



(22) Date de dépôt/Filing Date: 2012/04/26

(41) Mise à la disp. pub./Open to Public Insp.: 2012/10/26

(30) Priorité/Priority: 2011/04/26 (US13/094,123)

(51) Cl.Int./Int.Cl. *E04F 15/024* (2006.01),
B66F 3/00 (2006.01), *E04G 21/14* (2006.01)

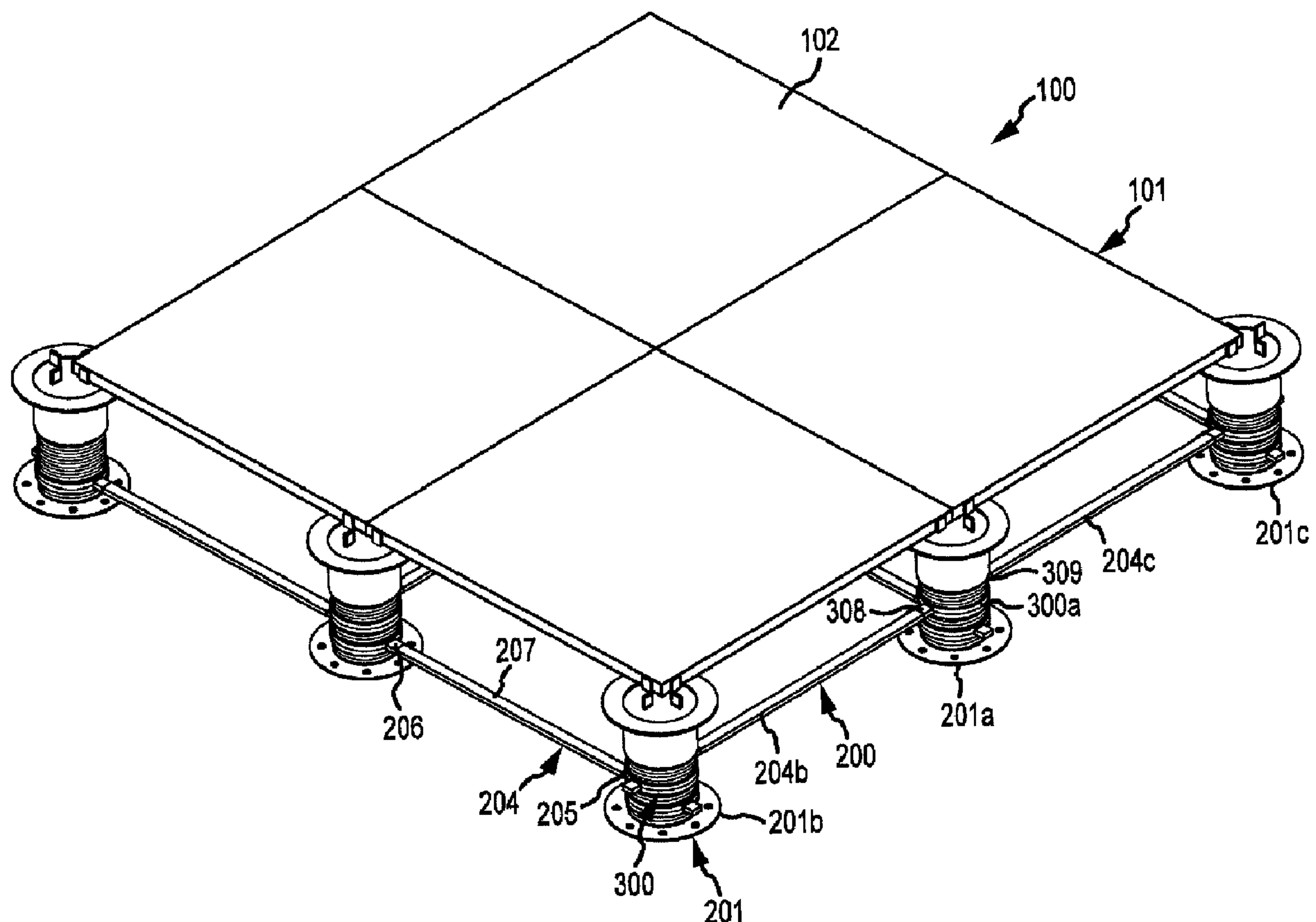
(71) Demandeur/Applicant:
UNITED CONSTRUCTION PRODUCTS, INC., US

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

(74) Agent: PARLEE MCLAWS LLP

(54) Titre : RENFORT DE STABILITE D'UNE STRUCTURE DE SOUTIEN POUR ELEVER UNE SURFACE DE
BATIMENT

(54) Title: STABILITY BRACING OF A SUPPORT STRUCTURE FOR ELEVATING A BUILDING SURFACE



(57) Abrégé/Abstract:

A support structure for elevating a building surface above a fixed surface and having stability bracing to provide increased stability to the elevated building surface assembly. The support structure includes a plurality of support pedestals that are disposed in



(57) **Abrégé(suite)/Abstract(continued):**

spaced-apart relation on a fixed surface. Stabilizing braces are attached to the central section of adjacent support pedestals to interconnect the support pedestals. The stabilizing braces may attach to the support pedestals using anchoring members that are anchored to the support pedestals. Interconnecting the support pedestals in such a manner creates a stable elevated building surface assembly that can be utilized in unstable environments, such as seismically active geographic areas. The support pedestals can be adjustable-height support pedestals.

ABSTRACT

A support structure for elevating a building surface above a fixed surface and having stability bracing to provide increased stability to the elevated building surface assembly. The support structure includes a plurality of support pedestals that are
5 disposed in spaced-apart relation on a fixed surface. Stabilizing braces are attached to the central section of adjacent support pedestals to interconnect the support pedestals. The stabilizing braces may attach to the support pedestals using anchoring members that are anchored to the support pedestals. Interconnecting the support pedestals in such a manner creates a stable elevated building surface assembly that can be utilized
10 in unstable environments, such as seismically active geographic areas. The support pedestals can be adjustable-height support pedestals.

STABILITY BRACING OF A SUPPORT STRUCTURE FOR ELEVATING A BUILDING SURFACE

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This application claims priority of U.S. Patent Application No. 13/094,123 filed on April 26, 2011, which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

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

2. Description of Related Art

15 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
20 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.

25 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
30 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, the support pedestal and/or coupler member may be in the form of a pipe or box-shaped support that may be cut to the desired 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 that is associated with some support structures for elevated surfaces is that the support structures do not provide adequate structural stability in certain unstable environments. As a result, the support structures need to be stabilized to be utilized in certain seismically active geographic areas or other locations that may be subject to disruptive vibrations of the underlying fixed surface. This can be a particular problem when the support pedestals themselves are not affixed to the underlying surface (e.g., using bolts or fasteners) and therefore under some circumstances do not move in unison with movement of the underlying surface.

Another problem associated with some support structures for elevated surfaces is that the safely obtainable height of the support pedestals is limited due to the increasing instability of the support pedestals as the height of the pedestals and the slenderness ratio are increased, e.g., through the use of coupling members to increase the support pedestal height. The increased height of the center of gravity further compounds the problems associated with disruptive vibrations of the underlying surface.

It is therefore an objective to provide a support structure for an elevated surface, where the support structure has improved structural stability. It is also an objective to provide a support structure that can enable the safe construction of an elevated surface having an increased height above the fixed surface as compared to existing support
5 structures, particularly in geographic areas that are prone to disruptive vibrations.

In one embodiment, a support structure for elevating a building surface above a fixed surface is provided. The support structure includes a plurality of support pedestals disposed in spaced-apart relation, the support pedestals having a base plate that is adapted to be placed on the fixed surface, a support plate that is adapted to support a
10 building surface component (e.g., a tile), and a central section extending between the base plate and the support plate. At least a first anchor engagement element is disposed on the central sections of the support pedestals. The support structure also includes a plurality of anchoring members that are engaged with the first anchor engagement elements of the support pedestals to anchor the anchoring members to the support
15 pedestals. Additionally, at least one stabilizing brace is operatively attached to at least first and second adjacent support pedestals. In this regard, a first end of the stabilizing brace is secured to a first anchoring member anchored to the first support pedestal, and a second end of the stabilizing brace is secured to a second anchoring member anchored to the second support pedestal to operatively interconnect the first support
20 pedestal to the second support pedestal. Additional stabilizing braces may be used to operatively interconnect the first and second support pedestals to additional support pedestals to further stabilize the support structure.

In one aspect, the anchoring members may include a mounting member having first and second ends defining an anchoring member gap therebetween. This mounting
25 members may be subject to a number of characterizations. In one characterization, the mounting members may be resilient, e.g., resiliently movable between first and second states. In this regard, the mounting members may be compressively engaged and mounted on the central sections of the support pedestals at any appropriate location. In other characterizations, the mounting members may be curvilinear, an inner surface of
30 the mounting members may contact the central sections of the support pedestals, and/or the central sections of the support pedestals may be disposed within the anchoring member gaps. In one variation, the mounting members may be resiliently movable

between at least first and second states, the anchoring member gaps being greater in the second state than in the first state and the anchoring members being detachable from the central sections in the second state. In yet another aspect, the anchoring members may be mechanically fastened to the central sections of the support pedestals.

5 In another aspect, the anchoring members may include at least a first attachment element (e.g., lug, projection) that is operatively engaged with the first anchor engagement element (e.g., aperture, bore) on a central section of the support pedestals. In some arrangements, the anchoring members may include a second attachment
10 element that is engaged with a second anchor engagement element disposed on the central sections of the support pedestals. For instance, the first and second anchor engagement elements may be disposed on the central sections and may be separated by about 45° or more, such as by about 90° or more, along a circumference of the central sections, although numerous other orientations are also contemplated. In another arrangement, the support pedestals may further include at least third and fourth
15 anchor engagement elements disposed on the central sections of the support pedestals. In this arrangement, the first and second anchor engagement elements may be disposed at a first vertical position above the base plates and the third and fourth anchor engagement elements may be disposed at a second vertical position above the base plates that is different than the first vertical position. This arrangement may allow first
20 and second anchoring members to be attached to the central section of a pedestal to enable the attachment of stabilizing braces at different heights (e.g., vertical positions) to the central sections of the pedestals and to enable stabilizing braces to be attached to the support pedestals at different positions along the circumference of the central sections.

25 In another aspect, the anchoring members may further include at least a first brace engagement element (and/or additional brace engagement elements) that is adapted to engage (e.g., removably, permanently) with the first or second end of the stabilizing brace. As an example, the brace engagement elements may include a tab extending outwardly from the anchoring members. The tabs may include a cavity that is
30 adapted to receive (e.g., telescopically) the first or second end of the stabilizing brace. To removably lock or otherwise secure the stabilizing brace to an anchoring member, an end of the stabilizing brace may have a spring-loaded locking element that is adapted to

be received in an aperture on the tab. For instance, a user may insert a tool (e.g., screwdriver) into the aperture to displace the locking element from the aperture and permit removal of the stabilizing brace from the tab. In another aspect, the ends of the stabilizing brace may be secured to the anchoring members using an adhesive or a mechanical fastener (e.g., a threaded fastener).

The stabilizing brace may be subject to a number of characterizations. In one characterization, the stabilizing brace may have an adjustable length. For instance, the stabilizing brace may include at least first and second telescoping members that may be removably locked in position relative to each other (e.g., via a pin being extended through aligned apertures in the first and second telescoping members). However, fixed length stabilizing braces may also be utilized as part of the structure, alone or in combination with adjustable stabilizing braces. In another characterization, the stabilizing brace may be constructed of any appropriate material (e.g., plastic, metal, and/or composites). Additionally, the stabilizing braces interconnecting adjacent support pedestals may in one characterization be disposed generally horizontally relative to the fixed surface (i.e., generally parallel to the fixed surface), although other orientations are also envisioned being used with the system.

The support pedestals may also be subject to a number of characterizations. In one characterization, the central sections include a base member extension extending away from the base plates, and a support member extension extending away from the support plates that is operatively attached to the base member extension. For instance, the base and support member extensions may be cylindrical and may be threadably attached, telescopically translatable, etc. Further, the central sections may include one or more coupling members extending between the base member extensions and the support member extensions that operatively attach the base member extensions to the support member extensions. The coupling members may also be cylindrical and may be attached in any appropriate manner (e.g., threaded interconnection, telescoping interconnection). It should be appreciated that the support pedestals are not limited to cylindrically shaped support pedestals; support pedestals of other cross-sectional shapes are also encompassed by the present disclosure. Further, the support pedestals may be constructed of any appropriate materials (e.g., plastic, metal, composites) and of any appropriate dimensions. For example, a distance between the base plate and the

support plate may be at least about two inches, at least about 12 inches or at least about 18 inches.

5 In another embodiment, a support structure for elevating a building surface above a fixed surface is disclosed. The structure may include a plurality of support pedestals disposed in spaced-apart relation on the fixed surface that include a base plate, a support plate, a central section extending between the base and support plates, and a plurality of apertures disposed on the central sections. The structure also includes a plurality of anchoring members that are removably anchored to the apertures on the central sections of the support pedestals, and a stabilizing brace operatively attached to
10 first and second of the plurality of support pedestals. A first end of the stabilizing brace is secured to a first anchoring member anchored to the first support pedestal and a second end of the stabilizing brace is secured to a second anchoring member anchored to the second support pedestal.

15 In one aspect, the plurality of apertures may include at least a first aperture and a second aperture that are disposed at substantially the same vertical position above the base plates and are separated by about 45° or more along the circumference of the central sections, such as by about 90° or more. In another aspect, the plurality of apertures may include at least a first aperture that is disposed at a first vertical position above the base plates and at least a second aperture that is disposed at a second
20 vertical position above the base plates that is different than the first vertical position. For example, the first and second anchoring members may be anchored to the first support pedestal and the second support pedestal respectively at a first vertical position above the base plates. Third and fourth anchoring members may be anchored to the first support pedestal and the second support pedestal respectively at a second vertical
25 position above the base plates that is different than the first vertical position. A first end of the second stabilizing brace may be operatively attached to the first anchoring member anchored to the first support pedestal, and a second end of the second stabilizing brace may be operatively attached to an anchoring member anchored to a third support pedestal.

30 In another aspect, the central sections of the plurality of support pedestals include a base member extension extending away from the base plate and a support member extension extending away from the support plate that is operatively attached to

the base member extension. The central sections of the plurality of support pedestals may also include one or more coupling members operatively attaching the base member extensions and the support member extensions. In this regard, the first and second anchoring members may be anchored to the coupling members of the first and second support pedestals respectively. In one characterization, the base member extension, the support member extension and the coupling member may each be cylindrical.

In another aspect, the anchoring members may be compressively engaged and mounted on the central sections of the support pedestals. For example, the anchoring members may include a resilient mounting member having first and second ends defining an anchoring member gap therebetween, where the central sections are disposed in the anchoring member gaps. In another aspect, the anchoring members may be mechanically fastened to the central sections of the support pedestals. In another aspect, the stabilizing brace may be secured to the anchoring member using a mechanical fastener and/or adhesive (e.g., an epoxy).

In another embodiment, an elevated building surface assembly is disclosed. The assembly includes a plurality of support pedestals disposed in spaced-apart relation on a fixed surface, where the support pedestals include a base plate, a support plate, and a central section extending generally perpendicularly from the base and support plates. The assembly also includes a plurality of stabilizing braces operatively attached to and interconnecting adjacent support pedestals, wherein first and second ends (e.g., distal and proximal ends) of the stabilizing braces are attached to the central sections of the adjacent support pedestals. The stabilizing braces may be disposed generally horizontally relative to the fixed surface. A plurality of building surface components (e.g., surface tiles) is operatively disposed on the support plates of the support pedestals.

In one characterization, a plurality of anchoring members may be anchored to the central sections of the adjacent support pedestals, wherein first and second ends of the stabilizing braces are attached to the anchoring members to interconnect adjacent support pedestals. For example, the anchoring members may be removably attached to the central sections of the adjacent support pedestals. The anchoring members may include a mounting member having first and second ends defining an anchoring member gap therebetween, wherein the central sections of the support pedestals are disposed within the anchoring member gaps. The anchoring members may also include at least a

first attachment element that is operatively engaged with a first anchor engagement element on the central sections of the support pedestals. In this regard, the anchoring members may also include at least a second attachment element that is engaged with a second anchor engagement element disposed on the central sections to anchor the anchoring members to the support pedestals. For example, the anchor engagement elements may comprise apertures, and the first and second attachment elements may include lugs that are adapted to be received in the anchor engagement apertures. In one aspect, at least third and fourth anchor engagement elements are disposed on the central sections, wherein the first and second anchor engagement elements are disposed at a first vertical position above the base plates and the third and fourth anchor engagement elements are disposed at a second vertical position above the base plates that is different than the first vertical position. The anchoring members may also include a first brace engagement element, where the first brace engagement elements are adapted to engage with a first and/or second end of the stabilizing braces. For example, the anchoring members may include a second brace engagement element, wherein the second brace engagement elements are adapted to engage with the first and/or second end of the stabilizing braces. In this regard, the first brace engagement elements may include a tab extending outwardly from the anchoring members.

The central sections of the support pedestals may include a base member extension extending away from the base plates, and a support member extension extending away from the support plates, wherein the support member extensions are operatively attached to the base member extensions. The central sections may also include a coupling member extending between the base member extensions and the support member extensions, wherein the coupling members operatively attach the base member extensions to the support member extensions. In one aspect, the base member extension, the support member extension and the coupling member are cylindrical. The support pedestals may comprise plastic to resist degradation or corrosion in an exterior environment.

The stabilizing braces may have an adjustable length or may have a fixed length. Further, the stabilizing braces may include a material selected from the group consisting of plastic, metal and composites. Further, the building surface components may include

surface tiles. For example, the surface tiles may be selected from the group consisting of slate tiles, natural stone tiles, composite tiles, concrete tiles and wooden tiles.

Some embodiments disclosed herein provide various methodologies for constructing elevated building surface assemblies. In one embodiment, a method for constructing an elevated building surface includes locating a plurality of support pedestals including support pillars on a fixed surface in spaced-apart relation, installing anchoring members on the support pillars of the support pedestals, attaching a stabilizing brace to the anchoring members of adjacent support pedestals to operatively interconnect the adjacent support pedestals, and placing building surface components on the support pedestals to form a stabilized elevated building surface assembly.

In one characterization, the attaching step may include attaching first and second ends of the stabilizing brace to the anchoring members of the adjacent support pedestals using a mechanical fastener. In another characterization, the installing step may include compressively mounting the anchoring members onto the support pillars of the support pedestals. The installing step may also include inserting a lug disposed on an inner surface of the anchoring members into an anchor engagement aperture on the support pillars of the support pedestals. In this regard, the inserting step may include inserting first and second opposing lugs disposed on the anchoring members into anchor engagement apertures on the support pillars of the support pedestals.

In another aspect, the attaching step may include attaching a first stabilizing brace at a first vertical position along the length of the support pillar of the adjacent support pedestals and attaching the second stabilizing brace at a second vertical position along the length of the support pillar to interconnect adjacent support pedestals, wherein the second vertical position is different than the first vertical position.

The support pedestals may include a base plate that is placed on the fixed surface, and a support plate that supports the building surface components, wherein the support pillar extends generally perpendicularly from the base and support plates. The building surface components may include surface tiles, such as surface tiles selected from the group consisting of slate tiles, natural stone tiles, composite tiles, concrete tiles and wood tiles.

In accordance with the foregoing embodiments and aspects, the support structure can provide increased structural stability. In one aspect, the support structure can be used to support elevated surfaces in seismically active geographic areas. Through interconnection of the support pedestals using stabilizing braces attached to a central section of the support pedestals, the support pedestals can move in unison during a seismic event or other disruption to maintain the desired spacing between the support pedestals, and therefore continue to safely support surface tiles placed on the support pedestals and maintain the integrity of the building surface. The stabilizing braces may be rapidly and easily attached to the support pedestals during construction of the support structure.

The support structure can have an increased structural stability, thereby enabling the use of support pedestals having an increased height without adversely affecting the stability of the elevated surface. For example, the support pedestals can have a height of greater than 12 inches, such as at least about 24 inches and even up to about 36 inches or more.

DESCRIPTION OF THE DRAWINGS

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

Fig. 2 illustrates a top view of a stable support structure for elevating a surface.

Fig. 3a illustrates an anchoring member that is adapted to interconnect stabilizing braces between support pedestals in a support structure for elevating a surface, and showing a first end of a stabilizing brace being separated from the anchoring member.

Fig. 3b illustrates the anchoring member of **Fig. 3a** and showing an end of the stabilizing brace being inserted into a brace engagement element of the anchoring member.

Figs. 3c-3d illustrate alternative embodiments of brace engagement elements of an anchoring member.

Fig. 4a illustrates another anchoring member that is adapted to interconnect stabilizing braces between the support pedestals and showing an end of a stabilizing brace being separated from the anchoring member.

Fig. 4b illustrates another anchoring member that is adapted to interconnect
5 stabilizing braces between the support pedestals and showing an end of a stabilizing brace being separated from the anchoring member.

Fig. 5 illustrates a support pedestal that may be used as part of the support structure of **Figs. 1-2**.

Fig. 6a illustrates the anchoring member of **Fig. 3a** before being anchored to a
10 support pedestal.

Fig. 6b illustrates the anchoring member of **Fig. 3a** after being anchored to a support pedestal.

Fig. 7 illustrates a support pedestal having two anchoring members anchored to a central section of the support pedestal.

Fig. 8 illustrates a side view of a stabilized elevated building surface assembly.
15

DESCRIPTION OF THE INVENTION

Fig. 1 illustrates a portion of an elevated building surface assembly **100** that includes a building surface **101** formed from a plurality of building surface components
20 such as surface tiles **102** that are elevated above a fixed surface by a support structure **200**. The support structure **200** includes a plurality of spaced-apart support pedestals **201** and a plurality of stabilizing braces **204** having first and second ends **205**, **206** that interconnect the support pedestals **201**. Additionally, a plurality of anchoring members **300** are anchored (e.g., removably) to the support pedestals **201** to secure the stabilizing
25 braces **204** to the support pedestals **201**. The anchoring members **300** will be discussed in more detail in relation to **Figs. 3a-6b**.

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,
30 including hardwood deck tiles, tiles of metal or fiberglass grating, rubber tiles and the

like. The support pedestals **201** can be placed in a spaced-apart relation on fixed surfaces including, but not limited to, rooftops, on-grade (e.g., natural ground), over concrete slabs including cracked concrete slabs, and can be placed within fountains and water features, used for equipment mounts, and the like. The elevated building surface assembly **100** can be used for both interior and exterior applications.

Each of the surface tiles **102** is placed upon several support pedestals **201** to elevate the surface tile **102** above the fixed surface. As illustrated in **Fig. 1**, the surface tiles **102** are rectangular (e.g., square) and a support pedestal **201** may be disposed beneath four corners of adjacent surface tiles **102**. Further, although illustrated in **Fig. 1** as being laid out in a symmetric square pattern, the support pedestals **201** can also be laid out in various configurations as may be dictated by the shape and size of the surface tiles, such as a rectangular configuration or a triangular configuration.

The support pedestals **201** are interconnected by a plurality of stabilizing braces **204** that are secured to the support pedestals **201** via the anchoring members **300**, and operatively interconnect each support pedestal **201** with one or more adjacent support pedestals **201** to form a stable support structure **200**. The stabilizing braces **204** interconnecting the support pedestals **201** by attachment to central sections of the support pedestals can advantageously enhance the stability of the support structure **200** as compared to a structure utilizing support pedestals that are not interconnected and are thus free to move independently with respect to other support pedestals. For example, if one or more of the support pedestals **201** shift, such as during a seismic event or other disruption, the stabilizing braces **204** may cause the interconnected support pedestals **201** to move essentially in unison such that the spacing between adjacent support pedestals may remain substantially fixed. Therefore, the surface tiles **102** may remain supported above the fixed surface and the integrity of the building surface **101** may be maintained. It is a particular advantage that the structural integrity of the building surface **101** can be maintained, even when neither the stabilizing braces **204** nor the support pedestals **201** are attached to the fixed surface.

Fig. 2 illustrates a top view of a support structure **200** for elevating a building surface. The support structure **200** includes a plurality of support pedestals **201** that are disposed in spaced-apart relation by a predetermined distance. The placement of the support pedestals **201** will generally be dictated by the shape and size of the surface

tiles that are placed on the support structure **200**. By way of example, the distance between adjacent support pedestals, such as pedestals **201e** and **201i**, can typically be from about 1 foot to about 3 feet, such as about 2 feet. As discussed below, the stabilizing braces **204** can optionally have an adjustable length, such as to
5 accommodate the use of surface tiles having edges of different lengths

As is illustrated in **Fig. 2**, a plurality of stabilizing braces **204** are attached to and interconnect the support pedestals **201**. For example, each stabilizing brace **204** can operatively interconnect two adjacent support pedestals **201**. As illustrated in **Fig. 2**, each interior support pedestal, such as support pedestal **201i**, may be connected by a
10 stabilizing brace **204** to each nearest adjacent support pedestal. Thus, the interior support pedestal **201i** may be interconnected to four nearest adjacent support pedestals using four individual stabilizing braces **204**. Exterior support pedestals located on the perimeter of the support structure **200** may be attached to fewer than four support pedestals, such as support pedestal **201e**, which may be interconnected to three
15 adjacent support pedestals. In a similar fashion, corner support pedestals such as support pedestal **201c** may be interconnected to two adjacent support pedestals. Although **Fig. 2** illustrates that stabilizing braces **204** are disposed between and interconnected to nearest adjacent support pedestals, the braces **204** may also be disposed to interconnect adjacent support pedestals that are diagonally opposed, such
20 as corner support pedestal **201c** and interior support pedestal **201i**.

The support structure **200** comprising the support pedestals **201** interconnected with stabilizing braces **204** can advantageously provide enhanced stability for the elevated building surface. For example, the support structure **200** can be used in seismically active geographic areas to improve the stability of the elevated building
25 surface during seismic events. In this regard, the stabilizing braces **204** can cause the support pedestals **201** to move essentially in unison during movement of the fixed surface, thereby maintaining the required spaced-apart relationship between support pedestals to keep the surface tiles supported. Such a stable structure may also be desired in other locations that are subject to periodic vibrations, such as a train platform.

30 The utilization of stabilizing braces **204** to interconnect the support pedestals **201** in the manner described herein may also increase the safely obtainable height of the support pedestals **201**. That is, the stabilizing braces **204** can provide sufficient

structural stability such that support pedestals **201** having a higher center of gravity can be utilized to elevate the building surface while reducing the risk of the building surface collapsing. It is also an advantage that the stabilizing braces **204** may be attached to the support pedestals **201** on the central section of the support pedestals, e.g., nearer the center of gravity of the support pedestals **204**, as opposed to being attached to the support plate and/or the base plate of the support pedestals **204**.

The stabilizing braces **204** are therefore adapted to interconnect the support pedestals **201** and provide a sufficiently rigid lateral connection between the support pedestals **201** such that the support pedestals **201** may move in unison, and such that the spacing among the support pedestals **201** does not substantially change due to seismic events or other events that can cause movement of the support pedestals **201**.

As noted above with respect to **Fig. 1**, anchoring members may be anchored to the support pedestals to facilitate attachment of the stabilizing braces to the support pedestals. Turning now to **Fig. 3a**, an example of an anchoring member **300** is illustrated that may be used as part of the support structure **200** in **Figs. 1-2** to attach the stabilizing braces **204** to the support pedestals **201**. Stated otherwise, the anchoring member **300** allows one or more stabilizing braces **204** to be operatively attached to a support pedestal **201**. The anchoring member **300** may comprise a resilient mounting member that may be quickly mounted (e.g., compressively) onto a support pillar of a support pedestal **201** (e.g., onto a central section **230** illustrated in **Fig. 5**, discussed below) and that allows one or more stabilizing braces **204** to be quickly mounted and attached to the anchoring member **300** (e.g., via insertion).

As illustrated in **Fig. 3a**, the anchoring member **300** may broadly include a mounting member **301** for mounting onto a central section of a support pedestal. For instance, the mounting member **301** may be a generally flexible or otherwise resilient member that may be mounted (e.g., in compression) on the central section of a support pedestal. The mounting member **301** may be in the form of a curvilinear member **302** but also maybe in the form of non-curvilinear members such as square-shaped members, partially hexagonal members, and the like. In some arrangements, the mounting member **301** may be appropriately mechanically fixed (e.g., mechanically fastened) to the central section of a support pedestal (e.g., via threaded fasteners and holes) whether or not the mounting member **301** is resilient. In any event, the anchoring

member **300** may also include at least one attachment element adapted for engagement with an anchor engagement element (e.g., anchor engagement element **232** of **Figs. 5-7**) on a support pedestal. For instance, the anchoring member **300** may include first and second opposing attachment elements **304**, **306** for respective engagement with a pair of anchor engagement elements disposed on the central section of the support pedestal **201**.

As will be appreciated below in relation to **Figs. 6a-6b**, the mounting member **301** may be adapted to deflect away from an initial position or state and then maintain a state of compression when anchored to a support pedestal. For instance, the curvilinear member **302** may be in the form of an arcuate member including an inside surface **310** that is adapted to face the central section of a support pedestal **201** and an outside surface **312** that is generally configured to face away from the central section when the anchoring member **300** is attached to a support pedestal.

The inside surface **310** may be generally smooth which allows the curvilinear member **302** to better conform to a central section (e.g., a cylindrical central section) of a support pedestal, although in some variations the inside surface **310** may include any appropriate structure (e.g., protrusions, teeth) that may serve to enhance the grip of the anchoring member **300** on a support pedestal. In any case, the inside surface **310** may also include the first and second opposing attachment elements **304**, **306** which may be sized and configured for engagement with a pair of anchor engagement elements, such as the anchor engagement elements **232** on the central section of the support pedestal **201** shown in **Figs. 5-7**. The first and second opposing attachment elements **304**, **306** may be generally opposed from each other (e.g., separated by about 180°), although other orientations are also envisioned. Each of the first and second opposing attachment elements **304**, **306** may be in the form of a protrusion (e.g., a lug) that is adapted for receipt in and/or introduction or insertion into a corresponding aperture in the central section of the support pedestal **201**.

As shown, the first and second opposing attachment elements **304**, **306** may include a plurality of converging side walls **314** (e.g., the side walls converge in a direction from the inside surface **310** towards a center of the curvilinear member **302**) which facilitate insertion of the first and second opposing attachment elements **304**, **306** into anchor engagement apertures in the support pedestal **201**. In other variations, each

of the first and second opposing attachment elements **304**, **306** may be in the form of an aperture that is sized for receipt of a protrusion on the central section of a support pedestal. Engagement of the first and second opposing attachment elements **304**, **306** and the central section of a support pedestal will be shown and discussed in more detail in relation to **Figs. 6a-7**.

The outside surface **312** of the curvilinear member **302** may include one or more stiffening ribs **316** disposed thereon which may serve to enhance the structural integrity of the anchoring member **300**. Additionally, at least one brace engagement element may be disposed on the outside surface **312** that is adapted to engage with the first or second end **205**, **206** of the brace **204**. For instance, the outside surface **312** may include first and second brace engagement elements **308**, **309** that allow a support pedestal to be interconnected to at least two adjacent support pedestals. Turning back to **Fig. 1**, a first brace engagement element **308** of a first anchoring member **300a** allows a first support pedestal **201a** to be interconnected to a second support pedestal **201b** via a stabilizing brace **204b**, and a second brace engagement element **309** allows the first support pedestal **201a** to also be interconnected to a third support pedestal **201c** via another stabilizing brace **204c**, the second and third support pedestals **201b**, **201c** being situated approximately 180° to each other in relation to the first support pedestal **201a**. This will be further discussed below in relation to **Figs. 6a-6b**.

With reference again to **Fig. 3a**, the first brace engagement element **308** (similar discussion may apply equally to the second brace engagement element **309**) may be in the form of a tab **313** that extends outwardly from the curvilinear member **302**. The tab **313** may include a cavity **318** that is sized for receipt of the first end **205** of the stabilizing brace **204**. For instance, the cavity **318** may have internal dimensions that are approximately equal to or slightly greater than the external dimensions of an end **205** of the stabilizing brace **204**. This allows the end **205** of the stabilizing brace **204** to be inserted into the cavity **318** such that a slight friction fit may be achieved. The first brace engagement element **308** may also include at least one aperture **320** which is sized for receipt of a spring-loaded locking element or member **322** disposed adjacent an end **205** of the stabilizing brace **204** which is discussed in more detail below.

With reference now to **Figs. 1-3a**, each stabilizing brace **204** may be in the form of any appropriate elongated reinforcement member and can have a variety of sizes,

shapes and configurations. As discussed above, each stabilizing brace **204** may include first and second ends **205**, **206**, and these may be disposed at opposite ends of an elongate central portion **207**. Additionally, the stabilizing brace **204** may include top and bottom surfaces **208**, **209** (with the understanding that either of such surfaces could be the "top" or "bottom" surface) such as when the stabilizing braces have a rectangular cross-section. The first and second ends **205**, **206** are adapted to be operatively attached to a support pedestal **201** (e.g., via the anchoring member **300**), and in this regard may include a locking mechanism such as spring-loaded locking members **322** for engagement with the first and second brace engagement elements **308**, **309** of the anchoring member **300**. While the spring-loaded locking member **322** will be discussed in relation to the first end **205** of the stabilizing brace **204**, similar discussion may also apply to the second end **206** of the stabilizing brace **204**.

With particular reference to **Fig. 3a**, the spring-loaded locking member **322** may be in the form of a resilient arm **324** having a protuberance **326** disposed on one end thereof that is sized for receipt in the at least one aperture **320** of the brace engagement element **308** when the end **205** of the stabilizing brace **204** is inserted into the cavity **318**. The resilient arm **324** and protuberance **326** may be disposed within an opening **328** located adjacent the first end **205** of the brace **204** and are designed to be flexibly mounted in the opening **328**. That is, upon the resilient arm **324** and protuberance **326** being deflected from the position shown in **Fig. 3a** (e.g., either upwardly or downwardly), the resilient arm **324** and protuberance **326** may generally return to the position shown in **Fig. 3a**. This feature may be due to the material of the brace **204** and/or due to any appropriate joint between the resilient arm **324** and the body of the stabilizing brace **204**.

The protuberance **326** may have at least one insertion surface **330** that facilitates insertion of the protuberance **326** into the cavity **318** of the first brace engagement element **308** (e.g., where the insertion surface **330** is beveled or otherwise sloped). Furthermore, the protuberance **326** may at least partially extend above or beyond the top surface **208** of the stabilizing brace **204** for reasons that will be described below. Turning now to **Fig. 3b**, the anchoring member **300** is shown after insertion of the first end **205** of the stabilizing brace **204** into the cavity **318** of the first brace engagement element **308**. During insertion, the insertion surface **330** initially contacts a portion of the first brace engagement element **308** which deflects the resilient arm **324** (not shown in

Fig. 3b) and the protuberance **326** downward (e.g., towards the bottom surface **209**) as the end **205** is inserted into the cavity **318**. More specifically, after insertion and before the protuberance **326** has reached the aperture **320**, the protuberance **326** is deflected such that a top surface of the protuberance **326** is essentially level with the top surface **208** of the stabilizing brace **204**. Continued insertion of the first end **205** of the brace **204** into the cavity **318** results in the protuberance **326** entering (e.g., snapping into) the aperture **320** (as shown in **Fig. 3b**) whereby the protuberance **326** deflects upwardly so as to again protrude above the top surface **208** of the stabilizing brace **204**.

At this point, the first end **205** of the stabilizing brace **204** is locked to the anchoring member **300** as an attempted removal of the stabilizing brace **204** from the cavity **318** will result in the protuberance **326** abutting an inside wall of the aperture **320** and limiting removal of the stabilizing brace **204** from the cavity **318**. A similar procedure can be performed with the second end **206** of the stabilizing brace **204** to lock the second end **206** to an anchoring member **300** anchored to an adjacent support pedestal **201** to form a support structure **200** (e.g., as in **Figs. 1-2**). In one variation, the first brace engagement element **308** may include a series of apertures **320** such that the protuberance **326** can be ratcheted into a desired aperture **320** which may further limit removal of the stabilizing brace **204** from the cavity **318** as the protuberance **326** would need to travel through a series of apertures **320** to be completely removed from the cavity **318**. When desired, the first end **205** can be removed from the cavity **318** by inserting any appropriate tool (e.g., screwdriver) into the aperture **320** to deflect the protuberance **326** away from the aperture **320** and pulling on the stabilizing brace **204**.

It should be appreciated that the cavity **318** and the spring-loaded locking member **322** can be appropriately designed in a manner that allows the resilient arm **324** and protuberance **326** to deflect upon insertion into the cavity **318**. That is, the cavity **318**, opening **328**, etc. can be designed to allow deflection of the resilient arm **324** and protuberance **326** in the manner described above. Additionally, the first end **205** of the stabilizing brace **204** and the cavity **318** can be designed such that an end **332** (see **Fig. 3a**) is in contact with a back surface of the cavity **318** (e.g., a portion of the outside surface **312**) when the first end **205** is locked to the anchoring member **300** (e.g., when the protuberance **326** is received in the aperture **320**). In this regard, and during a seismic event, for instance, the support pedestal **201**, anchoring member **300** and the

stabilizing brace **204** may be able to move substantially as a single unit which may provide for a more structurally robust support structure **200**.

While the first brace engagement element **308** has been shown as comprising a cavity **318** and the locking member **322** as comprising a resilient arm **324** and a protuberance **326**, it is envisioned that the brace engagement element **308** and spring-loaded locking member **322** may alternatively be in the form of a resilient arm and protuberance, and a cavity **318**, respectively. For example, the stabilizing brace **204** could comprise a cavity into which a protuberance and/or tab on the anchoring member **300** is inserted.

The foregoing illustrates an example of one way that the stabilizing braces may be attached to the anchoring members. However, the stabilizing braces may be secured to the anchoring members in any way that securely interconnects the support pedestals and retains lateral rigidity through the structure. Thus, alternative arrangements to that illustrated in **Figs. 3a-3b** are possible. For example, **Fig. 3c** illustrates an embodiment wherein a stabilizing brace **204c** includes an aperture **362** that is adapted to line-up with an aperture **360** in the brace engagement element **308c** when the brace **204c** is inserted into the cavity **318c**. A mechanical fastener **364** (e.g., a threaded fastener or a lock pin) may then be inserted through apertures **360** and **362** to secure the stabilizing brace **204c** to the brace engagement element **308c**, and hence to the anchoring member **300c**.

As illustrated in **Fig. 3d**, the stabilizing brace **204d** may be inserted into the cavity **318d** of the brace engagement element **308d** and an adhesive **366** (e.g., an epoxy) or similar substance may be used to secure the brace **204d** to the brace engagement element **308d**. It will also be appreciated that combinations of the foregoing may also be used. For example, an adhesive may be used in conjunction with a mechanical fastener to secure the stabilizing brace to the brace engagement element. Other structures are also possible, such as where the stabilizing brace comprises a cavity at an end thereof that is inserted over a brace engagement element. Other means of securing the stabilizing braces to the anchoring members will be apparent to those that are skilled in the art.

Further, in an alternative embodiment, one or more of the stabilizing braces may include an anchoring member integrally (e.g., permanently) formed on one or both ends

of the stabilizing brace. In this manner, the time to install the building surface assembly may be reduced by virtue of requiring fewer manual steps to assemble the support structure.

The anchoring members may be fabricated from a variety of materials and in one embodiment are fabricated from plastic to resist degradation and corrosion, such as in an exterior environment. The stabilizing braces **204** may be rigid or may be elastic and sufficiently flexible to accommodate the placement of the support structure upon uneven fixed surfaces, while maintaining sufficient lateral rigidity to rigidly interconnect the support pedestals. In any event, the stabilizing braces **204** may be fabricated from a variety of materials. For example, the stabilizing braces **204** may be fabricated from metallic or non-metallic materials, such as plastics, wood and composite materials. In one exemplary embodiment, the braces have a length of from about 1 foot to about 3 feet, and a thickness of from about 1/8" to about 3/4". In some variations, the stabilizing braces **204** may be adjustable in length and in this regard may include a number of telescopic portions. For instance, the stabilizing braces **204** may be adjustable in the manner described in U.S. Patent Publication No. 2011/0011012 by Knight et al. which is incorporated herein by reference in its entirety.

Turning now to **Figs. 4a-4b**, other embodiments of an anchoring member are illustrated for attaching a stabilizing brace **204** to a support pedestal **201** (e.g., as shown in **Figs. 1-2**). Corresponding components between the anchoring member **300** of **Figs. 3a-3b** and **4a-4b** are identified by common reference numerals. The anchoring member **300'** of **Fig. 4a** includes only a first brace engagement element **308'** which may be useful in situations where only a single stabilizing brace **204'** needs to be attached to a support pedestal. Anchoring members are also envisioned having more than one or two brace engagement elements. During construction of a support structure (e.g., support structure **200** of **Figs. 1-2**), operators will readily understand which of the various anchoring members are needed to interconnect the various support pedestals.

With reference now to **Fig. 4b**, the first and second opposing attachment elements **304"**, **306"** comprise respective first and second locking mechanisms **311**, **315**. The first and second locking mechanisms **311**, **315** are operable to resist removal of the first and second opposing attachment elements **304"**, **306"** from anchor engagement elements (e.g., apertures) within a support pedestal. For instance, each of

the first and second locking mechanisms **311**, **315** may include at least one tooth or catch **317** for contacting an inside wall of a support pedestal after the first and/or second locking mechanism **311**, **315** have been inserted or introduced through an aperture of a support pedestal. For instance, the catch **317** may be resilient and may flex as it passes
5 through the aperture and then substantially return to an initial position after reaching an interior of the central section of the support pedestal. In some arrangements, a width of the first and second locking mechanism **311**, **315** may be designed to be greater than a width of the apertures that the first and second locking mechanism **311**, **315** are inserted through in the support pedestal (e.g., greater than a width of apertures **232** in **Fig. 6b**) to
10 resist removal of the first and second locking mechanisms **311**, **315** and/or first and second opposing attachment elements **304"**, **306"**.

The locking mechanisms **311**, **315** may be integral with or otherwise formed as part of the first and second opposing attachment elements **304"**, **306"**, and/or may be formed separately from the first and second opposing attachment elements **304"**, **306"**.
15 Additionally, any appropriate number (e.g., one or more) of the locking mechanisms may be utilized at any appropriate location(s) about the anchoring member **300"**. Moreover, other forms of locking mechanisms are also envisioned (e.g., clips, latches). Locking mechanisms may be useful in situations where the curvilinear member **302** loses some portion of its resilient nature over time and/or otherwise loses its ability to apply a
20 compressive force about the support pedestal to urge the first and second opposing attachment elements into apertures in the support pedestal. Such locking mechanisms may also permit brace engagement elements **308**, **309** to be anchored to a support pedestal without requiring a member (e.g., curvilinear member **302**) to interconnect the brace engagement elements.

25 Thus, stabilizing braces are utilized to interconnect a plurality of support pedestals to form a support structure that supports the surface tiles to form the elevated building surface. The support pedestals that are useful for forming the support structure can have a variety of configurations. The support pedestals can have a fixed height, or can be height-adjustable support pedestals. Further, any combination of fixed height
30 and height-adjustable support pedestals can be used to form the support structure. The support pedestals may also be fabricated from a variety of materials. Preferably, the

support pedestals are fabricated from a non-metallic material, such as plastic, that is resistant to rot and corrosion and is advantageous for use in exterior environments.

Fig. 5 illustrates a side view of an exemplary support pedestal **201** that is adapted to be placed upon a fixed surface. The support pedestal **201** illustrated in **Fig. 5** is a height-adjustable support pedestal. 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 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 adapted to 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** (or 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 (e.g., tiles) thereon. 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 and internal threads on the base member. 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 pedestal may also have a fixed height.

The support plate **220** includes a top surface **222** upon which the corners of adjacent surface tiles 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 that form the elevated building surface. 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**.

It should be appreciated from a broad perspective that the support pedestal **201** may 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**. As illustrated in Fig. 5, the central section **230** also includes 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 variation, 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 should be appreciated 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.

The central section **230** may include at least one anchor engagement element such as anchor engagement element **232b** (e.g., being in the form of an aperture disposed at least partially through the central section **230**) that is adapted to receive at least one of the first and second attachment elements **304**, **306** of the anchoring

members **300, 300', 300''** (shown in **Figs. 3a-4b**). For instance, the central section **230** may include a pair of anchor engagement elements (e.g., being in the form of a rectangular apertures disposed at least partially through the central section **230**) that are adapted to receive the first and second opposing attachment elements **304, 306** of the

5 anchoring members **300, 300', 300''** (shown in **Figs. 3a-4b**). Each pair of anchor engagement elements may include a first anchor engagement element (e.g., the upper anchor engagement element **232a** shown in **Fig. 5**) at a first vertical position along a length of the central section **230** (e.g., above the base plate **215**) and a second anchor engagement element (not shown in **Fig. 5**) also positioned at the first vertical position

10 but disposed on another portion of the central section **230** (e.g., separated by about 180° from element **232a** along the circumference of the central section **230**, or other angular positions).

As will be discussed in relation to **Figs. 6a-6b**, the anchor engagement element **232a** allows an anchoring member to be anchored at a first vertical position above the

15 base plate **215**. Additional anchor engagement elements may also be formed on the central section **230** at other vertical positions above the base plate and at other angular positions along the circumference of the central section **230**. For example, attachment elements **232b** and **232c** are disposed at second and third vertical positions above the base plate **215**. Additionally, in some variations, the anchor engagement elements at a

20 particular vertical position are separated by angles other than about 180° .

Turning now to **Fig. 6a**, a top perspective view of a support pedestal **201** and anchoring member **300** are shown before the anchoring member **300** has been anchored to the central section **230** of the support pedestal. For clarity, the support member **216** and coupling member **258** (shown in **Fig. 5**) have been removed. As

25 illustrated, the central section **230** of the support pedestal **201** may be cylindrical and include a diameter **334** (e.g., an outside diameter). Additionally, an anchoring member gap **336** may be defined between first and second ends **338, 340** of the curvilinear member **302**. The state of the curvilinear member **302** illustrated in **Fig. 6a** may be considered a "first state", and the anchoring member gap **336** comprises a first distance

30 in this first state that is less than the diameter **334** of the central section **230**. In this regard, it should be appreciated that the first and second ends **338, 340** generally should

be separated from each other to allow the curvilinear member **302** to be mounted onto the central section **230**.

Another observation is that the first and second brace engagement elements **308**, **309** may include different first and second insertion axes **342**, **344** when the
 5 anchoring member is in this first state. As seen in **Fig. 6a**, the insertion axes **342**, **344** are non-collinear and generally converge in a direction towards a center of the curvilinear member **302**. As will be appreciated, the non-collinear nature of the first and second insertion axes **342**, **344** in this first state of the curvilinear member **302** allows the first and second insertion axes **342**, **344** to become substantially collinear when the
 10 first and second ends **338**, **340** are spread apart and the curvilinear member **302** is mounted (e.g., compressively) about the central section **230** of the support pedestal **201**.

Turning now to **Fig. 6b**, the curvilinear member **302** has been mounted on the central section **230** and has been moved to another "state". In this second state, the diameter **334** and the anchoring member gap **336** are approximately equal. Stated
 15 otherwise, the central section **230** in this state is disposed within the anchoring member gap **336**. As will be appreciated, the anchoring member gap **336** has a second distance in the second state that is greater than the first distance in the first state. This results from deflection of the first and second ends **338**, **340** of the curvilinear member **302** away from each other during mounting of the curvilinear member **302** about the central
 20 section **230** of the support pedestal **201**. Of course, additional states of the curvilinear member **302** whereby the anchoring member gap **336** is of different distances can be achieved. For instance, an operator may deflect the first and second ends **338**, **340** such that the anchoring member gap **336** is of a distance greater than the diameter **334** of the central section **230** to allow the anchoring member **300** to be removed from the
 25 support pedestal **201**. It should be appreciated that any of the various states of the curvilinear member **302** could be considered the "first state," "second state," etc. depending upon an initial, starting state of the curvilinear member **302**. It should also be appreciated that the flexible compressive nature (e.g., resilient nature) of the anchoring member **300** allows the anchoring member **300** to be used with support pedestals **201** of
 30 varying diameters.

Additionally, deflection of the first and second ends **338**, **340** away from each other causes the first and second insertion axes **342**, **344** of the first and second brace

engagement elements **308, 309** to at least substantially align or otherwise be least substantially collinear. This allows first and second opposing stabilizing braces separated by about 180° to be attached to opposing sides of the support pedestals **201** (e.g., see support pedestal **201a** in **Fig. 1** and opposing braces **204b** and **204c**). It is contemplated that the anchoring member **300** could be designed such that the first and second insertion axes **342, 344** are non-collinear even in this state which may allow stabilizing braces disposed at angles other than about 180° relative to each other to be attached to a support pedestal. Additionally, in the case where the mounting member **301** is generally not resilient and is operable to be mechanically fixed to the central section of the support pedestal **201**, the first and second insertion axes **342, 344** may always be substantially aligned, or may always be in the same non-collinear relationship to each other.

With continued reference to **Fig. 6b**, the central section **230** may include at least one pair of anchor engagement elements **232**, a first of which may be disposed on one portion of the central section **230** and a second of which may be disposed on an opposing portion of the central section **230** (e.g., separated by about 180°). For instance, the central section **230** may include a first pair **346** of anchor engagement elements disposed at a first vertical position **348** above the base plate **215** and a second pair **350** of anchor engagement elements disposed at a second vertical position **352** above the base plate **215**. Additionally, the anchor engagement elements of the first and second pairs **346, 350** (and/or other pairs) need not necessarily be disposed at the same angular position along the circumference of the central section **230**. For instance, while the first anchor engagement elements **232** of the first and second pairs **346, 350** have been illustrated as being generally disposed at a first angular position **354** on the circumference of the central section **230**, the first anchor engagement element **232** of one of the first and second pairs **346, 350** could be disposed at a second angular position **356** (e.g., separated by about 90° from the first angular position **354**).

As illustrated, the first and second attachment elements **304, 306** (e.g., lugs) have been respectively engaged in the first pair **346** of anchor engagement elements **232** (e.g., anchor engagement apertures). In this manner, movement of the anchoring member **300** relative to the central section **230** (e.g., vertical movement or rotational movement) may be inhibited. Installation of the anchoring member **300** onto the central

section **230** may occur in numerous manners. For instance, an operator can initially engage one of the first and second opposing attachment elements **304**, **306** of the curvilinear member **302** with a first anchor engagement element **232** of one pair of anchor engagement elements **232** (e.g., locate one of the lugs on the anchoring member **300** into one of the apertures on the central section **230**). Thereafter, the operator can wrap the other end of the curvilinear member **302** around the central section **230** and locate (e.g., snap) the other of the first and second opposing attachment elements **304**, **306** into a corresponding second anchor engagement element **232** of the pair of anchor engagement elements **232**. It will be appreciated that as the gap **336** is initially less than the diameter **334** (e.g., as shown in **Fig. 6a**), the curvilinear member **302** may need to be flexed or deflected (e.g., such that the first and second ends **338**, **340** move apart from each other) to allow the other of the first and second opposing attachment elements **304**, **306** to be engaged into the corresponding second anchor engagement element.

The tendency of the curvilinear member **302** to return to the first state (shown in **Fig. 6a**) due to the resilient nature of the curvilinear member **302** serves to resist disengagement of the first and second opposing attachment elements **304**, **306** from the anchor engagement elements. In other words, the compressive nature of the curvilinear member **302** helps to maintain positioning of the anchoring member **300** on the central section **230** of the support pedestal. As discussed previously, the anchoring member **300** may be equipped with locking mechanisms (e.g., first and or second locking mechanism **311**, **315** in **Fig. 6b**) for further resisting disengagement of the first and second opposing attachment elements **304**, **306** from the pair of anchor engagement elements **232**. Once (or even before) the anchoring member **300** has been anchored to the central section **230**, one or more stabilizing braces **204** can be engaged with the first and/or second brace engagement elements **308**, **309** (e.g., as shown in **Fig. 3a**) as part of the construction of a support structure (e.g., support structure **200** shown in **Fig. 2**). After a plurality of adjacent support pedestals **201** have been interconnected via anchoring members **300** and stabilizing braces **204**, any appropriate building surface components (e.g., tiles, pavers) can be placed on top of the support pedestals (e.g., over the support plate **220** shown in **Fig. 5**) to form an elevated building surface (e.g., building surface **101** shown in **Fig. 1**). Removal of the anchoring member **300** from the support pedestal **201** may be achieved by, for instance, grasping one of the first and second brace engagement elements **308**, **309** and pulling in a direction away from the central

section **230** so as to withdraw the corresponding first or second opposing attachment element **304, 306** out of the corresponding anchor engagement element **232**. This may entail disengaging any locking mechanisms present between the central section **230** and the anchoring member **300**.

5 In one arrangement, a second anchoring member may be disposed at a different vertical position along the length of the central section **230** in relation to the first anchoring member **300**. For instance, the first and second brace engagement elements **308, 309** of the first and second anchoring members may be separated by about 90° which may allow a single support pedestal (e.g., support pedestal **201i** in **Fig. 2**) to be
10 interconnected to four adjacent support pedestals via four different stabilizing braces **204**. Alternatively, the first brace engagement elements **308** of the first and second anchoring members could be at the same angular position (e.g., first angular position **354**) and the second brace engagement elements **309** of the first and second anchoring members could be at the same angular position (e.g., a third angular position **358** in **Fig.**
15 **6b**). This may allow a single support pedestal to be interconnected to each of two adjacent support pedestals by two stabilizing braces. As will be appreciated, the support pedestal **201** acquires a higher center of gravity when a cylindrical coupling member is used as part of the central section **230**. In this regard, at least one anchoring member may be disposed about the coupling member and another anchoring member may be
20 disposed about the base member extension (e.g., base member extension **214** in **Fig. 5**) to interconnect the support pedestals **201**.

Fig. 7 illustrates a side view of a support pedestal **201** having a first anchoring member **300a** and a second anchoring member **300b** attached to a central section **230** of the support pedestal **201**. As illustrated in **Fig. 7**, the central section **230** extends
25 between the base member plate **215** and the support plate **220** and includes a base member extension **214**, a support member extension **219** and a coupling member **258** coupling the base member **212** to the support member **216**.

The first anchoring member **300a** is anchored to the central section **230** at a first vertical position **V₁** above the base plate **215**. The first vertical position **V₁** is below the
30 support plate **220** and as illustrated in **Fig. 7** is located on the coupling member **258**. The first anchoring member **300a** includes a brace engagement element **308a** that is adapted to engage a stabilizing brace with the anchoring member **300a**. As illustrated in

Fig. 7, brace engagement element **308a** is adapted to engage a stabilizing brace that would come out of **Fig. 7** (e.g., perpendicular to the plane of the sheet illustrating **Fig. 7**).

The second anchoring member **300b** is also anchored to the central section **230** of the support pedestal **201**, but at a second vertical position V_2 that is different (i.e., lower) than the first vertical position V_1 . The second anchoring member **300b** includes a first brace engagement element **308b** and a second brace engagement element **308c** that are separated about 180° along the circumference of the central section **230** from the first brace engagement element **308b**. In this manner, stabilizing braces may be secured to the anchoring member **300b** at brace engagement elements **308b**, **308c** such that the stabilizing braces may interconnect to support pedestals placed at either side (e.g., left and right) of the support pedestal **201**. Further, each of the brace engagement elements **308b**, **308c** are separated by about 90° from the brace engagement element **308a** along the circumference of the central section **230**.

The first anchoring member **300a** and the second anchoring member **300b** are anchored to the central section **230** through anchor engagement elements (not visible), similar to anchor engagement element **232** that is disposed on the base member extension **214**.

Fig. 8 illustrates a side view of a stabilized elevated building surface structure **100** that includes a building surface **101** that includes a plurality of surface tiles **102a-102d**. The structure **100** includes a plurality of spaced-apart support pedestals **201a-201c** disposed upon a fixed surface **110**. A plurality of stabilizing braces **204a-204d** interconnects the support pedestals **201a-201c**. The stabilizing braces **204a-204d** are attached to the support pedestals **201a-201c** by anchoring members **300a-300c** and the stabilizing braces **204a-204d** are disposed generally horizontally and substantially parallel with the fixed surface **110**.

The structure **100** also includes a plurality of anchoring members **300d-300f** that are anchored to the support pedestals **201a-201c** at a vertical position above the base plates that is different than (e.g., higher than) the vertical position of the anchoring members **300a-300c**. The anchoring members **300d-300f** are adapted to attach stabilizing braces that are disposed substantially orthogonally in relation to stabilizing braces **204a-204d**.

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. For instance, while the anchor engagement elements **232** have been illustrated as apertures and the opposing attachment elements **304, 306** have been illustrated in the form of lugs, the structures could be reversed such that anchor engagement elements **232** are in the form of lugs and the opposing attachment elements **304, 306** are in the form of apertures. Additionally, other arrangements such as aligned apertures and threaded fasteners, flexible tabs and the like are also envisioned. As an additional example, while the braces **204** have been illustrated in **Figs. 1-2** as being generally horizontal, it is also contemplated that the anchoring members **300** could be designed to allow the braces **204** to be disposed other than horizontal. Further, one or more portions of the anchoring members (e.g., the brace engagement elements) could be an integral portion of the central section or pillar of the support pedestals. However, it 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 support structure for elevating a building surface above a fixed surface, the support structure comprising:

a plurality of support pedestals disposed in spaced-apart relation, the support pedestals comprising:

a base plate that is adapted to be placed on the fixed surface;

a support plate that is adapted to support a building surface component;

a central section extending between the base plate and the support plate; and

at least a first anchor engagement element disposed on the central sections of the support pedestals;

a plurality of anchoring members, the anchoring members being engaged with the first anchor engagement elements of the support pedestals to anchor the anchoring members to the support pedestals; and

a stabilizing brace operatively attached to at least first and second adjacent support pedestals, wherein a first end of the stabilizing brace is secured to a first anchoring member anchored to the first support pedestal, and a second end of the stabilizing brace is secured to a second anchoring member anchored to the second support pedestal.

2. The support structure as recited in Claim 1, wherein the anchoring members comprise a mounting member having first and second ends defining an anchoring member gap therebetween.

3. The support structure as recited in Claim 2, wherein the mounting members are resilient.

4. The support structure as recited in Claim 2, wherein the mounting members are curvilinear.

5. The support structure as recited in Claim 2, wherein the mounting members are compressively engaged and mounted on the central sections of the support pedestals.

6. The support structure as recited in Claim 2, wherein an inner surface of the mounting members contacts the central sections of the support pedestals.

7. The support structure as recited in Claim 2, wherein the central sections of the support pedestals are disposed within the anchoring member gaps.

8. The support structure as recited in Claim 7, wherein the mounting members are resiliently movable between at least first and second states, wherein the anchoring member gaps are greater in the second state than in the first state, whereby the anchoring members may be detached from the central sections in the second state.

9. The support structure as recited in Claim 2, wherein the anchoring members further comprise at least a first attachment element that is operatively engaged with the first anchor engagement element on a central section.

10. The support structure as recited in Claim 9, wherein the anchoring members further comprise at least a second attachment element that is engaged with a second anchor engagement element disposed on the central sections.

11. The support structure as recited in Claim 10, wherein the first and second anchor engagement elements are separated by about 45° or more along a circumference of the central sections.

12. The support structure as recited in Claim 10, wherein the first and second anchor engagement elements are separated by about 90° or more along a circumference of the central sections.

13. The support structure as recited in Claim 1, wherein at least the first anchor engagement elements comprise apertures.

14. The support structure as recited in Claim 10, wherein at least the first attachment elements comprise lugs that are adapted to be received in anchor engagement apertures.

15. The support structure as recited in Claim 10, wherein the support pedestals further comprise at least third and fourth anchor engagement elements

disposed on the central sections, wherein the first and second anchor engagement elements are disposed at a first vertical position above the base plates and the third and fourth anchor engagement elements are disposed at a second vertical position above the base plates that is different than the first vertical position.

5 16. The support structure as recited in Claim 1, wherein the anchoring members further comprise at least a first brace engagement element, wherein the first brace engagement elements are adapted to engage with a first or second end of the stabilizing brace.

10 17. The support structure as recited in Claim 16, wherein the anchoring members further comprise a second brace engagement element, wherein the second brace engagement elements are adapted to engage with the first or second end of the stabilizing brace.

 18. The support structure as recited in Claim 16, wherein the first brace engagement elements comprise a tab extending outwardly from the anchoring members.

15 19. The support structure as recited in Claim 1, wherein the anchoring members are mechanically fastened to the central sections of the support pedestals.

 20. The support structure as recited in Claim 1, wherein the central sections of the support pedestals comprise:

 a base member extension extending away from the base plates; and

20 a support member extension extending away from the support plates, wherein the support member extensions are operatively attached to the base member extensions.

 21. The support structure as recited in Claim 20, wherein the base member extensions and the support member extensions are cylindrical.

25 22. The support structure as recited in Claim 20, wherein the central sections further comprise a coupling member extending between the base member extension and the support member extension, wherein the coupling members operatively attach the base member extensions to the support member extensions.

30 23. The support structure as recited in Claim 1, wherein the stabilizing brace has an adjustable length.

24. The support structure as recited in Claim 1, wherein the stabilizing brace has a fixed length.

25. The support structure as recited in Claim 1, wherein the stabilizing brace comprises a material selected from the group consisting of plastic, metal and
5 composites.

26. The support structure as recited in Claim 1, wherein the support pedestals comprise plastic.

27. The support structure as recited in Claim 1, wherein the stabilizing brace is disposed generally horizontally relative to the fixed surface.

10 28. A support structure for elevating a building surface above a fixed surface, the support structure comprising:

a plurality of support pedestals disposed in spaced-apart relation on the fixed surface, the support pedestals comprising:

a base plate;

15 a support plate;

a central section extending between the base and support plates;

and

a plurality of apertures disposed on the central sections;

20 a plurality of anchoring members that are removably anchored to the apertures on the central sections of the support pedestals; and

25 a stabilizing brace operatively attached to at least a first and a second of the plurality of support pedestals, wherein a first end of the stabilizing brace is secured to a first anchoring member anchored to the first support pedestal and a second end of the stabilizing brace is secured to a second anchoring member anchored to the second support pedestal.

29. The support structure as recited in Claim 28, wherein the plurality of apertures comprises at least a first aperture and a second aperture that are each disposed at substantially the same vertical position above the base plates and are separated by about 45° or more along a circumference of the central sections.

30. The support structure as recited in Claim 28, wherein the plurality of apertures comprises at least a first aperture and a second aperture that are disposed at substantially the same vertical position above the base plates and are separated by about 90° or more along a circumference of the central sections.

5 31. The support structure as recited in Claim 28, wherein the plurality of apertures comprise at least a first aperture that is disposed at a first vertical position above the base plates and at least a second aperture that is disposed at a second vertical position above the base plates that is different than the first vertical position.

10 32. The support structure as recited in Claim 28, wherein the first and second anchoring members are anchored to the first support pedestal and the second support pedestal respectively at a first vertical position above the base plates, and wherein at least third and fourth anchoring members are anchored to the first support pedestal and the second support pedestal respectively at a second vertical position above the base plates that is different than the first vertical position, and wherein a first end of a second
15 stabilizing brace is operatively attached to the first anchoring member anchored to the first support pedestal and a second end of the second stabilizing brace is operatively attached to an anchoring member anchored to a third support pedestal.

20 33. The support structure as recited in Claim 28, wherein the central sections of the plurality of support pedestals comprise a base member extension extending away from the base plate and a support member extension extending away from the support plate that is operatively attached to the base member extension.

25 34. The support structure as recited in Claim 33, wherein the central sections of the plurality of support pedestals further comprise a coupling member operatively attaching the base member extensions and the support member extensions, and wherein the first and second anchoring members are anchored to the coupling members of the first and second support pedestals respectively.

35. The support structure as recited in Claim 28, wherein the anchoring members are compressively engaged and mounted onto the central sections of the support pedestals.

36. The support structure as recited in Claim 35, wherein the anchoring members comprise a resilient mounting member having first and second ends defining an anchoring member gap therebetween.

5 37. The support structure as recited in Claim 28, wherein the anchoring members are mechanically fastened to the central sections of the support pedestals.

38. The support structure as recited in Claim 28, wherein the first and second ends of the stabilizing brace are secured to the first and second anchoring members using an adhesive.

10 39. An elevated building surface assembly, the assembly comprising:
a plurality of support pedestals disposed in spaced-apart relation on the fixed surface, the support pedestals comprising:
a base plate;
a support plate; and
15 a central section extending generally perpendicularly from the base and support plates;
a plurality of stabilizing braces operatively attached to and interconnecting adjacent support pedestals, wherein first and second ends of the stabilizing braces are attached to the central sections of the adjacent support pedestals and
20 wherein the stabilizing braces are disposed generally horizontally relative to the fixed surface; and
a plurality of building surface components operatively disposed on the support plates of the support pedestals.

25 40. The assembly as recited in Claim 39, further comprising a plurality of anchoring members anchored to the central sections of the adjacent support pedestals, wherein the first and second ends of the stabilizing braces are attached to the anchoring members.

41. The assembly as recited in Claim 40, wherein the anchoring members are removably attached to the central sections of the adjacent support pedestals.

42. The assembly as recited in Claim 40, wherein the anchoring members comprise a mounting member having first and second ends defining an anchoring member gap therebetween, and wherein the central sections of the support pedestals are disposed within the anchoring member gaps.

5 43. The assembly as recited in Claim 40, wherein the anchoring members further comprise at least a first attachment element that is operatively engaged with a first anchor engagement element disposed on the central sections.

 44. The assembly as recited in Claim 43, wherein the anchoring members further comprise at least a second attachment element that is engaged with a second
10 anchor engagement element disposed on the central sections.

 45. The assembly as recited in Claim 44, wherein the first and second anchor engagement elements comprise apertures.

 46. The assembly as recited in Claim 45, wherein the first attachment elements comprise lugs and the first anchor engagement elements comprise apertures,
15 where the lugs are inserted into the anchor engagement apertures.

 47. The assembly as recited in Claim 44, further comprising at least third and fourth anchor engagement elements disposed on the central sections, wherein the first and second anchor engagement elements are disposed at a first vertical position above the base plates and the third and fourth anchor engagement elements are disposed at a
20 second vertical position above the base plates that is different than the first vertical position.

 48. The assembly as recited in Claim 40, wherein the anchoring members further comprise at least a first brace engagement element, wherein the first brace engagement elements are adapted to engage with a first or second ends of the
25 stabilizing braces.

 49. The assembly as recited in Claim 48, wherein the anchoring members further comprise at least a second brace engagement element, wherein the second brace engagement elements are adapted to engage with the first or second ends of the stabilizing braces.

50. The assembly as recited in Claim 48, wherein the first brace engagement elements comprise a tab extending outwardly from the anchoring members.

51. The assembly as recited in Claim 39, wherein the central sections of the support pedestals comprise:

- 5 a base member extension extending away from the base plates; and
a support member extension extending away from the support plates,
wherein the support member extensions are operatively attached to the base member extensions.

10 52. The assembly as recited in Claim 51, wherein the central sections further comprise a coupling member extending between the base member extensions and the support member extensions, wherein the coupling members operatively attach the base member extensions to the support member extensions.

53. The assembly as recited in Claim 39, wherein the stabilizing braces have an adjustable length.

15 54. The assembly as recited in Claim 39, wherein the stabilizing braces have a fixed length.

55. The assembly as recited in Claim 39, wherein the stabilizing braces comprise a material selected from the group consisting of plastic, metal and composites.

20 56. The assembly as recited in Claim 39, wherein the support pedestals comprise plastic.

57. The assembly as recited in Claim 39, wherein the building surface components comprise surface tiles selected from the group consisting of slate tiles, natural stone tiles, composite tiles, concrete tiles and wooden tiles.

25

58. A method for constructing an elevated building surface assembly, comprising the steps of:

locating a plurality of support pedestals on a fixed surface in spaced-apart relation, the support pedestals comprising support pillars;

5 installing anchoring members on the support pillars of the support pedestals;

attaching a stabilizing brace to the anchoring members of adjacent support pedestals to operatively interconnect the adjacent support pedestals; and

10 placing building surface components on the support pedestals to form a stabilized elevated building surface assembly.

59. The method as recited in Claim 58, wherein the attaching step comprises attaching first and second ends of the stabilizing brace to the anchoring members of the adjacent support pedestals using a mechanical fastener.

15 60. The method as recited in Claim 58, wherein the installing step comprises compressively mounting the anchoring members onto the support pillars of the support pedestals.

61. The method cited in Claim 60, wherein the installing step further comprises inserting a lug on an inner surface of the anchoring members into an aperture on the support pillars of the support pedestals.

20 62. The method as recited in Claim 61, wherein the inserting step further comprises inserting first and second opposing lugs on the anchoring members into apertures on the support pillars of the support pedestals.

25 63. The method as recited in Claim 58, wherein the attaching step comprises attaching a first stabilizing brace at a first vertical position along the length of the support pillar of the adjacent support pedestals, and

attaching a second stabilizing brace at a second vertical position along the length of the support pillar to interconnect adjacent support pedestals, wherein the second vertical position is different than the first vertical position.

64. The method as recited in Claim 58, wherein the support pedestals further comprise:

a base plate that is placed on the fixed surface; and

5 a support plate that supports the building surface components, wherein the support pillar extends generally perpendicularly from the base and support plates.

65. The method as recited in Claim 58, wherein the building surface components comprise surface tiles selected from the group consisting of slate tiles, natural stone tiles, composite tiles, concrete tiles and wood tiles.

10

Application number / numéro de demande: 2775453

Figures: _____

Pages: 13

Unscannable items
received with this application
(Request original documents in File Prep. Section on the 10th floor)

Documents reçu avec cette demande ne pouvant être balayés
(Commander les documents originaux dans la section de préparation des dossiers au
10ème étage)

1/13

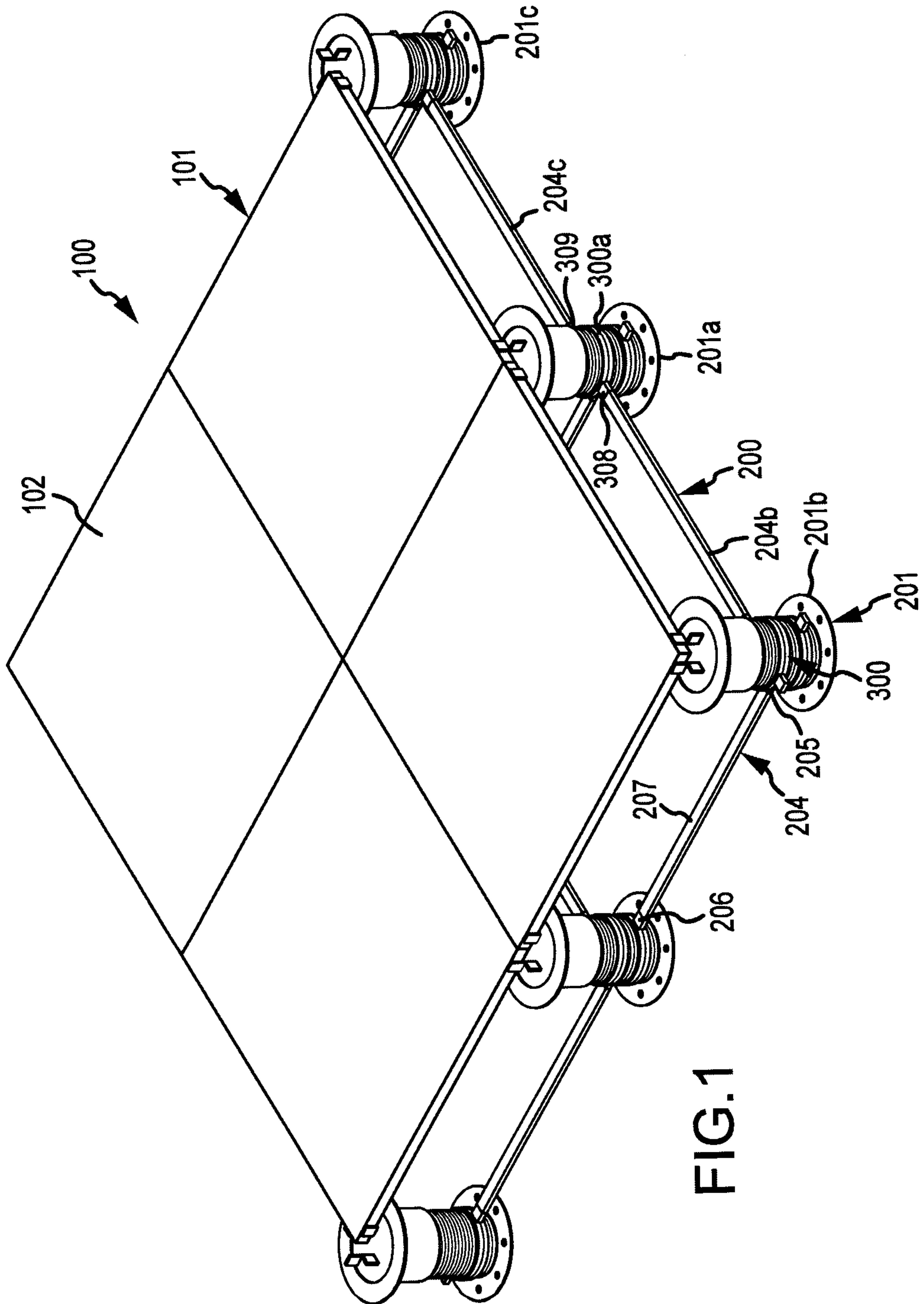


FIG. 1

2/13

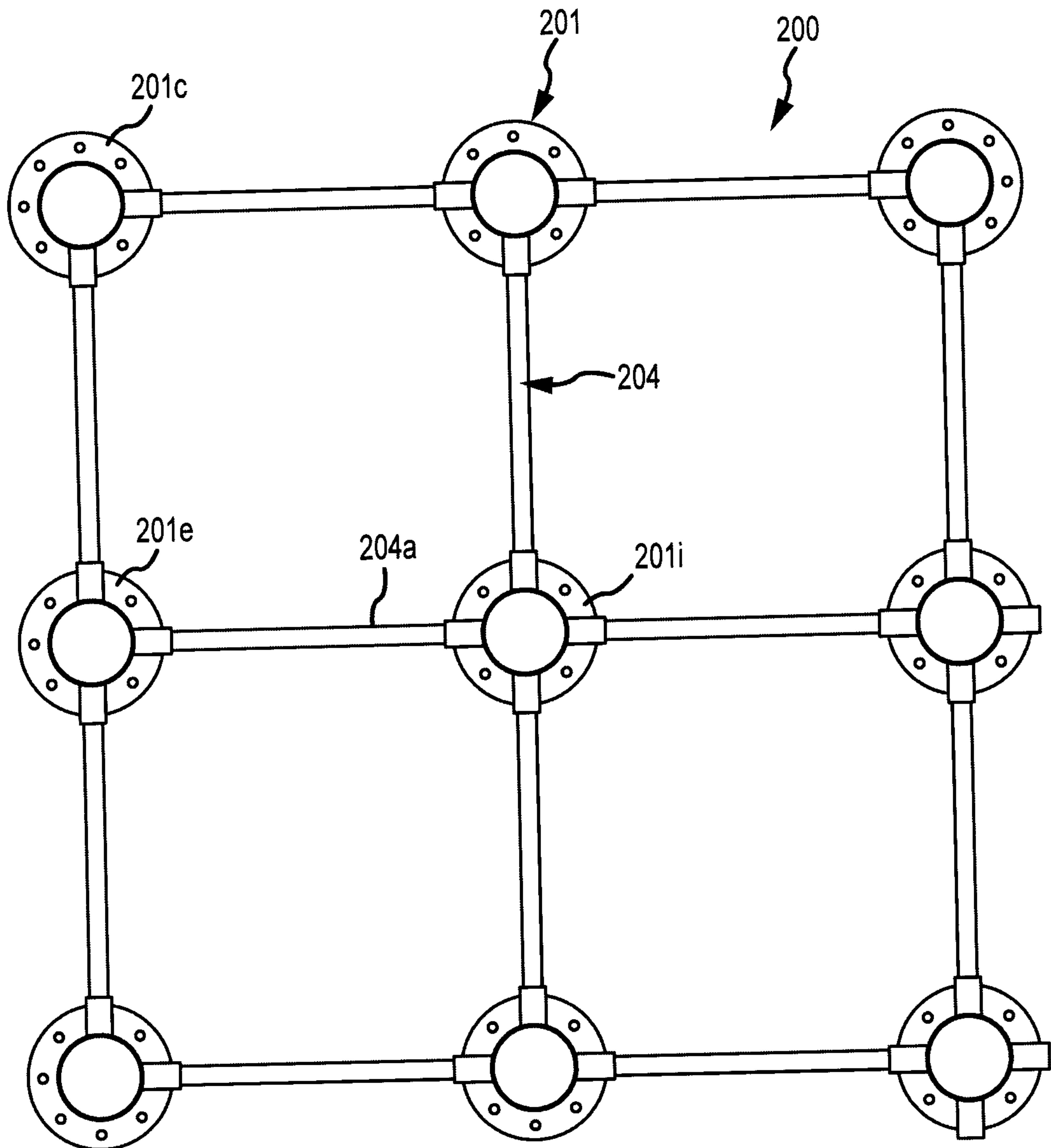


FIG.2

3/13

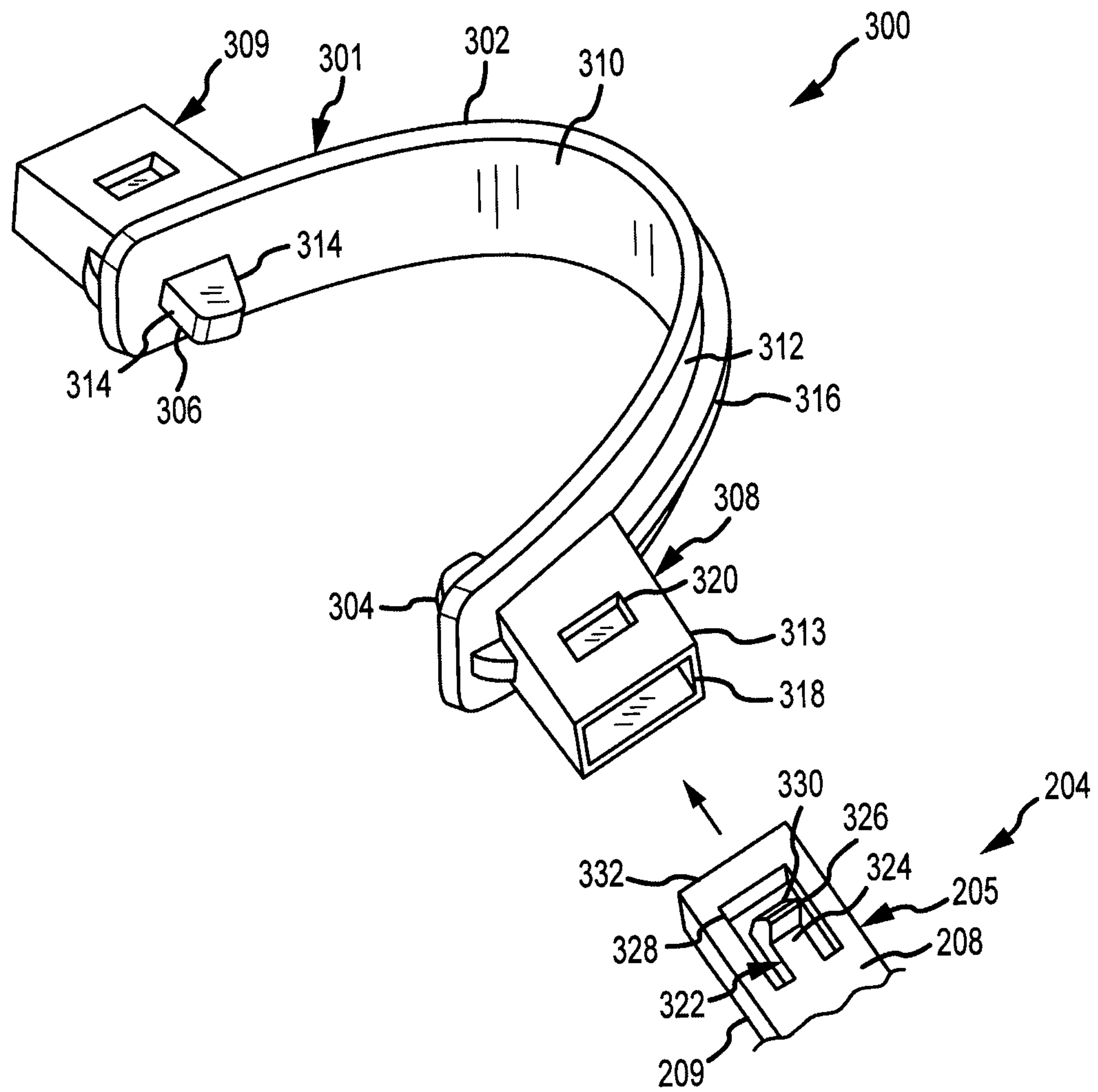


FIG.3a

4/13

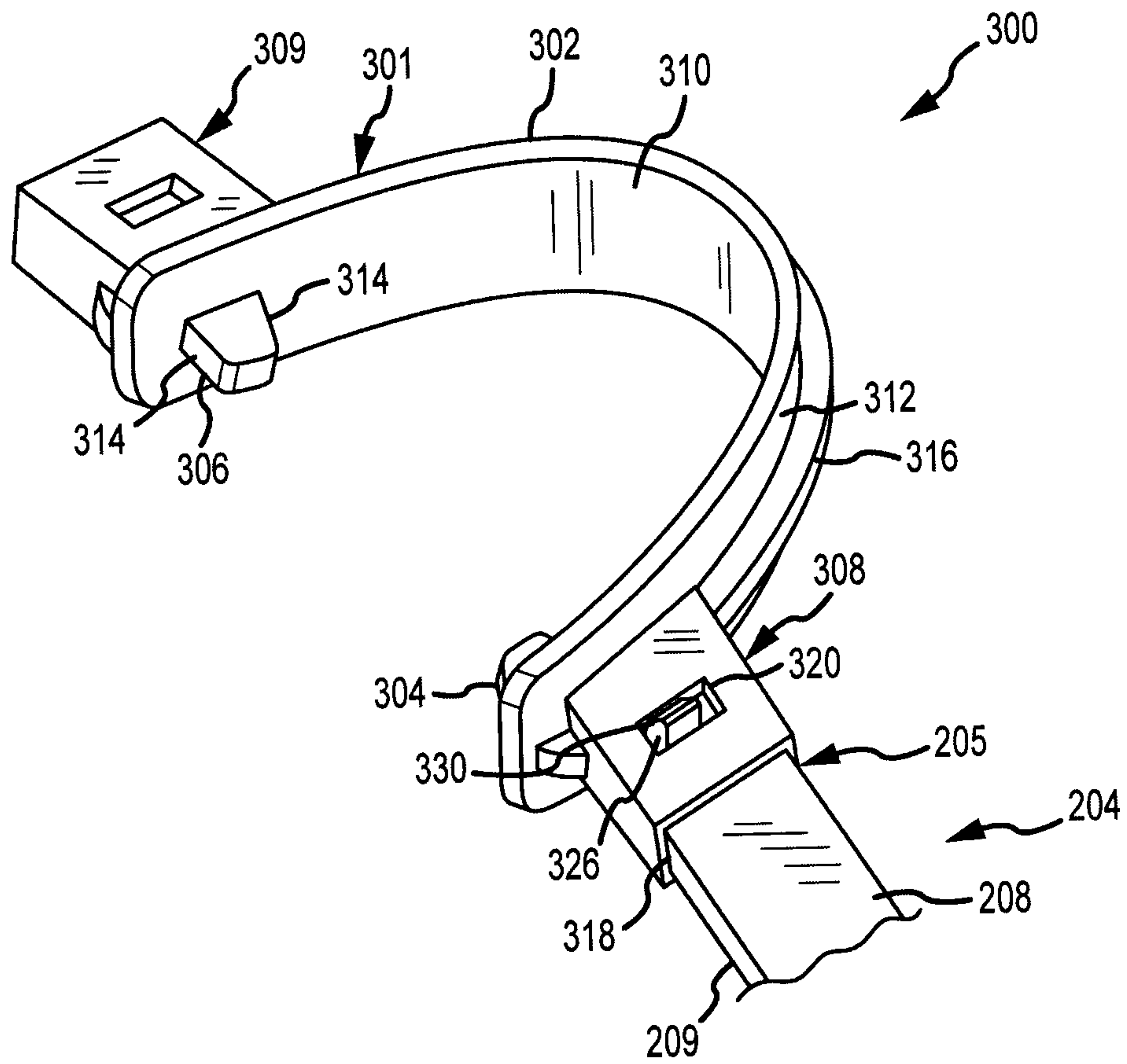


FIG.3b

5/13

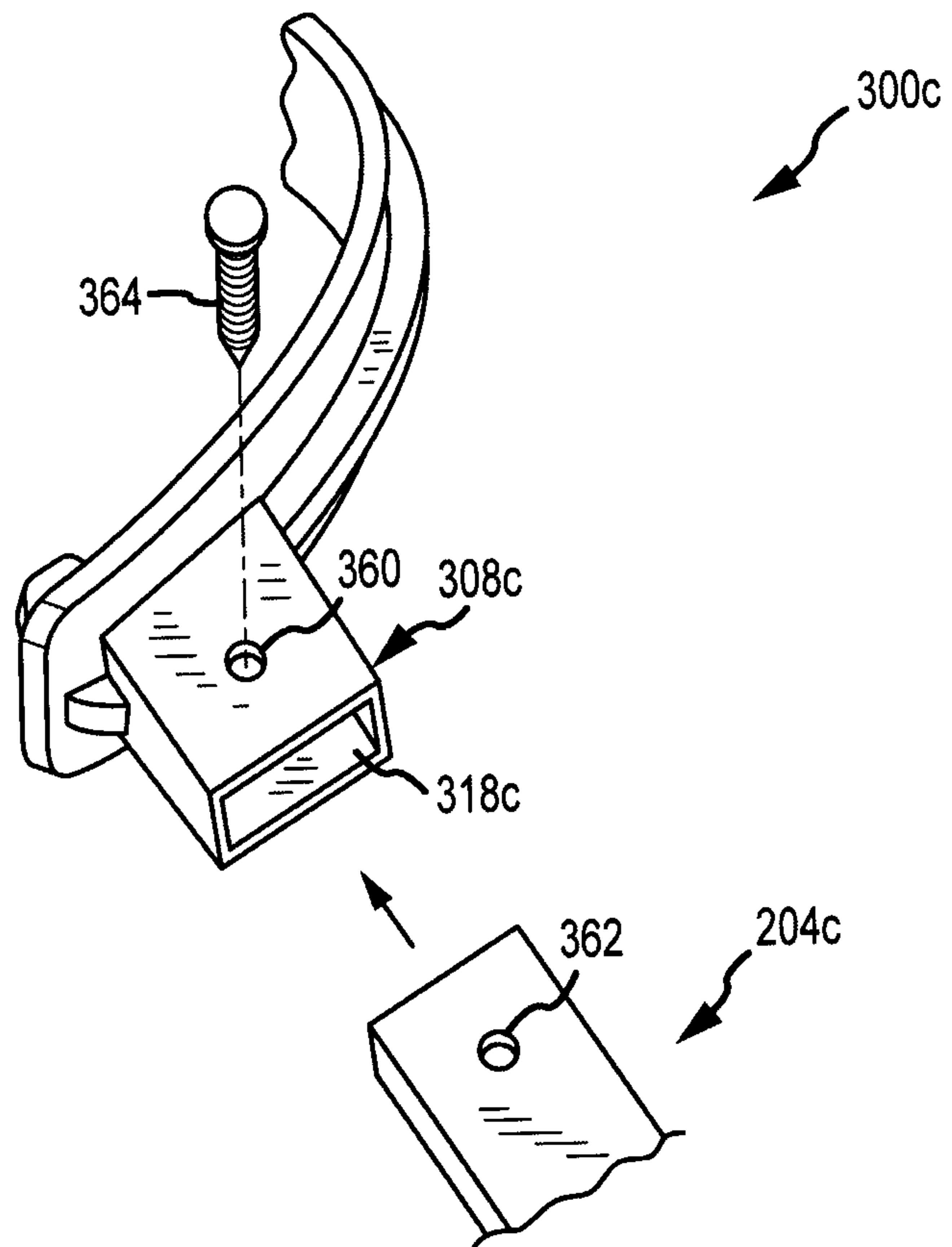


FIG.3c

6/13

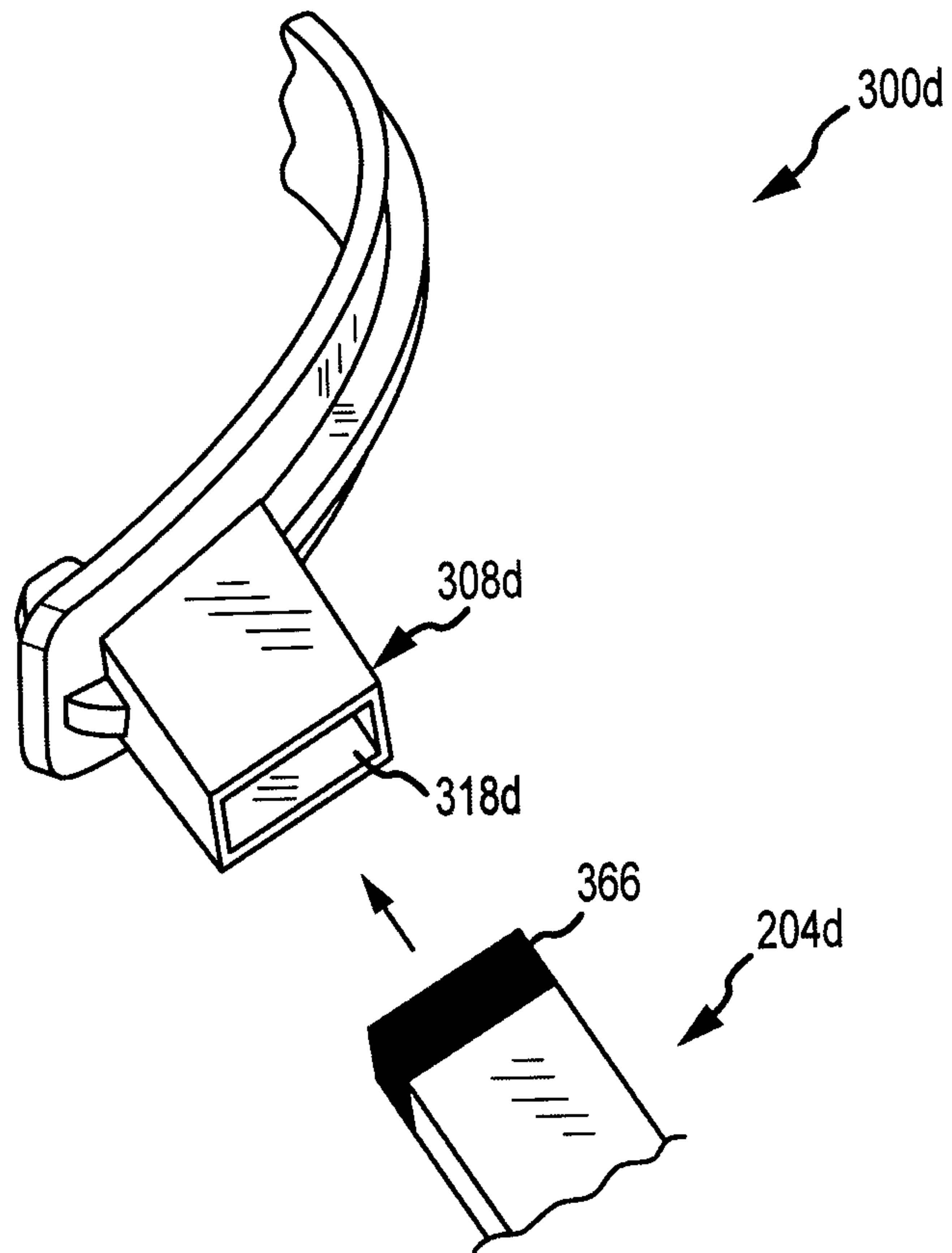


FIG.3d

7/13

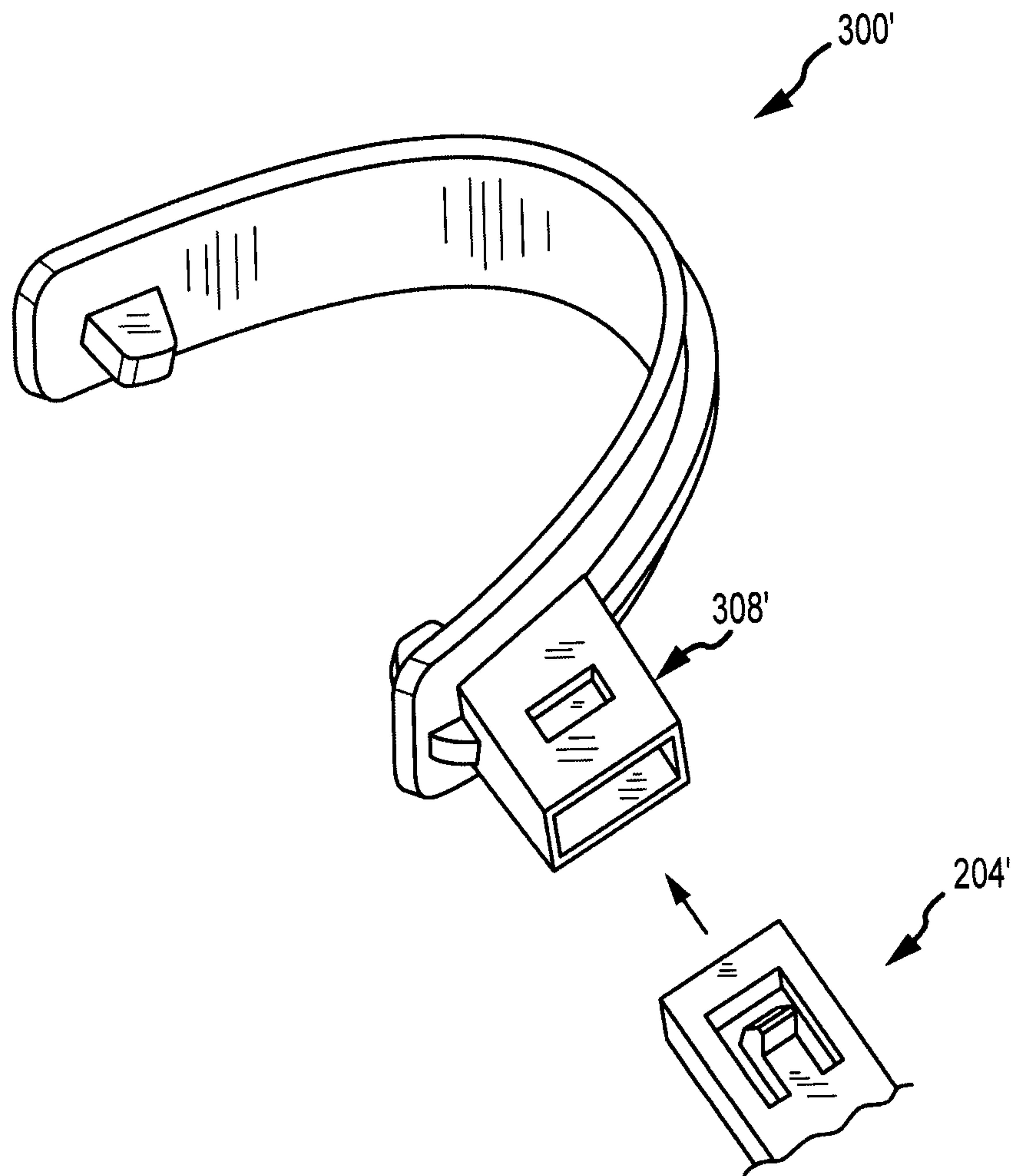


FIG.4a

8/13

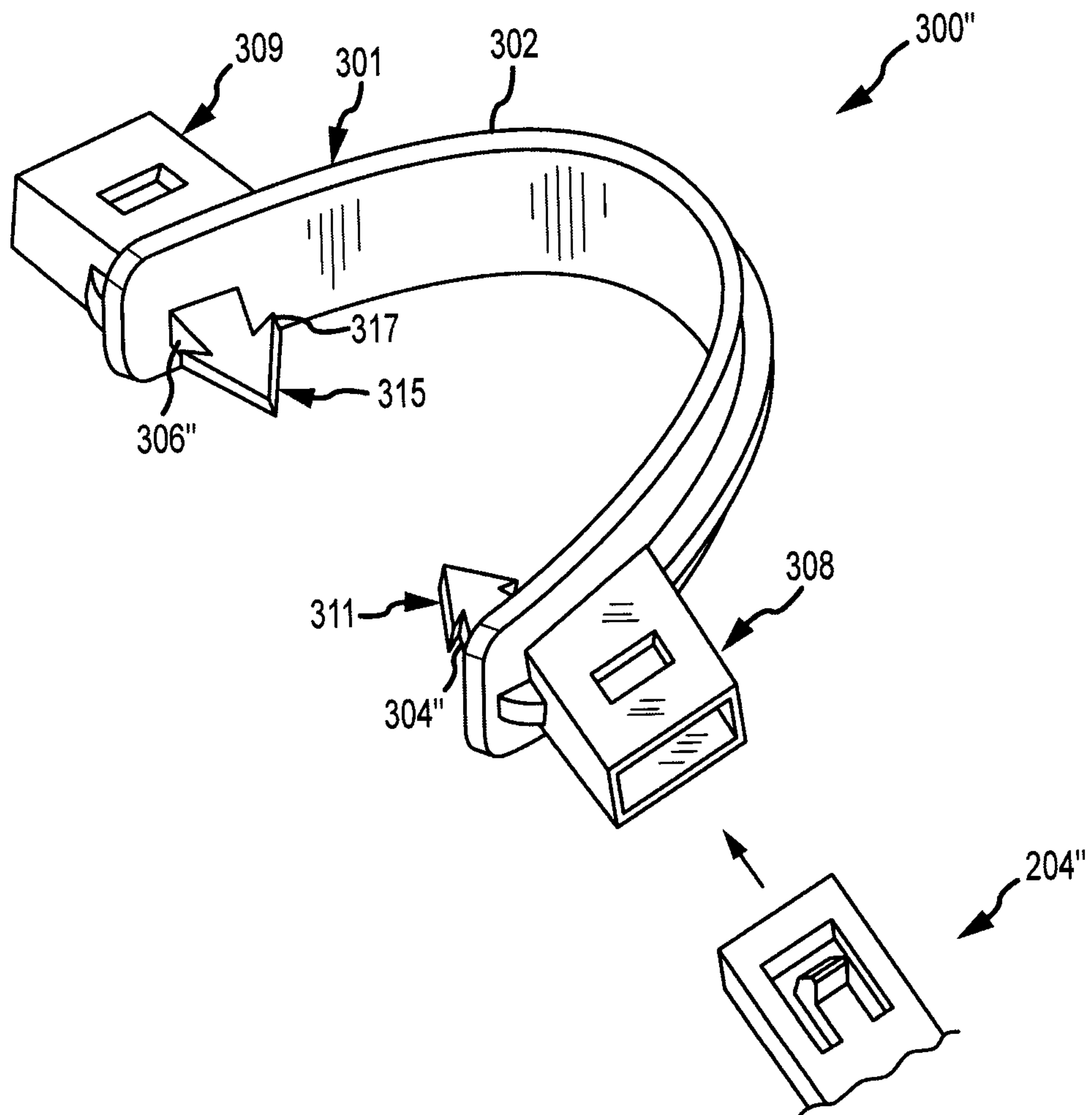


FIG.4b

9/13

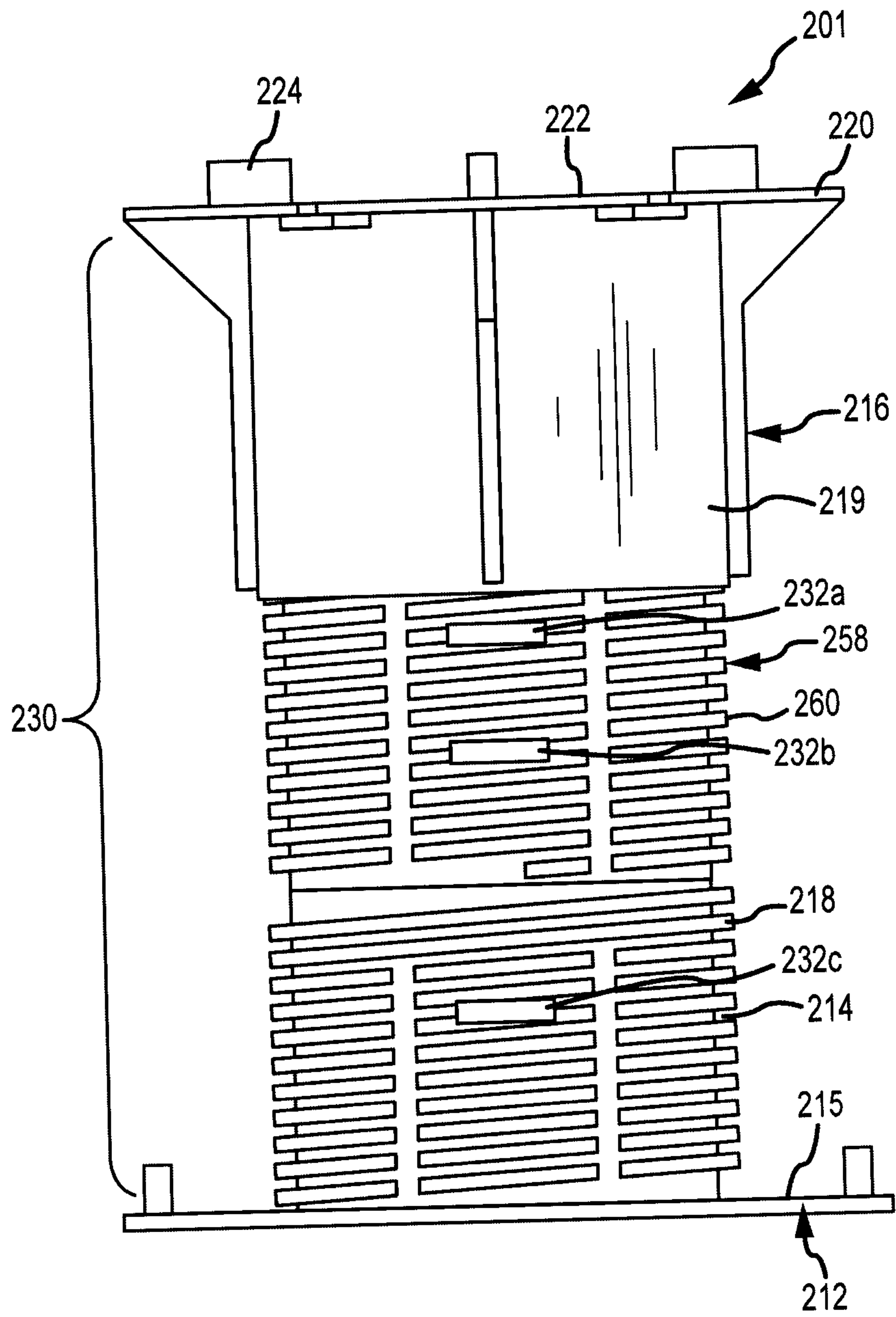


FIG. 5

10/13

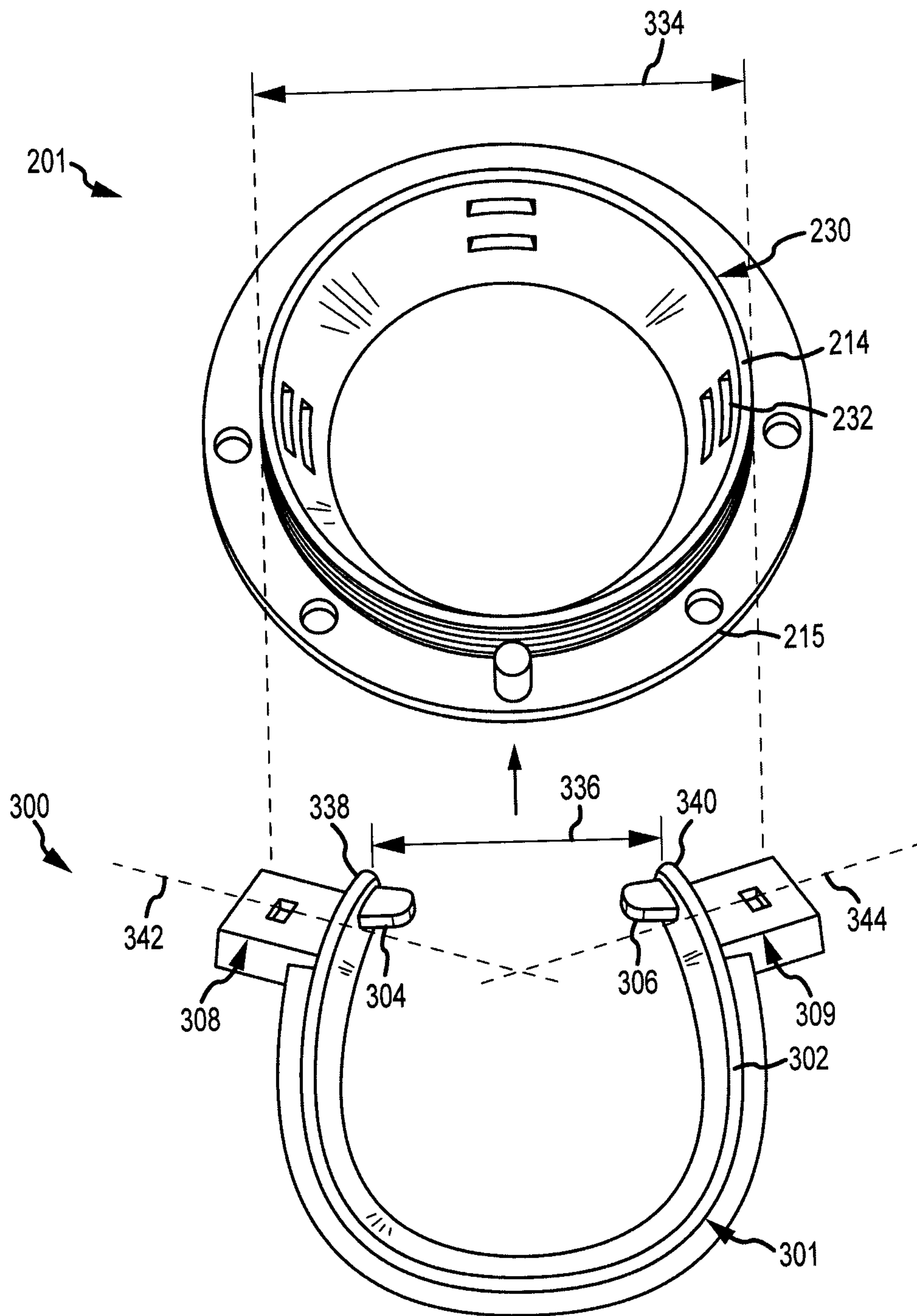


FIG.6a

11/13

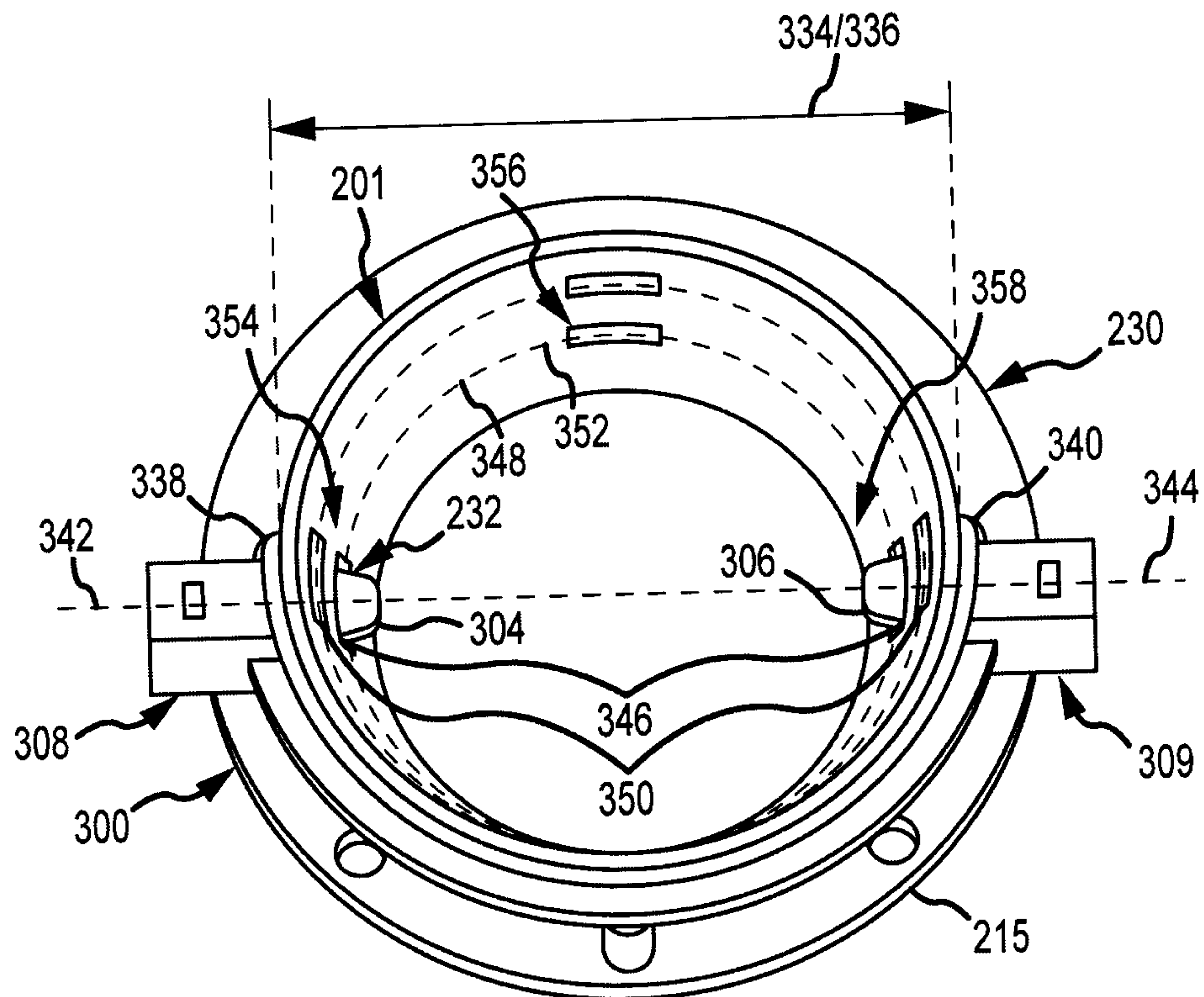


FIG. 6b

12/13

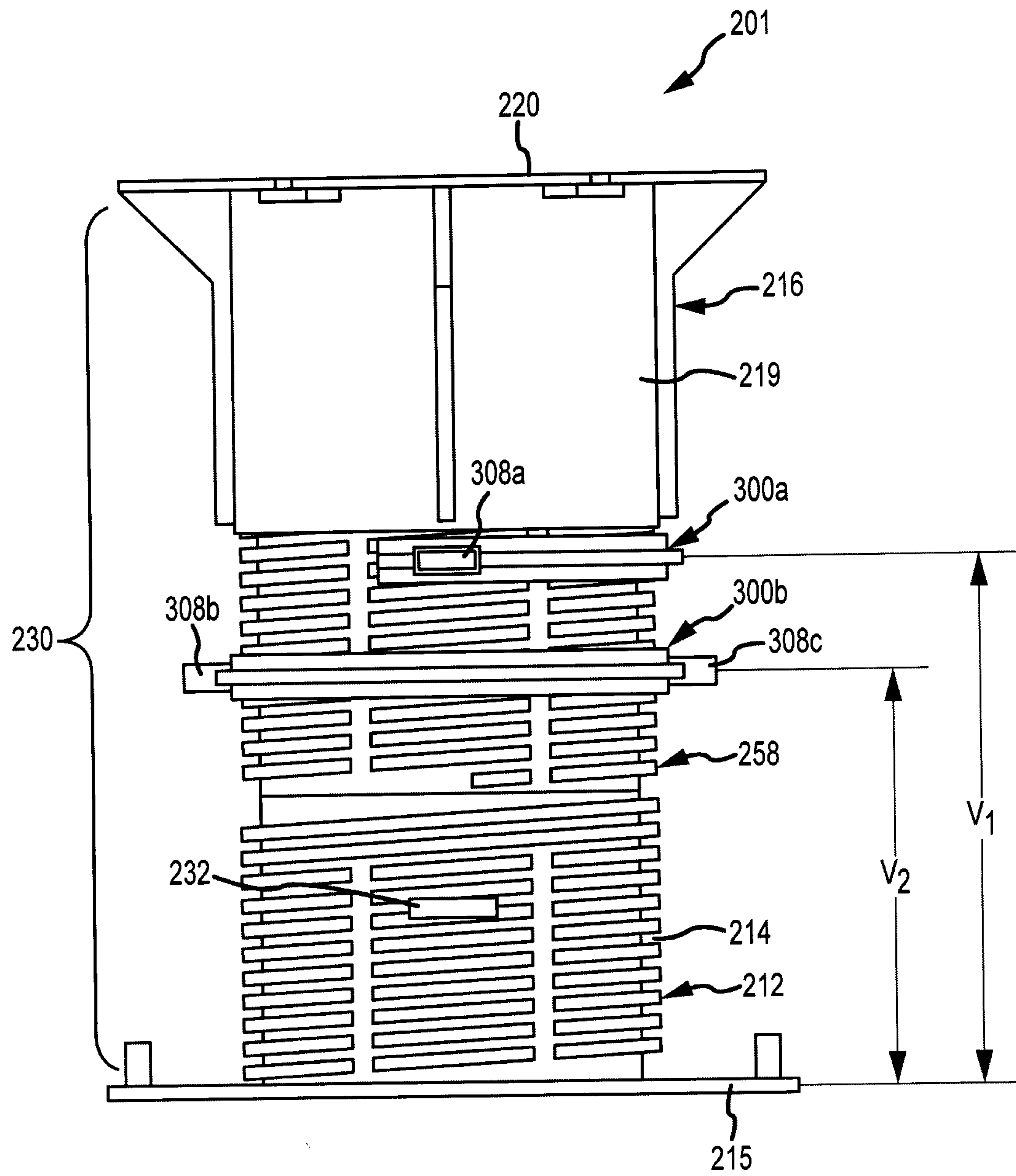


FIG. 7

