

TILE SUPPORT STRUCTURE

FIELD OF THE INVENTION

[0001] The present disclosure relates generally to tile support structures, and more specifically to a tile support structure used for supporting tiles used to make a floor or a deck for a building.

BACKGROUND OF THE INVENTION

[0002] Tile support structures support tiles which are used as a relatively quick and easy way to design a horizontal deck over floors and uneven surfaces. There are several ways to construct tile support structures. One way is to use a concrete base or stumps. However, such known construction can be relatively slow and require long lead times. Also, an alkali-silica reaction known as concrete cancer can occur. This is caused when the steel reinforcing beam within a concrete slab begins to rust. As the steel rusts, the steel and iron-oxides expand and displace the surrounding concrete. This can cause the concrete to become brittle and crack which further exacerbates damage to known tile support structures. There is also the risk of a need for rework if weather damage appears during the period of time when the concrete cures. In some instances, aluminium hollow structures maybe applied on top of such concrete stumps. These structures are a series of lightweight rails to which tiles can be mounted. Typically, such a support structure has elaborate fastening mechanism such as drilled holes and bolts to secure the various elements together. Such known tile support structures therefore can be relatively slow and

expensive to construct. It would therefore be desirable to provide a tile support structure which is robust but also relatively easy and low cost to assemble both in terms of materials and labour.

SUMMARY OF THE INVENTION

[0003] In accordance with a first aspect, a tile support structure for supporting tiles above a floor comprises a rail having a top surface adapted to support the tiles, wherein the rail has at least one overhang wall which defines an undercut, a pedestal comprising a pedestal top and a pedestal base, and a clip operatively connecting the pedestal to the rail, and moveable from an unassembled position to an assembled position. The clip has at least one flange which resiliently deforms past a corresponding one of the overhang rails and moves the to the undercut, wherein the at least one flange cooperates with the corresponding at least one overhand wall to resist separation of the rail from the clip when the clip is in the assembled position.

[0004] From the foregoing disclosure and the following more detailed description of various embodiments it will be apparent to those skilled in the art that the present invention provides a significant advance in the technology of tile support structures. Particularly significant in this regard is the potential the invention affords for providing a relatively low-cost and easy to assembly tile support structure for use as part of a above a floor for a deck or a roof. Additional elements and advantages of various embodiments will be better understood in view of the detailed description provided below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Fig. 1 is a partial isometric view of a deck formed from tiles/rows supported by a tile support structure in accordance with one embodiment.

[0006] Fig. 2 is an isometric view of a tile structure in accordance with one embodiment.

[0007] Fig. 3 is an exploded isometric view of the tile support structure of Fig. 2.

[0008] Fig. 4 is a cross section view of the rail prior to attachment to a clip.

[0009] Fig. 5 is a cross section view of the rail shown attached to the clip via a snap fit.

[0010] Fig. 6 is a side view of the clip.

[0011] Fig. 7 is an isolated isometric view of the clip.

[0012] It should be understood that the appended drawings are not necessarily to scale, presenting a somewhat simplified representation of various features illustrative of the basic principles of the invention. The specific design features of the tile support structure as disclosed here, including, for example, the specific dimensions of the clip, will be determined in part by the particular intended application and use

environment. Certain features of the illustrated embodiments have been enlarged or distorted relative to others to help provide clear understanding. In particular, thin features may be thickened, for example, for clarity of illustration. All references to direction and position, unless otherwise indicated, refer to the orientation illustrated in the drawings.

DETAILED DESCRIPTION OF CERTAIN EMBODIMENTS

[0013] It will be apparent to those skilled in the art, that is, to those who have knowledge or experience in this area of technology, that many uses and design variations are possible for the tile support structure disclosed here. The following detailed discussion of various alternate elements and embodiments will illustrate the general principles of the invention with reference to a tile support structure suitable for use as a foundation for a deck. Other embodiments suitable for other applications will be apparent to those skilled in the art given the benefit of this disclosure.

[0014] Turning now to the drawings, Fig. 1 shows a partial isometric view of a tile support structure 10 for a series of tiles 15. The tile support structure can comprise a series of pedestals 60 to elevate the tiles off of a floor, along with a series of rails 20 mounted on the pedestals, with the tiles on top of one or more of the rails, as shown. Each rail 20 defines an upper channel, here formed as a U-shaped channel 21, and an underside channel 11. These channels 21, 11 are described in more detail at Fig. 3. The tiles may be connected by a connector 16 which also acts a spacing element or separator. Fig. 2 shows a view an example of the one tile

support structure 10 for the series of tiles 15. The tile support structure is shown comprising a rail 20, typically formed of an elongate lightweight material such as aluminium, a pedestal 60 comprising a pedestal top 40 and a pedestal base 50. The rail 20 may be a central horizontal wall 25 and a cross section which permits for snap fit connection. The pedestal top 40 may be adjustably mounted on the pedestal base 50 such that a relative distance between the floor and the pedestal top may be increased or decreased. For example, the pedestal top 40 may be threadably connected to the pedestal bottom. That is, the pedestal top may have a threaded portion which is received by the pedestal base (or vice versa) for relative height adjustment of the pedestal top with respect to the pedestal base. Advantageously, the pedestal base 60 may be made of an engineering plastic such as a polypropylene and attached to the floor via an adhesive instead of bolts and drilled holes.

[0015] Fig. 3 shows an exploded perspective view of the tile support structure of Fig. 2, showing the clip 30. The rail 20 defines an upper channel, here formed as a U-shaped channel 21, and an underside channel 11. In accordance with a highly advantageous aspect, the rail 20 may be secured to the clip 30 via a snap fit connection, and the clip 30 may also be secured to the pedestal 60 via a snap fit connection with the pedestal top 40. Snap fit assembly advantageously eliminates the need for separate fasteners, special tooling, and much of the labour to assemble the components together. The pedestal top 40 is provided with an opening such as a central opening 41, defined by a circumferential side wall 41 which cooperates with the central opening to form an undercut adapted to receive a portion of the clip and secure the clip to the pedestal as described in greater detail below.

[0016] Figs. 4-5 are schematic side views showing the snap fit connection between the clip and the rail. Fig. 4 shows a cross section view of the rail 20 and the clip 30. The rail can be formed as an elongate extruded member, for example. The rail 20 has a top surface 22 to which the tiles are attached to and thereby support the tiles. The U-shaped channel 21 may be defined by the elements of the rail 20. The rail also has bottom walls 23, 24, the central horizontal wall 25, and vertical side walls 28, 29. Each side wall 28, 29 connects one of the horizontal bottom surfaces to the central horizontal wall, as shown. The vertical side walls 28, 29 each have a corresponding overhang wall 26, 27 respectively, which define undercuts 18, 19 adapted to receive a corresponding flange (34, 37) of the clip 30 when the clip is in an assembled position (Fig. 5). The central horizontal wall 25 cooperates with the vertical side walls 28, 29 to define the underside channel 11 which receives the clip 30 when the clip is moved to from an unassembled position (as shown in Fig. 4) to the assembled position of Fig. 5.

[0017] Preferably the clip 30 operatively connects to both the rail and the pedestal. In Fig. 4 the clip is shown about to be attached to the rail via a snap fit assembly. The clip 30 is shown with bases 35, 38, each base having a corresponding resiliently deformable flange 34, 37 which cooperate to define corresponding ledges 36, 39. Typically during assembly of the rail 20 and the clip 30, the rail is moved down towards the clip and the resiliently deformable flange 34, 37 are biased away by contact with the corresponding vertical overhang walls 26, 27 until continued movement allows the flanges to move past the overhang walls and nest in the undercuts 18,19, as shown in Fig. 5. See also Fig. 7 which shows an isolated

isometric view of the clip and the pair of resiliently deformable flanges positioned on opposite sides of a center of the clip. As shown, the overhang walls may be separated by a width which is less than the maximum width of the rail. Alternatively, the overhang walls may be formed so as to be separated by a width similar to the maximum width of the rail. Preferably the clip is formed of a plastic and can be of a one piece or unitary construction, also helping to reduce or eliminate the need for separate fasteners.

[0018] Fig. 5 shows the clip in the assembled position, after snap fit connection of the clip to the rail to resist separation of the clip from the rail, such that nondestructive vertical force will be insufficient to separate the rail and the clip. Further, the resiliently deformable flanges 34, 37 of the clip abutting against the vertical side walls 28, 29 of the rail limit relative motion of the clip towards the top surface of the rail. In accordance with another advantageous element, when the clip is in the assembled position (that is, when snap fit connection has been made between the rail and the clip), the rail may be slidable with respect to the clip along a elongate or lengthwise axis of the rail perpendicular to the plane of the paper in Figs. 4 and 5. This can be useful to fine position adjustment, to account for tolerances, and may also be useful for disassembly without damaging the rails when needed. Thus, the term assembled position is understood here to mean a range of assembled positions where the clip and rail are connected but the rail can slide with respect to the clip and consequently the cross-section view of Fig. 5 remains mostly unchanged.

[0019] Figs. 6 and 7 show views of the clip in isolation. As noted above, not only

may the clip be connected to the rail via a snap fit connection, but also the clip may be connected to the pedestal by a snap fit connection. In Fig. 6 the clip is shown with a pair of resiliently deformable flanges (34, 37) on a top side of the clip as noted above. The clip also has resiliently deformable fingers 31 extending from a base 32 where the base and fingers cooperate to define a shelf 33. The fingers and bases are positioned on a (bottom) side of the clip opposite the flanges. In the embodiment of the clip shown in the Figs., four resiliently deformable fingers 31 can be used, and the fingers may be equidistantly circumferentially spaced around a center of the clip. The pedestal top 40 may be provided with an opening 41 (as shown in Fig. 3), preferably a central opening which cooperates with the pedestal top to define an undercut 42, preferably a circumferential undercut. The clip 30 can be moved from an unassembled position to a connected position (meaning connection between the clip and the pedestal/pedestal top) by moving the resiliently deformable fingers 31 so they are biased past the pedestal top such that the shelves 33 engage an underside of the pedestal top at the undercut 42. This is a snap fit connection between the clip and the pedestal which advantageously helps resist separation of the clip from the pedestal top, and secure the clip to the pedestal top when the clip is in a connected position.

[0020] In accordance with another highly advantageous element, the clip, when in the connected position with respect to the pedestal top, may still be rotatable with respect to the pedestal top. This element advantageously allows for relative movement for ease of assembly and disassembly, and to account for tolerance stackup. The combination of elements disclosed herein can result in significant cost savings compared to traditional concrete stumps produces, both in material and in

labour.

[0021] From the foregoing disclosure and detailed description of certain embodiments, it will be apparent that various modifications, additions and other alternative embodiments are possible without departing from the true scope of the invention. The embodiments discussed were chosen and described to provide the best illustration of the principles of the invention and its practical application to thereby enable one of ordinary skill in the art to use the invention in various embodiments and with various modifications as are suited to the particular use contemplated. All such modifications and variations are within the scope of the invention as determined by the appended claims when interpreted in accordance with the breadth to which they are fairly, legally, and equitably entitled.

What is claimed is:

1. A tile support structure for supporting tiles above a floor comprising, in combination:

a rail having a top surface adapted to support the tiles, wherein the rail has at least one overhang wall which defines an undercut;

a pedestal comprising a pedestal top and a pedestal base; and

a clip operatively connecting the pedestal to the rail, and moveable from an unassembled position to an assembled position;

wherein the clip has at least one flange which resiliently deforms past a corresponding one of the overhang rails and moves the to the undercut, wherein the at least one flange cooperates with the corresponding at least one overhand wall to resist separation of the rail from the clip when the clip is in the assembled position.

2. The tile support structure of claim 1 wherein the rail is slidable with respect to clip after the clip is in the assembled position.

3. The tile support structure of claim 1 wherein the rail defines a U-shaped channel formed in part by the top surface, a pair of horizontal bottom surfaces, a central horizontal wall, a pair of side walls with each side wall connecting one of the horizontal bottom surfaces to the central horizontal wall.

4. The tile support structure of claim 3 wherein the central horizontal wall cooperates with the pair of side walls to define an underside channel, and a pair of undercuts, with each undercut adapted to receive a corresponding flange of the clip.

5. The tile support structure of claim 4 wherein the horizontal bottom surface of the rail limits motion of the clip toward the top surface of the rail.

6. The tile support structure of claim 1 wherein the at least one overhang wall is a pair of overhang walls, the clip has a pair of bases, the at least one flange is a pair of flanges, and each of the flanges extends from one of the bases;

wherein each base and flange cooperate to define a ledge which abuts against one of the overhang walls when the clip is in the assembled position.

7. The tile support structure of claim 1 wherein:

the clip has at least one finger on a side of the clip opposite the at least one flange;

the pedestal top defines an opening and has an undercut; and

the at least one finger of the clip is resiliently deformable into the undercut of the pedestal top, such that pedestal top cooperates with the at least one finger to resist separation of the clip from the pedestal top and secure the clip to the pedestal top when the clip is in a connected position.

8. The tile support structure of claim 7 further comprising four bases extending from the clip toward the pedestal top, and the at least one finger comprises four fingers, with one of each of the four fingers extending from a corresponding base, with each of the fingers defining a shelf which engages the undercut of the pedestal top to resist separation of the clip from the pedestal top.

9. The tile support structure of claim 8 wherein the opening is a central opening and the undercut extends circumferentially around the central opening.
10. The tile support structure of claim 8 wherein the clip is rotatable with respect to the pedestal top when the clip is secured to the pedestal.
11. The tile support structure of claim 1 wherein the pedestal is attachable to the floor with an adhesive, and the pedestal top is adjustable with respect to the pedestal base.
12. The tile support structure of claim 1 wherein the pedestal top is threadably connected to the pedestal base.
13. A tile support structure for supporting tiles above a floor comprising, in combination:
 - a rail having a top surface adapted to support the tiles;
 - a pedestal comprising a pedestal top and a pedestal base; and
 - a clip operatively connecting the pedestal to the rail, and moveable from an unassembled position to a connected position;wherein the clip has at least one finger and the pedestal top defines an undercut, and the at least one finger is resiliently deformable into the undercut of the pedestal top when moved to the connected position, such that the pedestal top cooperates with the at least one finger to resist separation of the clip from the pedestal top and secure the clip to the pedestal when the clip is in the connected position.