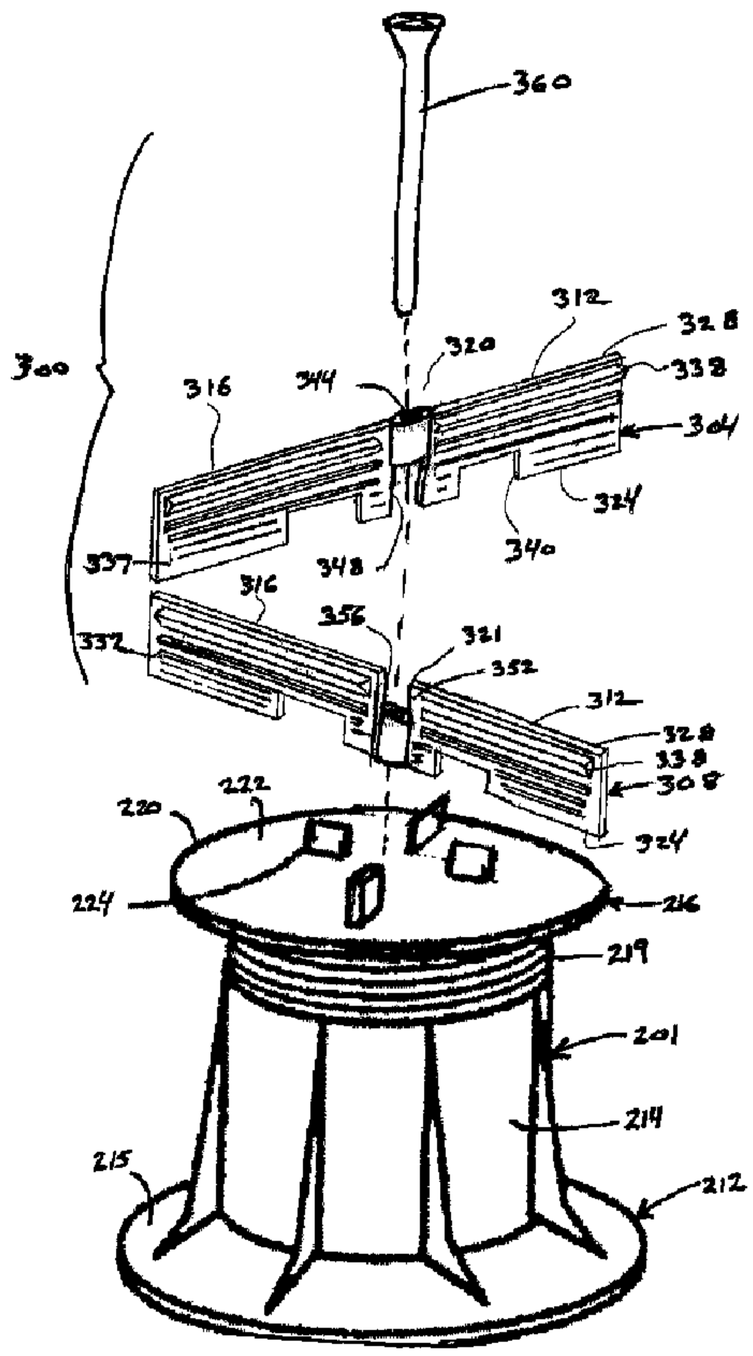
(72) **Inventeurs/Inventors:**
KUGLER, WILLIAM E., US;
KNIGHT, STEPHEN J., III, US

(73) **Propriétaire/Owner:**
UNITED CONSTRUCTION PRODUCTS, INC., US

(74) **Agent:** PARLEE MCLAWS LLP

(54) **Titre : SYSTEMES ET ENSEMBLES DE SOUTIEN POUR IMMOBILISER DES COMPOSANTS DE TERRASSE ELEVEE**
(54) **Title: SYSTEMS AND SUPPORT ASSEMBLIES FOR RESTRAINING ELEVATED DECK COMPONENTS**



(57) **Abrégé/Abstract:**
A system for restraining relative lateral and/or vertical movement between adjacent support tiles of an elevated building surface assembly. The system is usable with a support structure including a plurality of support pedestals that are disposed in spaced-apart

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(57) **Abrégé(suite)/Abstract(continued):**
relation on a fixed surface and that are disposed beneath corner portions of surface tiles to vertically support and elevate the tiles above the fixed surface. The system includes stability members that may be inserted into predetermined gaps between adjacent surface tiles so as to be fit between adjacent surface tiles to restrict lateral and/or vertical movement of the tiles. Fasteners may be placed through apertures in inner portions of the stability members into the top surface of the support pedestals to further secure the stability members to the support pedestals.

ABSTRACT

A system for restraining relative lateral and/or vertical movement between adjacent support tiles of an elevated building surface assembly. The system is usable with a support structure including a plurality of support pedestals that are disposed in spaced-apart relation on a fixed surface and that are disposed beneath corner portions of surface tiles to vertically support and elevate the tiles above the fixed surface. The system includes stability members that may be inserted into predetermined gaps between adjacent surface tiles so as to be fit between adjacent surface tiles to restrict lateral and/or vertical movement of the tiles. Fasteners may be placed through apertures in inner portions of the stability members into the top surface of the support pedestals to further secure the stability members to the support pedestals.

SYSTEMS AND SUPPORT ASSEMBLIES FOR RESTRAINING ELEVATED DECK COMPONENTS

1. Field of the Invention

This invention relates to the field of systems support structures for supporting and restraining an elevated surface above a fixed surface, such as support structures to elevate surface tiles for elevated floors, decks and walkways.

2. Description of Related Art

Elevated building surfaces such as elevated floors, decks, terraces and walkways are desirable in many environments. One common system for creating such surfaces includes a plurality of surface tiles, such as concrete tiles (e.g., pavers), stone tiles or wood tiles, and a plurality of spaced-apart support pedestals upon which the tiles are placed to be supported above a fixed surface. For example, in outdoor applications, the surface may be elevated above a fixed surface by the support pedestals to promote drainage, to provide a level structural surface for walking, and/or to prevent deterioration of or damage to the surface tiles. The pedestals can have a fixed height, or can have an adjustable height such as to accommodate variations in the contour of the fixed surface upon which the pedestals are placed, or to create desirable architectural features.

Although a variety of shapes are possible, in many applications the surface tiles are generally rectangular in shape, having four corners. In the case of a rectangular shaped tile, each of the spaced-apart support pedestals can support four adjacent surface tiles at the tile corners. Stated another way, each rectangular surface tile can be supported by four pedestals that are disposed under each of the corners of the tile. Large or heavy tiles can be supported by additional pedestals at positions other than at the corners of the tiles.

One example of a support pedestal is disclosed in U.S. Patent No. 5,588,264 by Buzon. The support pedestal disclosed by Buzon can be used in outdoor or indoor environments and is capable of supporting heavy loads applied by many types of building surfaces. The support pedestal generally includes a threaded base member and a threaded support member that is threadably engaged with the base member to enable the height of the support pedestal to be adjusted by rotating the support member or the base member relative to the other. The support pedestal can also include a coupling or coupler member disposed between the base member and the support member for further increasing the height of the pedestal, if necessary. Alternatively, support or coupler members may be in the form of a pipe or box-shaped support that may be cut to length.

Support pedestals are also disclosed in U.S. Patent No. 6,363,685 by Kugler and U.S. Patent Application Pub. No. 2004/0261329 by Kugler et al.

SUMMARY OF THE INVENTION

One problem associated with some support structures for elevated surfaces is that the support structures may not adequately restrict relative lateral and/or vertical movement between adjacent surface tiles. This failure of current support structures may become more pronounced when the support structures are utilized in seismically active geographic areas or other locations that may be subject to disruptive vibrations of the fixed surface upon which the support structures are placed, such as exterior environments that are subject to high wind conditions. More particularly, disruptive vibrations or wind may cause relative lateral and/or vertical movement between surface tiles when the surface tiles are not adequately restricted from such relative movement , and this situation may result in increased stress being placed on the surface tiles (e.g., when adjacent surface tiles strike one another) and on the support structure itself.

It is therefore an objective to provide a support assembly structure or system for an elevated surface that has improved structural stability compared to existing support structures, particularly in areas that are prone to disruptive vibrations and/or high winds. In one embodiment, a system for supporting a plurality of building surface tiles is provided. The system includes a plurality of support pedestals, the support pedestals comprising a support plate having a top surface for operatively supporting corner portions of a plurality of building surface tiles in horizontally spaced-apart relation. A plurality of stability members are also provided that are adapted to be disposed over the support plates and between building surface tiles, the stability members comprising at least first and second stabilizing arms extending away from an inner portion of the stability members, where the stabilizing arms have a top edge, a bottom edge, and at least a first tile engaging element protruding from each of the first and second stabilizing arms between the top edge and the bottom edge.

The foregoing embodiment is subject to a number of characterizations. In one characterization, the stabilizing arms further comprise at least a second tile engaging element protruding from each of the first and second stabilizing arms between the top edge and the bottom edge. For example, the first tile engaging element may protrude from a first side of the first and second stabilizing arms and the second tile engaging element may protrude from a second side of the first and second stabilizing arms. In this regard, the first and second tile engaging elements may be comprised of longitudinally extending ribs protruding from a surface of the stabilizing arms, may comprise an arcuate surface portion longitudinally extending along the first and second stabilizing arms, or may comprise an oblique surface portion longitudinally extending along the first and second stabilizing arms. The stabilizing arms may also comprise a hollow portion adjacent to at least the first tile engaging element.

In another characterization, the stability members may include a vertically extending aperture disposed in the inner portion of the stability members. For example, a plurality of mechanical fasteners may be provided that are adapted to

be placed through the apertures to secure the stability members to the support plates.

In another characterization, the first and second stabilizing arms may be disposed at an angle of about 180° (e.g., may be co-planar and/or co-linear). Further, the stability members may further comprise third and fourth stabilizing arms extending away from the inner portion of the stability members, such as where the third and fourth stabilizing arms are orthogonally disposed relative to the first and second stabilizing arms. In this regard, the stability members may also include a vertically extending aperture disposed in the inner portion of the stability members, and a plurality of mechanical fasteners adapted to be placed through the apertures may be provided to secure the stability members to the support plates. The stability members may comprise a material selected from the group consisting of wood, natural stone, concrete, metal, polymers, plastic or composites thereof.

The support pedestals are also subject to a number of characterizations, and in one characterization the support pedestals include a base plate and a central section interconnecting the base plate and the support plate.

According to another embodiment, a system for supporting a plurality of building surface tiles is provided. The system may include a plurality of support pedestals, the support pedestals comprising a support plate having a top surface for operatively supporting corner portions of a plurality of building surface tiles in horizontally spaced-apart relation. The system may also include a plurality of stability members comprising at least first and second stabilizing arms extending away from an inner portion of the stability members, where the stabilizing arms have a first thickness proximal to a bottom edge and a second thickness proximal to a top edge, where the second thickness is greater than the first thickness. A plurality of mechanical fasteners that are adapted to be placed through the inner portion of the stability members to secure the stability members to the support plates may also be provided.

The foregoing embodiment may also be subject to a number of characterizations. For example, the support plates may comprise a plurality of spacer tabs protruding upwardly from the top surface of the support pedestals. In this regard, the second thickness of the stabilizing arms may be greater than the thickness of the spacer tabs, and the stabilizing arms may be adapted to be disposed over the spacer tabs. For example, the bottom edge of the stabilizing arms may comprise a notch that is adapted to be placed over the spacer tab.

In another characterization, the stabilizing arms may have a height that is not greater than the thickness of the surface tiles. In this manner, the stabilizing arms may be disposed flush with or beneath a top surface of the surface tile. For example, the stabilizing arms may have a height that is not greater than about 2 inches.

In another characterization, the stabilizing arms may include longitudinally extending ribs protruding from a surface of the stabilizing arms proximate to the top edge of the stabilizing arms. In another characterization, the thickness of the stabilizing arms may taper (e.g., generally decrease in thickness) from the top edge towards the bottom edge. The first and second stabilizing arms may also be disposed at an angle of about 180°, for example.

In another characterization, the plurality of stabilizing members comprise a first stabilizing element having an aperture that is adapted to be placed in vertical alignment over an aperture in a second stabilizing element, e.g., where each stabilizing element includes two stabilizing arms extending away from an inner portion of the stabilizing elements. In another characterization, the plurality of stabilizing members also include a third stabilizing arm and a fourth stabilizing arm extending away from the inner portion of the stabilizing members. For example, the third and fourth stabilizing arms may be orthogonally disposed relative to the first and second stabilizing arms. The stabilizing members may further comprise an aperture through the inner portion of the stability members, wherein the mechanical fasteners are adapted to be disposed through the

apertures, such as to secure the stabilizing members to the support pedestals. The stability members may comprise a material selected from the group consisting of wood, natural stone, concrete, metal, polymers, plastic or composites thereof.

The support pedestals are also subject to a number of characterizations. For example, the support pedestals may include a base plate and a central section interconnecting the base plate and support plate.

In another embodiment, an elevating building surface assembly is provided. The assembly may include a plurality of building surface tiles, the building surface tiles comprising a top surface, an outer edge having an edge thickness and a plurality of corner portions. At least one support pedestal is provided, the support pedestal being disposed beneath the corner portions of adjacent building surface tiles to vertically support and elevate the building surface tiles above a fixed surface, the support pedestal comprising a support plate having a top surface that supports the building surface tiles. At least one stability member is disposed within a gap between adjacent building surface tiles, wherein the stability member comprises at least first and second stabilizing arms extending away from an inner portion of the stability member, where the stabilizing arms have a top edge, a bottom edge, and at least a first tile engaging element protruding from each of the first and second stabilizing arms between the top edge and the bottom edge.

In accordance with this embodiment, the stabilizing arms may further include at least a second tile engaging element protruding from each of the first and second stabilizing arms between the top edge and the bottom edge. For example, the first tile engaging element may protrude from a first side of the first and second stabilizing arms and the second tile engaging element may protrude from a second side of the first and second stabilizing arms. In this regard, the first and second tile engaging elements may comprise longitudinally extending ribs protruding from the surface of the stabilizing arms. Alternatively, the first and

second tile engaging elements may comprise an arcuate surface portion or an oblique surface portion longitudinally extending along the first and second stabilizing arms.

In another characterization, the outer edges of the building surface tiles may comprise stability member engaging portions, such as a notch for receiving the tile engaging element. Further, the stability member may be disposed beneath the top surface of the building surface tiles.

In another embodiment, an elevated building surface assembly is provided that includes a plurality of building surface tiles, the building surface tiles comprising a top surface, an outer edge having an edge thickness and a plurality of corner portions. At least one support pedestal is disposed beneath the corner portions of adjacent building surface tiles to vertically support and elevate the building surface tiles above a fixed surface, the support pedestal comprising a support plate having a top surface that supports the building surface tiles. The assembly also includes at least one stability member comprising at least a first stabilizing arm that is disposed within a gap between adjacent building surface tiles, wherein the first stabilizing arm comprises at least a first tile engaging element protruding from the stabilizing arm between a top edge and a bottom edge of the stabilizing arm, wherein the outer edges of the building surface tiles comprise stability member engaging portions, and wherein the first tile engaging element is operatively engaged with a stability member engaging portion.

In one characterization, the first tile engaging element comprises a protrusion on a surface of the stabilizing arm and the stability member engaging portions comprise a notch for receiving the protrusion. For example, each building surface tile may include a plurality of outer edges where adjacent outer edges meet at a corner, wherein each notch intersects at least two adjacent outer edges at a corner of a building surface tile.

In another characterization, the stability member is disposed beneath the top surface of the building surface tiles. In yet another characterization, the first

stabilizing arm further comprises at least a second tile engaging element protruding from a side of the first stabilizing arm opposite the first tile engaging element, wherein the first tile engaging element is engaged with a stability member engaging portion of a first adjacent building surface tile, and wherein the second tile engaging element is engaged with a stability member engaging portion of a second adjacent building surface tile.

In another characterization, a mechanical fastener secures the stability member to the support plate. In yet another characterization, the stability member further comprises a second stabilizing arm, wherein the first and second stabilizing arms extend away from an inner portion of the stability member. In this regard, the stability member may include an aperture disposed in the inner portion of the stability member. The stability member may also comprise a third stabilizing arm and a fourth stabilizing arm extending away from the inner portion of the stability member, such as where the third and fourth stabilizing arms are orthogonally disposed relative to the first and second stabilizing arms.

In another characterization, a predetermined gap width of the gap is at least about 0.05 inch and is not greater than about 0.5 inch.

In yet another embodiment, an elevated building surface assembly is provided. The assembly may include a plurality of building surface tiles, the building surface tiles comprising a top surface, an outer edge having an edge thickness, and a plurality of corner portions. The assembly also includes a plurality of support pedestals, the support pedestals being disposed beneath the corner portions of the plurality of building surface components to vertically support and elevate the building surface components above a fixed surface to form an elevated building surface, the support pedestals comprising a support plate having a top surface that receives corner portions of the building surface components. A plurality of stability members are provided that comprise at least first and second stabilizing arms extending away from an inner portion of the stability members, where the stabilizing arms have a first thickness proximal to a

bottom edge and a second thickness proximal to a top edge, where the second thickness is greater than the first thickness, wherein the stability members are disposed within gaps between adjacent building surface tiles to restrict lateral and/or vertical movement of the building surface tiles.

In one characterization, the stability members are disposed below the top surface of the building surface tiles. In another characterization, the assembly includes a plurality of fasteners extending through the stability members and into the support plates to secure the stability members to the support pedestals. In yet another characterization, the stability members comprise an inner portion, and wherein the stabilizing arms extend away from the inner portion.

In another embodiment, a method for the construction of an elevated building surface assembly is provided. The method may include locating a plurality of support pedestals upon a fixed surface with a predetermined spacing between the support pedestals. Corner portions of building surface tiles may then be placed upon a top surface of the support pedestals, and first securing portions disposed on outer edges of the building surface tiles may be engaged with first tile engaging elements disposed on stabilizing arms of stability members disposed over the top surface of the support pedestals. In this regard, the stability members define a gap between adjacent building surface tiles, the gap comprising a gap width, and wherein engagement of the first securing portion and the first tile engaging element restricts movement of the building surface tiles away from the support pedestals.

In one characterization, the method may also include the step of securing the stability members to the top surfaces of the support pedestals, such as by extending mechanical fasteners through the stability members and into the top surfaces of the support pedestals. For example, screws may be threaded through the stability member and into the top surfaces of the support pedestals. According to another characterization, the gap width is at least about 0.05" and is not greater than about 0.5".

DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates a perspective view of an elevated building surface assembly.

Fig. 2 illustrates an exploded perspective view of a support pedestal and a stability member usable with the stabilized elevated building surface assembly of **Fig. 1**.

Fig. 3 illustrates a side elevation view of a stabilizing arm of the stabilizing member of **Fig. 2** being inserted into a gap between adjacent surface tiles on a support pedestal.

Fig. 4 illustrates a perspective view of a portion of the stabilized elevated building surface assembly of **Fig. 1** having the stabilizing arm of **Fig. 2** restraining lateral and/or movement between adjacent surface tiles, where one surface tile has been removed for clarity.

Figs. 5(a) and 5(b) illustrate an alternative embodiment of a stabilizing member.

Fig. 6 illustrates a cross-sectional view of a stabilizing member and surface tiles supported by a support pedestal.

Fig. 7 illustrates a blown-up perspective view of a stabilizing member, surface tiles and a support pedestal.

Fig. 8 illustrates another alternative embodiment of a stabilizing member.

DESCRIPTION OF THE INVENTION

Fig. 1 illustrates a portion of an elevated building surface assembly **100** that includes a building surface **101** formed from a plurality of surface tiles **102** that are elevated above a fixed surface (not shown) by a support structure **200**. The support structure **200** includes a plurality of spaced-apart support pedestals

201, each of which is adapted to be disposed beneath corner portions of adjacent surface tiles **102** to support the surface tiles **102** above the fixed surface.

The surface tiles **102** can be comprised of virtually any material from which a building surface is constructed. Examples include, but are not limited to, slate tiles, natural stone tiles, plastic tiles, composite tiles, concrete tiles (e.g., pavers), wooden deck tiles, including hardwood deck tiles, tiles of metal or fiberglass grating, rubber tiles and the like. The support pedestals **201** can be placed in a spaced-apart relation on fixed surfaces including, but not limited to, rooftops, on-grade (e.g., natural ground), over concrete slabs including cracked concrete slabs, and can be placed within fountains and water features, used for equipment mounts, and the like. The elevated building surface assembly **100** can be used for both interior and exterior applications.

Each surface tile **102** may be placed upon several support pedestals **201** to elevate the surface tile **102** above the fixed surface. As illustrated in **Fig. 1**, the surface tiles **102** may be square or any other appropriate shape (e.g., regular polygonal shapes such as hexagonal) and a support pedestal **201** may be disposed beneath the corners (e.g., 4 corners) of adjacent surface tiles **102**. As shown, each surface tile **102** may include a top surface **104**, an outer edge **106** having an edge thickness **108**, and a plurality of corner portions **110**. Further, although illustrated in **Fig. 1** as being laid out in a symmetric square pattern, the support pedestals **201** may also be laid out in various configurations as may be dictated by the shape and size of the surface tiles, such as a rectangular configuration or a triangular configuration.

The plurality of support pedestals may be any combination of fixed-height and/or height-adjustable support pedestals constructed of any appropriate materials (e.g., plastic, composites). For example, referring to **Fig. 2**, the support pedestal **201** may broadly include a base member **212** including a base member extension **214** (e.g., a cylindrical base member extension) that extends upwardly

from a base member plate **215** (e.g., a base plate) when the support pedestal **201** is operatively placed on a fixed surface. The base member **212** may include base member threads on a surface of the base member extension **214**, e.g., internal or external threads.

A support member **216** is adapted to be operatively connected to the base member **212** and includes a support plate **220** and a support member extension **219** (e.g., a cylindrical support member extension) that extends downwardly from the support plate **220**. The support member **216** may include support member threads, e.g., external or internal threads, on the support member extension **219** that are adapted to threadably engage base member threads to connect the support member **216** to the base member **212** and more specifically to operatively attach the support member extension **219** to the base member extension **214**. Thus, the support member **216** can be mated directly to base member threads **218** (not shown) and can be rotated relative to the base member **212** (or vice versa) to adjust the height of the support pedestal **201**. The support plate **220** is thereby disposed above the base member **212** to support surface tiles thereon.

In one variation, the support pedestal **201** may include at least one coupling member (not shown) extending between the base member extension **214** and the support member extension **219** that operatively attaches the base member extension **214** to the support member extension **219** and that is adapted to increase the height of the support pedestal **201**. Additionally, although illustrated as having external threads on the support member **216** and internal threads on the base member **212**, it will be appreciated that other configurations are possible. See, for example, U.S. Patent No. 5,588,264 by Buzon and U.S. Patent No. 6,363,685 by Kugler. The support pedestal may also have a fixed height. It should be appreciated that the support pedestal **201** may, from a broad perspective, be in the form of the base member plate **215**, the support plate **220**, and a "support pillar" or "central section" interconnecting the base and support

plates **215**, **220**. As shown in **Fig. 2**, the central section is made up of the base member extension **214** and the support member extension **219**, although in other embodiments, the central section may be a single, fixed-height member.

In any event, the support plate **220** includes a top surface **222** upon which the corner portions **110** of adjacent surface tiles **102** can be placed. Spacer tabs **224** may optionally be provided on the top surface **222** of the support plate **220** to provide predetermined gaps **226** (see **Fig. 3**) between adjacent surface tiles **102** that form the elevated building surface. That is, the predetermined gaps **226** may have gap widths **227** that are approximately equal to a width of the spacer tabs **224**. For instance, the gap widths **227** may be at least about 0.05" and not greater than about 0.5". Moreover, the spacer tabs **224** may be disposed on a crown member (not illustrated) that is placed in a recess on the top surface of the support plate **220**. In this manner, the crown member can be rotated independent of the support member **216** to adjust the position of the spacer tabs **224**.

With continued reference to **Fig. 2**, a stability member **300** is illustrated that may be used in conjunction with or as part of the support structure **200** to restrain relative lateral and/or vertical movement between adjacent surface tiles. The stability member **300** is operable to be placed within the predetermined gap between adjacent surface tiles (e.g., see **Fig. 4**) to limit such lateral and/or vertical movement between the surface tiles **102**. For example, the stability member **300** may be compression fit into the gap. In this regard, the elevated building surface assembly **100** of **Fig. 1** may be more likely to move as a single unit and thus less likely to sustain damage during vibratory disruptions or wind events.

As seen in **Figs. 2-4**, the stability member **300** may include first and second stability segments **304**, **308** that are operable to be compression-fit into the predetermined gaps **226** between adjacent surface tiles **102**. The first and second stability segments **304**, **308** may each include first and second stabilizing

arms **312**, **316** that extend away from respective inner portions **320**, **321** at any appropriate angle (e.g., 180°). As will be described in more detail below, the first and second stability segments **304**, **308** may be similar in all substantive respects except for the inner portions **320**, **321**. This arrangement may facilitate the attachment of the first and second stability segments **304**, **308** to an underlying support pedestal.

The first and second stabilizing arms **312**, **316** may include a bottom edge **324** that is generally adapted to face towards and/or contact the top surface **222** of the support pedestal **201** and a top edge **328** that is generally adapted to face away from the top surface **222** when the stability member **300** is installed with the elevated building surface assembly **100**. The first and second stabilizing arms **312**, **316** may include a first thickness **332** proximal to the bottom edge **324** and a second thickness **336** proximal to the top edge **328**. As seen in **Fig. 3**, the second thickness **336** may be greater than the first thickness **332** (i.e., before the first and second stabilizing arms **312**, **316** are compression fit into the gaps **226**) and the first and second stabilizing arms **312**, **316** may be designed such that the overall thickness of the first and second stabilizing arms **312**, **316** generally tapers (i.e., generally decreases in thickness) from or near the top edge **328** towards the bottom edge **324**. For instance, each of the first and second stabilizing arms **312**, **316** may include a series of tile engaging elements **338** (e.g., teeth or ribs) protruding outwardly from a front surface **337** thereof that generally decrease in size (e.g., thickness) in a direction from the top edge **328** towards the bottom edge **324**.

Constructing the second thickness **336** to be greater than the first thickness **332**, or in other words designing the first and second stabilizing arms **312**, **316** to taper in thickness as discussed above, may facilitate initial insertion of the first and second stabilizing arms **312**, **316** into the gaps **226** and/or subsequent compression fitting of the first and second stabilizing arms **312**, **316** between adjacent surface tiles **102**. Additionally, the tile engaging elements **338** may serve to increase the wedging or binding between the stability member **300**

and the surface tiles **102** (i.e., may limit the surface tiles **102** from moving away from the support plate **220** of the support pedestal **201**). In some embodiments, tile engaging elements **338** (e.g., longitudinally extending ribs) may be provided on both the front surface **337** and a rear surface (not shown) of the first and second stabilizing arms **312**, **316**. In other embodiments, the first and second stabilizing arms **312**, **316** may not include tile engaging elements **338** while the overall thickness of the first and second stabilizing arms **312**, **316** still generally tapers from or near the top edge **328** towards the bottom edge **324**. In further embodiments, the first and second stabilizing arms **312**, **316** may have a generally constant thickness from the top edge **328** towards the bottom edge **324**, or the bottom edge **324** may be pointed or rounded.

As seen in **Fig. 4**, the first and second stabilizing arms **312**, **316** may be adapted to be placed into the predetermined gap **226** such that the top edge **328** is generally disposed substantially level with or below the top surface **104** of the surface tiles **102**. In this regard, the first and second stabilizing arms **312**, **316** may include one or more notches **340** (**Fig. 2**) in the bottom edges **324** that are sized to receive the spacer tabs **224**. That is, the notch **340** may be of a shape that generally conforms to the shape of a respective spacer tab **224**. In one arrangement, the first and second stabilizing arms **312**, **316** of the first and second stability segments **304**, **308** include one or more notches to accommodate spacer tabs **224** protruding or extending upwardly from the top surface **222** of the support plate **220**.

The inner portion **320** of the first stability segment **304** may include an aperture **344** therein and a first interlocking space **348** disposed adjacent (e.g., below) the first aperture **344**. Similarly, the inner portion **321** of the second stability segment **308** may include an aperture **352** therein , and a second interlocking space **356** disposed adjacent (e.g., above) the aperture **352**. With reference to **Fig. 2**, the first and second stability segments **304**, **308** may be identical in all respects except for the location of the first and second apertures **344**, **352** and the first and second interlocking spaces **348**, **356**. More

specifically, the inner portions **320**, **321** of the first and second stability segments **304**, **308** may essentially be mirror images of each other to allow the first and second interlocking spaces **348**, **356** to interlock and the first and second apertures **344**, **352** to thereby become collinear (e.g., as seen in **Fig. 4**). Stated otherwise, the first aperture **344** of the first stability segment **304** is adapted to be placed in vertical alignment over the second aperture **352** of the second stability segment **308**. It should also be noted that the inner portions **320**, **321** may have an elongate shape such as an oblong rectangle or an oval shape to enable the inner portions **320**, **321** to fit between the surface tiles **104**, although the inner portions 320, 321 may deform when installed.

Once so positioned, the first and second stability segments **304**, **308** may be disposed at approximately right angles (e.g., orthogonally) relative to each other (i.e., the first and second stabilizing arms **312**, **316** of the stability segment **304** may be disposed at approximately right angles to the first and second stabilizing arms **312**, **316** of the second stability segment **308**). Additionally, the first and second stability segments **304**, **308** may also be pivoted relative to each other about an axis that runs through the first and second apertures **344**, **352** to allow the first and second stability segments **304**, **308** to adjust and accommodate various designs of building surfaces **101**.

In any event, the stability member **300** may also include at least one mechanical fastener **360** (e.g., bolt, screw) that may be inserted (e.g., threaded) through the first and second apertures **344**, **352** and into the top surface **222** of the support plate **220** to secure the stability member **300** to the support pedestal **201** and thereby restrain lateral and/or vertical movement of the surface tiles **102** of the building surface **101**. Before discussing a method for constructing an elevated building surface assembly using the stability member **300**, it should be appreciated that numerous other arrangements and embodiments of the stability member **300** are envisioned.

In one arrangement, the first and second stability segments **304**, **308** may effectively function as a single/first stability unitary member that includes for example first, second, third and fourth stabilizing arms, all of which extend away from an inner portion of the stability member such that the first and second stabilizing arms are disposed substantially orthogonally to the third and fourth stabilizing arms. In this arrangement, it is envisioned that the first and second stabilizing arms may pivot relative to the third and fourth stabilizing arms or may be fixed relative to the third and fourth stabilizing arms (i.e., the first, second, third and fourth stabilizing arms and the inner portion could all be a single integral piece or at least function as a single piece). In another arrangement, a stability member including only a single stability segment having an aperture and first and/or second stabilizing arms may be utilized between adjacent surface tiles **102**. Of course, the stability member **300** may include fewer or additional stabilizing arms than shown in the figures depending on the shape and design of the building surface **101** and size and location of the predetermined gaps **226**.

One method for constructing an elevated building surface assembly using the stabilizing member **300** discussed herein will now be described, although numerous other methods and manners of utilizing the stabilizing member **300** are also envisioned. Initially, a plurality of support pedestals **201** may be appropriately located upon a fixed surface with any appropriate predetermined spacing **368** between the support pedestals **201** (see **Fig. 1**). As appreciated by those in the art, this step may include appropriately aligning (e.g., leveling) the top surfaces **222** of the support pedestals **201** via adjusting (e.g., rotating) the base and support member extensions **214**, **219** relative to each other. This step may also include appropriately aligning, orienting or adding spacer tabs **224** in a manner to allow a desired building surface **101** to be formed. As seen in **Fig. 1**, each support pedestal **201** may optionally have four spacer tabs **224**, each being disposed at about 90° to two of the other spacer tabs **224** and at about 180° to a third other spacer tab **224** (i.e., the spacer tabs **224** may be arranged in a cross shape). This arrangement allows the top surface **222** of each support pedestal

201 to support four corner portions **110** of four surface tiles **102**. However, other arrangements of spacer tabs **224** are also contemplated to allow the creation of various types of building surfaces **101**.

Once the support pedestals **201** have been located on the fixed surface in the desired arrangement, surface tiles **102** may be placed on top of the support pedestals **201**. That is, corner portions **110** of the surface tiles **102** may be placed on the top surface **222** of the support pedestals **201** so as to abut or nearly abut the spacer tabs **224**. As seen in **Fig. 3**, such placement defines a predetermined gap **226** between adjacent surface tiles **102** on the support pedestals **201**. However, it should be appreciated that once the entire building surface **101** has been constructed, the gap widths **227** of the various predetermined gaps **226** between adjacent surface tiles **102** may not be the same, even if the width of the spacer tabs **224** is the same. More specifically, some of the gap widths **227** of the predetermined gaps **226** may be larger than the widths of the spacer tabs **224** (e.g., due to unintended movement of the surface tiles **102**). Without use of the stability member **300** discussed herein, this may result in the surface tiles **102** adjacent to such predetermined gaps **226** being more likely to move (e.g., slide laterally or move vertically) during disruptive vibrations (e.g., seismic events, foot traffic) or when subjected to high winds. Additionally, and as seen in **Fig. 3**, the spacer tabs **224** may not fill the entire space of the predetermined gaps **226** (i.e., the height of the spacer tabs **224** may be less than the thickness **108** of the surface tiles **102**). As a result, disruptive vibrations or winds may cause a surface tile **102** to essentially "pivot" about an adjacent spacer tab **224** resulting in a top edge of one surface tile **102** abutting the top edge of an adjacent surface tile **102**. Any of these situations may result in damage to surface tiles **102** and the support pedestals **201** and/or injury to pedestrians using the building surface **101**.

The next step of the construction process includes locating areas on the building surface **101** where lateral and/or vertical movement between adjacent surface tiles **102** may need to be restrained or limited, and inserting at least one

stabilizing arm (e.g., first and second stability segments **304**, **308**) into one or more predetermined gaps **226** between adjacent surface tiles **102**. For instance, this may include locating a central axis of the inner portions **320**, **321** of the first and second stability segments **304**, **308** over the center of the top surface **222** of the support pedestals. When the support pedestals **201** cannot be seen, the user may simply align the inner portions **320**, **321** over the space between the four corner portions **110** of four surface tiles **102** (e.g., note the center of the building surface **101** in **Fig. 1**). In any case and once so aligned, the bottom edge **324** of the first and second stability segments **304**, **308** can be inserted into the predetermined gaps **226**.

As seen in **Fig. 3** (only first stability segment **304** being shown), at least a portion of the first stability member **304** may be thicker or wider than the predetermined gap **226** it is being inserted into (i.e., at least a portion of the first and/or second stabilizing arms **312**, **316** of the first stability segment **304** may have a thickness or width greater than the gap width **227** before the first stability segment **304** is inserted into the predetermined gap **226**). For instance, the first thickness **332** near the bottom edge **324** may be at least equal to or smaller than the gap width **227** of the predetermined gap **226** while the second thickness **336** near the top edge **328** may be greater than the gap width **227**. In one arrangement, the first stability segment **304** may be tapered in a direction from the top edge **328** towards the bottom edge **324**, and may or may not include the tile engaging elements **338**. Having a portion near the bottom edge **324** of a reduced thickness compared to a portion near the top edge **328** allows the stability segment **304** to be initially at least partially inserted into the predetermined gap **226** and then further urged and compression fit between adjacent surface tiles **102**.

The next step may be to further urge the first and second stability segments **304**, **308** into the predetermined gaps **226** until the top edges **328** of the first and second stability segments **304**, **308** are at least approximately level with or below the top surface **104** of the surface tiles **102** (see **Fig. 4**, one surface

tile **102** has been removed for clarity). This may entail striking the first and second stability segments **304**, **308** using any appropriate tool(s) (e.g., hammer, stake) so as to compression fit or wedge the first and second stability segments **304**, **308** between adjacent surface tiles **102** to restrain lateral and/or vertical movement of the surface tiles **102**. In one arrangement, one or more portions of the top edge **328** of the first and second stability segments **304**, **308** may include notches or divots for receiving the end of a tool (e.g., stake, screwdriver) which may be struck by another tool (e.g., hammer) to facilitate driving of the first and second stability segments **304**, **308** into the predetermined gaps **226**. Also as part of this process, the notches **340** may fit over or otherwise receive the spacer tabs **224**.

In any event, it can be seen now in **Fig. 4** that the second thickness **336** of the first and second stability segments **304**, **308** proximal the top edge **328** is substantially equal to or slightly greater than the gap width **227** of the predetermined gap **226** between adjacent surface tiles **102**. This may result from the first and second stability segments **304**, **308** being compression fit and partially deformed between the surface tiles **102**. In this regard, the first and second stability segments **304**, **308** may be constructed of a material (e.g., plastic) that is softer than at least the outer edge **106** of the surface tiles **102**. While it appears in **Fig. 4** that the height of the first and second stability segments **304**, **308** is equal to the thickness **108** of the surface tiles **102**, the height of the first and second stability segments **304**, **308** may actually be less than the thickness **108** of the surface tiles **102** to allow the top edges **328** of the first and second stability segments **304**, **308** to be disposed below the top surface **104** of the surface tiles **102**. Doing so may reduce the visual footprint of the stability member **300** as well as reduce the likelihood of a pedestrian tripping on the stability member **300**.

The final step may be to secure the first and second stability segments **304**, **308** to the top surface **222** of the support pedestal **201**. In one arrangement, a fastener **360** may be inserted through the aligned apertures of

the inner portions **320**, **321** of the first and second stability segments **304**, **308** and into the top surface **222** of the support plate **220** of the support pedestal **201** to complete the stability member **300**. For instance, the fastener **360** may be in the form of a screw that may be threaded through the central portions **320**, **321** and into the support plate. Of course, the fastener **360** can be selected such that the fastener **360** can be inserted or threaded to a point where its head (not labeled) is below the top surface **104** of the surface tiles **102** for reasons discussed previously.

With continued reference to **Fig. 4**, while it appears that the corner portions **110** of the surface tiles **102** have been rounded so as to conform to a curved outside surface of the central portions **320**, **321** of the first and second stability segments **304**, **308**, this need not be the case. For instance, due to the presence of the spacer tabs **224**, there may naturally be a space in the middle of the pointed corners of the corner portions **110** of the four surface tiles **102** (or other number of surface tiles **102**) being supported on a support pedestal **201**. Thus, the inner portions **320**, **321** of the first and second stability segments **304**, **308** can also be wedged or compression fit into this space such that the inner portions **320**, **321** deform from the shape shown in **Fig. 4**. In this regard, the inner portions **320, 321** may be shaped (e.g., an oval rectangular shape) to facilitate placement of the inner portions within the intersecting gaps. In some embodiments, the stability member **300** may include additional fasteners **360** (e.g., through apertures in the first and second stabilizing arms **312**, **316**) while in other embodiments, the stability member **300** may be attached using other means, such as an adhesive. In such arrangements, the apertures in the inner portions **320**, **321** may be included with the first and second stability segments **304**, **308**. For example, each stabilizing arm could simply be in the form of an elongated tapered planar member. To allow interlocking between stabilizing members, each stabilizing member could have a notch sized to receive the notch of another stabilizing member.

An alternative embodiment of the present invention is illustrated in **Figs. 5-8**. **Figs. 5(a)** and **5(b)** illustrate a stability member **500** that is adapted to be disposed over the support plate **620** of a support pedestal **612**. The stability member **500** includes a plurality of stabilizing arms, such as stabilizing arms **504** and **508** that extend away from an inner portion **520** of the stability member **500**. The stabilizing arms include a top edge **512** and a bottom edge **524**, and a tile engaging element **538** protrudes from each of the stabilizing arms **504** and **508** between the top edge **512** and the bottom edge **524**. As illustrated in **Figs. 5(a)** and **5(b)**, the tile engaging element **538** comprises an arcuate surface portion that longitudinally extends along the sides of the stabilizing arms **504**, **508**. Although illustrated as being a substantially solid piece, it will be appreciated that the tile engaging element may be hollow, e.g., such that a hollow portion lies adjacent to the tile engaging element **538** as is illustrated by the broken lines on stabilizing arm **508**.

As is illustrated in **Fig. 6**, the tile engaging element **538** protruding from the stabilizing arm **504** may be adapted to engage with building surface tiles **102** that are placed upon the support pedestal **612**. More specifically, outer edges of the surface tiles **102** may include stability member engaging portions, such as notches formed in an edge of the tile below a top surface **104**. These stability member engaging portions may operatively engage with the tile engaging element **538** to restrict lateral and/or vertical movement of the surface tiles **102**. For example, a notch may interconnect at least two adjacent outer edges of the building surface tiles **102**. A mechanical fastener **560** may be utilized to secure the stability member **500** to the support pedestal **612**.

Fig. 7 illustrates an exploded perspective view of a portion of an elevated building surface assembly. The assembly includes a stability member **500** substantially as described with respect to **Figs. 5a-5b**. The stability member includes a tile engaging element **538** protruding from each of the stabilizing arms. The tile engaging element **538** is adapted to engage with stability member engaging portion **570** disposed in an edge of the surface tiles **102** and below a

top surface **104** of the surface tiles **102**. As illustrated in **Fig. 7**, the stability member engaging portions **570** comprise notches formed in a corner of the surface tiles **102**.

An alternative embodiment to the stability member illustrated in **Figs. 5(a)-5(b)** is illustrated in **Fig. 8**. Here, the stability member **500a** includes a plurality of stabilizing arms such as stabilizing arms **504a** and **508a**. In this example, the stabilizing arms **504a** and **508a** include a tile engaging element **538a** protruding from each of the first and second stabilizing arms **504a** and **508a**. In this example, the tile engaging elements comprise an oblique surface portion longitudinally extending along the first and second stabilizing arms. The stability member **500a** can be utilized to stabilize the tiles in a fashion similar to the stability member **500** illustrated in **Figs. 5-7**.

While various embodiments of the present invention have been described in detail, it is apparent that modifications and adaptations of those embodiments will occur to those skilled in the art.

What is claimed is:

1. A system for supporting a plurality of building surface tiles, comprising:

a plurality of support pedestals, the support pedestals comprising a support plate having a top surface for operatively supporting corner portions of a plurality of building surface tiles in horizontally spaced-apart relation; and

a plurality of stability members that are adapted to be disposed over the support plates and between building surface tiles, the stability members comprising at least first and second stabilizing arms extending away from an inner portion of the stability members, where the stabilizing arms have a top edge, a bottom edge, and at least a first tile engaging element protruding from each of the first and second stabilizing arms between the top edge and the bottom edge that is receivable within an opening in one of the corner portions of at least one of the building surface tiles.

2. The system as recited in Claim 1, wherein the stabilizing arms further comprise at least a second tile engaging element protruding from each of the first and second stabilizing arms between the top edge and the bottom edge.

3. The system as recited in Claim 2, wherein the first tile engaging element protrudes from a first side of the first and second stabilizing arms and the second tile engaging element protrudes from a second side of the first and second stabilizing arms.

4. The system as recited in Claim 2, wherein the first and second tile engaging elements comprise longitudinally extending ribs protruding from a surface of the stabilizing arms.

5. A system for supporting a plurality of building surface tiles, comprising:

a plurality of support pedestals, the support pedestals comprising a support plate having a top surface for operatively supporting corner portions of a plurality of building surface tiles in horizontally spaced-apart relation; and

a plurality of stability members that are adapted to be disposed over the support plates and between building surface tiles, the stability members comprising at least first and second stabilizing arms extending away from an inner portion of the stability members, where the stabilizing arms have a top edge, a bottom edge, and at least a first tile engaging element protruding from each of the first and second stabilizing arms between the top edge and the bottom edge, and wherein the first and second tile engaging elements comprise an arcuate surface portion longitudinally extending along the first and second stabilizing arms.

6. A system for supporting a plurality of building surface tiles, comprising:

a plurality of support pedestals, the support pedestals comprising a support plate having a top surface for operatively supporting corner portions of a plurality of building surface tiles in horizontally spaced-apart relation; and

a plurality of stability members that are adapted to be disposed over the support plates and between building surface tiles, the stability members comprising at least first and second stabilizing arms extending away from an inner portion of the stability members, where the stabilizing arms have a top edge, a bottom edge, and at least a first tile engaging element protruding from each of the first and second stabilizing arms between the top edge and the bottom edge, and wherein the first and second tile engaging elements comprise an oblique surface portion longitudinally extending along the first and second stabilizing arms.

7. The system as recited in Claim 1, wherein the stabilizing arms comprise a hollow portion adjacent to the first tile engaging element.

8. The system as recited in Claim 1, wherein the stability members comprise a vertically extending aperture disposed in the inner portion of the stability members.

9. The system as recited in Claim 8, further comprising:

a plurality of mechanical fasteners adapted to be placed through the apertures to secure the stability members to the support plates.

10. The system as recited in Claim 1, wherein the first and second stabilizing arms are disposed at an angle of about 180°.

11. The system as recited in Claim 1, wherein the stability members further comprise third and fourth stabilizing arms extending away from the inner portion of the stability members.

12. The system as recited in Claim 11, wherein the third and fourth stabilizing arms are orthogonally disposed relative to the first and second stabilizing arms.

13. The system as recited in Claim 12, wherein the stability members comprise a vertically extending aperture disposed in the inner portion of the stability members.

14. The system as recited in Claim 13, further comprising:

a plurality of mechanical fasteners adapted to be placed through the apertures to secure the stability members to the support plates.

15. The system as recited in Claim 1, wherein the support pedestals comprise a base plate and a central section interconnecting the base plate and the support plate.

16. The system as recited in Claim 1, wherein the stability members comprise a material selected from the group consisting of wood, natural stone, concrete, metal, polymers, plastic and composites thereof.

17. A system for supporting a plurality of building surface tiles, comprising:

a plurality of support pedestals, the support pedestals comprising a support plate having a top surface for operatively supporting corner portions of a plurality of building surface tiles in horizontally spaced-apart relation;

a plurality of stability members comprising at least first and second stabilizing arms extending away from an inner portion of the stability members, where the stabilizing arms have a first thickness proximal to a bottom edge and a second thickness proximal to a top edge, where the second thickness is greater than the first thickness, and where each of the stabilizing arms comprises a series of tile engaging elements arranged along at least a first surface of each of the stabilizing arms between the top and bottom edges thereof; and

a plurality of mechanical fasteners adapted to be placed through the inner portion of the stability members to secure the stability members to the support plates.

18. The system as recited in Claim 17, wherein the support plates comprise a plurality of spacer tabs protruding upwardly from the top surface.

19. The system as recited in Claim 18, wherein the second thickness of the stabilizing arms is greater than the thickness of the spacer tabs.

20. The system as recited in Claim 18, wherein the stabilizing arms are adapted to be disposed over the spacer tabs.

21. A system for supporting a plurality of building surface tiles, comprising:

a plurality of support pedestals, the support pedestals comprising a support plate having a top surface for operatively supporting corner portions of a plurality of building surface tiles in horizontally spaced-apart relation;

a plurality of stability members comprising at least first and second stabilizing arms extending away from an inner portion of the stability members, where the stabilizing arms have a first thickness proximal to a bottom edge and a second thickness

proximal to a top edge, where the second thickness is greater than the first thickness; and

a plurality of mechanical fasteners adapted to be placed through the inner portion of the stability members to secure the stability members to the support plates, wherein the support plates comprise a plurality of spacer tabs protruding upwardly from the top surface, and wherein the bottom edge of the stabilizing arms comprises a notch that is adapted to be placed over the spacer tab.

22. The system as recited in Claim 17, wherein the stabilizing arms have a height that is not greater than the thickness of the surface tiles.

23. The system as recited in Claim 17, wherein the stabilizing arms have a height that is not greater than about 2 inches.

24. The system as recited in Claim 17, wherein the tile engaging elements comprise longitudinally extending ribs protruding from the first surface of the stabilizing arms.

25. A system for supporting a plurality of building surface tiles, comprising:

a plurality of support pedestals, the support pedestals comprising a support plate having a top surface for operatively supporting corner portions of a plurality of building surface tiles in horizontally spaced-apart relation;

a plurality of stability members comprising at least first and second stabilizing arms extending away from an inner portion of the stability members, where the stabilizing arms have a first thickness proximal to a bottom edge and a second thickness proximal to a top edge, where the second thickness is greater than the first thickness; and

a plurality of mechanical fasteners adapted to be placed through the inner portion of the stability members to secure the stability members to the support plates, wherein the thickness of the stabilizing arms tapers from the top edge towards the bottom edge.

26. The system as recited in Claim 17, wherein the first and second stabilizing arms are disposed at an angle of about 180°.

27. A system for supporting a plurality of building surface tiles, comprising:

a plurality of support pedestals, the support pedestals comprising a support plate having a top surface for operatively supporting corner portions of a plurality of building surface tiles in horizontally spaced-apart relation;

a plurality of stability members comprising at least first and second stabilizing arms extending away from an inner portion of the stability members, where the stabilizing arms have a first thickness proximal to a bottom edge and a second thickness proximal to a top edge, where the second thickness is greater than the first thickness; and

a plurality of mechanical fasteners adapted to be placed through the inner portion of the stability members to secure the stability members to the support plates, wherein the plurality of stabilizing members comprise a first stabilizing element having an aperture that is adapted to be placed in vertical alignment over an aperture in a second stabilizing element.

28. The system as recited in Claim 17, wherein the plurality of stabilizing members further comprise a third stabilizing arm and a fourth stabilizing arm extending away from the inner portion of the stabilizing members.

29. The system as recited in Claim 28, wherein the third and fourth stabilizing arms are orthogonally disposed relative to the first and second stabilizing arms.

30. The system as recited in Claim 17, wherein the support pedestals comprise a base plate and a central section interconnecting the base plate and support plate.

31. The system as recited in Claim 17, wherein the stability members comprise a material selected from the group consisting of wood, natural stone, concrete, metal, polymers, plastic and composites thereof.

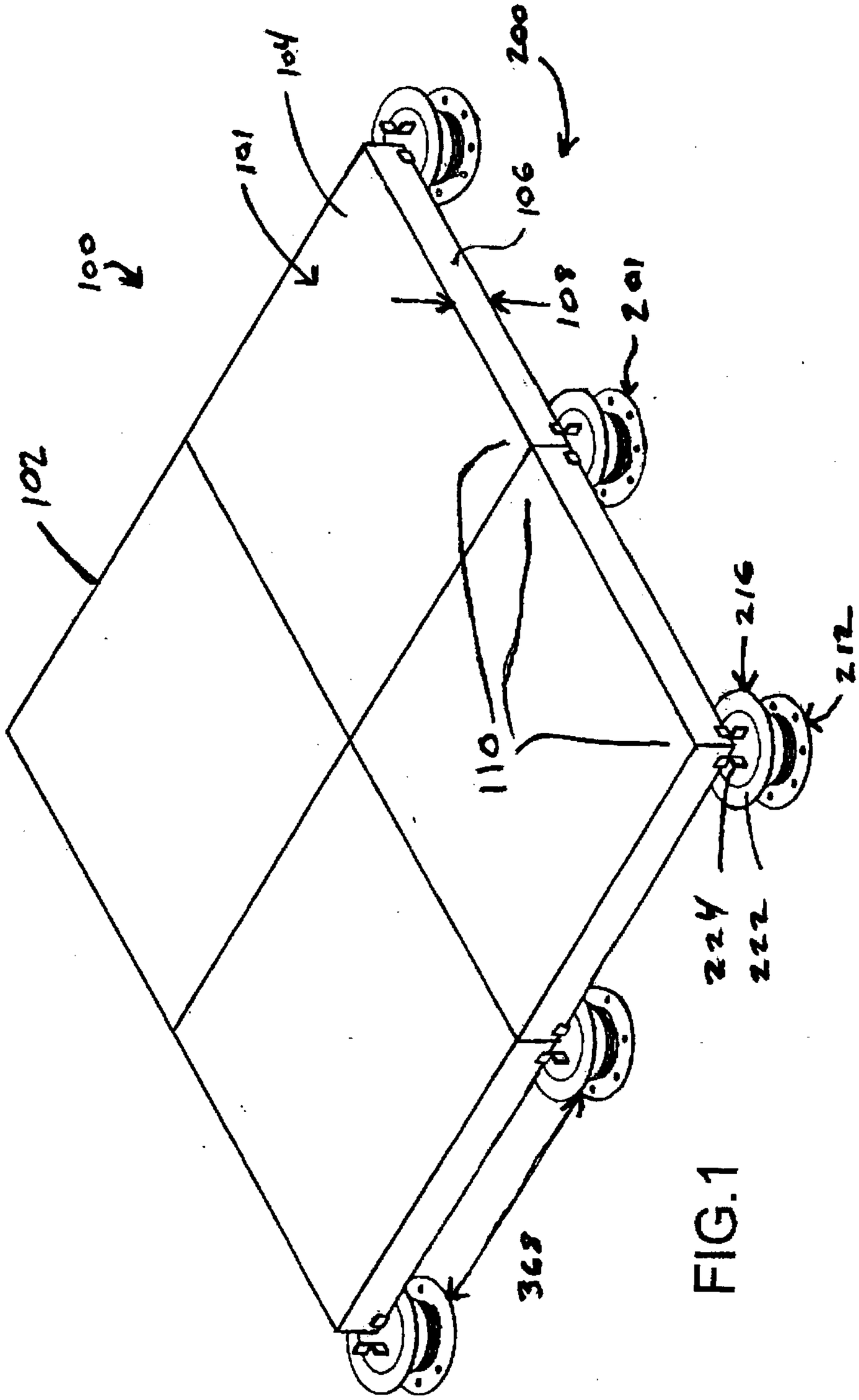

FIG.1

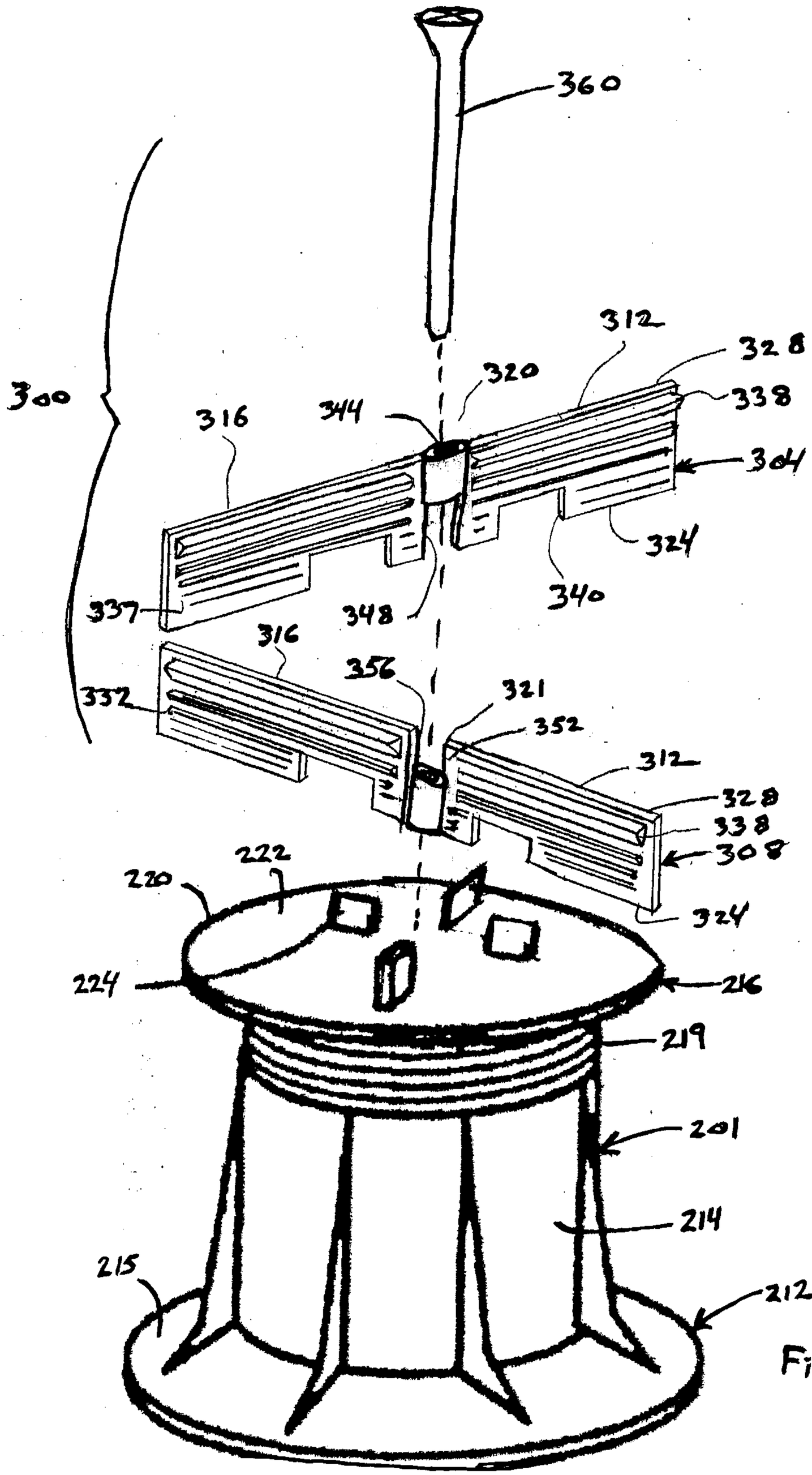
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Fig. 2

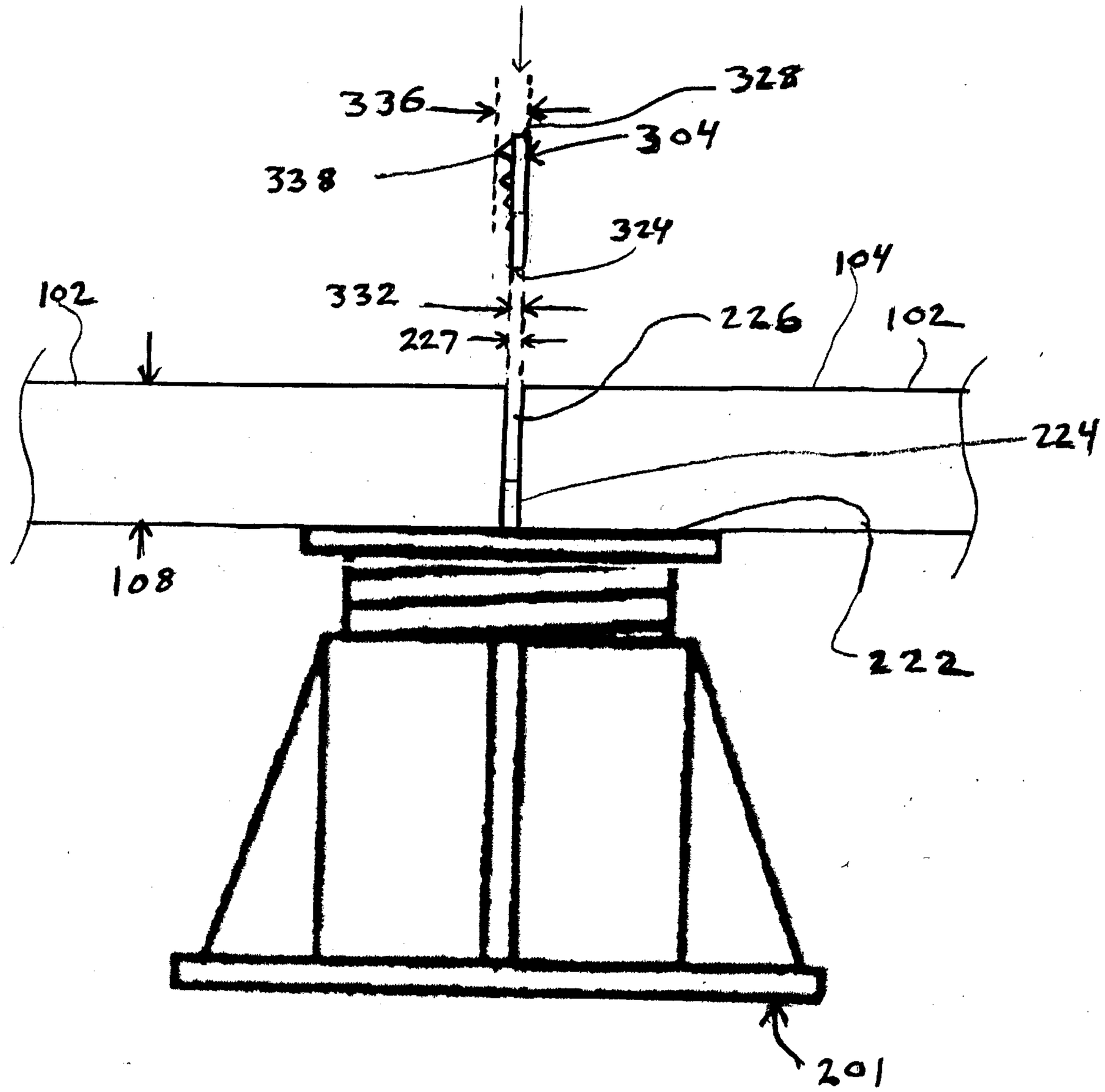

FIG. 3

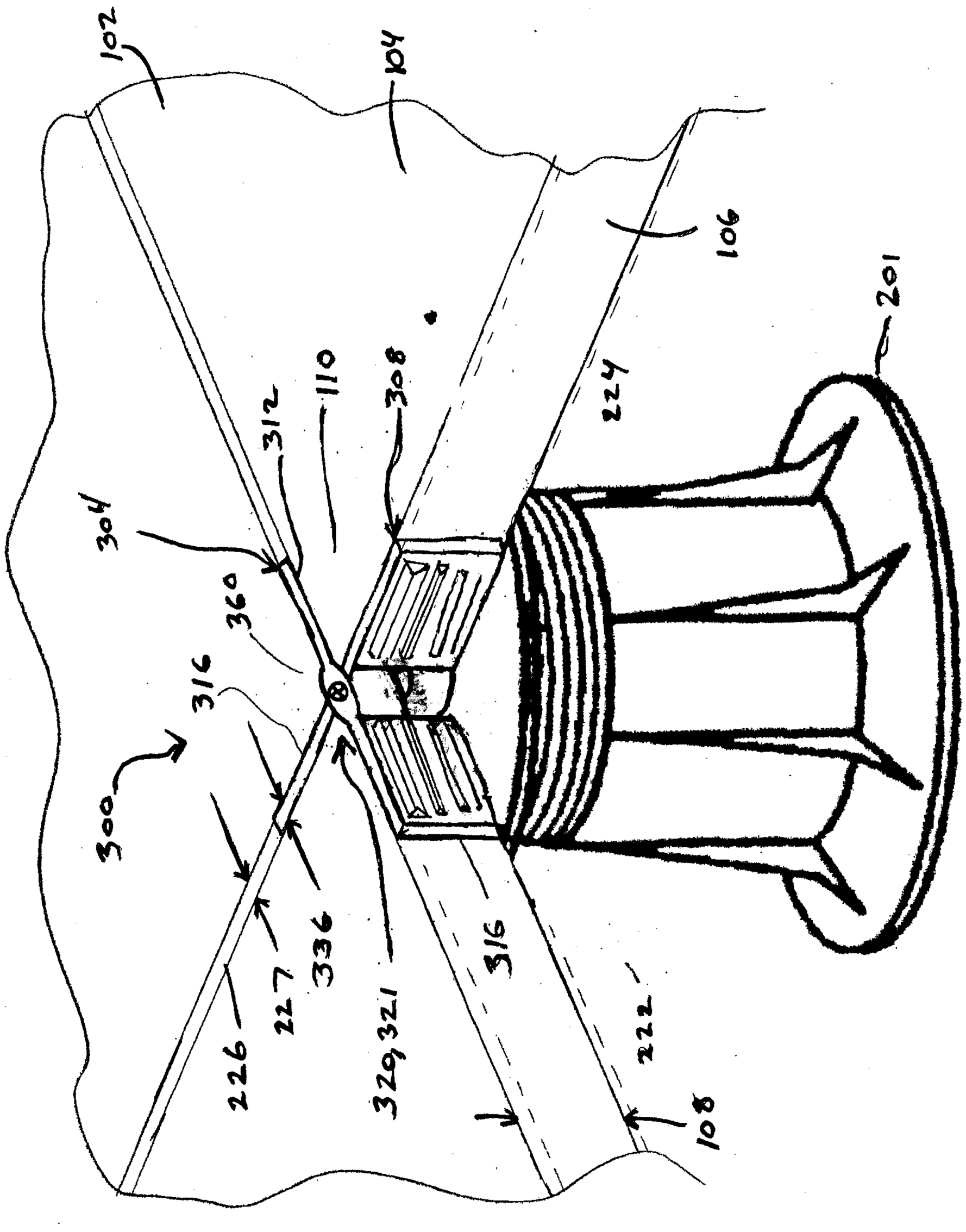
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FIG. 4

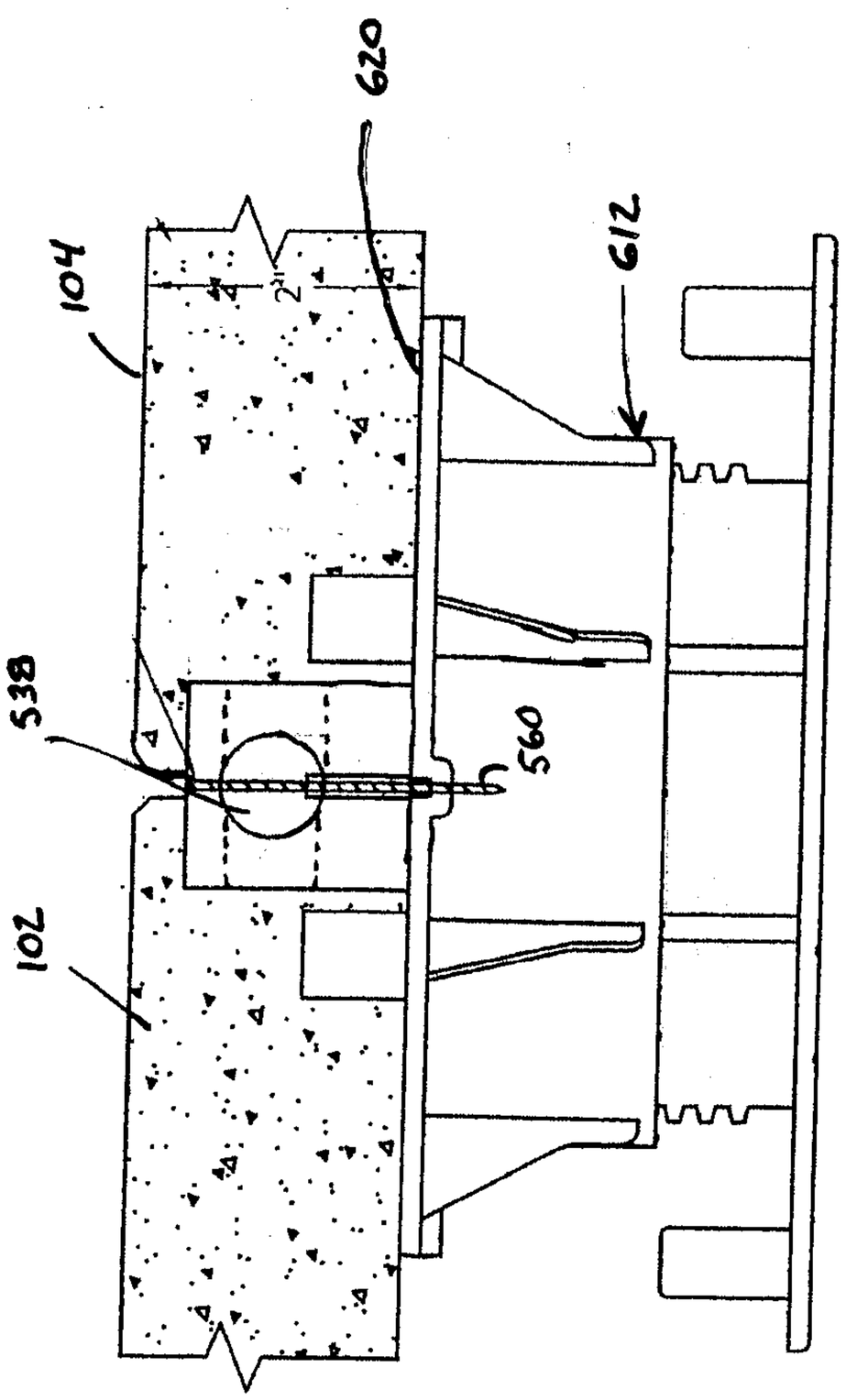


Fig. 6

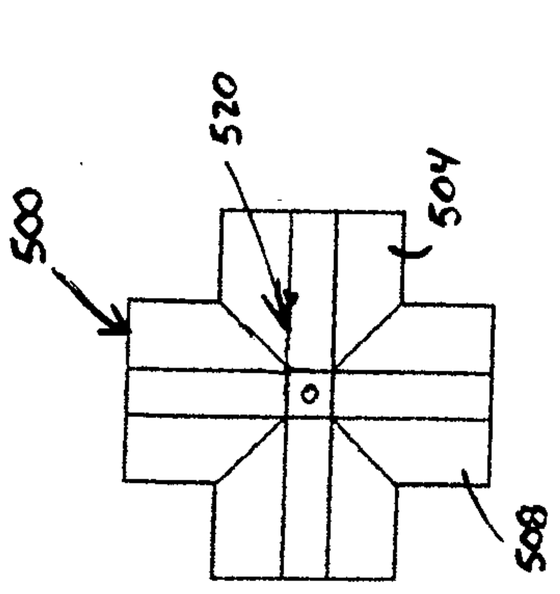


Fig. 5(a)

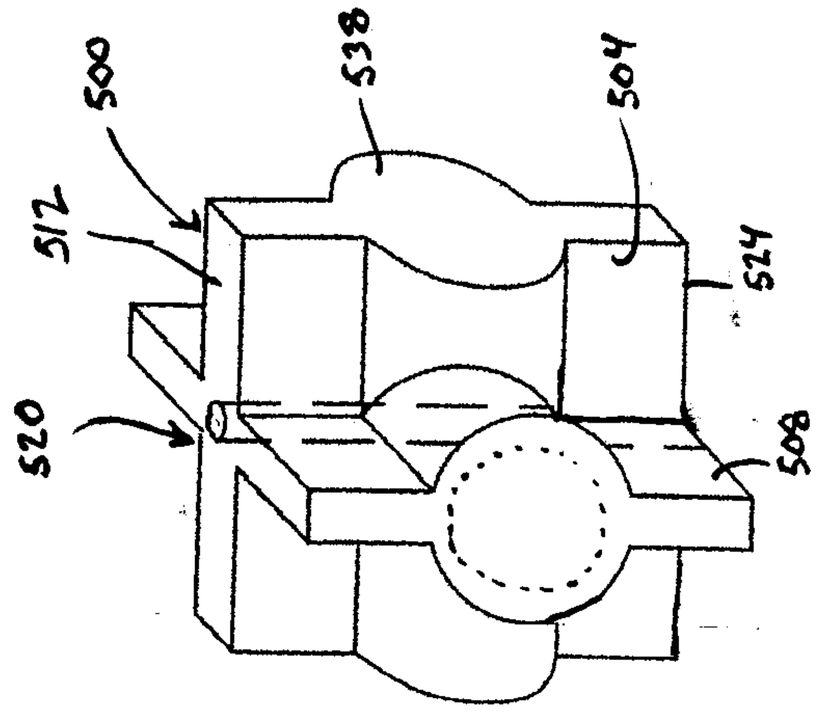


Fig. 5(b)

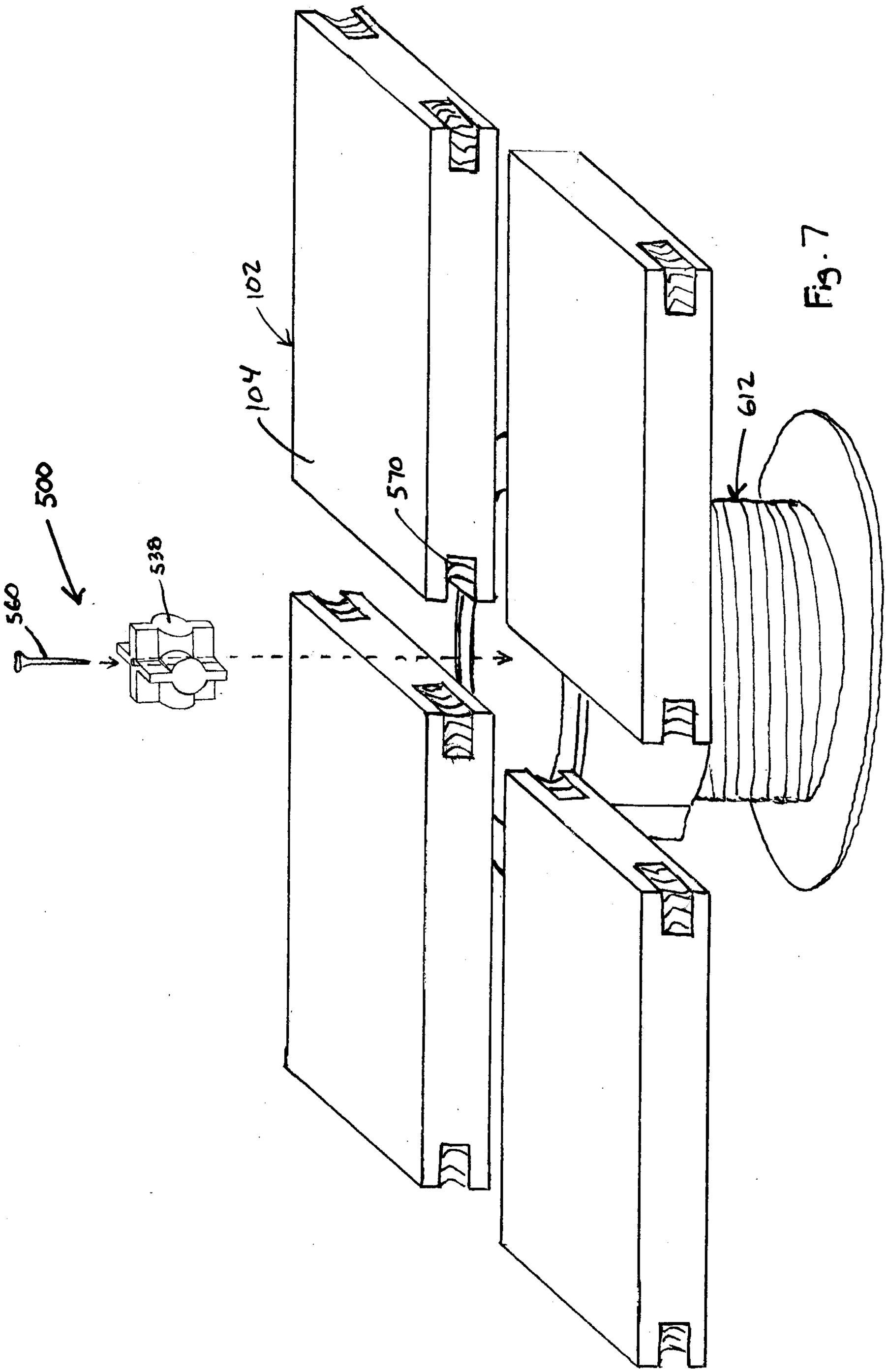
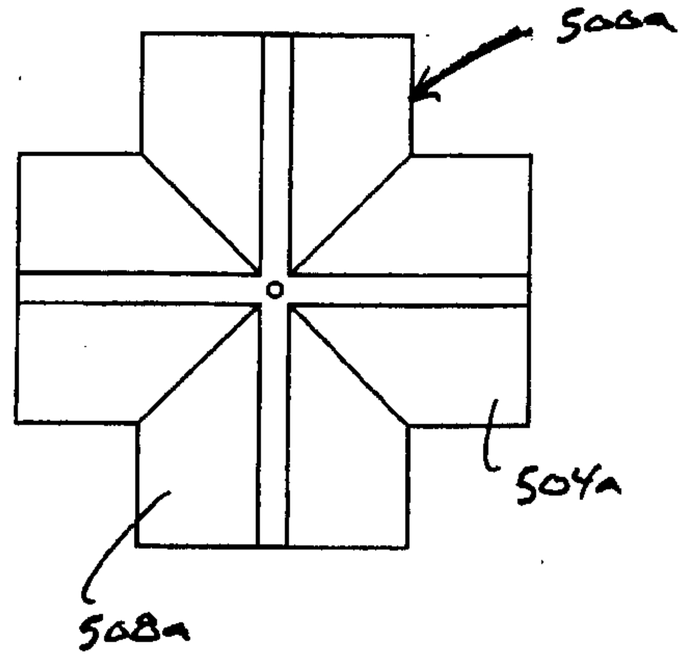


Fig. 7



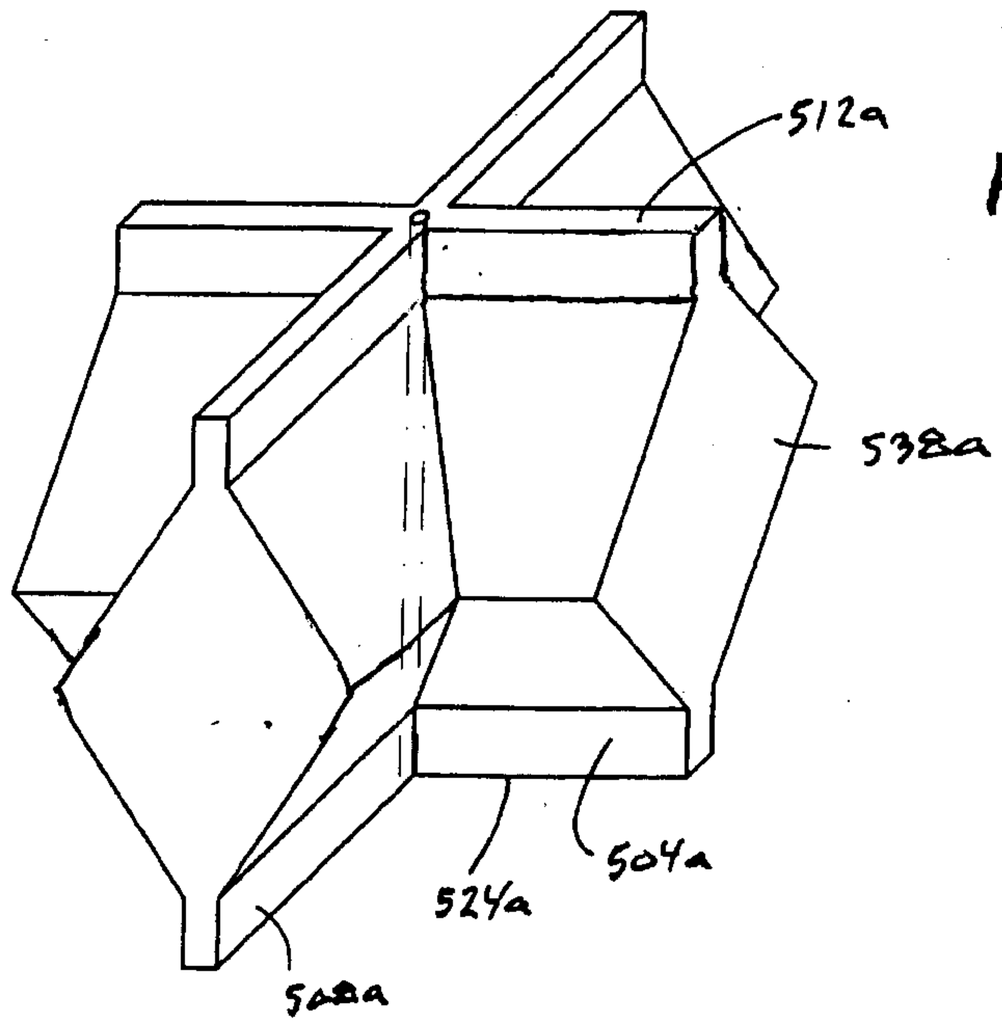
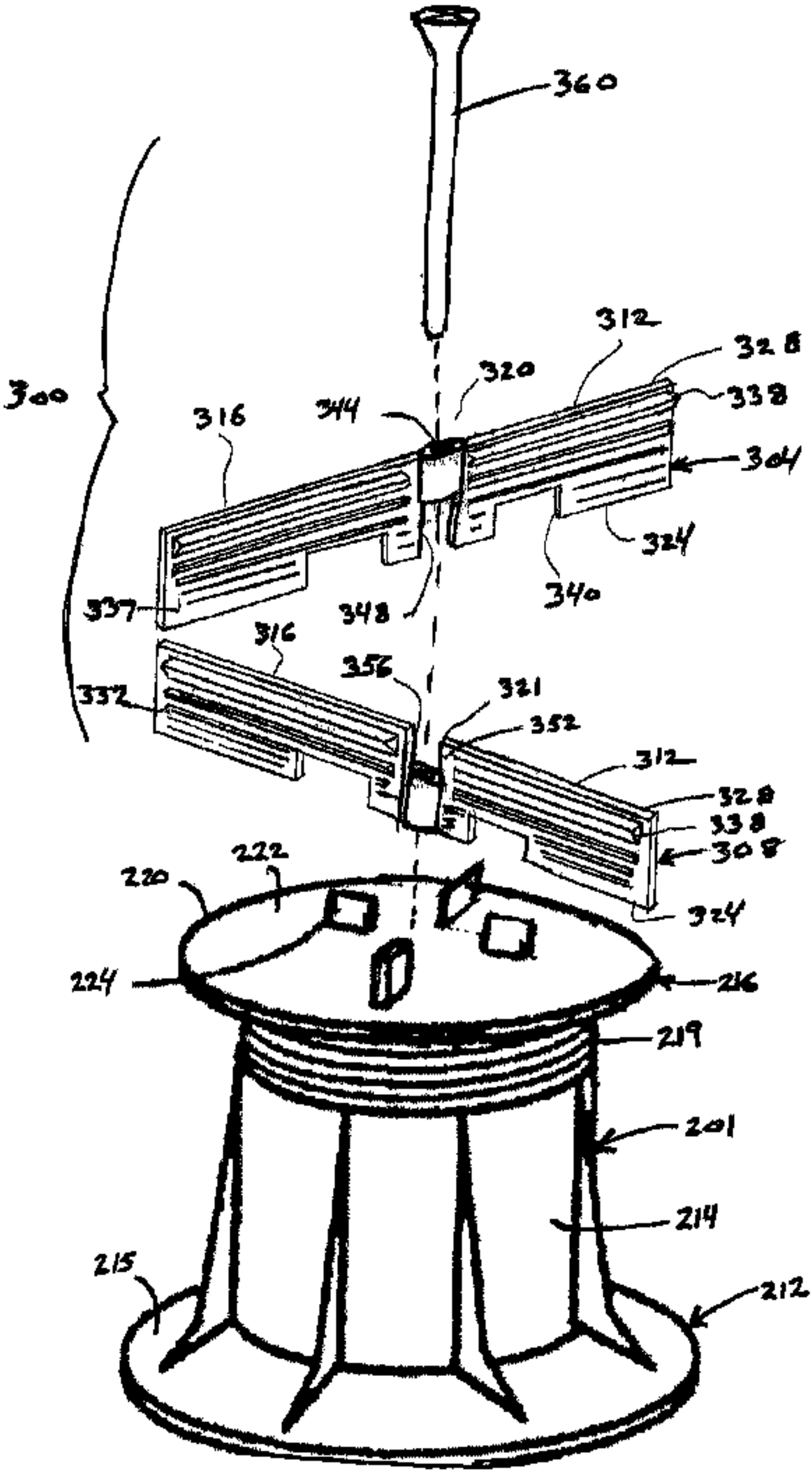


Fig. 8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