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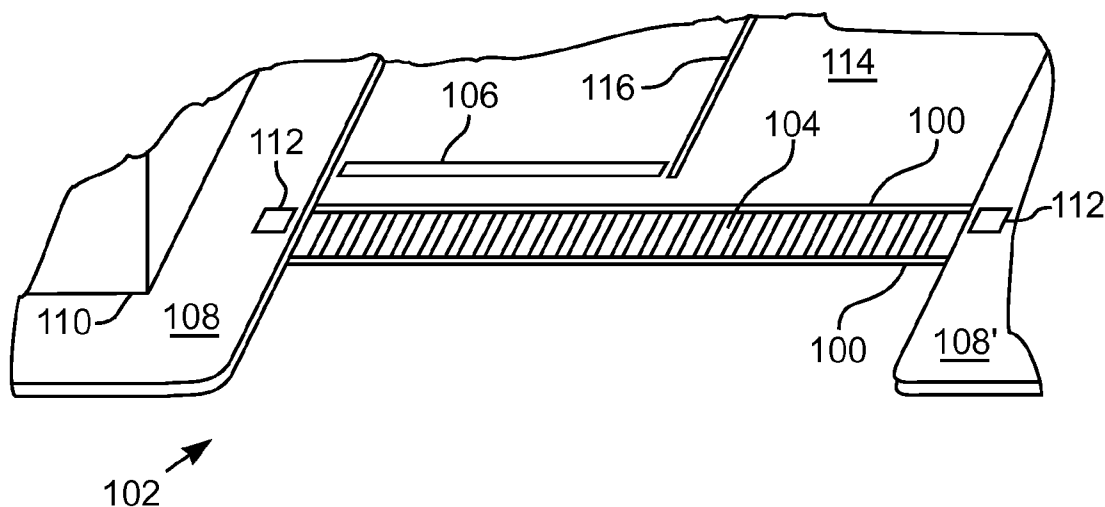
(19) **United States**(12) **Patent Application Publication****Donald et al.**(10) **Pub. No.: US 2008/0095576 A1**(43) **Pub. Date: Apr. 24, 2008**(54) **TACTILE SURFACE FOR PEDESTRIAN WALKWAY****Publication Classification**(76) Inventors: **Malcolm Roger Curzon Donald**,
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Knoxville, TN (US)(51) **Int. Cl.**
E01C 15/00 (2006.01)(52) **U.S. Cl.** **404/34**(57) **ABSTRACT**

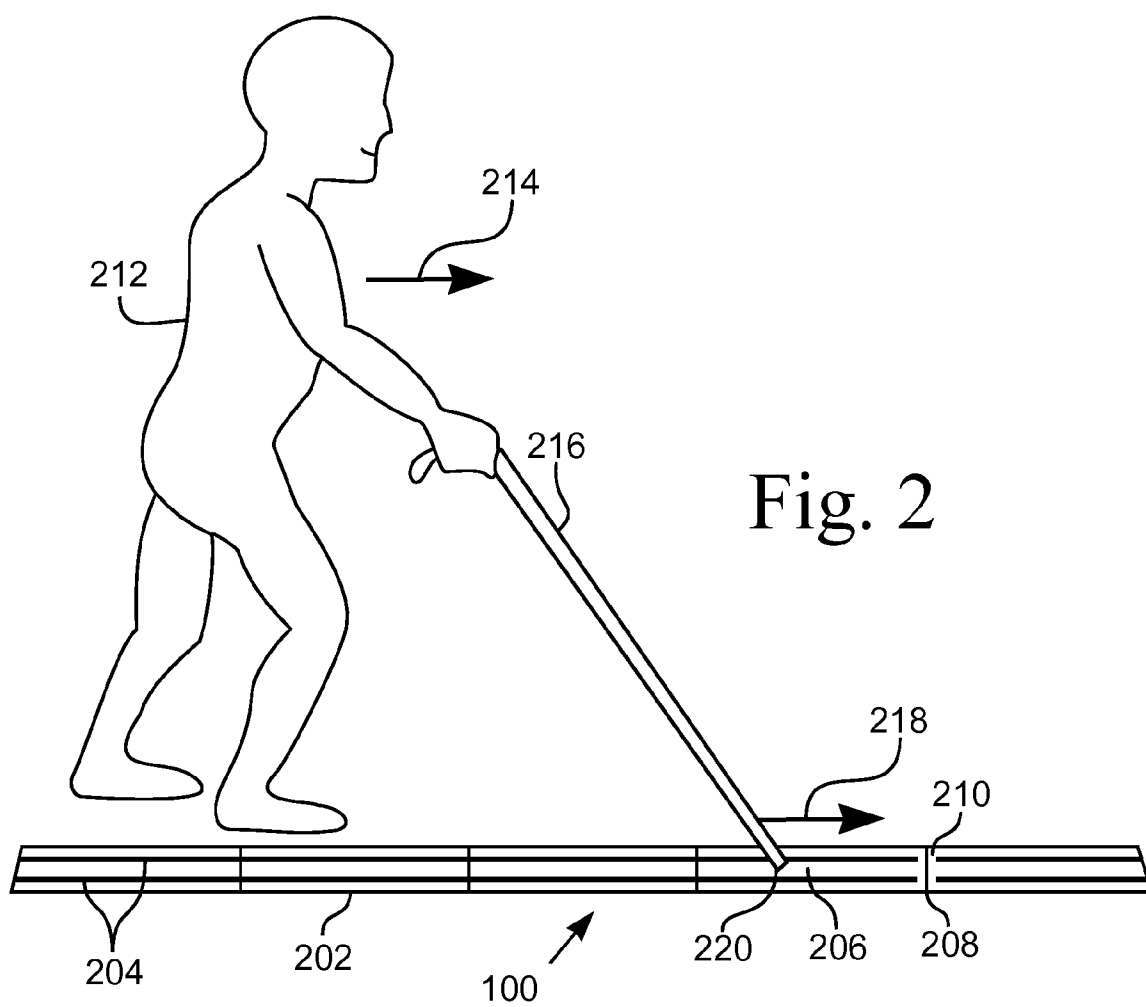
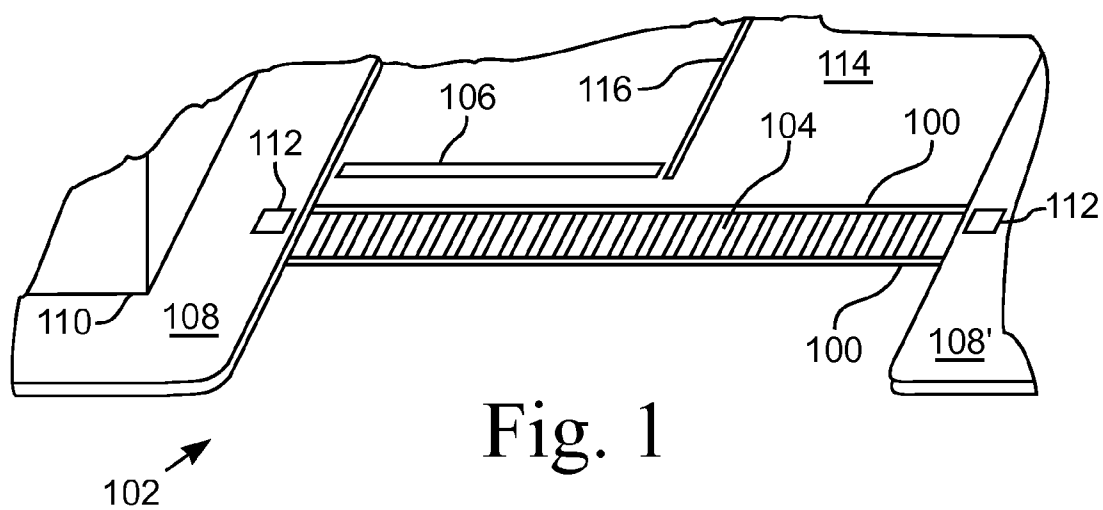
An apparatus for a tactile surface in a pedestrian walkway aiding navigation of the walkway by visually impaired persons. The apparatus includes a tactile tile segment with a base and a pair of parallel, raised ribs. In one embodiment, the tile segment is a resilient material. Between the parallel ribs is a flat area or guideway configured to receive a tip of a cane for guiding a cane user in a direction parallel to the ribs. The tile segments are configured to butt together at their distal ends to form an extended surface. In one embodiment, a clamping strip is positioned with a portion over a longitudinal edge of the tile segment to prevent the lifting of the edge of the strip from vehicular traffic. The clamping strip is configured to attach to a roadway and is made of a durable, rigid material.

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KNOX PATENTS**P.O. BOX 30034****KNOXVILLE, TN 37930-0034 (US)**(21) Appl. No.: **11/875,884**(22) Filed: **Oct. 20, 2007****Related U.S. Application Data**

(60) Provisional application No. 60/862,423, filed on Oct. 20, 2006.





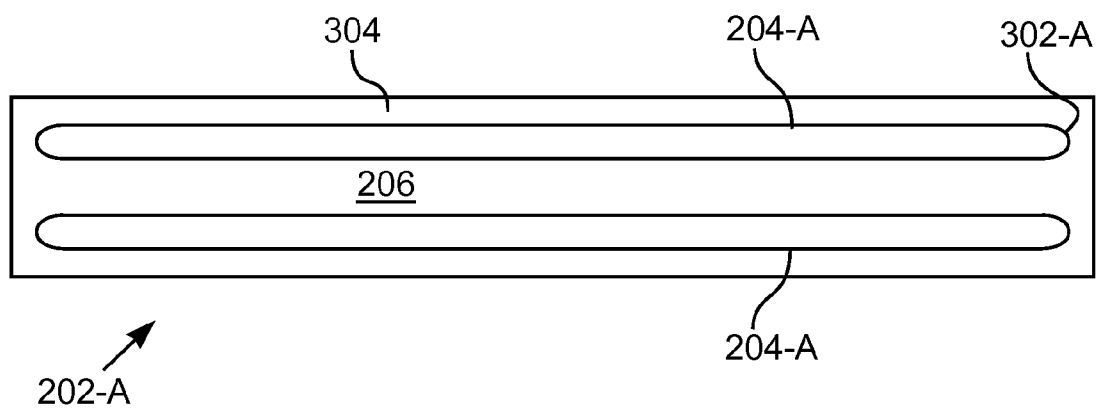


Fig. 3

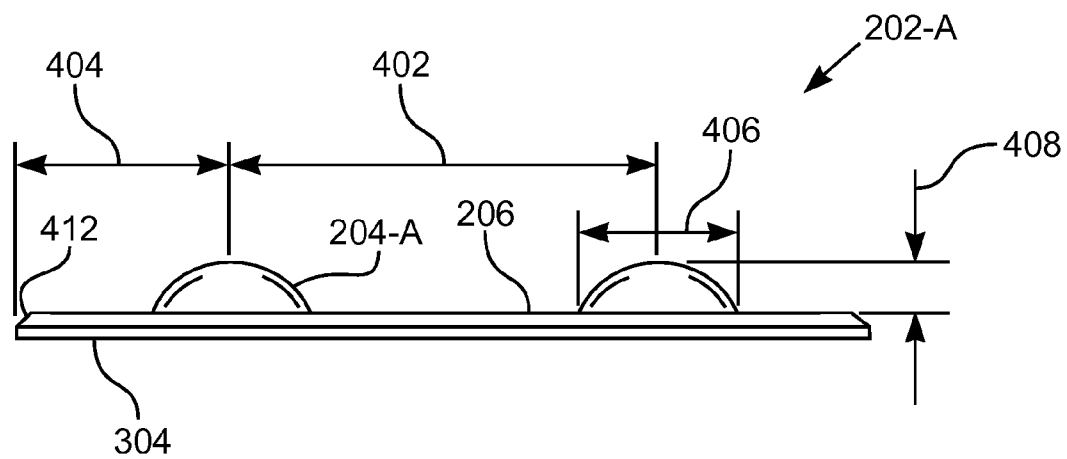
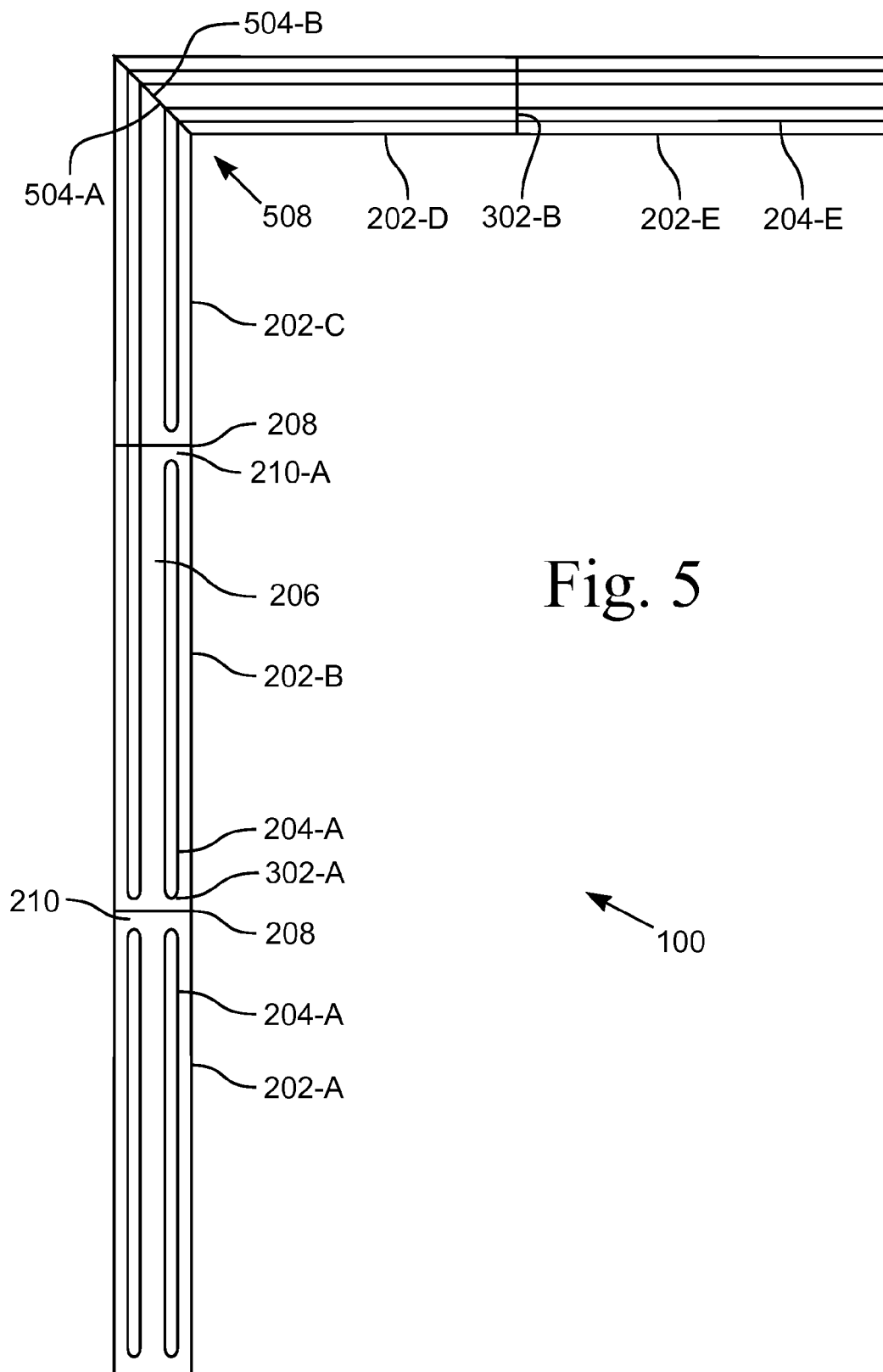


Fig. 4



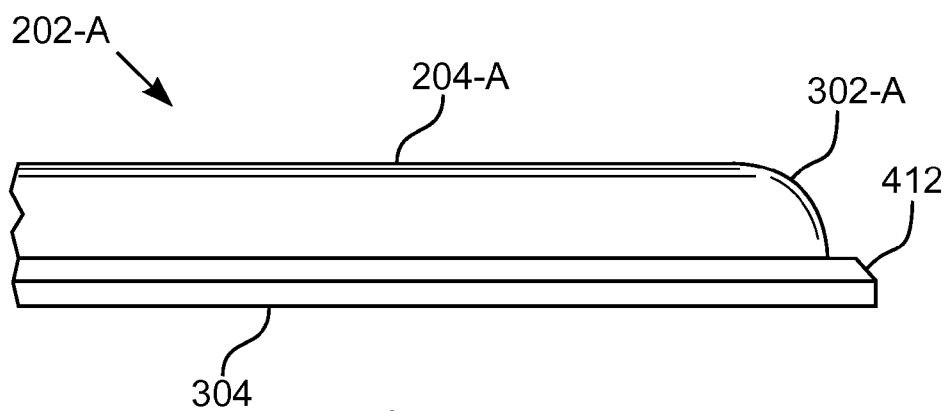


Fig. 6

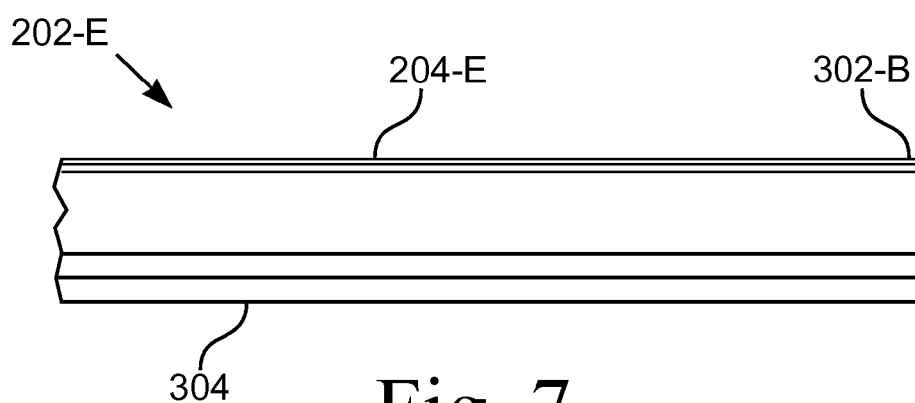


Fig. 7

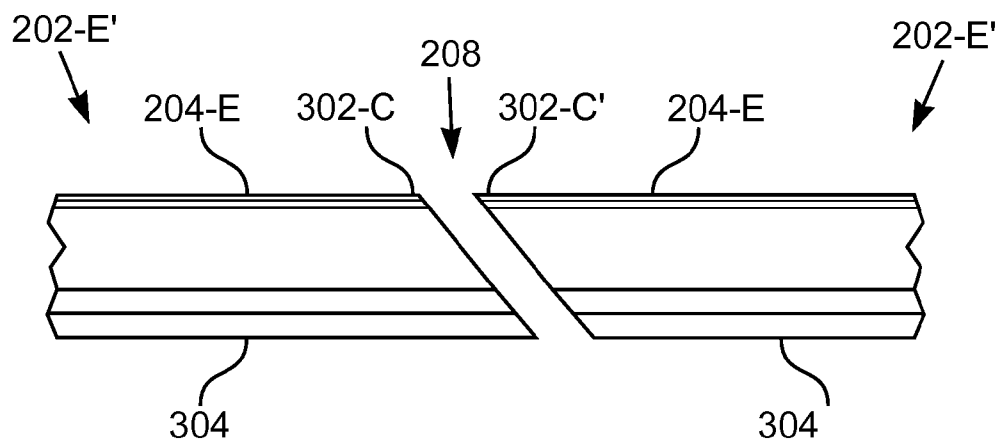


Fig. 8

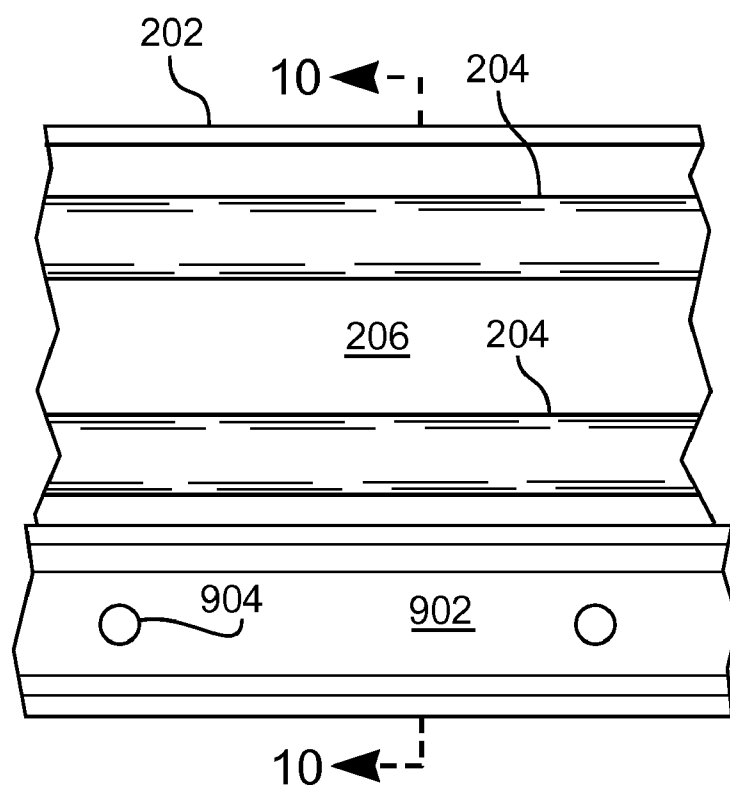


Fig. 9

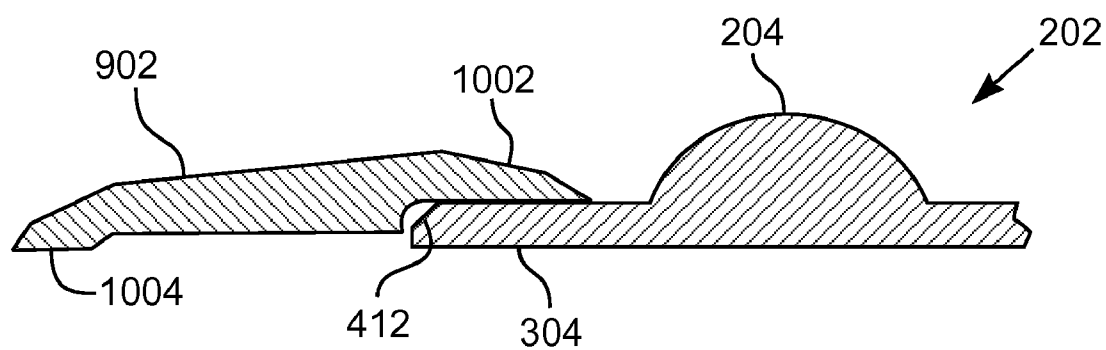


Fig. 10

TACTILE SURFACE FOR PEDESTRIAN WALKWAY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 60/862,423, filed Oct. 20, 2006.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable

BACKGROUND OF THE INVENTION

[0003] 1. Field of Invention

[0004] This invention pertains to a tactile surface disposed on a pedestrian walkway to enable passage by blind or partially-sighted persons. More particularly, this invention pertains to a series of parallel raised ribs positioned alongside or on the walkway.

[0005] 2. Description of the Related Art

[0006] Many visually impaired persons, that is, blind or partially sighted persons, have developed skills necessary to navigate in public. These skills include using their senses, such as touch and hearing, and various aids, such as canes and guide dogs. In many cases, these skills are sufficient to allow a visually impaired person to navigate walkways and streets.

[0007] Attempts have been made to provide secondary aids to assist visually impaired persons in navigating in public. For example, U.S. Pat. No. 5,936,528, issued to Kobayashi, et al., on Aug. 10, 1999, titled "Visually handicapped person guidance and support" discloses a portable scanner incorporated into a cane. The scanner is responsive to a resonance label that is positioned adjacent a passage, stair, aisle floor, wall surface, or Braille block.

[0008] U.S. Pat. No. 6,867,697, issued to Nanayakkara, et al., on Mar. 15, 2005, titled "System for guiding the visually handicapped," discloses another navigation aid that is incorporated into a walkway and is sensed by a person wearing special shoes or carrying a special cane. A continuous electrical conductor is embedded within a walkway. A detector sensitive to the embedded conductor is incorporated into a shoe or a cane. The detector provides information to a person when the detector is proximate the embedded conductor.

[0009] U.S. Pat. Nos. 6,992,592 and 7,199,725, both issued to Gilfix, et al., on Jan. 31, 2006, and Apr. 3, 2007, respectively, both titled "Radio frequency identification aiding the visually impaired with sound skins," disclose electronic travel aids that are responsive to radio frequency identification (RFID) tags associated with objects that a visually impaired person would encounter. The electronic travel aid is a hand held device that provides information via a speaker and a tactile display when the travel aid receives data from the RFID.

[0010] The above-identified aids require that the visually impaired person carry a special device other than would normally be carried by such a person. There is a need for a passive travel aid that readily provides information to a

visually impaired person without requiring the person to carry or wear special equipment. There is a need for such a passive travel aid to be available to everyone. There is a need for such a passive travel aid to be readily deployed at locations where such a travel aid would provide useful navigational information. There is a need for a travel aid that is readily discernable from adjacent environmental features.

BRIEF SUMMARY OF THE INVENTION

[0011] According to one embodiment of the present invention, a tactile surface for a walkway is provided by a pair of parallel raised ribs that run parallel to the walkway. The raised ribs are elongated ridges that allow detection of the walkway direction directly when a person contacts the raised ribs with either footwear or a cane. The pair of raised ribs are positioned side-by-side with sufficient room for a cane tip to be positioned in a guideway between the ribs. A person is guided along the tactile surface by placing the cane tip between the pair of raised ribs and walking in the direction indicated by the pair of ribs. In one embodiment, one or both of the ribs have a short break that indicates a waypoint or a stopping point. In various embodiments, the raised ribs are positioned on one side and/or the other of the walkway or down the center of the walkway.

[0012] The ribs are spaced apart and have a height that allows for tactile feedback of the guideway, but does not present a tripping hazard. In one such embodiment, the height to separation ratio is approximately 1:8. The raised ribs avoid creating a tripping hazard by having a rounded surface with no edges or corners that would allow an object, such as a shoe or other footwear, to catch on the raised rib.

[0013] In one embodiment, the tactile surface is positioned on a roadway between opposing sidewalks. Adjacent the ends of the tactile surface on the sidewalks are tiles that indicate the presence of the tactile surface to blind or partially-sighted persons. In various embodiments, the tiles provide tactile and/or audible indication to pedestrians, without creating a tripping hazard.

[0014] In one embodiment, a tile segment includes the pair of raised ribs protruding from a base. The base is adapted to be securely attached to a surface. In one embodiment, the ends of the pair of raised ribs on the tile segment are flush with the ends of the base, thereby allowing one segment to be butted against another segment to form a pair of continuous raised ribs. In one such embodiment, the ends of the tile segments are angled, that is, the ends are not perpendicular to the base, but the surface of the end is at an angle relative to the base such that the ends of two tile segments have a larger surface area for an adhesive to be disposed when butt joining the two tile segments. In other embodiments, one or both ends of the raised ribs are rounded, which presents a smooth surface that avoids tripping hazards. The rounded ends are positioned at the start or end of the guideway. In another embodiment, the rounded ends are positioned between the ends of the guideway to indicate a waypoint or stopping point by the cane tip encountering the opening in the raised rib formed by a pair of rounded ends facing each other. In such an embodiment, the opening also allows for drainage of water and other fluids that would otherwise collect between the raised ribs.

[0015] In one embodiment, the tile segments are for placement alongside a pedestrian cross-walk on a roadway. A

clamping strip, or clamp, is positioned on the on-coming traffic side of the tile segments. The clamping strip has one side that forms a smooth joint with the roadway and an opposite side that pushes the base against the roadway. The clamping strip prevents the tile segments from being peeled or forced off the roadway by an object pushing against the tile segments. For example, a snow plow striking the clamping strip will be forced up and over the tile segments.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0016] The above-mentioned features of the invention will become more clearly understood from the following detailed description of the invention read together with the drawings in which:

[0017] FIG. 1 is a partial perspective view of an intersection showing one embodiment of the tactile surface;

[0018] FIG. 2 is a perspective view of a person using one embodiment of the tactile surface;

[0019] FIG. 3 is a plan view of one embodiment of a tactile tile segment;

[0020] FIG. 4 is an end view of the embodiment of the tactile tile segment of FIG. 3;

[0021] FIG. 5 is a top view of a series of tile segments for another embodiment of a tactile surface that makes a right-angle turn;

[0022] FIG. 6 is a partial side view of one embodiment of a tile segment showing a rounded end;

[0023] FIG. 7 is a partial side view of another embodiment of a tile segment showing a flush end;

[0024] FIG. 8 is a partial side view of another embodiment of a pair of tile segments showing angled ends;

[0025] FIG. 9 is a partial top view of one embodiment of a clamping strip securing a tile segment; and

[0026] FIG. 10 is a cross-sectional view of the clamping strip and tile segment shown in FIG. 9.

DETAILED DESCRIPTION OF THE INVENTION

[0027] An apparatus for a tactile surface 100 disposed on or along a pedestrian walkway 104 is disclosed. Visually impaired persons, such as blind or partially sighted persons, often rely upon tactile sensations in order to navigate while walking. Even for a sighted person, crossing a street is oftentimes hazardous. Enabling blind or partially sighted persons to navigate a street crossing in a straight-forward manner without conscious effort allows those persons to devote their senses to detecting the various dangers and hazards present on a roadway.

[0028] FIG. 1 illustrates a partial perspective view of a road or street intersection 102 showing a tactile surface 100 located on each side of a pedestrian cross-walk 104. An intersection 102 includes a stop line 106 on one side of the center line 116 in a roadway 114. Between the stop line 106 and the center of the intersection 102 are a pair of tactile surfaces 100 and the pedestrian cross-walk 104. In various embodiments, the tactile surface 100 and the pedestrian cross-walk 104 are positioned side-by-side, left to right or

vice versa, overlapping each other, or one overlaying the other. The pedestrian cross-walk 104, the stop line 106, and the roadway center line 116 are typically painted onto the surface of the roadway 114. It is common for the pedestrian cross-walk 104 to be a series of parallel white bars oriented perpendicular to the direction of pedestrian traffic on the roadway 114. Pedestrian cross-walks 104 are also known to be a pair of parallel white lines extending between the sidewalks 108 and delineating the path for pedestrians between the lines. In one embodiment, the tactile surfaces 100 are white and delineate the borders of the cross-walk 104.

[0029] On the sides of the roadway 114 are sidewalks 108 that typically have a curb separating the raised surface of the sidewalk 108 from the surface of the roadway 114. The sidewalks 108 are defined by the curb adjacent the roadway 114 and buildings 110 or other structures that are parallel to or set back from the roadway 114.

[0030] A pedestrian on one sidewalk 108, who wishes to cross a roadway 114 to the other sidewalk 108, stands on the sidewalk 108 until the traffic conditions on the roadway 114 permit the pedestrian to cross the roadway 114 on the pedestrian cross-walk 104. A sighted pedestrian typically has no difficulty in seeing the markings defining the cross-walk 104. Likewise, a sighted pedestrian has no problem positioning themselves on the sidewalk 108 adjacent to the cross-walk 104.

[0031] A blind or partially sighted person 212 walking along the sidewalk 108 relies upon various cues to determine the correct path to follow. Tapping a cane 216 provides such a person 212 with feedback indicating the location of buildings 110 and intersections 102. A crossing notice tile 112 on the surface of the sidewalk 108 adjacent the tactile surface 100 indicates to a blind or partially sighted person 212 where a tactile surface 100 for crossing the roadway 114 is located. After determining the location of the tactile surface 100, such a person 212 uses the tactile surface 100 to guide themselves across the roadway 114 in a sure and expeditious manner.

[0032] The crossing notice tile 112 is a tile embedded in the sidewalk 112 that provides an indication to a person 212 of the presence of the tactile surface 100. The notice tile 112 has features that are detectable by a blind or partially sighted person 212. In one embodiment, the notice tile 112 includes upward facing protrusions that are detectable by the person 212. In another embodiment, the notice tile 112 provides an audible response to the person 212 when tapped with a cane 216. After being detected, the crossing notice tile 112 informs the person 212 of the location of the tactile surface 100.

[0033] Audible signals are used for guiding blind or partially sighted persons 212 across roadways 114. The audible signals provide direction and distance information to the person 212 because the location of the audible signal is detected by moving the head and the intensity, which indicates the relative distance, is discerned by the ears. Roadways 114 carry traffic, which generates background noise. The background noise competes with the audible signals. It is not uncommon for the intensity of the audible signals to be drowned out by the background signals or for others to complain that the audible signals are too loud if the intensity of the signals are adjusted to overcome the back-

ground noise. The surface **100** allows a person **212** to be guided across such a roadway **114** without the use of an audible signal.

[0034] FIG. 2 illustrates a perspective view of a person **212** using one embodiment of the tactile surface **100**. The illustrated person **212** holds a cane **216** that provides tactile feedback to the person **212**. By tapping the cane **216** on a surface and listening for the echoes, a person **212** often obtains information about their surroundings. Also, the cane **216** provides tactile feedback to the person **212** regarding the type and texture of the surface surrounding the person **212**, in particular, the surface immediately in front of the person **212**. It is common for such a person **212** to swing the cane **216** from side-to-side or even back-and-forth in a direction **218** in-line with the direction of travel.

[0035] The tactile surface **100** is positioned alongside or on a walkway or path. The tactile surface **100** includes a series of segments **202** positioned adjacent each other. Each segment **202** includes a pair of raised ribs **204**. Each raised rib **204** is a rounded elongated ridge extending above the surface of the base **304** of the segment **202**. The person **212** holds a cane **216** with the tip **220** positioned in the area, or guideway, **206** between the raised ribs **204**. The cane tip **220** provides tactile feedback to the person **212** of the surface direction **218**, thereby allowing the person **212** to move in the forward direction **214**.

[0036] In another embodiment, the tactile surface **100** includes segments **202** that have various numbers of raised ribs **204**. In still another embodiment, the tactile surface **100** has a base **304** with a top surface flush with the surface of the roadway **114**. Various such embodiments include raised ribs **204** protruding either from a material deposited into a channel in the roadway **114** or from the material of the roadway **114** itself. For example, in a roadway **114** made of a concrete material, the tactile surface **100** includes raised ribs **204** of the same concrete material as the roadway **114** and are fabricated as part of the roadway **114**.

[0037] In the illustration, the cane tip **220** is approaching a gap **210** in the raised ribs **204**. The gap **210** is formed at a joint, or connection, **208** between two tile segments **202**. When the person **212** senses the gap **210** with the cane tip **220**, the person **212** is put on notice of a specific location on the tactile surface **100**. The specific location indicated by the gap **210** includes stopping points, warnings of upcoming turns, or other information.

[0038] The illustrated embodiment of the tactile surface **100** also provides notice to a person **212** as a warning indication. The tactile tile segments **202** are un-obtrusive and suitable for use in many environments. When a person **212**, sighted or not, steps on the tactile tile segments **202**, the person **212** is immediately put on notice of the direction and boundary of a walkway **104**.

[0039] FIG. 3 illustrates a plan view of one embodiment of a tactile tile segment **202-A**. FIG. 4 illustrates an end view of the embodiment of the tactile tile segment **202-A** shown in FIG. 3. The tile segment **202-A** includes a base **304** that is substantially rectangular. The base **304** has a thickness sufficient to support and secure the raised ribs **204-A**. The length of the segment **202-A**, that is, the length of the base measured along the longitudinal axis of the raised ribs **204-A**, is determined by the desired length of the tactile

surface **100**. In one embodiment, the length is 24 inches. The length of the raised ribs **204-A** is slightly less than the length of the base **206** because the ends **302-A** of the raised ribs **204-A** are rounded to avoid creating a tripping hazard.

[0040] In the illustrated embodiment, the base **304** includes an upper bevel **412**. In one embodiment, the bevel **412** extends to the bottom of the base **304**. In another embodiment, there is no bevel **412** on the base **304**. In one embodiment, the segment **202-A** is formed of a polyurethane casting resin with the illustrated shape and configuration. In other embodiments, the raised ribs **204-A** are formed of the material used for the roadway **114** or other surface from which the raised ribs **204-A** protrude.

[0041] In the illustrated embodiment, an area, or guideway, **206** is defined between raised ribs **204-A**. The centers of the raised ribs **204-A** are separated by a first distance **402** and the center of the raised ribs **204-A** are a second distance **404** from the edge of the segment **202-A**. To maintain even spacing of the raised ribs **204-A** when multiple segments **202-A** are joined by butting them together, the second distance **404** is one-half the first distance **402**. In one embodiment, the separation, or first, distance **402** is approximately two inches.

[0042] The raised ribs **204-A** are elongated ridges with a rounded surface, that is, each rib **204** has a partial cylindrical shape. Each raised rib **204-A** has a width **406** and a height **408**. The width **406** and the height **408**, along with the separation distance **402**, are dimensioned to avoid creating a tripping hazard to pedestrians while still being of a size that enables tactile feedback to a blind or partially sighted person **212**. In one embodiment, the dimensions found to provide tactile feedback without causing a tripping hazard were a width **406** of 0.75 inches and a height **408** of 0.25 inches with a separation distance **402** of two inches. Such dimensions result in a height **408** to separation **402** ratio of 1:8.

[0043] The spacing **402** and the dimensions **406**, **408** of the raised ribs **204** allow a person **212** to detect the raised ribs **204-A** with their feet. If the person **212** is barefoot or has footwear with thin soles, the person **212** detects directly the raised ribs **204-A** under the foot when the foot are in contact with the raised ribs **204-A**. Additionally, the person **212** detects indirectly the raised ribs **204-A** by the interaction of the foot with the raised ribs **204-A** and base **304**, even when the person **502** has footwear with thick soles. Such interaction includes tilting of the foot from side-to-side and provides information as to the direction **218** of the tactile surface **100**. Accordingly, the dimensions and configuration of the raised ribs **204-A** on the tactile surface **100** allows a blind or partially sighted person **212** to follow the tactile surface **100** and stay on the walkway **104**.

[0044] FIG. 5 illustrates a top view of a series of tile segments **202** for an embodiment of a tactile surface **100** that makes a right-angle turn **508**. The illustrated embodiment of the tactile surface **100** includes a series of tile segments **202** positioned end-to-end at joints **210**. The tile segments **202** include a tile segment **202-A** having rounded ends **306-A** on each end of the raised ribs **204-A**, a tile segment **202-B** having a pair of rounded ends **306-A** on one end of the raised ribs **204-A**, tile segments **202-C**, **202-D** having square-cut ends **306-B** on one end of the raised ribs **204-A** and with the opposite end of the tile segment **202-C** having a corner end

(miter) **604-A**, **604-B** configured to form one-half of a turn in the tactile surface **100-B**, and a tile segment **202-E** having square-cut ends **306-B** on each end of the raised ribs **204-A**. In other embodiments, the tile segments **202** have other combinations of ends **306** and shapes of the base **206** to accommodate the requirements of the tactile surface **100**. In one embodiment, the tile segments **202** are glued or adhered to a surface, such as the roadway **114**. In one such embodiment, the tile segments **202** are set inside an opening or channel in the surface such that the top of the base **304** is flush with the surface. In one such embodiment, the base **206** does not have a bevel **412**.

[0045] The illustrated embodiment of the tactile surface **100** includes a gap **210** in the raised ribs **204-A**. Gaps **210** in the raised ribs **204-A** are defined by in-line pairs of ribs **204-A** with rounded ends **302-A**. The gap **210** serves two purposes. First, the gaps **210** allow water and other fluids to escape the area **206** between the raised ribs **204**. Second, the gap **210** marks a location on the tactile surface **100** that a person **212** detects with a cane **216** and is used to indicate a location along the tactile surface **100**.

[0046] The illustrated embodiment shows a gap **210-A** positioned on one side of the guideway **206**. The gap **210-A** is defined by a break in one of the raised ribs **204** extending along tile segments **202-A**, **202-B**. The break, or gap, **210-A** is bounded by rounded ends **302-A**. By positioning the gap **210-A** on only one side of the guideway **206**, a visually impaired person **212** is provided tactile information that is specific. For example, the gap **210-A** is positioned on the same side as the upcoming turn **508** for a person **212** approaching the turn **508**, thereby warning the person **212** of the turn **508**.

[0047] FIG. 6 illustrates a partial side view of one embodiment of a tile segment **202-A** showing a rounded end **302-A**. The illustration applies equally to any tile segment **202** that includes a raised rib **204** with a rounded end **302-A**. The raised rib **204-A** has an end **302-A** with a rounded profile when viewed from the end (shown in FIG. 4) and a rounded profile when viewed from the side (shown in FIG. 6). The rounded end **302-A** is used to terminate the raised ribs **204-A**, such as at the start and finish of the tactile surface **100**, and to bound the gaps **210** between the ends of the raised ribs **204-A**. The rounded ends **302-A** provide a smooth end **302** for the raised ribs **204** and avoids creating a tripping hazard or otherwise presenting a surface or edge that will catch an object, such as an article of clothing, footwear, or other object that is dragged across the tile segment **202**.

[0048] FIG. 7 illustrates a partial side view of another embodiment of a tile segment **202-E** showing a flush, or square-cut, end **306-B**. The illustration applies equally to any tile segment **202** that includes a raised rib **204** with a square-cut end **302-B**. The square-cut end **302-B** of the raised rib **204-E** is flush with the adjacent end of the base **304**. Tile segments **202-B**, **202-C**, **202-D**, **202-E** that are butted together at a joint **208** without a gap **210** have a continuous section of raised ribs **204-E**. In the illustrated embodiment, the joint **208** is a butt joint with the ends **302-B** having a surface perpendicular to the top or bottom of the base **304**. Two tile segments **202** are joined with an adhesive disposed between the bases **304**, and for the tile segments **202-B**, **202-C**, **202-D**, **202-E** that are butted together at a

joint **208** without a gap **210**, the joint **208** includes an adhesive between the square-cut ends **302-B**.

[0049] FIG. 8 illustrates a partial side view of another embodiment of a pair of tile segments **202-E'** showing angled, or sloping, ends **306-C** to form a variation of a butt joint typically called a scarf joint. The illustration applies equally to any tile segment **202** that includes a raised rib **204** with an angle-cut end **302-C**. The angle-cut end **302-C** of the raised rib **204-E'** is flush with the adjacent end of the base **304**. That is, the surface of the angle-cut end **302-C** continues on the same plane as the surface of the adjacent end of the base **304**.

[0050] Tile segments **202-B**, **202-C**, **202-D**, **202-E** that are joined together at a joint **208** without a gap **210** have a continuous section of raised ribs **204-E**. In one embodiment, the joint **208** has the ends **302-C** being at an angle relative to the base **304**. Two tile segments **202** are joined with an adhesive disposed between the bases **304**, and for the tile segments **202-B**, **202-C**, **202-D**, **202-E** that are joined together at a joint **208** without a gap **210**, the joint **208** includes an adhesive between the angle-cut ends **302-C**. The joint **208** formed from mating two angle-cut ends **302-C**, **302-C'** allows for a greater surface area of the joint **208** to be joined with an adhesive than with the square-cut ends **302-B**, resulting in a strong joint **208**. The angle-cuts ends **302-C** also present an angled edge if there is a slight misalignment in joining two segments **202**, thereby aiding the passage of a cane tip **216** past the misalignment.

[0051] FIG. 9 illustrates a partial top view of one embodiment of a clamping strip **902** securing a tile segment **202**. FIG. 10 illustrates a cross-sectional view of the clamping strip **902** and tile segment **202** shown in FIG. 11. The tile segments **202** of the surface **100** when used on a roadway **114** present a side to oncoming traffic. A clamping strip **902** clamps one or both sides of the tile segments **202** to the roadway **114** or other surface, thereby protecting the side, or edge, of the tile segment **202**.

[0052] The clamping strip **902** includes an outboard end **1004** that contacts the roadway **114** and an inboard end **1002** with a surface that contacts the top of the base **206** outboard of the raised rib **204**. In various embodiments, the outboard end **1004** is tapered toward the tile segment or slanted profile away from the tile segment **202**. The profile of the outboard end **1004** aids in the smooth transition of foreign objects from the roadway **114** to the tile segment **202**, thereby aiding in preventing the foreign objects from catching on the side edge of the tile segment **202**, which could cause the tile segment **202** from being separated from the roadway **114** or other surface. Examples of foreign objects include plows or objects hanging from vehicles that either drag on or are carried just above the surface of the roadway **114**.

[0053] The illustrated embodiment of the clamping strip **902** includes a series of openings **904** along the length of the clamping strip **902**. The openings **904** receive nails or other fasteners that secure the clamping strip **902** to the roadway **114**, thereby clamping the tile segment **202** between the clamping strip **902** and the roadway **114**. In various embodiments, the clamping strip **902** is secured to the roadway **114** and/or the tile segment **202** with nails or other fasteners and/or an adhesive.

[0054] The tactile surface **100** includes various functions. The function of indicating the direction of the tactile surface

100 is implemented, in one embodiment, by the pair of spaced apart parallel raised ribs **204** oriented parallel to the direction **218** of travel along the surface **100**. The area **209** between the raised ribs **204** receives a cane tip **220**, thereby providing tactile feedback of the location of the surface **100**.

[0055] The function of providing tactile feedback to a pedestrian **212** without creating a tripping hazard is implemented, in one embodiment, by the raised ribs **204** protruding from the surface of the base **304** and by the raised ribs **204** having a rounded profile along the sides and exposed ends **302-A**, thereby not presenting a surface or edge susceptible to catching an object, such as a shoe or other footwear.

[0056] The function of avoiding a tripping hazard is implemented, in one embodiment, by the raised ribs **204-A** having a rounded profile along the sides and ends **302**, thereby not presenting a surface or edge susceptible to catching an object, such as a shoe or other footwear.

[0057] The function of guiding a person **212** is implemented, in one embodiment, by the pair of spaced apart parallel raised ribs **204** aligned parallel to the direction **218** of travel along the surface **100**. Such alignment allows the person **212** to detect the presence of the tactile surface **100** and to detect the direction **218** in which the surface **100** leads.

[0058] The function of indicating a location on the surface **100** is implemented, in one embodiment, by the gap **210** in the raised ribs **204-A**. The gap **210** is dimensioned and configured to be detected by a cane tip **220** as the tip **220** passes along the area **206** between the raised ribs **204**.

[0059] The function of joining the raised ribs **204** for the surface **100** without creating a hazard is implemented, in one embodiment, by the square-cut ends **302-B** of the raised ribs **204-E** butted together to form a joint **208**. In another embodiment, the function is implemented by the angle-cut ends **302-C** of the raised ribs **204-E** butted together to form a joint **208**.

[0060] From the foregoing description, it will be recognized by those skilled in the art that a tactile surface **100** disposed on a pedestrian surface has been provided. In one embodiment, the tactile surface **100** includes a pair of raised ribs **204** that are evenly spaced, parallel, and have a longitudinal axis parallel to, or aligned with, the direction **218** of travel of the tactile surface **100** and the walkway. In one embodiment of the surface **100**, the raised ribs **204** protrude from a base **304** of a tile segment **202**. In one such embodiment, the tile segments **202** are secured to the roadway **114** or other surface by an adhesive. In another embodiment of the surface **100**, the raised ribs **204** protrude from the substrate forming the surface of the walkway. That is, the raised ribs **204** are integral with the roadway **114** or other surface.

[0061] While the present invention has been illustrated by description of several embodiments and while the illustrative embodiments have been described in considerable detail, it is not the intention of the applicant to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications will readily appear to those skilled in the art. The invention in its broader aspects is therefore not limited to the specific details, representative apparatus and methods, and illustrative examples

shown and described. Accordingly, departures may be made from such details without departing from the spirit or scope of applicant's general inventive concept.

What is claimed is:

1. A system providing a tactile surface aiding navigation along a pedestrian walkway, the tactile surface positioned to one side of the walkway, said system comprising:

a plurality of tactile tiles positioned end-to-end, each one of said plurality of tactile tiles including

a base having a top surface, said base having a first distal end and a second distal end, said base having a pair of elongated edges, said pair of elongated edges being substantially parallel and on opposite sides of said base; and

a pair of ribs integrally formed in said base and extending from said top surface, each one of said pair of ribs having a partial cylindrical shape, said pair of ribs being substantially parallel to said pair of elongated edges, each one of said pair of ribs and an adjacent one of said elongated edges defining an outboard top surface, said pair of ribs defining a guideway configured to receive a tip of cane, said pair of ribs being dimensioned to avoid being a tripping hazard;

at least one connection joining said first distal end of one of said plurality of tactile tiles with said second distal end of another one of said plurality of tactile tiles such that said guideway of said one of said plurality of tactile tiles is continuous with said guideway of said another one of said plurality of tactile tiles.

2. The apparatus of claim 1 further including a clamping strip with an outboard end and an opposite clamping end, said outboard and clamping ends substantially parallel to said pair of ribs, said outboard end configured to engage a surface of a roadway, said outboard end being tapered from an outboard edge toward said clamping end, said clamping end having a first surface configured to contact a portion of one of said outboard top surface of said base of at least one of said plurality of tactile tiles.

3. The apparatus of claim 2 wherein said clamping strip is configured to be secured to said surface of said roadway with an adhesive.

4. The apparatus of claim 2 wherein said clamping strip includes a plurality of through-openings configured to receive a fastener that secures said clamping strip to said surface of said roadway.

5. The apparatus of claim 1 wherein one of said at least one connection is a mitered joint wherein said guideway of said one of said plurality of tactile tiles joins with said guideway of said another one of said plurality of tactile tiles at an angle.

6. The apparatus of claim 1 wherein said top surface of at least one of said plurality of tactile tiles is substantially flush with a surface of the pedestrian walkway.

7. The apparatus of claim 1 wherein said base of each of said plurality of tactile tiles is configured to be adhesively attached to a surface of the pedestrian walkway.

8. The apparatus of claim 1 wherein one of said at least one connection is a joint with a gap between said pair of ribs of said one of said plurality of tactile tiles and said pair of ribs of said another one of said plurality of tactile tiles.

9. An apparatus providing a tactile surface aiding navigation along a pedestrian walkway, said apparatus comprising:

a base having a top surface, said base having a first distal end and a second distal end, said base having a pair of elongated edges, said pair of elongated edges being substantially parallel and on opposite sides of said base; and

a pair of ribs integrally formed in said base and extending from said top surface, said pair of ribs being substantially parallel to said pair of elongated edges, each of said pair of ribs and an adjacent one of said elongated edges defining an outboard top surface, said pair of ribs defining a guideway configured to receive a tip of cane, said pair of ribs being dimensioned to avoid being a tripping hazard.

10. The apparatus of claim 9 further including a clamping strip with an outboard end and an opposite clamping end, said outboard and clamping ends substantially parallel to said pair of ribs, said outboard end configured to engage a surface of a roadway, said outboard end being tapered from an outboard edge toward said clamping end, said clamping end having a first surface configured to contact a portion of one of said outboard top surface of said base.

11. The apparatus of claim 10 wherein said clamping strip is configured to be secured to said surface of said roadway with an adhesive.

12. The apparatus of claim 10 wherein said clamping strip includes a plurality of through-openings configured to receive a fastener that secures said clamping strip to said surface of said roadway.

13. The apparatus of claim 9 further including at least one gap defined by a break in at least one of said pair of ribs, said at least one gap bounded by a pair of rounded ends of said one of said at least one of said pair of ribs.

14. The apparatus of claim 9 wherein said first distal end of said base is configured to connect to a second distal end

of another base wherein said guideway is continuous with a guideway defined by another pair of ribs formed in said another base.

15. The apparatus of claim 9 wherein said top surface of said base is substantially flush with a surface of the pedestrian walkway.

16. The apparatus of claim 9 wherein said base is configured to be adhesively attached to a surface of the pedestrian walkway.

17. An apparatus providing a tactile surface aiding navigation along a pedestrian walkway, said apparatus comprising:

a first rib having a partial cylindrical shape along a longitudinal axis; and

a second rib having a partial cylindrical shape along a longitudinal axis, said first rib being substantially parallel to said second rib, said first and second ribs extending from a substrate, said first and second ribs defining a guideway between said first and second ribs, said first and second ribs having a height and a separation dimensioned to avoid being a tripping hazard.

18. The apparatus of claim 17 further including a base forming said substrate, said base having a first distal end and a second distal end, said base having a pair of elongated edges, said pair of elongated edges being substantially parallel and on opposite sides of said base, said pair of elongated edges being substantially parallel to said first and second ribs.

19. The apparatus of claim 17 further including at least one gap defined by a break in said first rib, said at least one gap bounded by a pair of rounded ends of said first rib.

20. The apparatus of claim 17 further including at least one pair of gaps defined by a break in said first rib and a break in said second rib, said pair of gaps bounded by a pair of rounded ends of said first rib and a pair of rounded ends of said second rib.

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