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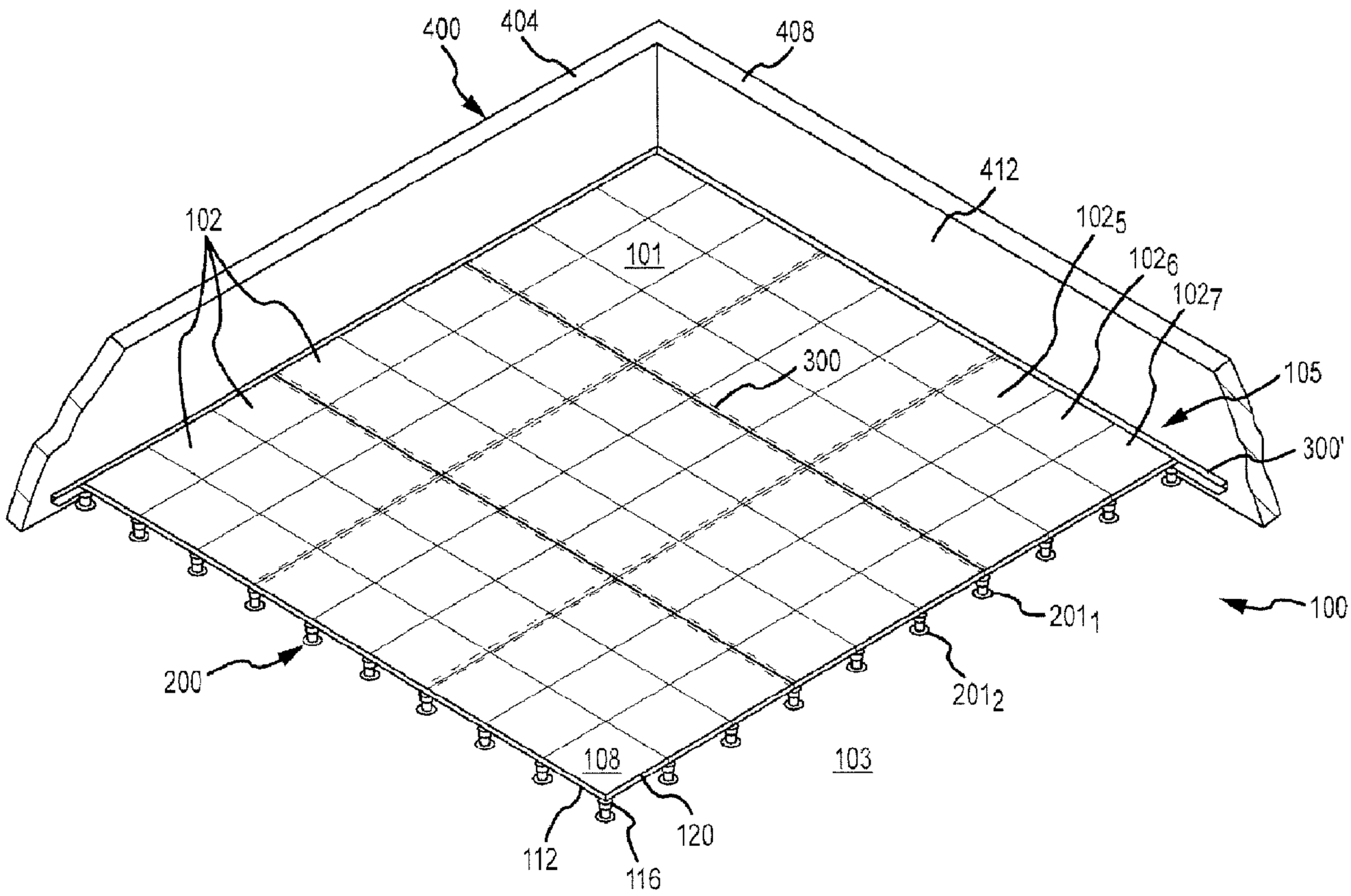

(57) Abrégé/Abstract:
An elevated building surface assembly including a plurality of surface tiles, a plurality of support pedestals disposed in spaced-apart relation on a fixed surface and having a support plate with a top surface operatively supporting the surface tiles in horizontally spaced-apart relation, and a plurality of elongate restraining members configured to restrict movement of the surface tile(s) in directions away from first and second adjacent support pedestals and/or relative to one or more adjacent surface tiles to advantageously limit movement or displacement of the surface tile(s) that may otherwise occur due to uplift forces (e.g., generated by winds and/or the like).

ABSTRACT

An elevated building surface assembly including a plurality of surface tiles, a plurality of support pedestals disposed in spaced-apart relation on a fixed surface and having a support plate with a top surface operatively supporting the surface tiles in horizontally spaced-apart relation, and a plurality of elongate restraining members configured to restrict movement of the surface tile(s) in directions away from first and second adjacent support pedestals and/or relative to one or more adjacent surface tiles to advantageously limit movement or displacement of the surface tile(s) that may otherwise occur due to uplift forces (e.g., generated by winds and/or the like).

FIELD PAVER CONNECTOR AND RESTRAINING SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the field of 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, which is incorporated herein by reference in its entirety. 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., each of which is also incorporated herein by reference in its entirety.

SUMMARY OF THE INVENTION

One problem associated with some support structures for elevated surfaces is that the surface tiles or other members making up the elevated surfaces are sometimes susceptible to movement due to pressure differences above and below the tiles, such as from strong winds blowing across the surface tiles. More specifically, wind can sometimes generate uplift forces, particularly around a perimeter of an elevated building surface, that can dislodge surface tiles and thereby create a possibly dangerous environment requiring subsequent repair. For instance, elevated building surfaces are sometimes built on rooftops or the like, where a parapet often extends upwardly from the elevated surface around the perimeter of the elevated surface. In this case, uplift forces from wind are often greatest near the corners of the elevated building surface (e.g., where adjacent parapet sections meet) and can dislodge surface tiles which may eventually lead to displacement or buckling of other surface tiles. Furthermore, some counties and other jurisdictions have building codes specifying that elevated surface support structures must be able to withstand winds up to, for instance, 100 mph or more.

In view of the foregoing, it is an object of the present invention to provide a support structure or system for an elevated building surface that has improved structural stability compared to existing support structures. Stated differently, it is an object of the present invention to stiffen an elevated building surface assembly to allow the assembly to more readily withstand the effects of uplift forces. In one aspect, a system for supporting and restraining a plurality of surface tiles that are disposed in horizontally spaced-apart relation is disclosed. The system includes a plurality of support pedestals

each having a support plate with a top surface for operatively supporting portions of a plurality of surface tiles in horizontally spaced-apart relation, and a plurality of elongate restraining members (e.g., C-shaped channels, H-shaped channels, and/or the like) each having a restraining element and a mounting element spaced apart from the restraining element and operatively attached thereto. The restraining element of each restraining member is configured to be disposed proximate an outer edge segment of at least a first surface tile and along at least a portion of a length of the outer edge segment of the first surface tile (e.g., such as over a top surface of the tile or within an opening in the outer edge segment). The mounting element is configured to be disposed under a bottom surface of the first surface tile that is adjacent the outer edge segment of the first surface tile and affixed to the support plates of at least first and second spaced-apart support pedestals to secure the restraining member to the first and second support pedestals.

In one arrangement, the mounting element of each restraining member may include a plurality of apertures therein, where first apertures of the plurality of apertures are sized and positioned to receive fasteners inserted therein and into the top surfaces of the support plates to secure the restraining members to the support pedestals. For instance, each mounting element may include a first plurality of the first apertures therein adjacent a first end of the restraining members and a second plurality of the first apertures therein adjacent an opposed second end of the restraining members, where the first plurality of the first apertures are sized and positioned to receive a first plurality of the fasteners inserted therein and into the top surfaces of a first of the support plates to secure the restraining members to a first of the support pedestals, where the second plurality of the first apertures are sized and positioned to receive a second plurality of the fasteners inserted therein and into the top surfaces of a second of the support plates to secure the restraining members to a second of the support pedestals, and where the first support pedestal is adjacent the second support pedestal.

In another arrangement, the restraining element may be configured to be disposed proximate a second adjacent surface tile that is adjacent the first surface tile and along a non-abutting outer edge segment of the second adjacent surface tile that is collinear with the outer edge segment of the first surface tile. For instance, the mounting elements may include apertures that are sized and positioned to receive spacers

extending from the top surfaces of the support plates, where one of the spacers is configured to space abutting outer edge segments of the first and second surface tiles.

In a further arrangement, the plurality of elongate restraining members may include a plurality of pairs of elongate restraining members, where the first elongate restraining member of each pair is configured to be disposed proximate an outer edge segment of the first surface tile disposed over a support pedestal, and where the second elongate restraining member of each pair is configured to be disposed proximate an abutting outer edge segment of a second surface tile disposed over the support pedestal. For instance, the top surfaces of the support plates may include spacers extending therefrom that are configured to space the first and second elongate restraining members of each pair of elongate restraining members. As another example, the connection elements of the first and second elongate restraining members of each pair may be in an abutting relationship.

In another aspect, an elevated building surface assembly is disclosed including a plurality of surface tiles, a plurality of support pedestals disposed in spaced-apart relation on a fixed surface and having a support plate with a top surface operatively supporting the surface tiles in horizontally spaced-apart relation, and a plurality of elongate restraining members having a restraining element and a mounting element spaced apart from the restraining element and operatively attached thereto. The restraining element is disposed proximate an outer edge segment of at least one of at least a pair of the plurality of surface tiles and along at least a portion of a length of the outer edge segments of at least one of the pair of surface tiles. The mounting element is disposed adjacent the outer edge segments of at least one of the pair of surface tiles and affixed to the support plate of at least a first of the plurality of support pedestals to secure the at least one of the pair of surface tiles to the first support pedestal.

The mounting elements may be secured to the support pedestals in various manners. In one arrangement, the mounting element includes first apertures that receive fasteners inserted therein and into the top surface of the support plate of the first support pedestal to secure the restraining member to the first support pedestal and second apertures that receive spacers extending from the top surface of the support plate of the first support pedestal for spacing abutting outer edge segments of the pair of surface tiles. In another arrangement, the elevated building surface assembly includes

adhesive disposed between the mounting element and the top surface of the support plate of the first support pedestal to secure the restraining member to the support pedestals. In a further arrangement, the elevated building surface assembly includes at least one weld joint disposed between the mounting element and the top surface of the support plate of the first support pedestal to secure the restraining member to the support pedestals. In an even further arrangement, the elevated building surface assembly includes at least one spring-loaded locking member disposed between the mounting element and the top surface of the support plate of the first support pedestal to secure the restraining member to the support pedestals.

In one embodiment, the pair of surface tiles includes a first pair of surface tiles, where the restraining element of a first of the plurality of elongate restraining members is disposed proximate an outer edge segment of each of the first pair of surface tiles and along at least a portion of the length of the outer edge segments of the first pair of surface tiles, where the mounting element of the first elongate restraining member is disposed adjacent the outer edge segments of the first pair of surface tiles and is affixed to the support plate of the first support pedestal to secure at least the first pair of surface tiles to the first support pedestal, where the restraining element of a second of the plurality of elongate restraining members is disposed proximate an outer edge segment of each of a second pair of the plurality of surface tiles and along at least a portion of the length of the outer edge segments of the second pair of surface tiles, and where the mounting element of the second elongate restraining member is disposed adjacent the outer edge segments of the second pair of surface tiles and is affixed to the support plate of one of the support pedestals to secure at least the second pair of surface tiles to the one of the support pedestals.

In another embodiment, at least a portion of the plurality of support pedestals may be disposed in a substantially linear row beneath collinear outer edge segments of a plurality of pairs of adjacent surface tiles, where at least a first of the plurality of elongate restraining members is disposed along the linear row of support pedestals. For instance, a second of the plurality of elongate restraining members may be disposed along the linear row of support pedestals.

In a further embodiment, the top surfaces of the plurality of surface tiles may collectively make up an elevated building surface including an outer periphery, where the

plurality of elongate restraining members include at least interior restraining members and peripheral restraining members, and where a plurality of the peripheral restraining members are disposed along at least a portion of the outer periphery of the elevated building surface. In one variation, the peripheral restraining members may abut a parapet that at least partially surrounds the outer periphery of the elevated building surface. For instance, some of the peripheral restraining members may be securable to the parapet (e.g., may be secured to and/or may float relative to the parapet).

In a further aspect, a method for the construction of an elevated building surface assembly includes locating a plurality of support pedestals upon a fixed surface with a predetermined spacing between the support pedestals, disposing restraining members over top surfaces of a first portion of the plurality of support pedestals, introducing at least portions of first outer edge segments of a first portion of a plurality of surface tiles between restraining and mounting elements of the restraining members, and placing second outer edge segments of the first portion of surface tiles over top surfaces of a second portion of the plurality of support pedestals.

In one arrangement, the disposing step may include first securing a first plurality of the mounting elements adjacent a first end of the restraining members to the top surfaces of first support pedestals of the first portion of the plurality of support pedestals, and second securing a second plurality of the mounting elements adjacent an opposing second end of the restraining members to the top surfaces of second support pedestals of the first portion of the plurality of support pedestals, where each of the first support pedestals is adjacent one of the second support pedestals. For instance, the first ends of a first plurality of the restraining members and the second ends of a second plurality of the restraining members may be secured over common ones of the first portion of the plurality of support pedestals.

In another arrangement, the method may include positioning at least some of the restraining members adjacent a parapet that at least partially surrounds the plurality of support pedestals. For instance the restraining members may be mechanically affixed in any appropriate manner to the parapet. In a further arrangement, the method may include placing outer edge segments of a second portion of surface tiles over the top surfaces of the second portion of support pedestals to create an elevated building surface. For instance, a method may include first removing, from the elevated building,

one of the second portion of surface tiles from the top surfaces of the second portion of support pedestals; and second removing, after the first removing step, one of the first portion of surface tiles from the top surfaces of one or more of the second portion of support pedestals and from the restraining member of one or more of the first portion of support pedestals. The second removing step may include lifting the second outer edge segment of the one of the first portion of surface tiles from the top surfaces of one or more of the second portion of support pedestals and sliding the first outer edge segment of the one of the first portion of surface tiles out from between the restraining and mounting elements of the restraining member of the one or more of the first portion of support pedestals.

DESCRIPTION OF THE DRAWINGS

Fig. 1 is an isometric view of an elevated building surface assembly according to an embodiment.

Fig. 2 is a side view of a support pedestal that may form part of a support structure of the elevated building surface assembly of **Fig. 1**.

Fig. 3a is a perspective view of an elongate restraining member according to one embodiment that may be used as part of the support structure of the elevated building surface assembly of **Fig. 1**.

Fig. 3b is a perspective view of an elongate restraining member according to another embodiment that may be used as part of the support structure of the elevated building surface assembly of **Fig. 1**.

Fig. 3c is a perspective view of an elongate restraining member according to another embodiment that may be used as part of the support structure of the elevated building surface assembly of **Fig. 1**.

Fig. 3d is a perspective view of an elongate restraining member according to another embodiment that may be used as part of the support structure of the elevated building surface assembly of **Fig. 1**.

Fig. 4 is a perspective view of a pair of the elongate restraining members of **Fig. 3** being disposed over a top surface of a support pedestal.

Fig. 5 is a perspective view similar to **Fig. 4**, but showing the pair of elongate restraining members being disposed on the top surface of the support pedestal.

Fig. 6 is a perspective view similar to **Fig. 5**, but showing a pair of surface tiles about to be inserted into one of the elongate restraining members.

Fig. 7a is a cross-sectional view of the pair of elongate restraining members of **Figs. 4-6** restraining a pair of surface tiles against movement relative to a top surface of the support pedestal, according to one embodiment.

Fig. 7b is a cross-sectional view of an elongate restraining member similar to one of those of **Figs. 4-6** and restraining surface tile adjacent a periphery of an elevated building surface and a parapet against movement relative to a top surface of the support pedestal, according to another embodiment.

Fig. 8 is a perspective view of a portion of the elevated building surface assembly of **Fig. 1** in one state of assembly.

Fig. 9 is a perspective view similar to **Fig. 8**, but in another state of assembly.

Fig. 10 is a perspective view similar to **Fig. 9**, but in another state of assembly.

Fig. 11 is a perspective view of an elongate restraining member according to another embodiment that may be used as part of the support structure of the elevated building surface assembly of **Fig. 1**.

Fig. 12 is a perspective view of a pair of the elongate restraining members of **Fig. 11** being disposed on top surfaces of a pair of support pedestal and with a pair of surface tiles about to be respectively inserted into the elongate restraining members.

Fig. 13 is a perspective view of a partially assembled elevated building surface assembly including a plurality of the elongated restraining members of **Fig. 11**.

Fig. 14 is a perspective view of a retraining unit according to one embodiment that may be used as part of the support structure of the elevated building surface assembly of **Fig. 1**.

DESCRIPTION OF THE INVENTION

Fig. 1 illustrates a portion of an elevated building surface assembly **100** according to one embodiment that includes an elevated building surface **101** formed from a plurality of building surface components such as surface tiles **102** that are elevated above a fixed surface **103** by a support structure **200**. Each surface tile **102** may broadly include generally opposing top and bottom surfaces **108**, **112**, one or more corner portions **116**, and one or more outer edge segments **120** disposed between adjacent corner portions **116**. The support structure **200** includes a plurality of spaced-apart support pedestals **201** (e.g., in any appropriate configuration, such as a plurality of rows and columns of support pedestals **201**) supporting the surface tiles **102** and a plurality of elongate restraining members **300**, **300'** (e.g., surface tile connectors), the restraining members **300** being shown in phantom lines in **Fig. 1**.

As will be discussed in more detail herein, each restraining member **300, 300'** is configured to be positioned proximate and along at least a portion of a length of one or more outer edge segments **120** of at least some of the surface tiles **102** to restrict movement of the surface tile(s) **102** in a direction away from the support pedestals **201** and/or relative to one or more adjacent surface tiles **102** to advantageously limit movement or displacement of the surface tile(s) **102** that may otherwise occur due to forces generated by winds and/or other disruptive events. Reference numeral **300** will be generally used to connote "interior" restraining members, or, in other words, restraining members disposed within an outer periphery **105** of the elevated building surface assembly **100**. Reference numeral **300'** will be generally used to connote "peripheral" restraining members, or, in other words, restraining members disposed along the outer periphery **105** of the elevated building surface assembly **100**. While the restraining members **300, 300'** will be illustrated as different embodiments (e.g., see **Figs. 7a** and **7b**), it is to be understood that the embodiment of the restraining member **300'** shown in **Fig. 7b** could be used in at least some situations for one or more of the restraining members **300**, and vice versa.

As also used herein, support pedestals **201** identified as "$\mathbf{201_1}$" (e.g., a "first portion" or "first group" of the support pedestals **201**) indicate support pedestals **201** to which a restraining member **300**, **300'** is secured in a particular embodiment, while support pedestals **201** identified as "$\mathbf{201_2}$" (e.g., a "second portion" or "second group" of

the support pedestals **201**) indicate support pedestals **201** to which a restraining member **300**, **300'** is not secured in a particular embodiment.

Before discussing the restraining members **300, 300'** in more detail, additional discussion in relation to the surface tiles **102** and support pedestals **201** will now be provided. 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, 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 **103** including, but not limited to, rooftops, plazas, 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.

Turning to **Fig. 2**, a side view of an exemplary support pedestal **201** (e.g., a height-adjustable support pedestal) that is configured to be placed upon the fixed surface **103** is illustrated. 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** when the support pedestal **201** is operatively placed on a fixed surface. The base member **212** includes base member threads **218** on a surface of the base member extension **214**.

A support member **216** is adapted to be operatively connected to the base member **212**, either directly or through a coupling (e.g., extension) member **258** that operatively attaches the base member **212** to the support member **216**. The support member **216** 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** includes support member threads (not illustrated) on an interior surface of the support member extension **219** that are configured to rotatably (e.g., threadably) engage the base member threads **218** to operatively 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** and can be rotated relative to the base member **212** (e.g., the base member **212** can be rotated

relative to the support member **216**) to adjust the height of the support pedestal **201**. The support plate **220** is thereby disposed above the base member **212** to support building surface components such as surface tiles **102** thereon (see **Fig. 1**). The support member threads may also be adapted to threadably engage with coupling member threads **260** to connect the support member **216** to the coupling member **258**, which in turn may be operatively connected to the base member **212**.

Although illustrated as having internal threads on the support member **216** and external threads on the base member **218** and coupling member **258**, it will be appreciated that other configurations are possible, including external threads on the support member **216** and internal threads on the base member **218**. See, for example, U.S. Patent No. **5,588,264** by Buzon and U.S. Patent No. **6,363,685** by Kugler, each of which is incorporated herein by reference in its entirety.

The support plate **220** includes a top surface **222** upon which the bottom surfaces **112** and corner portions **116** of adjacent surface tiles **102** (**Fig. 1**) can be placed. Spacers **224** can be provided on the top surface **222** of the support plate **220** to provide predetermined spacing between adjacent surface tiles **102** that form the elevated building surface **101**. For example, the spacers **224** can be disposed on a crown member (not shown) that is placed in a recess (not shown) on the top surface **222** 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 spacers **224**.

From a broad perspective, the support pedestal **201** may generally be in the form of the base member plate **215**, the support plate **220**, and a support pillar or central section such as a central section **230** extending between the base member plate **215** and the support plate **220**. The central section **230** may include the base member extension **214** extending away from the base plate **215** and a support member extension **219** extending away from the support plate **220**. In one arrangement, the central section **230** may also include at least one coupling member **258** 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 obtainable height of the support pedestal **201**. In another arrangement, the support pillar or central section may be in the form of only a single member which may be cylindrical or non-cylindrical (e.g., square-shaped cross-section).

In this regard, the support pedestal **201** may have a fixed height and thus be non-adjustable. It is to be understood that any discussion herein in relation to the central section **230** may be equally applicable to such other forms of support pillars and central sections. In any event, a distance between the base member plate **215** and the support plate **220** may be at least about 2 inches but for most applications is not greater than about 30 inches. Examples of support pedestals are also disclosed in U.S. Patent Nos. **7,921,612** and **8,156,694**, both of which are assigned to the assignee of the present application, and both of which are incorporated by reference herein as if set forth in full.

Turning back to **Fig. 1**, each surface tile **102** may be placed upon several support pedestals **201** to elevate the surface tile **102** above the fixed surface **103**. For instance, the surface tiles **102** may be rectangular (e.g., square) and a different support pedestal **201** may be disposed beneath corner portions **116** of adjacent surface tiles **102**. Although illustrated in **Fig. 1** as being laid out in a generally symmetric, square-shaped pattern, the support pedestals **201** can also be laid out in various other configurations as may be dictated by the shape and size of the surface tiles **102**, such as a rectangular configuration or a triangular configuration.

As mentioned above, the support structure **200** includes a plurality of elongate restraining members **300** that are broadly configured to be disposed adjacent or proximate outer edge segments **120** of one or more surface tiles **102** of the elevated building surface assembly **100** to limit movement or displacement of the surface tiles **102** relative to the support pedestals **201** and/or in relation to adjacent surface tiles **102**. With additional reference now to the embodiment of **Fig. 3a**, a restraining member **300** may be designed to receive at least portions of outer edge segments **120** of one or more surface tiles **102**, such as substantially collinear outer edge segments **120** of at least a pair of adjacent surface tiles **102**. Broadly, the restraining member **300** includes a restraining element **304** and a mounting element **308** that is spaced apart from the restraining element **304** and operatively attached thereto via a connection element **312**. In one arrangement, each restraining member **300** may be in the form of a C-shaped channel (e.g., as is illustrated in **Fig. 3**). The restraining element **304**, mounting element **308** and connection element **312** collectively define a receiving chamber or space **316** for operatively receiving at least a portion of collinear outer edge segments **120** of surface tiles **102** of the elevated building surface assembly **100**. **Figs. 3b-3d** illustrate

other embodiments of the restraining member **300** whereby the restraining element **304** may be in the form of one or more restraining tabs **328** configured to be disposed within corresponding apertures or openings formed in an outer edge segment **120** and/or corner portion **116** of one or more surface tiles **102**.

In any event, each restraining member **300** may be formed in any appropriate manner and of any appropriate materials. In one arrangement, each restraining member **300** may be formed of an elongated piece of sheet metal of any appropriate gauge (e.g., at least about 28 gauge; not greater than about 6 gauge) so as to form a single, unitary structure. In one arrangement, the piece of sheet metal may be appropriately shaped or formed (e.g., bended, folded, stamped, etc.) to form the restraining element **304**, mounting element **308**, and connection element **312**. In another arrangement, the restraining element **304**, mounting element **308**, and connection element **312** may each initially be in the form of respective pieces of elongated sheet metal which are appropriately secured together (e.g., via welding) to form the restraining member **300**. Furthermore, the restraining and mounting elements **304, 308** may in some arrangements be substantially parallel to each other while the connection element **312** may be substantially perpendicular to one or both of the restraining and mounting elements **304, 308**. In one arrangement, the restraining element **304** may be angled slightly towards the mounting element **308** so as to create a bias force against a surface tile **102** disposed within the receiving space **316**. As an alternative to forming the restraining members **300** from sheet metal, the restraining members **300** may also be constructed in other manners (e.g., via thermoforming, extrusion, pultrusion, etc.) and/or from other materials (e.g., plastics, metals, fiber reinforced composites, etc.).

Figs. 4-5 illustrate an exemplary process of securing first and second restraining members $\mathbf{300_1}$, $\mathbf{300_2}$ to a top surface **222** of a support pedestal $\mathbf{201_1}$, where each of the first and second restraining members $\mathbf{300_1}$, $\mathbf{300_2}$ is configured to receive and restrain one or more surface tiles **102** against movement relative to the support pedestal **201** and/or adjacent surface tiles **102**. While the first and second restraining members $\mathbf{300_1}$, $\mathbf{300_2}$ will be shown being secured to one support pedestal $\mathbf{201_1}$, it is to be understood that one or both of the first and second restraining members $\mathbf{300_1}$, $\mathbf{300_2}$ could be secured in a similar manner to the top surface **222** of a plurality of support pedestals $\mathbf{201_1}$ of the elevated building surface assembly **100**, such as to a plurality of support

pedestals **201_1** in a substantially linear row or column of support pedestals **201_1** or the like.

Initially, a bottom surface **310_1**, **310_2** of the mounting elements **308_1**, **308_2** of each of the first and second restraining members **300_1**, **300_2** may be placed on or otherwise disposed over a top surface **222** (e.g., of a support plate **220**) of the support pedestal on opposing sides of spacers **224_3**. As shown, the first and second restraining members **300_1**, **300_2** may be placed in a "back to back" orientation so that their connection elements **312_1**, **312_2** are abutting and so that their receiving spaces **316_1**, **316_2** generally face away from each other so as to receive one or more respective surface tiles **102**. As used herein, the term "abutting" and variations thereof (e.g., abut, abuts) indicates a facing and closely spaced relative positioning (e.g., direct contact, separated by only a slight gap, such as provided by spacers 224, etc.) between components (e.g., between connection elements **312_1**, **312_2** of a pair of restraining members **300**, between outer edge segments **120** of a pair of surface tiles **102**, etc.). As also used here, the term "non-abutting" and variations thereof indicates components that are not facing each other (e.g., that are facing opposite directions, that are collinearly arranged relative to each other, etc.).

In one arrangement, the first and second restraining members **300_1**, **300_2** may be mechanically affixed to the top surface 222 of the support pedestal **201_1**. For instance, the mounting elements **308_1**, **308_2** may each have one or more respective first mounting apertures **311_1**, **311_2** (e.g., countersunk holes, non-countersunk holes) extending fully or at least partially therethrough that are sized, shaped and/or and positioned to align with corresponding apertures **225_1**, **225_2** within the top surface **222** of the support pedestal **201_1**. Upon placement of the bottom surfaces **310_1**, **310_2** of the mounting elements **308_1**, **308_2** over the top surface **222** of the support pedestal **201_1** as discussed above, fasteners (e.g., bolts, screws, etc., not shown) may be inserted through the respective pairs of apertures **$311_1/225_1$**, **$311_2/225_2$** to secure the first and second restraining members **300_1**, **300_2** to the top surface **222** of the support pedestal. **See Fig. 5**. In one arrangement, the fasteners could be configured to self-tap into the top surface **222** of the support pedestal **201_1** (e.g., without requiring an aperture in the top surface **222** of the support pedestal). In another arrangement, the bottom surfaces **310_1**, **310_2** of the mounting elements **308_1**, **308_2** may be mechanically affixed to the top surface **222** of the

support pedestal **201_1** in other manners not necessarily requiring mounting apertures **311_1**, **311_2** such as via spring-loaded locking members, flexible tangs/snaps/clips, and/or the like. Of course, other manners of securing the mounting elements **308_1**, **308_2** to the top surface 222 are envisioned such as via adhesives, welding, and/or the like.

In one arrangement, the connection elements **312_1**, **312_2** may each have one or more respective second mounting apertures **313_1**, **313_2** that are sized, shaped and/or positioned to receive corresponding spacers **224_1**, **224_2** extending from the top surface **222** of the support pedestal **201_1**. Returning to **Fig. 4**, for instance, the second mounting apertures **313_1**, **313_2** may be disposed over the corresponding spacers **224_1**, **224_2** and then moved towards the top surface **222** so as to receive the spacers **224_1**, **224_2** as shown in **Fig. 5**. In addition to limiting lateral movement of the first and second restraining members **300_1**, **300_2** (e.g., in directions generally parallel to the top surface **222**), receipt of the spacers **224_1**, **224_2** in the second mounting apertures **313_1**, **313_2** may serve to align the respective pairs of apertures **$311_1/225_1$**, **$311_2/225_2$**. In one arrangement, the top surface **222** may not include any (pre-formed) apertures **225_1**, **225_2**. In this arrangement, however, receiving the spacers **224_1**, **224_2** through the corresponding second mounting apertures **313_1**, **313_2** may serve to align the first mounting apertures **311_1**, **311_2** with locations on the top surface **222** into which the fasteners may be threaded or otherwise inserted. While each second mounting aperture **313_1**, **313_2** has been illustrated as having a rectangular shape, it is envisioned that each second mounting aperture **313_1**, **313_2** could have other shapes such as circular, other polygonal shapes, and/or the like.

Once the mounting elements **308_1**, **308_2** have been secured to the top surface **222** of the support pedestal **201_1** as shown in **Fig. 5**, one or more surface tiles **102** may be inserted into the receiving spaces **316_1**, **316_2** of the first and second restraining members **300_1**, **300_2**. See **Fig. 6**. In the interest of clarity, surface tiles **102** have not been shown for insertion into the receiving space **316_2** of the second restraining member **300_2** in **Fig. 6**. For instance, first and second surface tiles **102_1**, **102_2** may be inserted into the receiving space **316_1** of the first restraining member **300_1** on opposing sides of the spacer **224_1**, such that substantially collinear outer edge segments **120_1**, **120_2** and respective corner portions **116_1**, **116_2** of the first and second surface tiles **102_1**, **102_2** are at least partially received in the receiving space **316_1**, and so that bottom surfaces **112_1**,

112$_2$ of the first and second surface tiles **102$_1$**, **102$_2$** are at least partially disposed over and/or abut a top surface **309$_1$** of the first mounting element **308$_1$**.

Fig. 7a illustrates a cross-sectional view of the first surface tile **102$_1$** being inserted into the first receiving space **316$_1$** and a third surface tile **102$_3$** (not shown in **Fig. 6**) being inserted into the second receiving space **316$_2$** such that a first outer edge segment **120$_1$** of the first surface tile **102$_1$** abuts a first outer edge segment **120$_3$** of the third surface tile **102$_3$**. In one arrangement, one or more spacers **224$_3$** extending from the top surface **222** of the support pedestal may be disposed between the connection elements **312$_1$**, **312$_3$** of the first and third restraining members **300$_1$**, **300$_2$** to space the connection elements **312$_1$**, **312$_3$** a distance **315** from each other. In another arrangement, the one or more spacers **224$_3$** may not be disposed between the connection elements **312$_1$**, **312$_3$** and the connection elements **312$_1$**, **312$_3$** may or may not be spaced from each other.

It can be seen how the restraining element **304$_1$** of the first restraining member **300$_1$** may be received within a correspondingly shaped, sized and/or positioned receiving aperture or opening **124$_1$** disposed within the outer edge segment **120$_1$** and spaced from and disposed between the top and bottom surfaces **108$_1$** and **112$_1$** (a similar discussion applies to third surface tile **102$_3$** relative to the second restraining member **300$_2$**). For instance, the receiving opening **124$_1$** may be in the form of an elongated slot, where the slot is spaced a distance from the bottom surface **112$_1$** that is approximately the same as the distance between the mounting and restraining elements **308$_1$** and **304$_1$**. In this regard, upon resting the bottom surface **112$_1$** of the surface tile **102$_1$** on the top surface **309$_1$** of the connection element **308$_1$**, the surface tile **102$_1$** may thereafter be pushed in the direction of the arrows in **Fig. 6** to allow the outer edge segment **120$_1$** to enter the receiving space **316$_1$** and the receiving opening **124$_1$** to receive the restraining element **304$_1$** as illustrated in **Fig. 7a**.

With reference to **Fig. 8**, it can be seen how after restraining a first outer edge segment of the first surface tile **102$_1$** with the first restraining member **300$_1$**, a second, opposing outer edge segment **120$_1$** of the first surface tile **102$_1$** may be placed on top surfaces **222** of respective support pedestals **201$_2$** to thereby add the top surface (not labeled in **Fig. 8**) of the first surface tile **102$_1$** to the elevated building surface **101** of the

elevated building surface assembly **100**. A similar process may be performed for other surface tiles **102** restrained by the first restraining member $\mathbf{300_1}$.

The elevated building surface **101** may also include surface tiles **102** that are not directly restrained by the restraining members **300**. That is, one or more of the surface tiles **102** may not have their outer edge segments **120** restrained by the restraining members **300**. For instance, **Fig. 8** also shows a surface tile $\mathbf{102_4}$ that may be placed over a plurality of support pedestals $\mathbf{201_2}$ (e.g., four support pedestals $\mathbf{201_2}$ corresponding to the four corner portions **116** of the surface tile $\mathbf{102_4}$), where the surface tile $\mathbf{102_4}$ is not directly restrained by a restraining member **300** (e.g., note absence of restraining members **300**, **300'** adjacent surface tile $\mathbf{102_4}$ in **Figs. 8-10**). To allow for ready removal of a surface tile **102** that is directly restrained by a restraining member **300** (e.g., surfaces tile $\mathbf{102_1}$ or $\mathbf{102_5}$), an adjacent surface tile **102** that is not directly restrained by one of the restraining members **300** (e.g., surface tile $\mathbf{102_4}$) may first be removed (e.g., see **Fig. 8**) to provide access to an exposed outer edge segment **120** of the surface tile **102** (e.g., second outer edge segment $\mathbf{120_1}$ of surface tile $\mathbf{102_1}$). The surface tile **102** (e.g., surface tile $\mathbf{102_1}$) may then be pulled away from its respective restraining member **300** (e.g., in a direction opposite arrows in **Fig. 6**) to remove the surface tile **102** from the elevated building surface assembly **100**. **See Fig. 10**.

In one arrangement, any appropriate tie-down device accessible from above the elevated building surface **101** may be used to secure one or more corner portions **116** of the surface tiles to the support pedestals $\mathbf{201_2}$ (i.e., support pedestals **201** free of restraining members **300**). For instance, an anchoring washer and fastener (e.g., such as that disclosed in U.S. Patent App. Pub. No. **2011/0016809**, which is assigned to the assignee of the present application, and which is incorporated herein by reference as if disclosed in full) may be used to secure corner portions **116** of surface tiles **102** to support pedestals $\mathbf{201_2}$. In this regard, a user could insert any appropriate tool (e.g., screwdriver, wrench) between adjacent corner portions **116** of surface tiles **102** over a support pedestal $\mathbf{201_2}$ and manipulate a corresponding fastener to allow for lifting of the corner portions **116** away from the support pedestal $\mathbf{201_2}$.

In some arrangements, and referring back to **Fig. 1**, it may be desirable to additionally or alternatively resist movement (e.g., upward movement) of surface tiles **102** adjacent the outer periphery **105** of the elevated building surface assembly **100**

away from a corresponding support pedestal **201** and/or adjacent surface tiles **102**, such as due to uplift forces (e.g., generated by wind and/or other environmental events). For instance, at least one parapet **400** (see **Fig. 1**) may extend upwardly away from the fixed surface **103** (e.g., such as the roof of a building), generally surrounding the outer periphery **105** of the elevated building surface assembly **100**, where the parapet **400** has one or more parapet sections such as first and second parapet sections **404**, **408**. As part of constructing the elevated building assembly **100**, one or more peripheral restraining members **300'** may be secured to one or more support pedestals $\mathbf{201}_1$ adjacent the parapet **400** so as to receive and restrain surface tiles **102** adjacent the outer periphery **105** of the elevated building surface assembly **100**.

Turning to **Fig. 7b**, a restraining member **300'** may be disposed over and secured to the top surface **222** of each support pedestal in a row or column of support pedestals adjacent an inner surface **412** of the parapet **400**. Each restraining member **300'** may be shaped and/or configured so that the distance between the restraining and connection elements **304'**, **308'** is substantially the same as the distance between the top and bottom surfaces **108**, **112** (i.e., the thickness) of a corresponding surface tile **102**. Outer edge segments **120** (collectively forming part of the outer periphery **105**) of a plurality of surface tiles **102** (e.g., surface tiles $\mathbf{102}_5$, $\mathbf{102}_6$, and $\mathbf{102}_7$ in **Fig. 1**) may then be fully inserted into the receiving space **316'** of the peripheral restraining member **300'** so that the restraining element **304'** rests on or is otherwise disposed closely adjacent the top surface **108** of the surface tile **102**. While not shown, a restraining member could in some arrangements include a restraining element configured to be received in at least one corresponding receiving opening in the outer edge segment **120** of a surface tile **102** and a second restraining element **304'** configured to be received over and to contact or abut a top surface **108** of the surface tile **120**.

In one arrangement, the restraining member **300'** may be secured to and positioned relative to the top surfaces of the support pedestals $\mathbf{201}_1$ in a manner similar to the manner in which restraining member $\mathbf{300}_1$ is secured to the top surface **222** of support pedestal $\mathbf{201}_1$ in **Figs. 4-5**. In this arrangement, a gap would exist between the inner surface **412** of the parapet **400** and the connection element **312'** of the restraining member **300'** because no restraining member would be disposed where restraining member $\mathbf{300}_2$ is shown in **Figs. 4-5**. In another arrangement, the restraining member

300' may be secured to and aligned relative to the top surface **222** by engaging with the spacer $\mathbf{224_2}$ and apertures $\mathbf{225_2}$ of **Fig. 4**, but where the receiving space **316'** opens in a direction similar to that in which the receiving space $\mathbf{316_1}$ of restraining member $\mathbf{300_1}$ opens in **Fig. 4**.

As shown in **Fig. 7b**, the connection element **312'** of the restraining member **300'** may be disposed adjacent the inner surface **412** of the parapet **400** so that the bottom surface **112** of the surface **102** is disposed over a substantial majority of the top surface **222** of the support pedestal $\mathbf{201_1}$ (instead of only about half of the surface area of the top surface **222** as in **Fig. 4**). In this arrangement, the top surface **222** may be devoid of the spacers $\mathbf{224_3}$ shown in **Figs. 4-6** to allow one or more surface tiles **102** to slide into the receiving space **316'** and be disposed over the top surface **222**. In any event, the connection element **312'** may be allowed to float relative to the inner surface **412** of the parapet **400** or be secured to the inner surface **412** of the parapet **400** (e.g., via fasteners being inserted/threaded through the connection element **312'** and into the inner surface **412**).

Turning now to **Figs. 11-13**, another embodiment of a restraining member **300"** is illustrated for use as part of the support structure **200** to elevate the surface tiles **102** above the fixed surface **103** (where the restraining member **300"** be used as an interior or peripheral restraining member). One difference between the restraining member **300"** of **Figs. 11-13** and the restraining member **300** of **Figs. 3-6** is that first and second opposing free ends **320", 324"** of the restraining member **300"** are respectively configured to rest over and be secured to the top surfaces **222** of the support plates **220** of a pair of adjacent support pedestals $\mathbf{201_1}$. **See Fig. 12**. As each restraining member **300"** is thus for use with only a pair of adjacent support pedestals $\mathbf{201_1}$, use of the restraining members **300"** (e.g., either in conjunction with or as an alternative to the restraining members **300**) advantageously increases the modularity of an elevated building surface assembly **100**. For instance, the adjacent restraining members **300"** may be disposed at right angles to each other over the support plate of a common support pedestal $\mathbf{201_1}$ depending upon the configuration necessary for a particular elevated building surface assembly **100**. **See Fig. 13**. It is noted that elevated building surface assemblies may or may not include the bracing members illustrated in **Fig. 13**

between adjacent support pedestals **201** depending upon the particular requirements of a particular assembly.

The mounting element **308"** may have one or more respective mounting apertures **311"** (e.g., countersunk holes, non-countersunk holes) extending fully or at least partially therethrough adjacent each of the first and second free ends **320", 324"**. Each mounting aperture **311"** is sized, shaped and/or and positioned to align with a corresponding aperture (not shown) within the top surface **222** of one of the pair of adjacent support pedestals $\mathbf{201}_1$. For instance, upon placement of the bottom surfaces **310"** of the mounting elements **308"** of first and second "back to back" restraining members **300"** over the top surfaces **222** of the pair of adjacent support pedestals $\mathbf{201}_1$ as shown in **Fig. 12** (e.g., and where spacers extending from the top surfaces **222** could be disposed between the abutting connection elements **312"** of the first and second restraining members **300"** similar to in **Fig. 7a**), fasteners (e.g., bolts, screws, etc., not shown) may be inserted through the various apertures **311"** and into the top surfaces **222** of the pair of adjacent support pedestals $\mathbf{201}_1$ to secure the first and second restraining members **300"** to the top surfaces **222** of the pair of adjacent support pedestals $\mathbf{201}_1$.

Alternatively, the fasteners could be configured to self-tap into one or both of the mounting elements **308"** and the top surfaces **222** of the pair of adjacent support pedestals $\mathbf{201}_1$ (e.g., without requiring pre-formed apertures). In one arrangement, any appropriate indicia (e.g., marks, texturing, etc.) may be disposed on the mounting elements **308"** and/or the top surfaces **222** to convey to an installer where apertures are to be formed. Still further, welding and/or adhesives may be used to secure the first and second free ends **320", 324"** to the top surfaces **222** of the support plates **220** of the pair of adjacent support pedestals $\mathbf{201}_1$ as alternatives to the use of fasteners and apertures as discussed previously.

The restraining element **304"** of the restraining member **300"** may be in the form of one or more restraining tabs **328** configured to be received within at least one receiving opening **124"** (e.g., a kerf cut) disposed within an outer edge segment **120"** of a surface tile **102"** or disposed over a top surface **108"** of the surface tile **102"**. In use, one or more restraining members **300"** may be disposed over and secured to the top surfaces **222** of a pair of adjacent support pedestals $\mathbf{201}_1$ as discussed above. **See Fig.**

12. Portions of outer edge segments **120"** of surface tiles **102"** may be inserted into the receiving spaces **316"** of the restraining members **300"** so that the one or more restraining tabs **328** are received in the receiving openings **124"** of the surface tiles **102"**. While three restraining tabs **328** have been illustrated in **Fig. 11**, the restraining element **304"** may have other numbers of tabs **328** (e.g., similar to the restraining element **304** illustrated in **Figs. 3a-3d**). For instance, the restraining members **300"** illustrated in **Fig. 13** include restraining members having only a single restraining tab **328**. Furthermore, some embodiments of the restraining element **304"** may be in the form of a single continuous member as is the restraining element **304** of the restraining member **300** of **Figs. 3-6.**

In one arrangement, first and second restraining members **300_1", 300_2"** may be secured together in a back-to-back arrangement to form a restraining unit **350** that may be placed over and secured to the top surfaces **222** of a pair of adjacent support pedestals **201_1**. **See Fig. 14**. For instance, the connection elements **312"** of the first and second restraining members **300_1", 300_2"** may be placed against each other and then the respective connection elements **312"** may be clinched together at one or more locations to fasten the first and second restraining members **300_1", 300_2"** together. As another example, welding, fasteners and apertures, and/or the like may be used to secure the respective connection elements **312"** to each other and thus fasten the first and second restraining members **300_1", 300_2"** together.

In one embodiment, the restraining unit **350** may include one or more apertures **354** extending therethrough adjacent the first and second free ends **320", 324"** for receiving one or more respective spacer tabs **224** extending away from the top surface **222** of the support plate **220** of the pair of adjacent support pedestals **201_1**. For instance, each aperture **354** may be formed through portions of the mounting elements **308"**, connection elements **312"** and restraining elements **304"** of both of the first and second restraining members **300_1", 300_2"** so as to be configured to receive a respective spacer tab **224** extending between the first and second restraining members **300_1", 300_2"**. While the restraining elements **304"** of the restraining unit **350** have been shown in the form of single continuous members, other arrangements envision that one or both of the restraining elements **304"** could be in the form of one or more restraining tabs **328** as discussed in relation to other embodiments disclosed herein. Furthermore, any of the

restraining members **300** in **Figs. 3a-3d** could also be used to construct corresponding restraining units.

One method for constructing the elevated building surface assembly **100** will now be described, although numerous other methods and manners of constructing the assembly **100** are also envisioned. Initially, a plurality of support pedestals **201** may be appropriately located upon the fixed surface **103** with any appropriate predetermined spacing between the support pedestals **201** and in any appropriate arrangement, such as a plurality of substantially linear rows and columns of support pedestals **201** (e.g., such as perpendicular rows and columns as shown in **Fig. 1**). Part of this step may in some situations include 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.

Any appropriate arrangement of restraining members **300**, **300', 300"** (e.g., and/or restraining units **350**) may also be secured to the top surfaces **222** of a first portion of the support pedestals **201**. For instance, peripheral restraining members **300'** (as in **Fig. 7b**) could be secured to the top surfaces **222** of the support pedestals $\mathbf{201}_1$ adjacent the parapet **400** in **Fig. 1**. As another example, interior restraining members **300, 300"** may be secured to the top surfaces **222** of support pedestals $\mathbf{201}_1$ (e.g., in the manner discussed in relation to **Figs. 4-5 and 11-12**) in at least some of the rows of support pedestals. In one arrangement, pairs of restraining members **300** may be secured to every third row of support pedestals **201** as shown in **Figs. 1** and **8**. Alternatively or additionally, a plurality of restraining members **300"** may be respectively secured to adjacent pairs of support pedestals $\mathbf{201}_1$ (e.g., as discussed previously in relation to **Figs. 11-13**).

The method may then include mounting a plurality of surface tiles **102, 102"** over the support pedestals **201** to create an elevated building surface **101**. For instance, this step may include introducing first outer edge segments **120, 120"** of a first portion of a plurality of surface tiles **102, 102"** (e.g., rows of surface tiles **102, 102"** to be directly restrained by a corresponding restraining member **300**, **300', 300"**) between restraining and mounting elements **304/304'/304"**, **308/308'/308"** of the restraining members (e.g.,

as in **Figs. 6**, **7a**, **7b and 11-13**), and placing second outer edge segments **120, 120"** (e.g., adjacent corner portions **116, 116"**) of the first portion of surface tiles over top surfaces **222** of a second portion of the plurality of support pedestals **201** (e.g., such as support pedestals $\mathbf{201_2}$ in **Fig. 8**).

As another example, outer edge segments **120** (e.g., adjacent corner portions **116**) of a second portion of surface tiles (e.g., surface tiles that are not to be directly restrained by restraining members **300**, **300'**, such as surface tile $\mathbf{102_4}$ in **Figs. 8-9**) may be placed over the top surfaces **222** of the second portion of support pedestals (e.g., support pedestals $\mathbf{201_2}$) to create the elevated building surface **101**. Advantageously, the surface tiles **102** in every third row of surface tiles (e.g., including surface tile $\mathbf{102_4}$ in **Fig. 8**) may be removed from the elevated building surface assembly **100** to provide a user with access to a surface tile (e.g., such as surface tile $\mathbf{102_1}$) that is being restrained by a restraining member **300**, **300', 300"** (e.g., so as to repair or replace the surface tile **102**, a particular support pedestal **201**, and/or the like). As discussed previously, any appropriate tie-down, anchoring washer arrangement, or the like may be disposed over or into support pedestals that are free of restraining members (e.g., support pedestals $\mathbf{201_2}$) as appropriate to provide increased levels of resistance to wind, weather, and/or other environment events.

It is to be understood that the various components disclosed herein have not necessarily been drawn to scale. For instance, the restraining members **300, 300', 300"** may actually be much thinner than depicted in the figures (e.g., in the event the restraining members **300, 300', 300"** are constructed of sheet metal or other material or the like). Also, many components have been labeled as "first," "second," "third,", etc. (e.g., "first surface tile $\mathbf{102_1}$," "second surface tile $\mathbf{102_2}$," "third surface tile $\mathbf{102_3}$," etc.) merely to assist the reader in understanding the relationships between the components should not imply that an elevated building surface assembly encompassed herein need have the specific arrangement shown and described herein. Furthermore, while small gaps have been shown between some of the components in the figures (e.g., between the bottom surfaces $\mathbf{112_1}$, $\mathbf{112_3}$ of the surface tiles $\mathbf{102_1}$, $\mathbf{102_3}$ and the top surfaces $\mathbf{309_1}$, $\mathbf{309_3}$ of the mounting elements $\mathbf{308_1}$, $\mathbf{308_3}$ of the restraining members $\mathbf{300_1}$, $\mathbf{300_2}$ in **Fig. 7a**), it is to be understood that in reality, these gaps may not exist and that such components may be in direct contact. In other words, at least some of such gaps have

merely been provided to assist the reader in understanding the various components of the elevated building surface assembly **100**.

The various restraining members disclosed herein may advantageously stiffen the elevated building surface assembly and thereby resist the effects of uplift forces and the like. Specifically, the interior restraining members may limit both buckling between adjacent surface tiles as well as limit the ability of the uplift forces to create force moments that may otherwise lift the surface tiles away from the support pedestals and away from other surface tiles (e.g., by changing the location on the lower surface of the surface tiles against which the uplift forces would need to be applied to move the surface tiles to a position that is less likely to result in lifting of the surface tiles). Also, the peripheral restraining members may restrain the outer periphery of the assembly to limit buckling between surface tiles adjacent the outer periphery. Furthermore, the disclosed elevated building surface assembly may not necessarily require any special modifications to the surface tiles in order to allow the restraining members to stiffen the assembly.

The foregoing description of the present invention has been presented for purposes of illustration and description. Furthermore, the description is not intended to limit the invention to the form disclosed herein. Consequently, variations and modifications commensurate with the above teachings, and skill and knowledge of the relevant art, are within the scope of the present invention. For instance, while the drawings illustrate a symmetrical arrangement of rows and columns of square-shaped surface tiles **102**, the present teachings may be readily applied to other arrangements and shapes of surface tiles **102**, support pedestals **201**, and/or the like. As another example, while the drawings illustrate restraining members **300**, **300'**, **300"** generally being secured to every third row of support pedestals **201**, other arrangements are also envisioned and encompassed within the scope of the present disclosure. In one arrangement, at least some combination of interior restraining members may be secured to at least some rows and columns of support pedestals **201** depending upon the particular design requirements of the elevated building surface assembly **100**.

As a further example, while the interior restraining members have been discussed in the context of pairs of interior restraining members (e.g., first and second restraining members $\mathbf{300_1}$, $\mathbf{300_2}$ in **Figs. 4-7a**), some arrangements envision that a

particular row or column of support pedestals may include only a single interior restraining member **300, 300"**. Still further, while the interior restraining members have been illustrated as being the restraining members **300, 300"** and the peripheral restraining member have been shown as being the restraining members **300'**, it is envisioned that at least some of the peripheral restraining members could be in the form of restraining members **300** and/or at least some of the interior restraining members could be in the form of the restraining members **300'**. Even further, while each of the restraining members **300, 300', 300"** has been shown in the form of a generally C-shaped channel, other configurations are also possible. For instance, one or more of the restraining members **300, 300', 300"** could be in the form of an H-shaped channel having opposing receiving spaces **316, 316, 316"** that would allow for receipt of opposing surface tiles **102, 102"**.

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. However, is to be expressly understood that such modifications and adaptations are within the spirit and scope of the present invention.

What is Claimed is:

1. A system for supporting and restraining a plurality of surface tiles that are disposed in horizontally spaced-apart relation, the system comprising:

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

a plurality of elongate restraining members, the restraining members comprising a restraining element and a mounting element that is spaced apart from the restraining element and operatively attached thereto, the restraining element configured to be disposed proximate an outer edge segment of at least a first surface tile and along at least a portion of a length of the outer edge segment of the first surface tile, and the mounting element configured to be disposed under a bottom surface of the first surface tile that is adjacent the outer edge segment of the first surface tile and affixed to the support plates of at least first and second spaced-apart support pedestals to secure the restraining member to the first and second support pedestals.

2. The system of claim 1, wherein the restraining members comprise an elongate C-shaped channel.

3. The system of claim 1, wherein the restraining element is configured to be disposed over a top surface of the first surface tile.

4. The system of claim 1, wherein the restraining element is configured to be operatively positioned within an opening disposed in the outer edge segment.

5. The system of claim 4, wherein the opening comprises a slot.

6. The system of claim 1, wherein the mounting element comprises a plurality of apertures therein, wherein first apertures of the plurality of apertures are sized and positioned to receive fasteners inserted therein and into the top surfaces of the support plates to secure the restraining members to the support pedestals.

7. The system of claim 6, wherein the mounting element comprises a first plurality of the first apertures therein adjacent a first end of the restraining members and a second plurality of the first apertures therein adjacent an opposed second end of the restraining members, wherein the first plurality of the first apertures are sized and positioned to receive a first plurality of the fasteners inserted therein and into the top surfaces of a first of the support plates to secure the restraining members to a first of the support pedestals, wherein the second plurality of the first apertures are sized and

positioned to receive a second plurality of the fasteners inserted therein and into the top surfaces of a second of the support plates to secure the restraining members to a second of the support pedestals, and wherein the first support pedestal is adjacent the second support pedestal.

8. The system of claim 7, wherein the first ends of a first plurality of the restraining members and the second ends of a second plurality of the restraining members are secured over common ones of the plurality of support pedestals.

9. The system of claim 8, wherein the first plurality of restraining members are perpendicular to the second plurality of restraining members.

10. The system of claim 8, wherein the first plurality of restraining members are collinear with the second plurality of restraining members.

11. The system of claim 6, wherein second apertures of the plurality of apertures are sized and positioned to receive spacers extending from the top surfaces of the support plates.

12. The system of claim 1, wherein the restraining element is configured to be disposed proximate a second adjacent surface tile that is adjacent the first surface tile and along a non-abutting outer edge segment of the second adjacent surface tile that is collinear with the outer edge segment of the first surface tile.

13. The system of claim 12, wherein the restraining element is configured to be disposed over top surfaces of the first and second surface tiles.

14. The system of claim 12, wherein the restraining element is configured to be positioned within openings disposed in the outer edge segments of the first and second surface tiles.

15. The system of claim 14, wherein the openings comprise slots.

16. The system of claim 12, wherein the mounting element comprises a plurality of apertures therein, wherein first apertures of the plurality of apertures are sized and positioned to receive fasteners inserted therein and into the top surfaces of the support plates to secure the restraining members to the support pedestals

17. The system of claim 16, wherein second apertures of the plurality of apertures are sized and positioned to receive spacers extending from the top surfaces of the support plates, and wherein one of the spacers is configured to space abutting outer edge segments of the first and second surface tiles.

18. The system of claim 17, wherein respective pairs of the first apertures are disposed on opposing sides of a respective one of the second apertures.

19. The system of claim 1, wherein the plurality of elongate restraining members comprise a plurality of pairs of elongate restraining members, wherein the first elongate restraining member of each pair is configured to be disposed proximate an outer edge segment of the first surface tile disposed over a support pedestal, and wherein the second elongate restraining member of each pair is configured to be disposed proximate an abutting outer edge segment of a second surface tile disposed over the support pedestal.

20. The system of claim 19, wherein the top surfaces of the support plates comprise spacers extending therefrom that are configured to space the first and second elongate restraining members of each pair of elongate restraining members.

21. The system of claim 19, wherein the restraining members further comprise a connection element interconnecting the restraining and mounting elements, and wherein the connection elements of the first and second elongate restraining members of each pair are abutting.

22. The system of claim 21, wherein each of the first and second restraining members of each pair comprises an elongate C-shaped channel.

23. The system of claim 1, wherein the restraining members are constructed from sheet metal.

24. The system of claim 20, wherein the sheet metal has a sheet metal gauge of at least about 28 and not greater than about 6.

25. The system of claim 1, wherein the restraining members are constructed from at least one of plastics, metals, or reinforced composites.

26. The system of claim 1, wherein the restraining members have a length of at least about 2 inches.

27. The system of claim 1, wherein the restraining members have a length not greater than about 144 inches.

28. The system of claim 1, wherein the restraining members have a length not greater than about 100 inches.

29. The system of claim 1, wherein the restraining members comprise a single, unitary structure.

30. The system of claim 1, wherein the restraining members further comprise a connection element interconnecting the restraining and mounting elements.

31. An elevated building surface assembly, comprising:

a plurality of surface tiles, the surface tiles comprising a top surface, a plurality of corner portions and outer edge segments disposed between adjacent corner portions;

a plurality of support pedestals disposed in spaced-apart relation on a fixed surface, the support pedestals comprising a support plate having a top surface operatively supporting the surface tiles in horizontally spaced-apart relation; and

a plurality of elongate restraining members, the restraining members comprising a restraining element and a mounting element that is spaced apart from the restraining element and operatively attached thereto, the restraining element being disposed proximate an outer edge segment of at least one of at least a pair of the plurality of surface tiles and along at least a portion of a length of the outer edge segments of at least one of the pair of surface tiles, and the mounting element being disposed adjacent the outer edge segments of at least one of the pair of surface tiles and affixed to the support plate of at least a first of the plurality of support pedestals to secure the at least one of the pair of surface tiles to the first support pedestal.

32. The elevated building surface assembly of claim 31, wherein the restraining element is disposed over the top surface of the pair of surface tiles.

33. The elevated building surface assembly of claim 32, wherein the plurality of surface tiles collectively comprise an elevated building surface having an outer periphery, and wherein the outer edge segments of the pair of surface tiles form a portion of the outer periphery.

34. The elevated building surface assembly of claim 31, wherein the restraining element is positioned within an opening disposed in the outer edge segment of at least one of the pair of surface tiles.

35. The elevated building surface assembly of claim 34, wherein the openings comprise slots.

36. The elevated building surface assembly of claim 31, wherein the outer edge segments of the pair of surface tiles are collinear.

37. The elevated building surface assembly of claim 31, wherein the mounting element comprises a plurality of apertures therein, wherein a first of the plurality of apertures receives a fastener inserted therein and into the top surface of the

support plate of the first support pedestal to secure the restraining member to the first support pedestal.

38. The elevated building surface assembly of claim 37, wherein a second of the plurality of apertures receives a spacer extending from the top surface of the support plate of the first support pedestal, and wherein the spacer spaces abutting outer edge segments of the pair of surface tiles.

39. The elevated building surface assembly of claim 38, wherein a third of the plurality of apertures receives a fastener inserted therein and into the top surface of the support plate of the first support pedestal to secure the restraining member to the first support pedestal.

40. The elevated building surface assembly of claim 39, wherein the first and third apertures are disposed on opposing sides of second aperture.

41. The elevated building surface assembly of claim 31, further comprising adhesive disposed between the mounting element and the top surface of the support plate of the first support pedestal to secure the restraining member to the first support pedestal.

42. The elevated building surface assembly of claim 31, further comprising at least one weld joint disposed between the mounting element and the top surface of the support plate of the first support pedestal to secure the restraining member to the first support pedestal.

43. The elevated building surface assembly of claim 31, further comprising at least one spring-loaded locking member disposed between the mounting element and the top surface of the support plate of the first support pedestal to secure the restraining member to the first support pedestal.

44. The elevated building surface assembly of claim 31, wherein the pair of surface tiles comprises a first pair of surface tiles, wherein the restraining element of a first of the plurality of elongate restraining members is disposed proximate an outer edge segment of each of the first pair of surface tiles and along at least a portion of the length of the outer edge segments of the first pair of surface tiles, wherein the mounting element of the first elongate restraining member is disposed adjacent the outer edge segments of the first pair of surface tiles and is affixed to the support plate of the first support pedestal to secure at least the first pair of surface tiles to the first support pedestal; and

wherein the restraining element of a second of the plurality of elongate restraining members is disposed proximate an outer edge segment of each of a second pair of the plurality of surface tiles and along at least a portion of the length of the outer edge segments of the second pair of surface tiles, and wherein the mounting element of the second elongate restraining member is disposed adjacent the outer edge segments of the second pair of surface tiles and is affixed to the support plate of one of the support pedestals to secure at least the second pair of surface tiles to the one of the support pedestals.

45. The elevated building surface assembly of claim 44, wherein the one of the support pedestals comprises the first support pedestal.

46. The elevated building surface assembly of claim 45, wherein the outer edge segments of the first pair of surface tiles abut the outer edge segments of the second pair of surface tiles.

47. The elevated building surface assembly of claim 45, wherein the top surface of the support plate of the first support pedestal comprises at least one spacer extending therefrom that spaces the first elongate restraining member from the second elongate restraining member.

48. The elevated building surface assembly of claim 31, wherein the restraining members comprise an elongate C-shaped channel.

49. The elevated building surface assembly of claim 31, wherein the restraining members are constructed from sheet metal.

50. The elevated building surface assembly of claim 49, wherein the sheet metal has a sheet metal gauge of at least about 28 and not greater than about 6.

51. The elevated building surface assembly of claim 31, wherein the restraining members are constructed from at least one of plastics, metals, or fiber reinforced composites.

52. The elevated building surface assembly of claim 31, wherein the restraining members have a length of at least about 2 inches.

53. The elevated building surface assembly of claim 31, wherein the restraining members have a length not greater than about 144 inches.

54. The elevated building surface assembly of claim 53, wherein the restraining members have a length not greater than about 100 inches.

55. The elevated building surface assembly of claim 31, wherein the restraining members comprise a single, unitary structure.

56. The elevated building surface assembly of claim 31, wherein at least a portion of the plurality of support pedestals are disposed in a substantially linear row beneath collinear outer edge segments of a plurality of pairs of adjacent surface tiles, wherein at least a first of the plurality of elongate restraining members is disposed along the linear row of support pedestals.

57. The elevated building surface assembly of claim 56, wherein a second of the plurality of elongate restraining members is disposed along the linear row of support pedestals.

58. The elevated building surface assembly of claim 31, wherein the plurality of support pedestals are disposed in a plurality of substantially linear rows beneath collinear outer edge segments of a plurality of pairs of adjacent building surface tiles, and wherein the restraining members are disposed along no more than every third linear row of support pedestals beneath collinear outer edge segments of the plurality of pairs of adjacent building surface tiles.

59. The elevated building surface assembly of claim 31, wherein the top surfaces of the plurality of surface tiles collectively comprise an elevated building surface comprising an outer periphery, wherein the plurality of elongate restraining members comprise at least interior restraining members and peripheral restraining members, and wherein a plurality of the peripheral restraining members are disposed along at least a portion of the outer periphery of the elevated building surface.

60. The elevated building surface assembly of claim 59, wherein the restraining elements of the peripheral restraining members are disposed over a top surface of the elevated building surface.

61. The elevated building surface assembly of claim 59, wherein the restraining elements of the interior restraining members are positioned within openings disposed in collinear outer edge segments of one or more pairs of surface tiles.

62. The elevated building surface assembly of claim 59, wherein the peripheral restraining members abut a parapet that at least partially surrounds the outer periphery of the elevated building surface.

63. The elevated building surface assembly of claim 62, wherein at least some of the peripheral restraining members are securable to the parapet.

64. The elevated building surface assembly of claim 62, wherein each of the peripheral restraining members comprises an elongate C-shaped channel.

65. A method for the construction of an elevated building surface assembly comprising the steps of:

locating a plurality of support pedestals upon a fixed surface with a predetermined spacing between the support pedestals;

disposing restraining members over top surfaces of a first portion of the plurality of support pedestals;

introducing at least portions of first outer edge segments of a first portion of a plurality of surface tiles between restraining and mounting elements of the restraining members; and

placing second outer edge segments of the first portion of surface tiles over top surfaces of a second portion of the plurality of support pedestals.

66. The method of claim 65, wherein the disposing step comprises:

first securing a first plurality of the mounting elements adjacent a first end of the restraining members to the top surfaces of first support pedestals of the first portion of the plurality of support pedestals; and

second securing a second plurality of the mounting elements adjacent an opposing second end of the restraining members to the top surfaces of second support pedestals of the first portion of the plurality of support pedestals, wherein each of the first support pedestals is adjacent one of the second support pedestals.

67. The method of claim 66, wherein the first ends of a first plurality of the restraining members and the second ends of a second plurality of the restraining members are secured over common ones of the first portion of the plurality of support pedestals.

68. The method of claim 66, wherein the securing step comprises:

mechanically affixing the restraining members to the top surfaces of the first portion of the support pedestals to secure the restraining members to the first portion of support pedestals.

69. The method of claim 68, wherein the mechanically affixing step comprises:

inserting a plurality of mechanical fasteners through the mounting elements of the restraining members and into the top surfaces of the first portion of support pedestals to secure the restraining members to the first portion of support pedestals.

70. The method of claim 66, wherein the disposing step comprises:

adhering the mounting elements to the top surfaces of the first portion of support pedestals to secure the restraining members to the first portion of support pedestals.

71. The method of claim 66, wherein the disposing step comprises:

welding the mounting elements to the top surfaces of the first portion of support pedestals to secure the restraining members to the first portion of support pedestals.

72. The method of claim 66, further comprising:

positioning at least some of the restraining members adjacent a parapet that at least partially surrounds the plurality of support pedestals.

73. The method of claim 72, further comprising:

securing at least some of the restraining members to the parapet.

74. The method of claim 73, wherein the securing step comprises mechanically affixing the at least some of the restraining members to the parapet.

75. The method of claim 65, wherein the disposing step comprises:

mechanically affixing the restraining members to the top surfaces of the first portion of the support pedestals to secure the restraining members to the first portion of support pedestals.

76. The method of claim 75, wherein the mechanically affixing step comprises:

inserting a plurality of mechanical fasteners through the mounting elements of the restraining members and into the top surfaces of the first portion of support pedestals to secure the restraining members to the first portion of support pedestals.

77. The method of claim 65, wherein the disposing step comprises:

adhering the mounting elements to the top surfaces of the first portion of support pedestals to secure the restraining members to the first portion of support pedestals.

78. The method of claim 65, wherein the disposing step comprises:

welding the mounting elements to the top surfaces of the first portion of support pedestals to secure the restraining members to the first portion of support pedestals.

79. The method of claim 65, wherein the disposing step comprises:

engaging the mounting elements with spring-loaded members to secure the restraining members to the first portion of support pedestals.

80. The method of claim 65, further comprising before the disposing step:

locating apertures in the mounting elements of the restraining members over spacers extending from the top surfaces of the first portion of support pedestals; and

receiving the spacers through the apertures.

81. The method of claim 80, further comprising:

spacing respective third outer edge segments of pairs of the first portion of surface tiles with the spacers.

82. The method of claim 65, further comprising during the introducing step:

receiving the restraining elements in openings in the first outer edge segments of the first portion of surface tiles.

83. The method of claim 65, further comprising during the introducing step:

receiving the restraining elements over top surfaces of the first portion of surface tiles.

84. The method of claim 65, further comprising during the introducing step:

receiving the mounting elements under bottom surfaces of the first portion of surface tiles.

85. The method of claim 65, wherein a substantial entirety of each first outer edge segment of the first portion of surface tiles is introduced between the restraining and mounting elements of the restraining members.

86. The method of claim 65, further comprising:

positioning at least some of the restraining members adjacent a parapet that at least partially surrounds the plurality of support pedestals.

87. The method of claim 86, further comprising:

securing at least some of the restraining members to the parapet.

88. The method of claim 87, wherein the securing step comprises affixing the at least some of the restraining members to the parapet.

89. The method of claim 86, further comprising:

placing outer edge segments of a second portion of surface tiles over the top surfaces of the second portion of support pedestals to create an elevated building surface.

90. The method of claim 89, wherein the second portion of support pedestals are free of restraining members.

91. A method, comprising:

first removing, from the elevated building surface of claim 89, one of the second portion of surface tiles from the top surfaces of the second portion of support pedestals; and

second removing, after the first removing step, one of the first portion of surface tiles from the top surfaces of one or more of the second portion of support pedestals and from the restraining member of one or more of the first portion of support pedestals.

92. The method of claim 91, wherein the second removing step comprises:

lifting the second outer edge segment of the one of the first portion of surface tiles from the top surfaces of one or more of the second portion of support pedestals; and

sliding the first outer edge segment of the one of the first portion of surface tiles out from between the restraining and mounting elements of the restraining member of the one or more of the first portion of support pedestals.

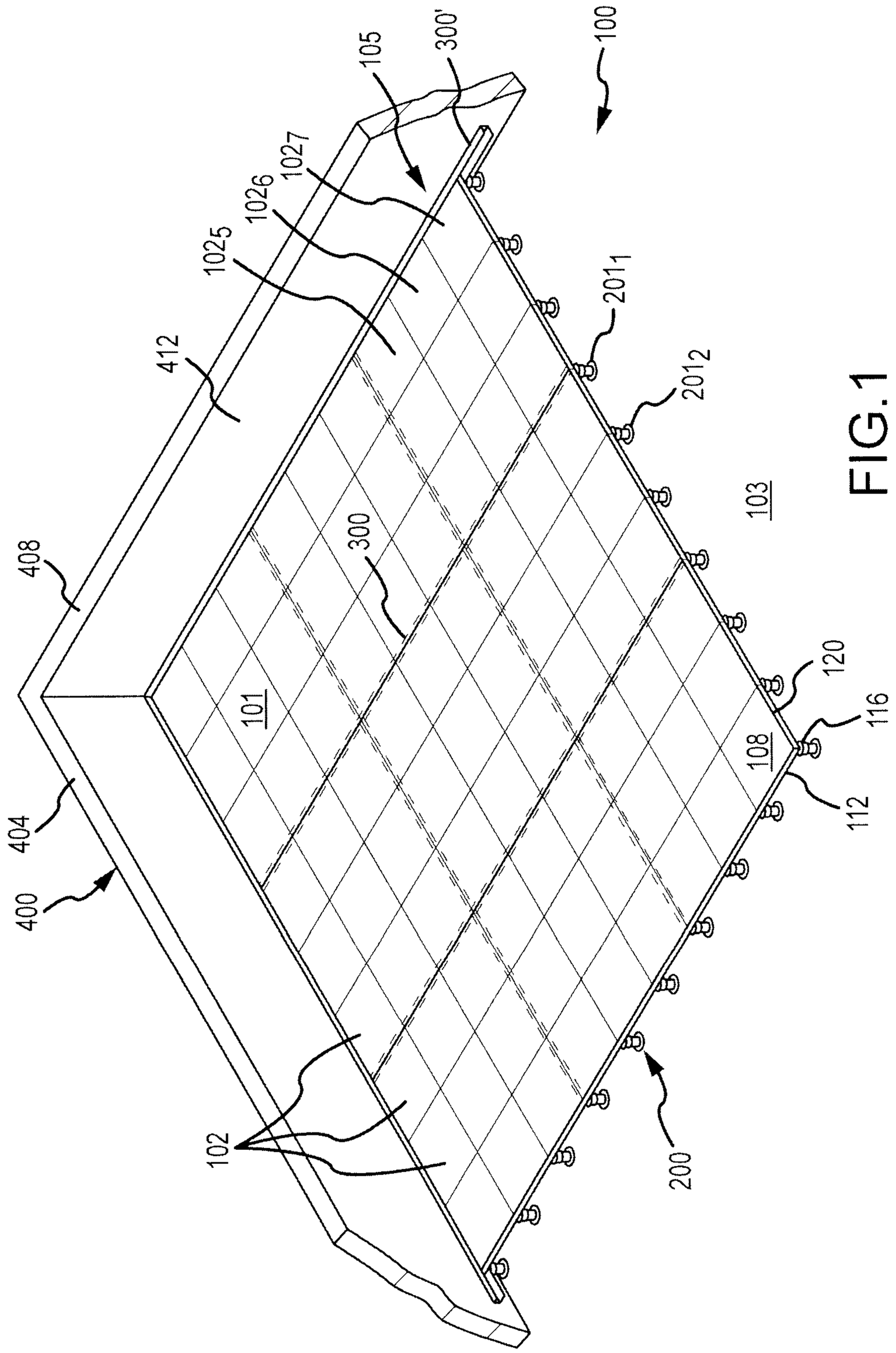
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FIG.1

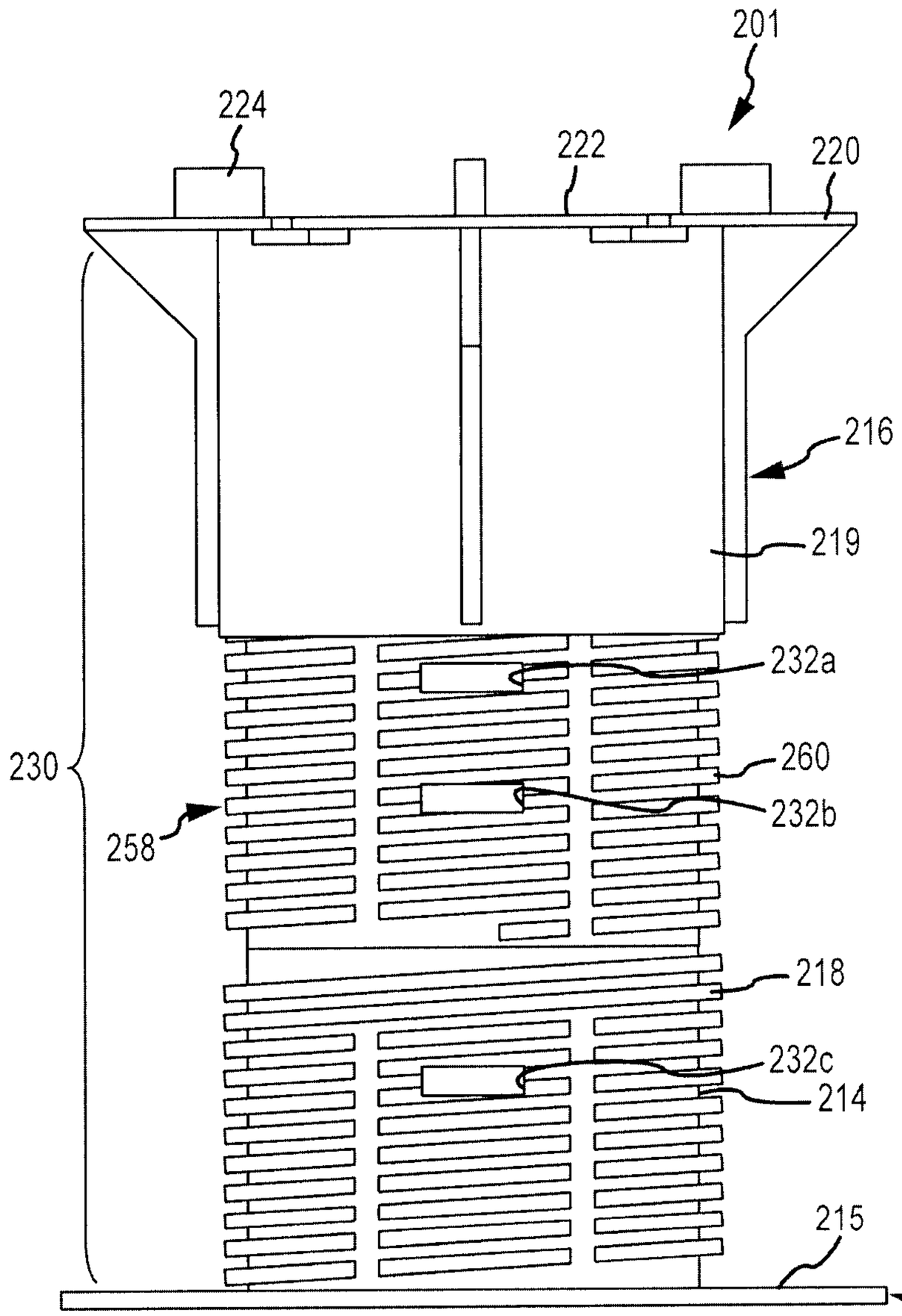
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FIG.2

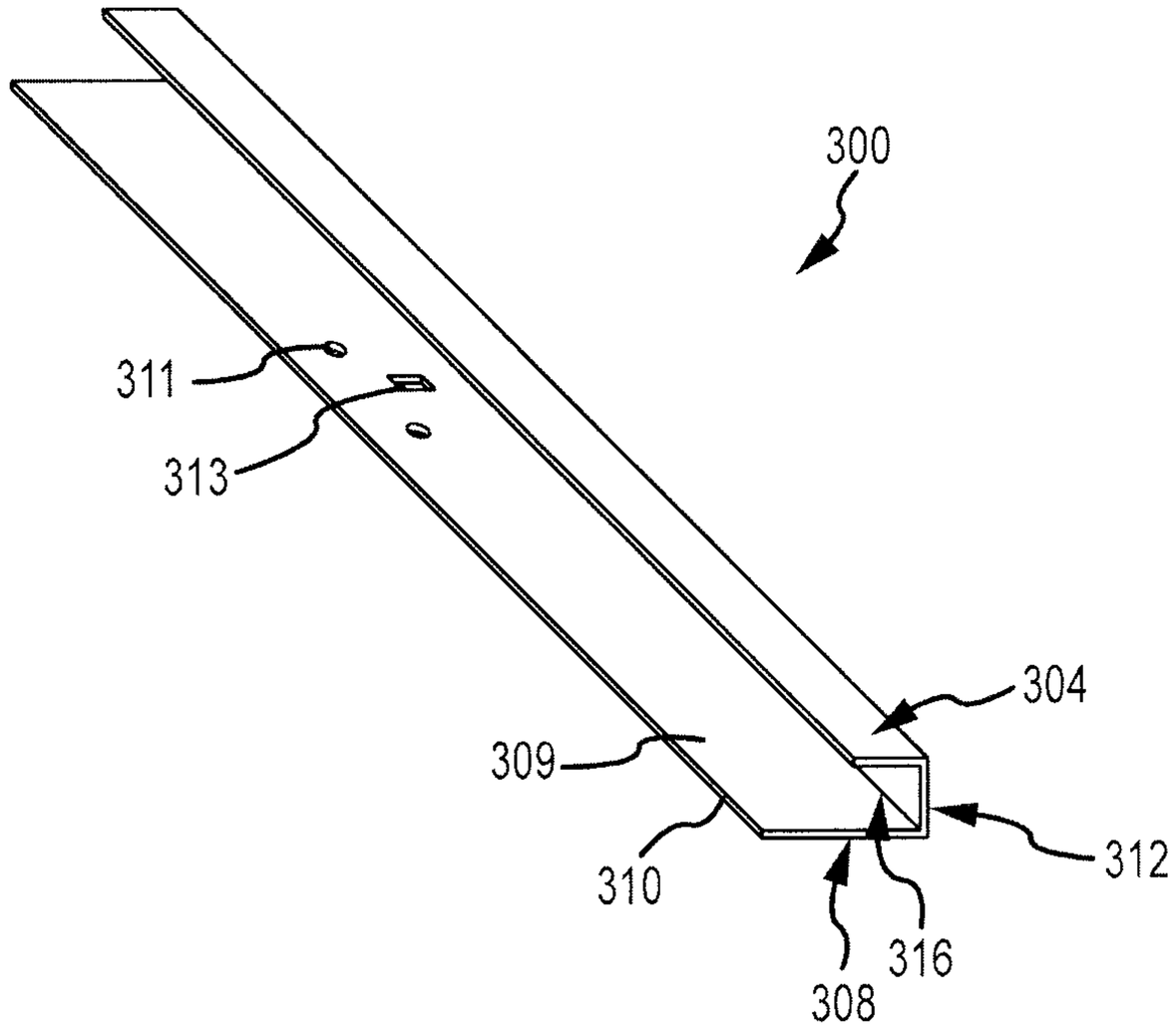

FIG.3a

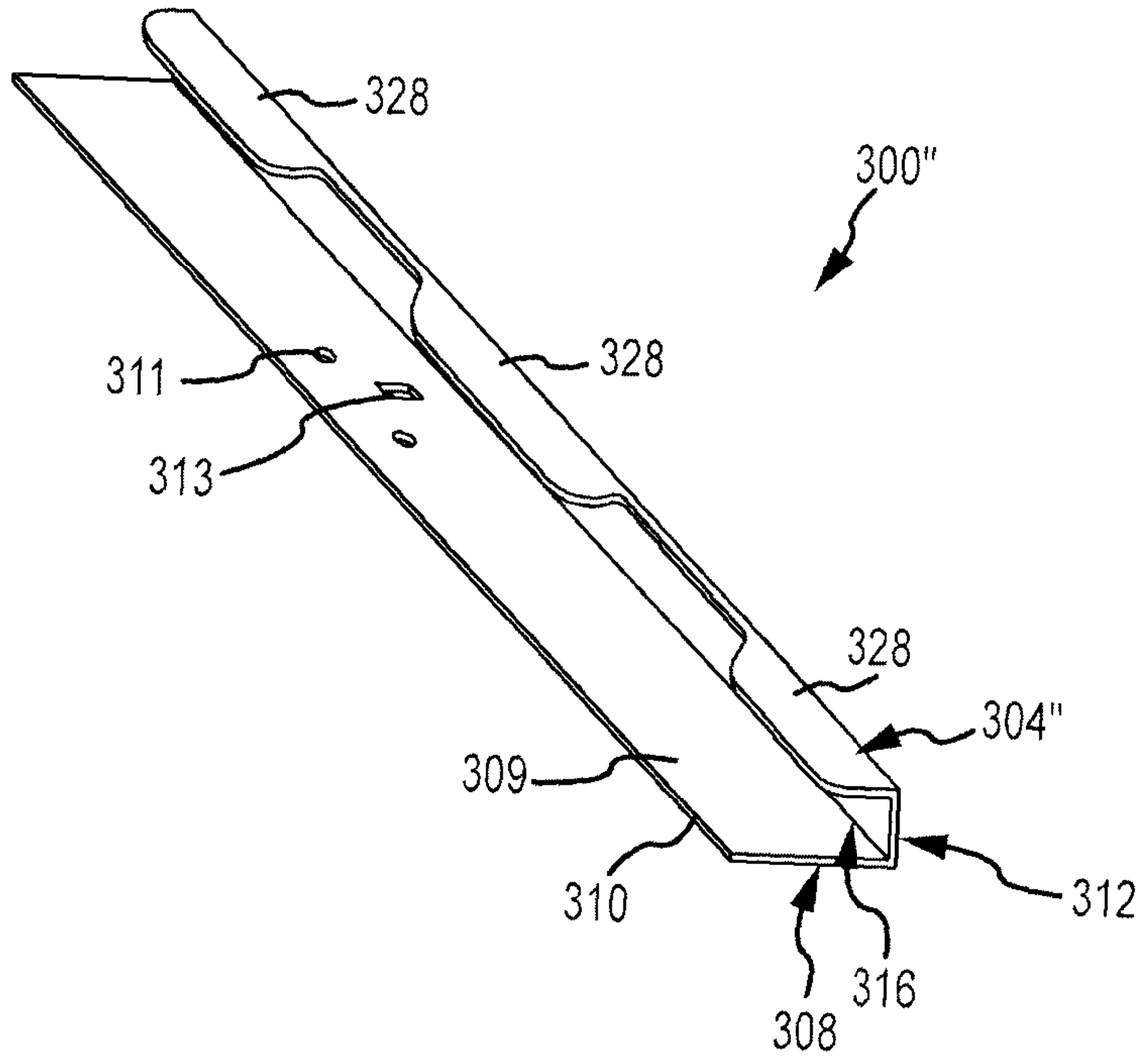

FIG.3b

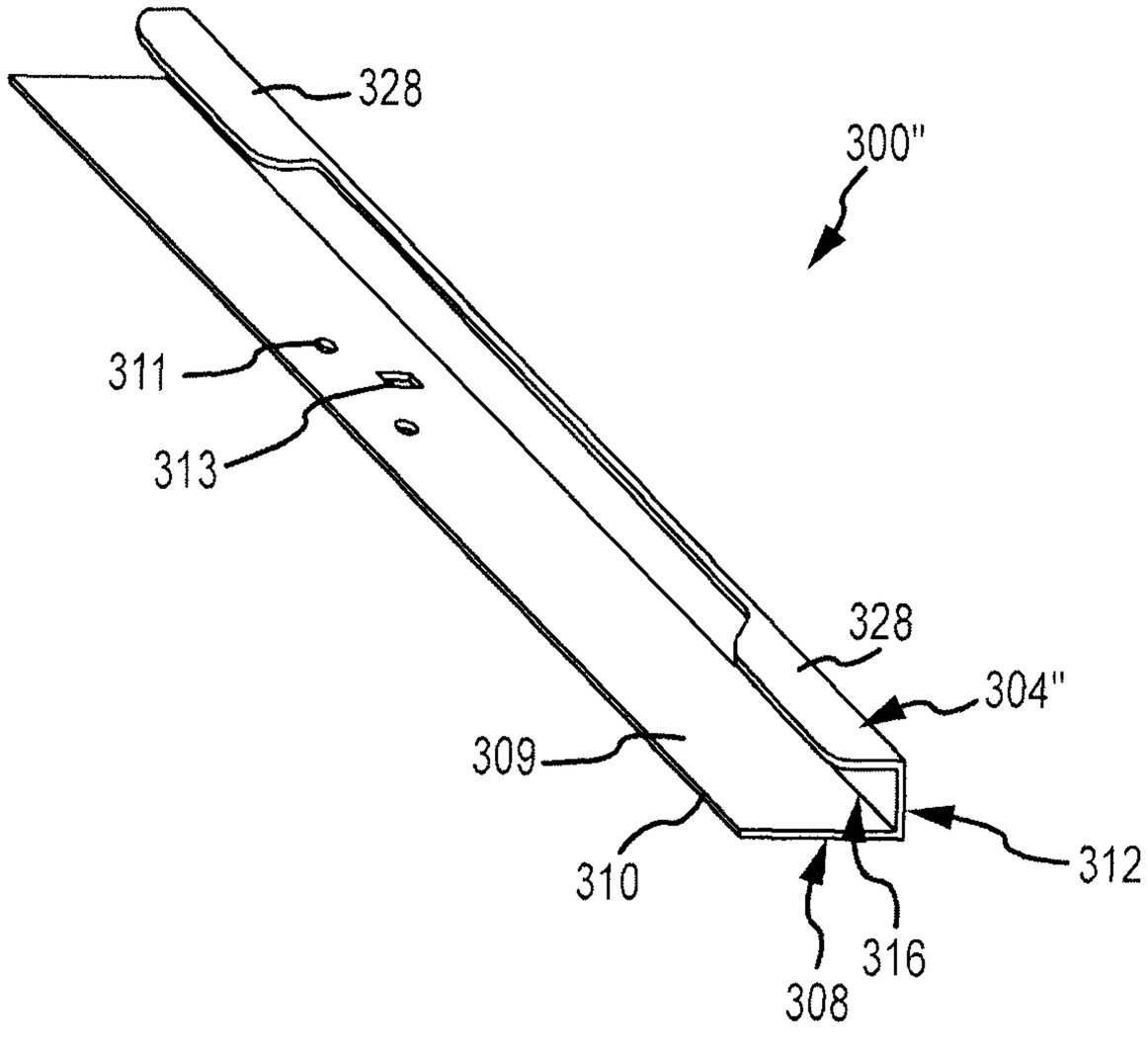

FIG.3c

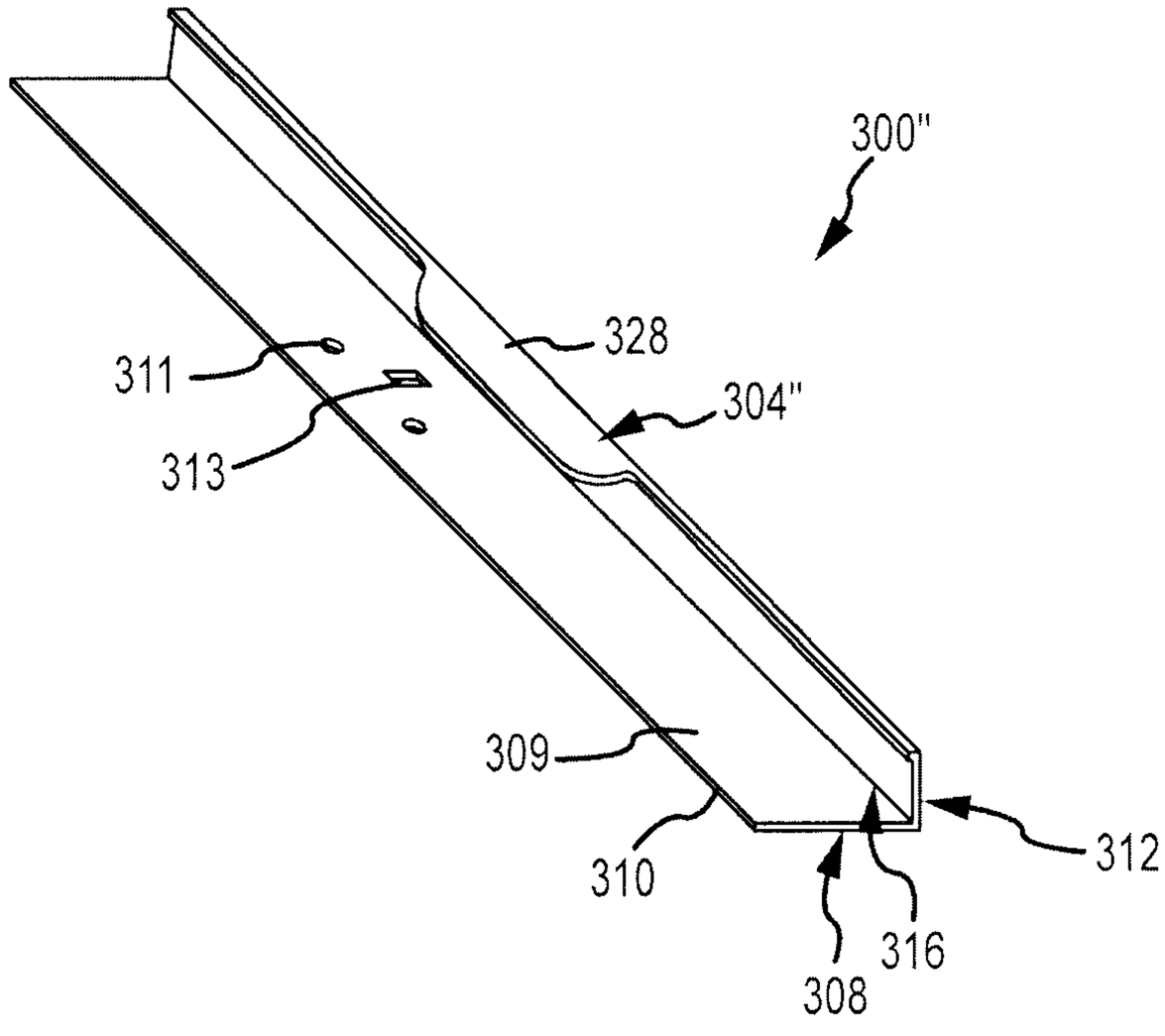

FIG.3d

7/17

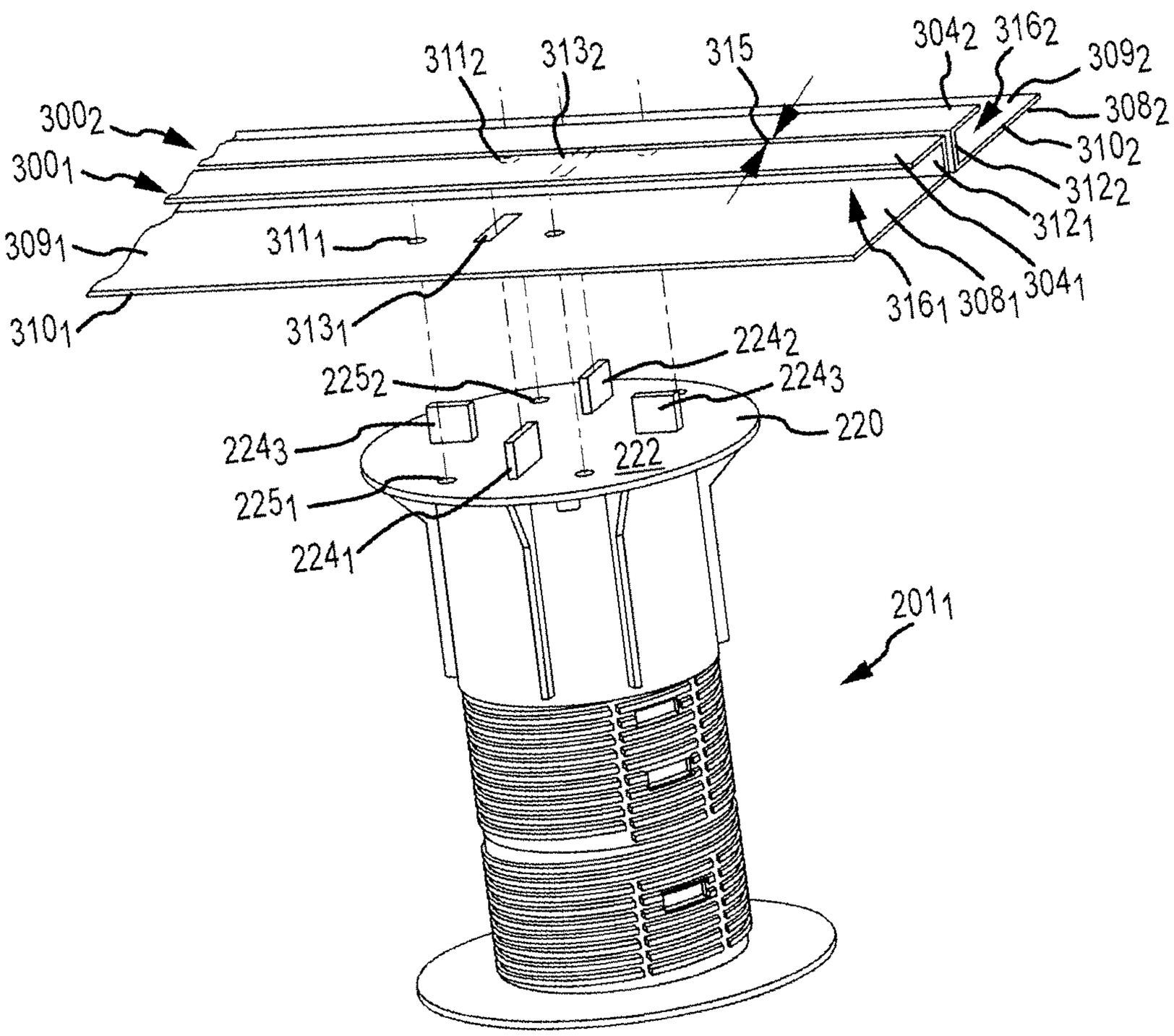
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FIG.4

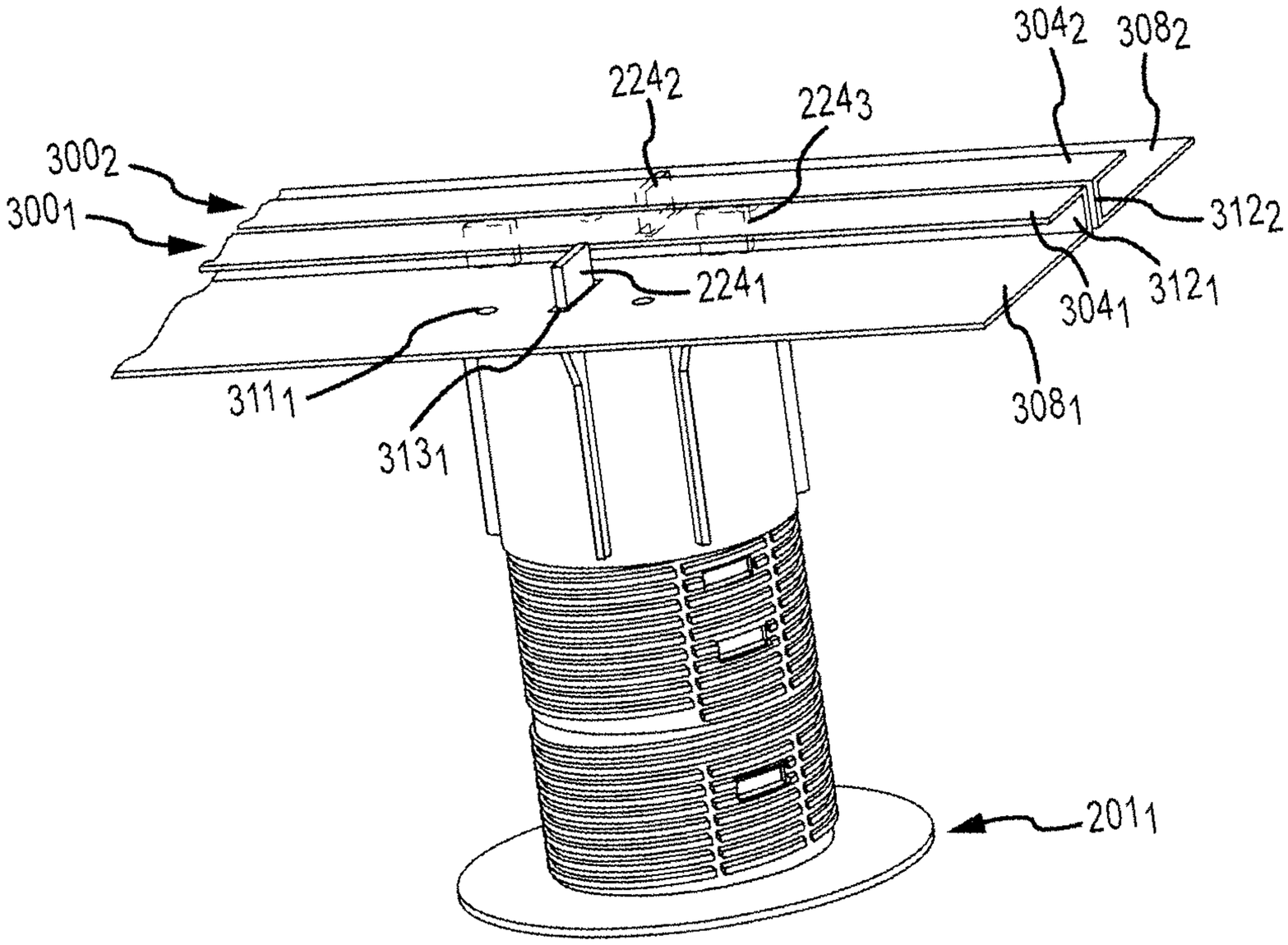
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FIG.5

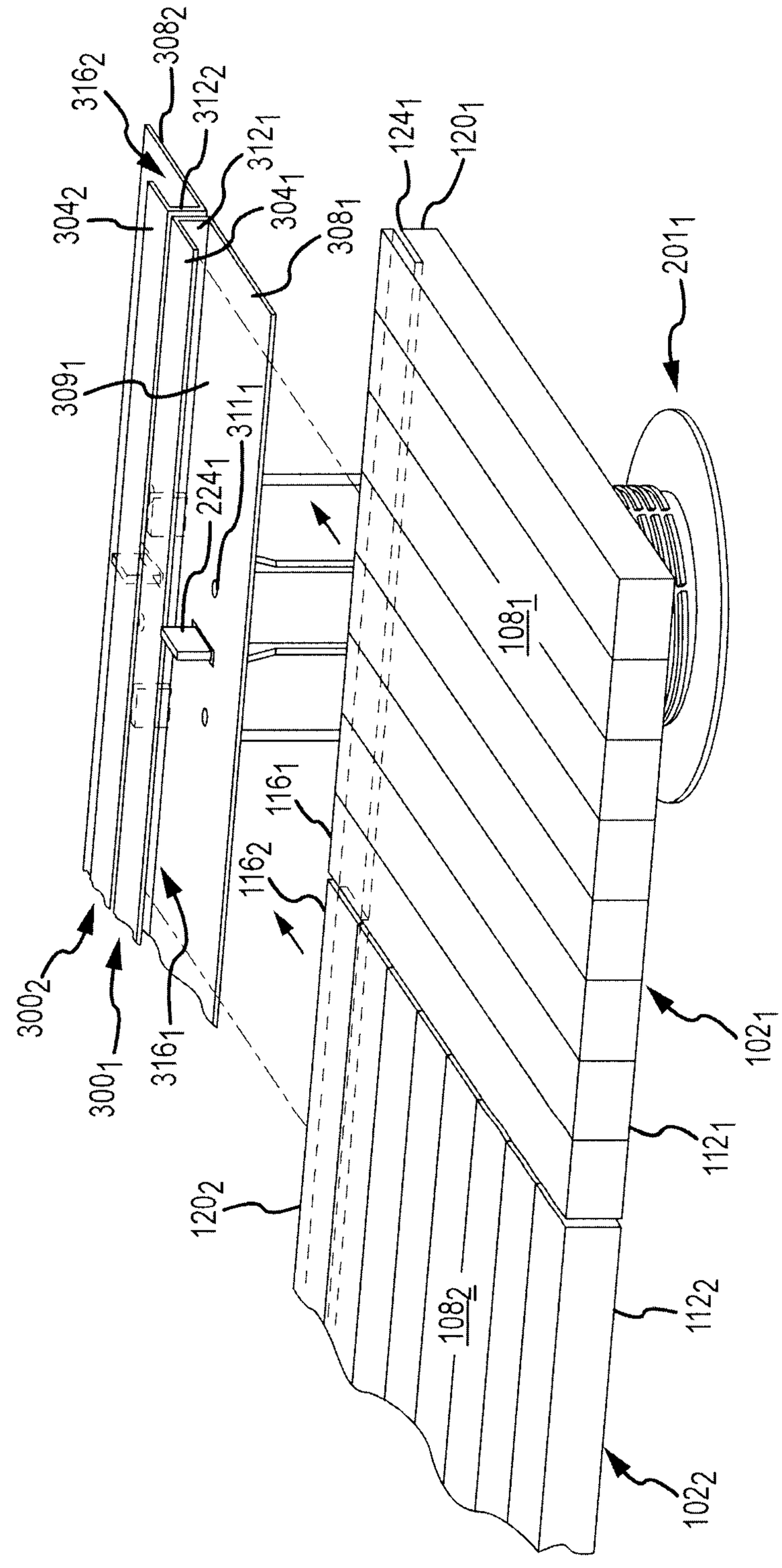
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FIG.6

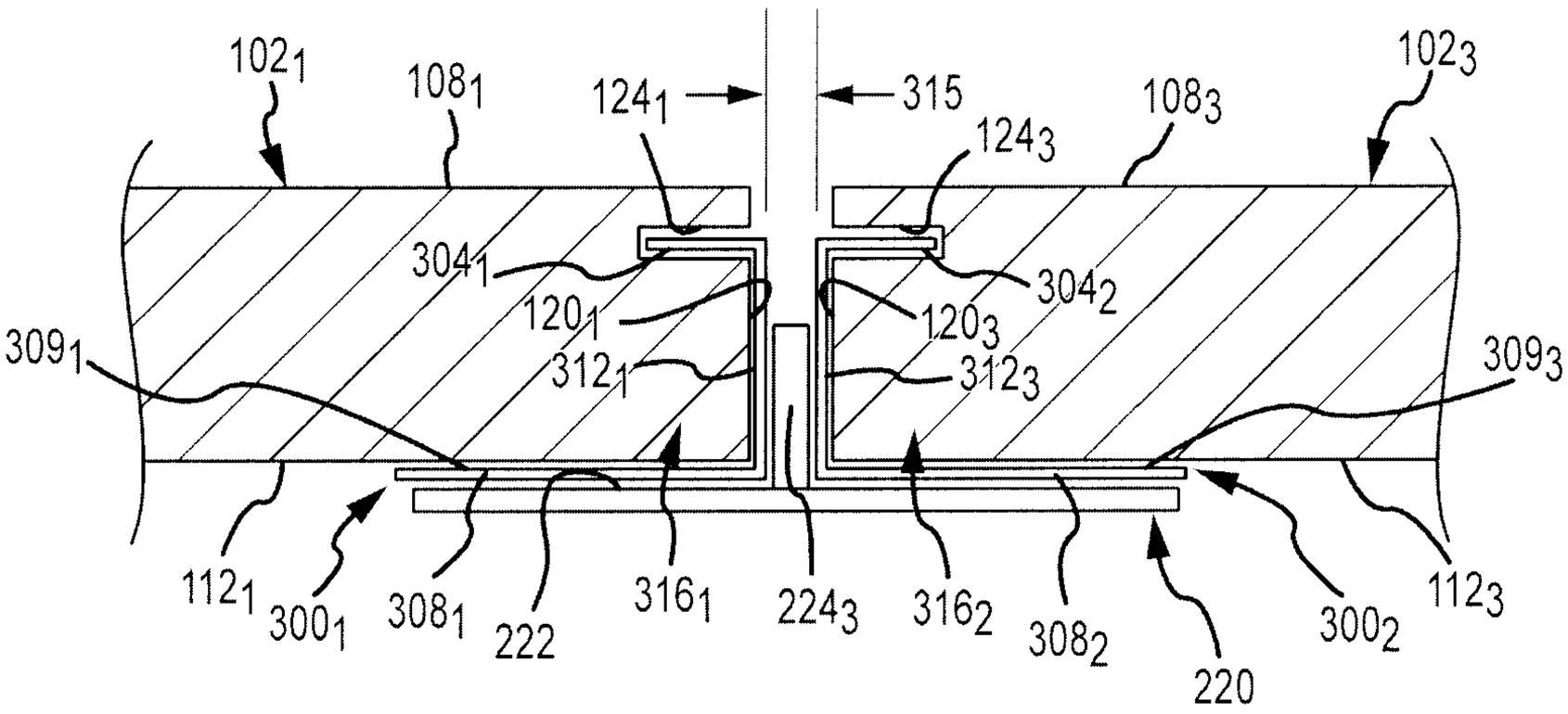
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FIG.7a

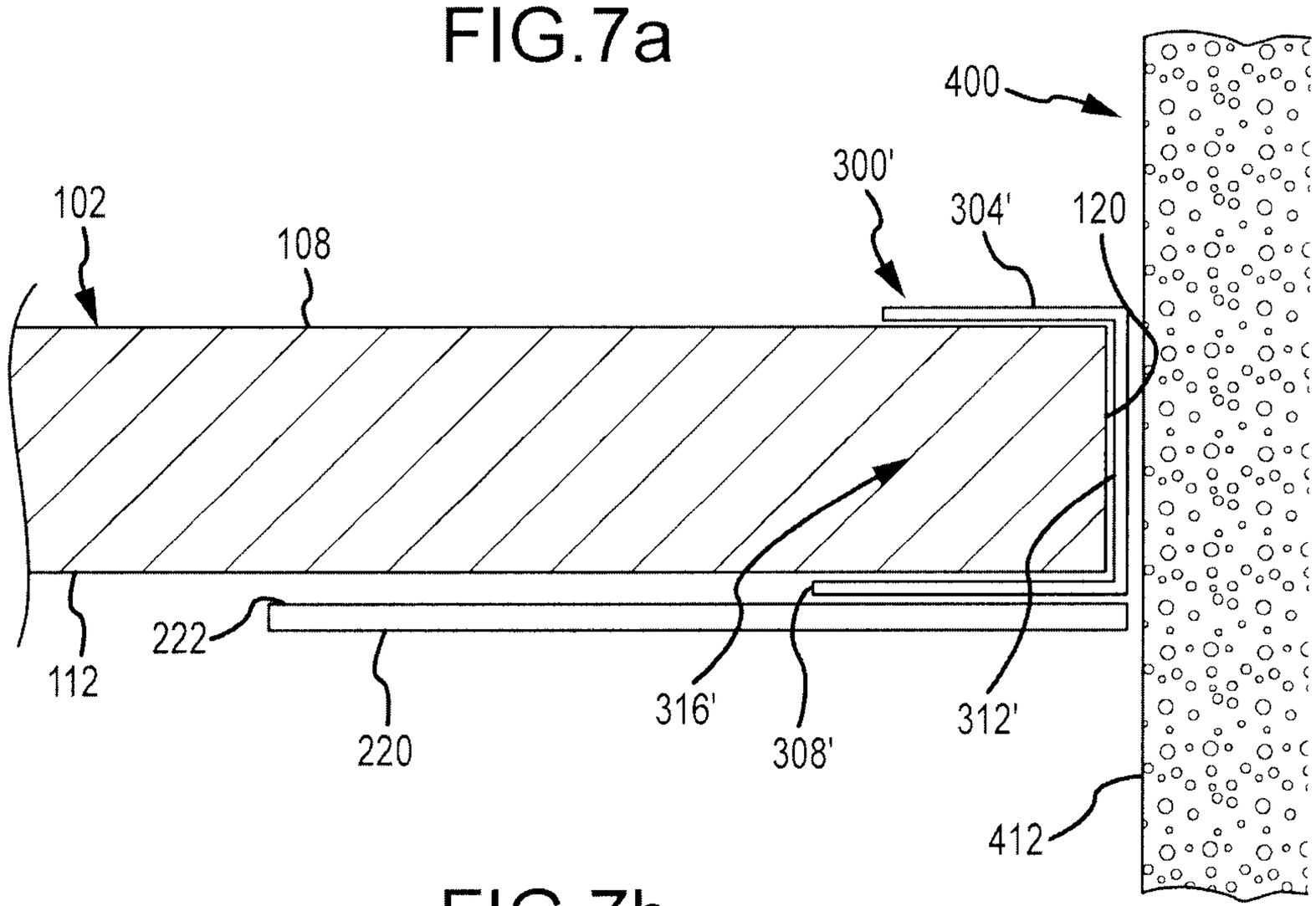
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FIG.7b

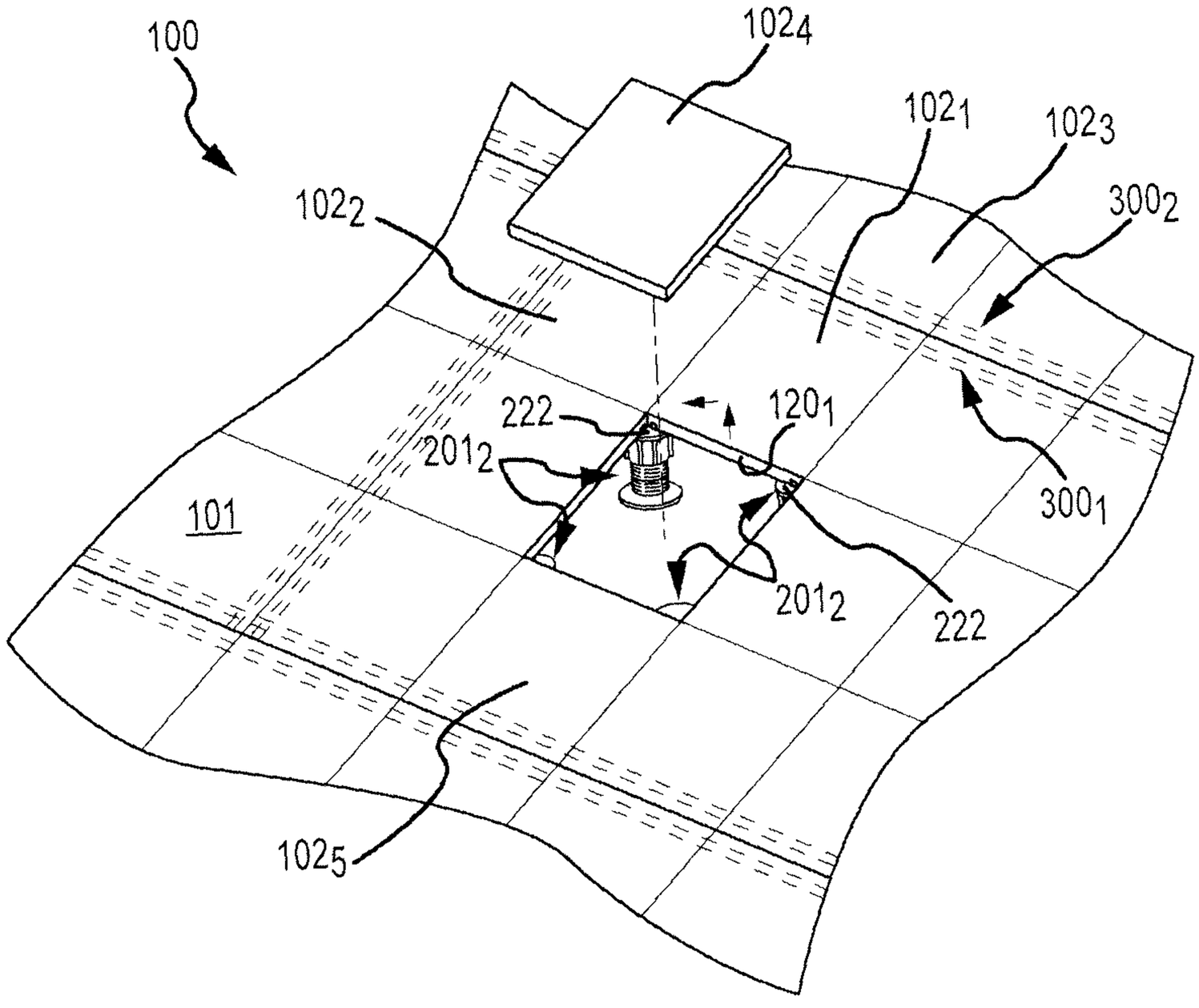
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FIG.8

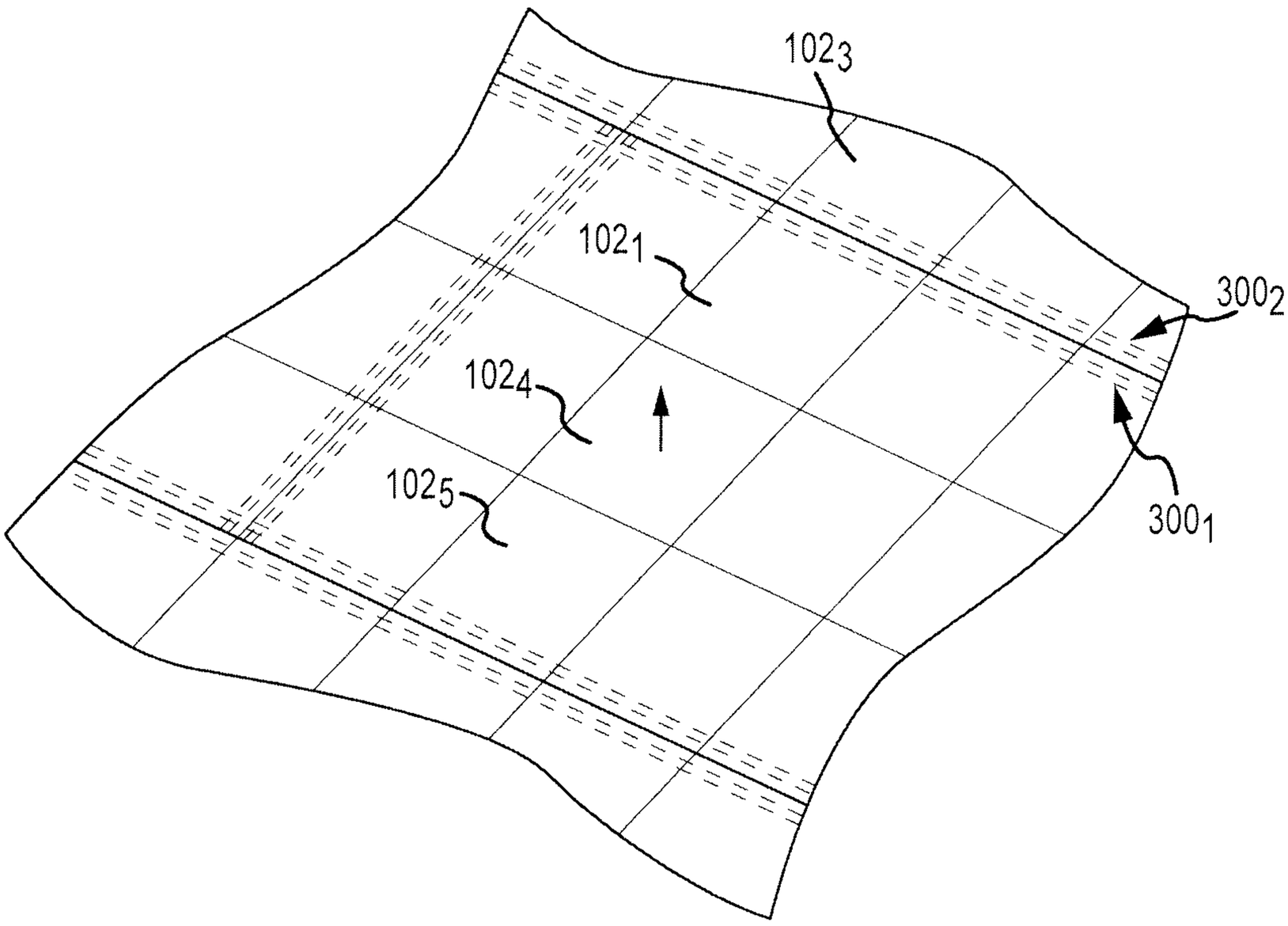

FIG.9

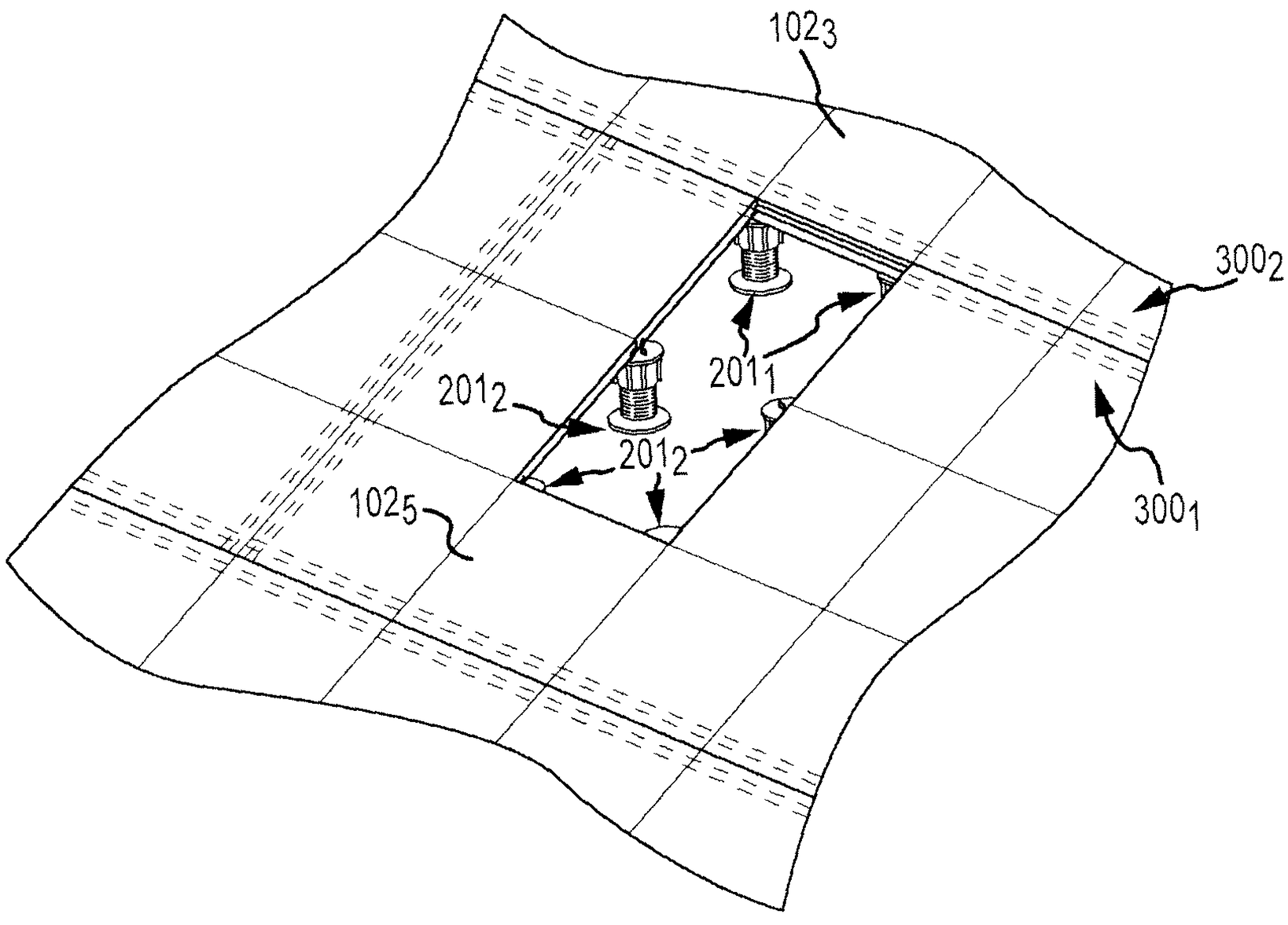

FIG.10

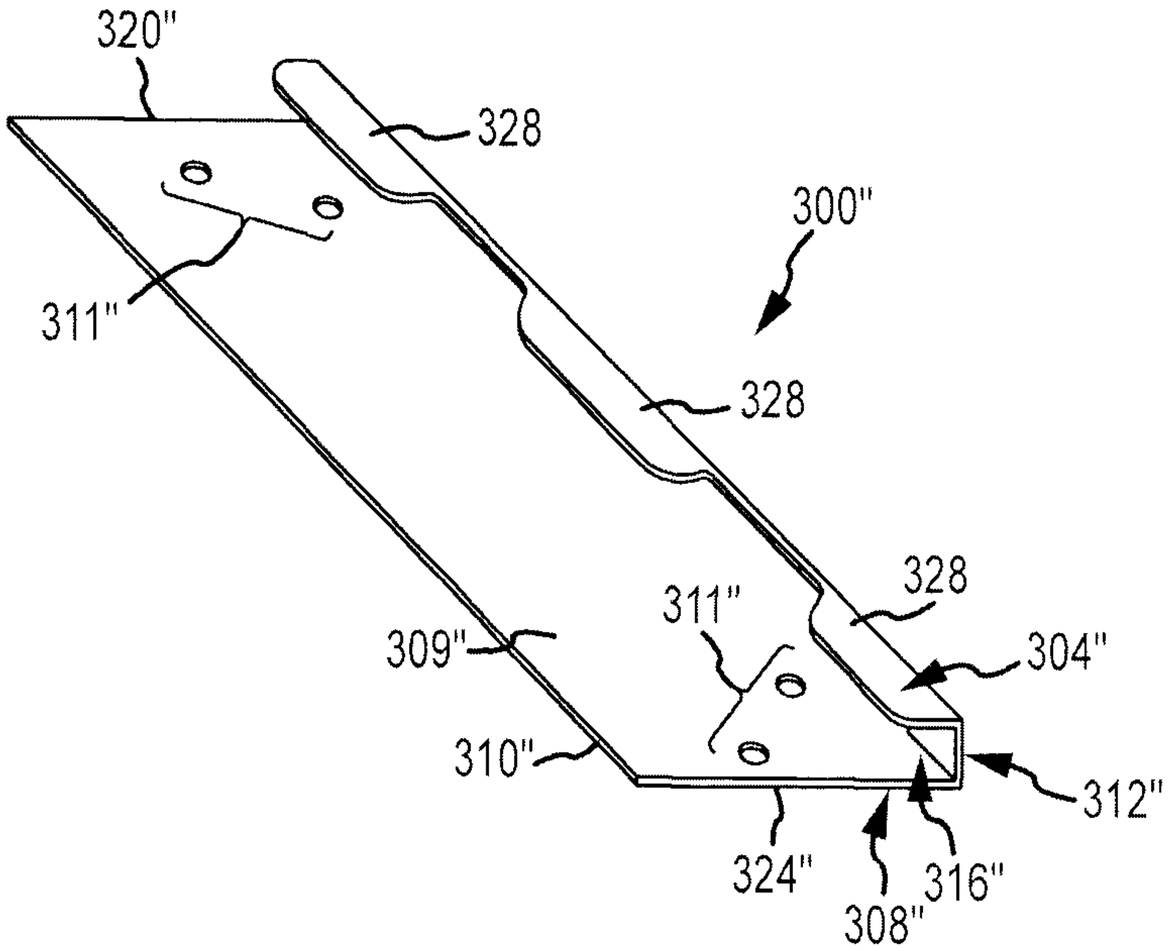

FIG.11

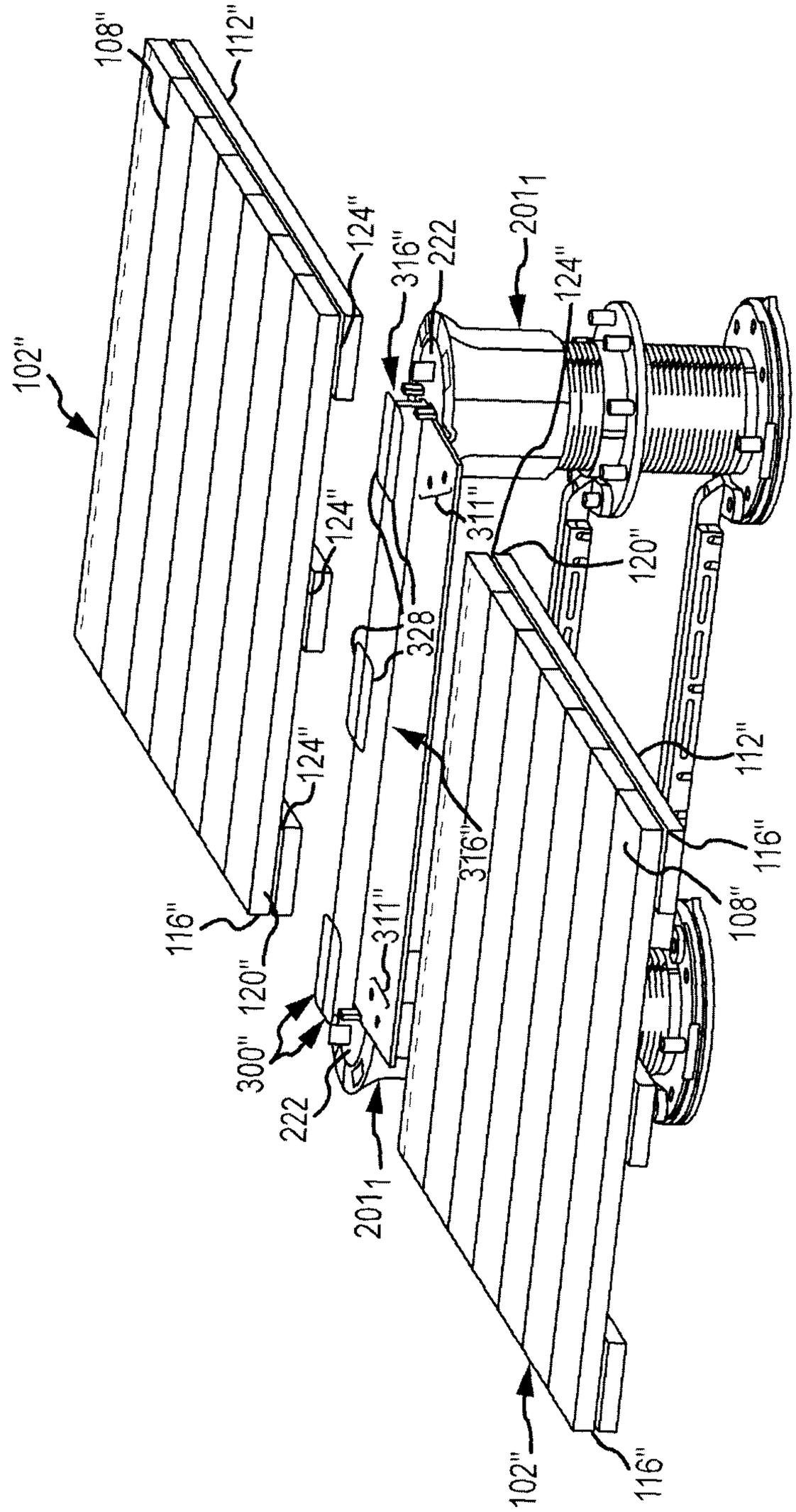
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FIG.12

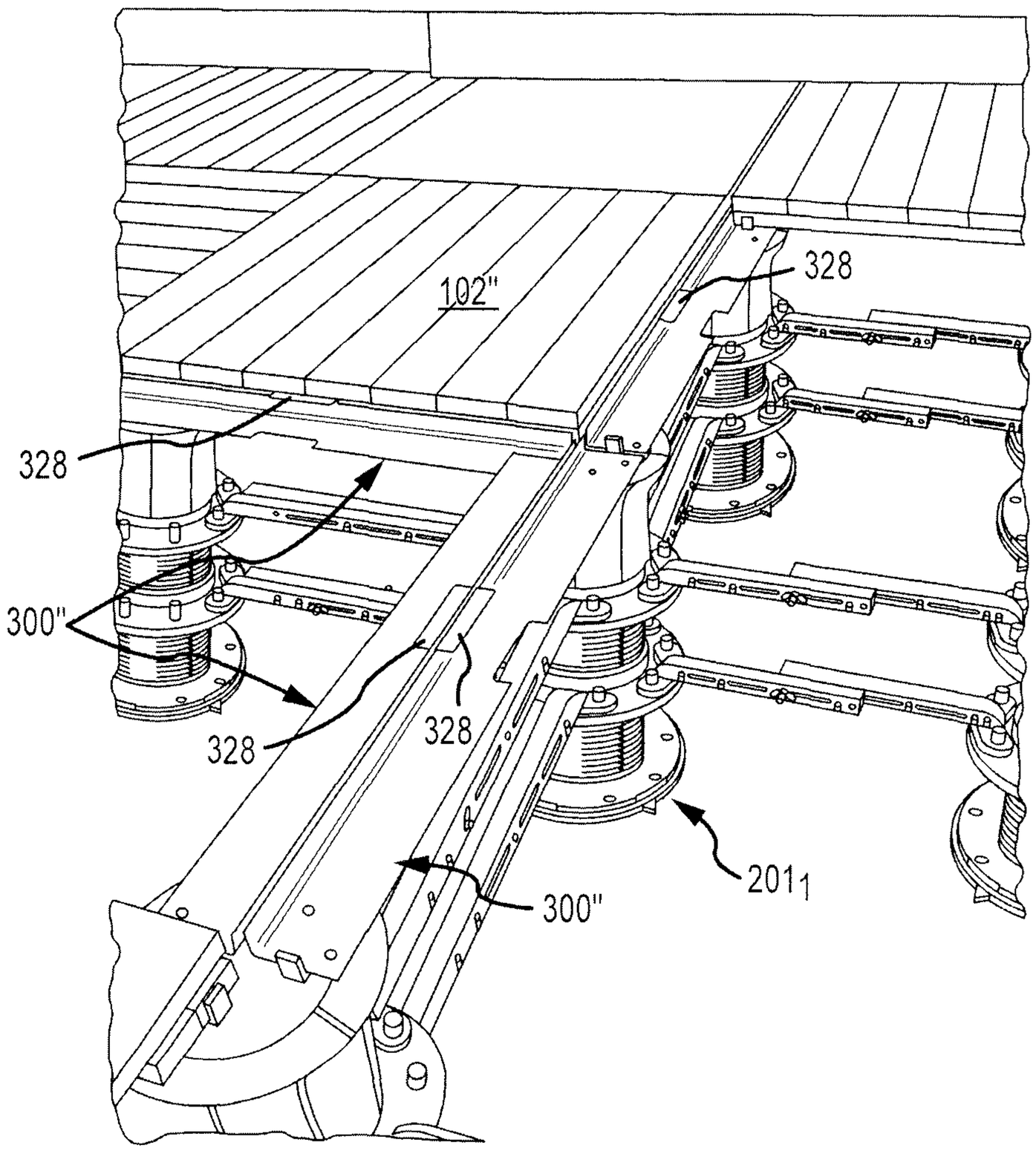

FIG.13

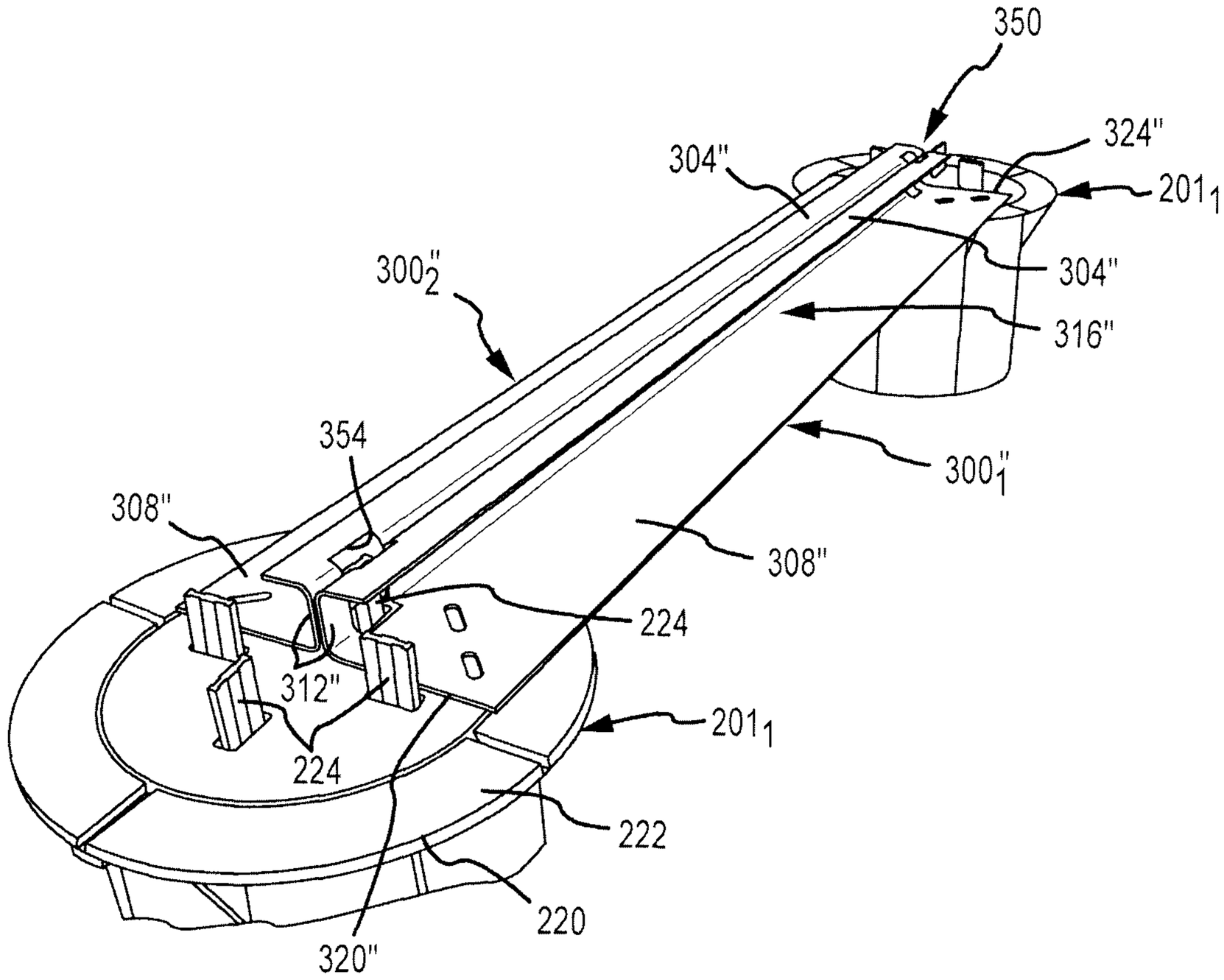
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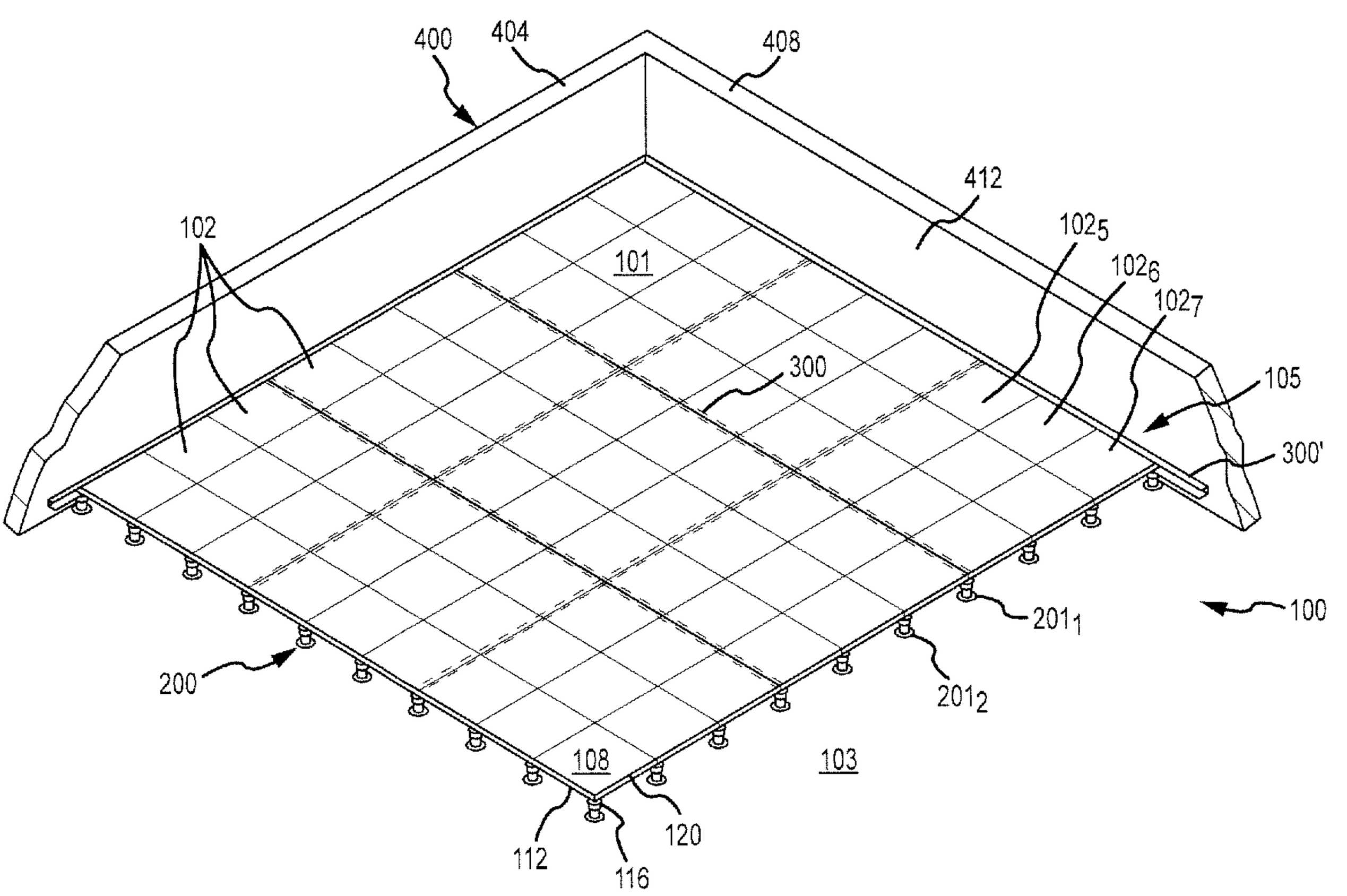
FIG.14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