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(54) **ARTIFICIAL DECKING MATERIAL AND METHOD FOR USE**

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(57) **ABSTRACT**

A deck planking assembly system, comprised of two independent extrusions, to construct outdoor decks, docks and like structures. The top member includes a horizontal walking surface with multiple downwardly projecting vertical legs for locking devices and two additional projections for outer side walls. The second member of the device includes an elongated support formed from a rigid extrusion of metal, plastic or composite material, having a horizontal mounting surface which is affixed to a joist system. This contains multiple upwardly extending vertical legs at different lengths to create a crowned walking surface. Each vertical leg supports a horizontal extension terminating into an engaging locking method and an intermediate support means for the top member.

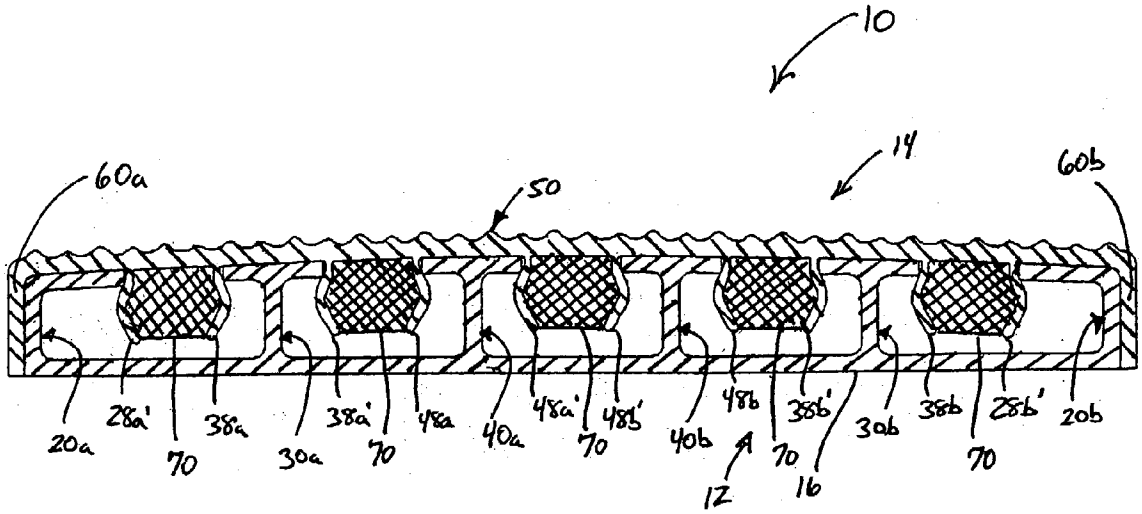
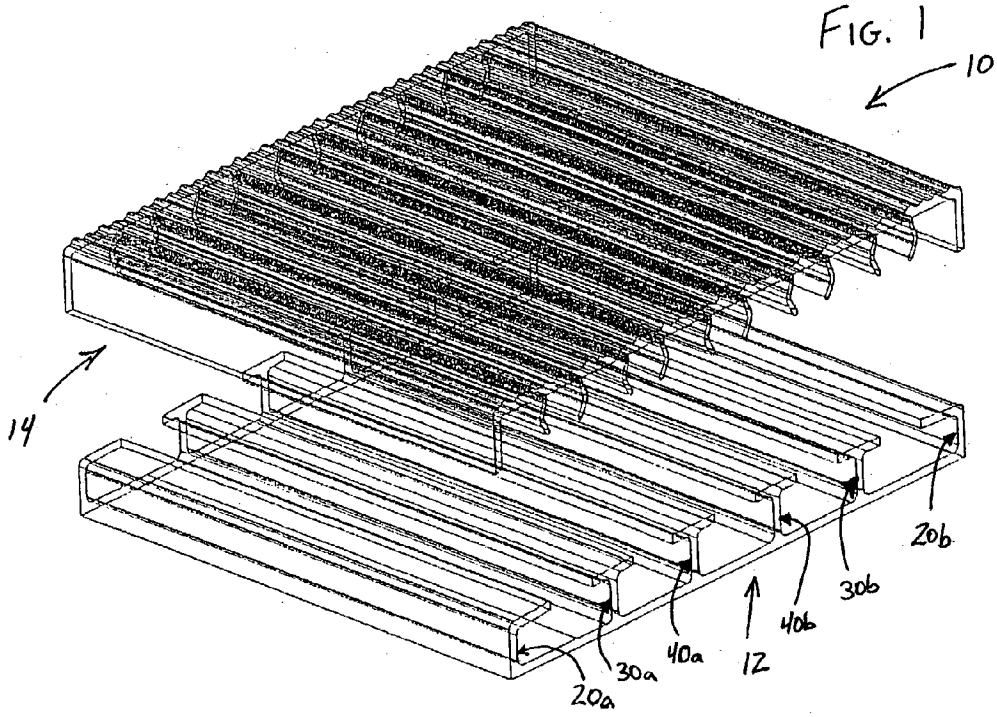


FIG. 1


10
14
20b
30b
40b
12
40a
30a
20a

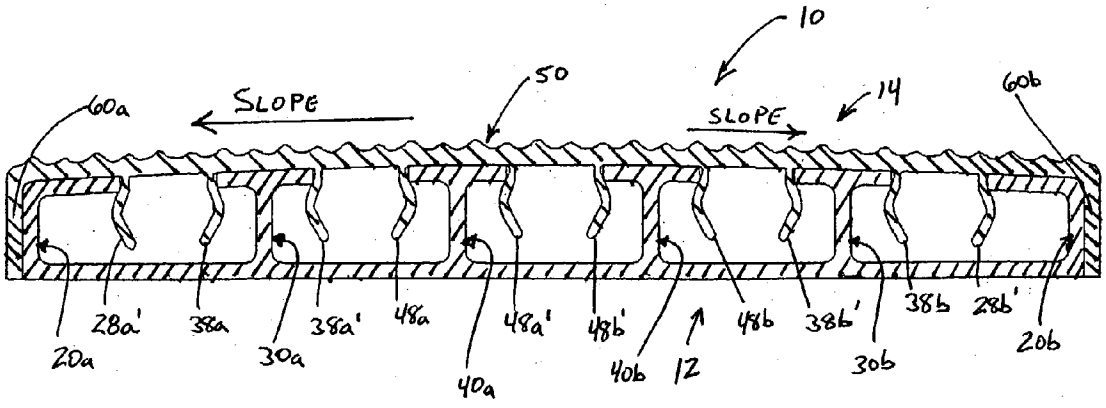

10
50
14
60a
SLOPE
SLOPE
60b
28a'
38a
38a'
48a
48a'
48b'
48b
38b'
38b
28b'
20a
30a
40a
40b
12
30b
20b

FIG. 4

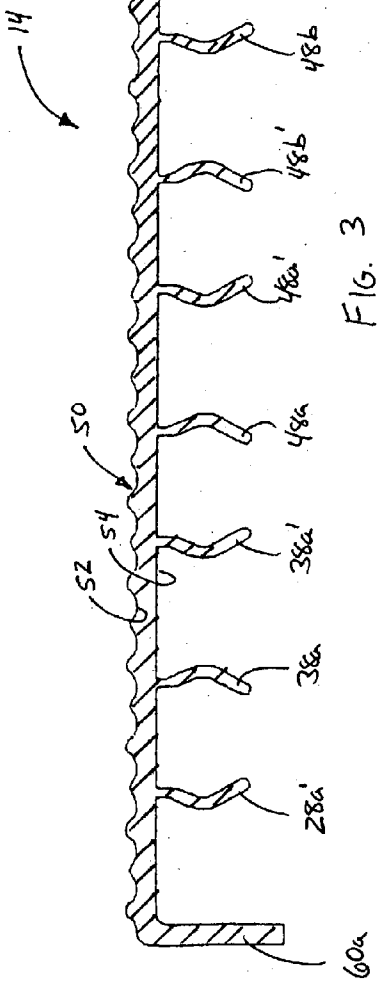

14
60b
28b'
38b
38b'
48b
48b'
48a'
48a
50
52
54
38a'
38a
28a'
60a

FIG. 3

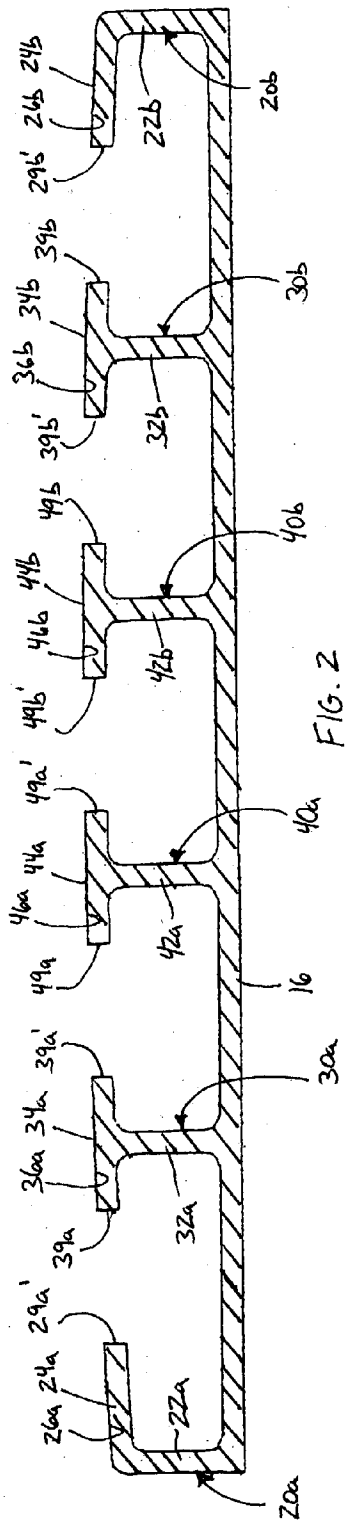

24b
26b
29b'
22b
20b
39b
34b
36b
39b'
32b
30b
49b
44b
46b
49b'
42b
40b
49a'
44a
46a
49a
42a
16
39a'
34a
36a
39a
32a
30a
29a'
24a
26a
22a
20a

FIG. 2

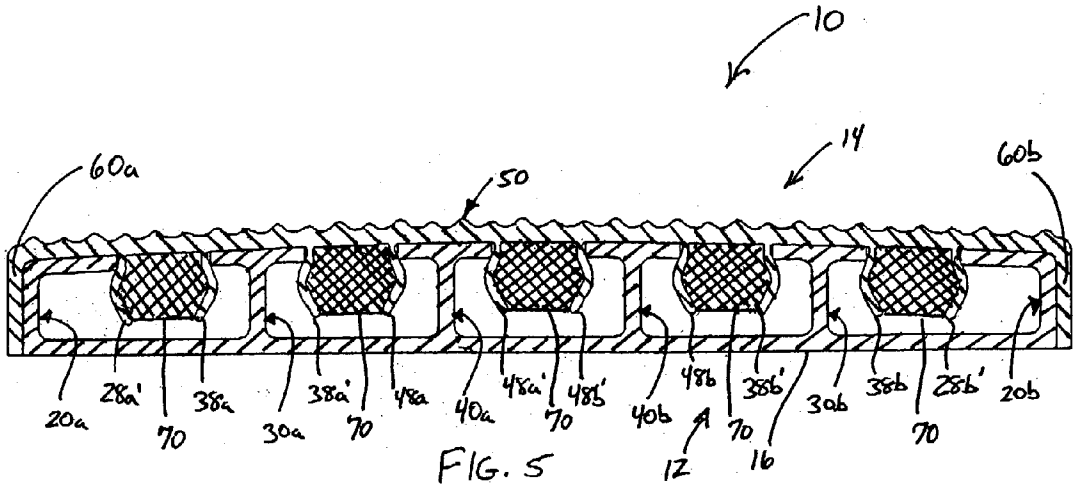

10
14
60a
50
60b
20a
28a'
38a
70
30a
38a'
70
48a
40a
48a'
48b'
70
40b
48b
70
38b'
16
30b
38b
70
28b'
20b
12

FIG. 5

ARTIFICIAL DECKING MATERIAL AND METHOD FOR USE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Priority is claimed from U.S. Provisional Patent Application No. 60/352,760 filed Jan. 28, 2002 entitled "ARTIFICIAL DECKING MATERIAL AND METHOD FOR USE," which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to outdoor decks, and more particularly, to man-made decking material or planks that can be used on new or renovated outdoor decks.

BACKGROUND OF THE INVENTION

[0003] Conventional decks are usually made of wood and consist of individual planks nailed or screwed into underlying wood joists. A typical deck comprises the use of nominal 2 inch by 6 inch planks having a dressed dimension of 1½ inches by 5½ inches secured to underlying joists spaced, for instance, on 16 inch centers. Other deck designs may utilize nominal 2 inch by 4 inch and 2 inch by 8 inch wood planks secured to the supporting joists. Such wood planks are subject to warping, rotting, splintering, splitting and require continual maintenance such as by staining or coating with protective sealants. In addition, such wood planks are subject to being cored by carpenter ants, wasps and other insects.

[0004] To address these concerns, man-made materials have been developed to address some or most of the above mentioned problems. For example, metal planking alone, while resistant to weathering if properly painted, is undesirable as a decking material because of its tendency to get extremely hot from exposure to the sun. While plastic plank members have been proposed such as shown in U.S. Pat. No. 5,009,045 which solve a number of the problems with wood and metal planks, they have a tendency to soften under high temperatures reached under a hot sun, thereby causing significant warping, which is both unattractive and may offer a tripping hazard.

[0005] The present invention serves to solve the ongoing problem associated with man-made materials by combining the benefits of a strong weather-resistant lower support member, with an attractive weather-resistant upper thermoplastic surface member.

SUMMARY OF THE INVENTION

[0006] The decking system of the present invention comprises a lower member that serves as a structural support for the surface member that serves as the walking surface of the deck. The lower member is comprised of a base with a series of vertical struts. The lower members are attached to the decking joists by means such as screws, bolts, or nails. Each surface member has a clip arrangement that interlocks with a corresponding vertical strut of the lower member. Subsequently, the surface member is either slid longitudinally over the lower member such that the clips of the surface member grasp the vertical struts of the lower member, or the surface member is simply pressed downward such that the clips of the surface member expand and then contract around the struts of the lower member, thereby interconnecting the surface member to the lower member.

[0007] In addition, the present invention offers the benefit of easy and relatively inexpensive replacement of the surface member. More specifically, should the surface member of one or more planks become damaged due to an event such as a grilling mishap, the surface member of the affected planks are simply slipped off, with a new surface member quickly installed. This feature also lends itself to modifying the appearance of the decking surface in the event that the deck owner desires a different color or textured surface. In this case, the surface members are simply slipped off the entire deck, with substitute surface members installed, and with no screwing or nailing required. Accordingly, the present invention offers multiple advantages over a wood deck, and further offers a significant improvement over artificial decking due to its ease of installation and its performance after installation.

BRIEF DESCRIPTION OF THE FIGURES

[0008] **FIG. 1** is an exploded perspective view of the decking system;

[0009] **FIG. 2** is a cross-sectional view of the lower member of the decking system;

[0010] **FIG. 3** is a cross-sectional view of the surface member of the decking system;

[0011] **FIG. 4** is a cross-sectional view of the assembled decking system; and

[0012] **FIG. 5** is a cross-sectional view of the assembled decking system where webbing is used between certain biased clips.

DETAILED DESCRIPTION OF THE INVENTION

[0013] The present invention is a two-member system comprising a structural base and a overlying surfacing layer. The two-member system may be installed on either newly constructed decks or renovated decks. The first member, or lower member, comprises a structural support member that is directly attached to the upper surface of the decking joists. The second member, or surface member, is interconnected to the lower member and serves as the walking surface of the deck.

[0014] In newly constructed decks, the foundation and structural members, including joists, are first constructed to provide the structural support for deck planking. Alternately, in the case of a deck renovation, the worn or otherwise undesirable existing deck surfacing is removed for replacement, thereby exposing the underlying joists. In either case, the two-member deck planking system of the present invention is attached to the upper surface of the structural joists.

[0015] As previously noted, the lower member of the present invention is directly attached to the top of the exposed structural joists. The lower member is preferably made of a man-made material that offers good weather-resistant properties, and is structurally capable of acting as a support for the surface member. Preferably, the lower member is metal, plastic, or a composite material. More preferably, the lower member is made of aluminum. Aluminum offers the benefit of being relatively strong while being relatively light weight.

[0016] The lower member is preferably manufactured in widths that correspond to typical wood products. More particularly, in a preferred embodiment, the lower member is manufactured in about a 5½ width to correspond to a typical wood dressed dimension of 5½ inches, as is the typical dressed dimension width of a nominal 2 inch by 6 inch wooden plank. Alternately, the lower member may be manufactured in other desirable widths, such as widths that correspond to standard 2 inch by 4 inch planking. One of the benefits of the present invention is the ability to manufacture the materials in an assortment of attractive and custom widths.

[0017] Preferably, the lower member is produced in lengths that provide for ease of construction at the installation site. Accordingly, in a preferred embodiment, the planks are produced in lengths that are dimensionally consistent with the particular deck under construction. The lower member may be manufactured in an extrusion process, whereby custom lengths of planking may be produced. This has the benefit of minimizing the number of exposed ends within the central area of the deck. For example, custom lengths of a desired size maybe extruded such that one plank spans the entire length of the deck, thereby eliminating the existence of multiple planks to span the length of the deck.

[0018] The lower member is preferably oriented such that the long axis of the lower member is approximately perpendicular to the orientation of the underlying joists. The lower member is then attached to the joists by an appropriate securing means, such as by nailing, or by screwing the lower member into the joists.

[0019] Referring now to **FIG. 1**, decking system **10** is depicted in an exploded perspective view. Decking system **10** includes both lower member **12** and surface member **14**. **FIG. 2** depicts lower member **12**. FIGS. **3** depicts surface member **14**. Referring now to **FIG. 2**, in a preferred embodiment, lower member **12** is comprised of a base **16**, side struts **20***a* and **20***b*, and two pairs of T-shaped vertical struts **30***a*, **30***b*, and **40***a*, **40***b*. Base **16** extends along the entire width of lower member **12**. A side strut **20***a*, **20***b* is positioned at each extreme end or side. Side struts **20***a*, **20***b* extend from the base **16** vertically and are generally L-shaped. The L-shaped side struts **20***a*, **20***b* include vertical portions **22***a*, **22***b* and a lateral portions **24***a*, **24***b*. Lateral portions **24***a*, **24***b* are positioned at the top of vertical portions **22***a*, **22***b* of side struts **20***a*, **20***b*. Lateral portions **24***a*, **24***b* extend toward the center of lower member **12**.

[0020] The two pairs of T-shaped vertical struts **30***a*, **30***b*, and **40***a*, **40***b* are placed interiorly of side struts **20***a*, **20***b*. The outside most T-shaped vertical struts **30***a*, **30***b*, those nearest side struts **20***a*, **20***b*, include a vertical portion **32***a*, **32***b*, and top portions **34***a*, **34***b*. Interior to T-shaped vertical struts **30***a*, **30***b*, are T-shaped vertical struts **40***a*, **40***b*. T-shaped vertical struts **40***a*, **40***b* include vertical portions **42***a*, **42***b* and top portions **44***a*, **44***b*.

[0021] Lower member **12** is preferably manufactured in an extrusion process, whereby a continuous length of the lower member **12** is produced. In addition, as a result of this manufacturing process, no weld points exist. More specifically, no weld points exist between side struts **20***a*, **20***b* and base **16**, nor between T-shaped vertical struts **30***a*, **30***b*, and **40***a*, **40***b* and base **16**, nor between vertical portions **22***a*, **22***b* and lateral portions **24***a*, **24***b*, nor between vertical portions **32***a*, **32***b* and **42***a*, **42***b* and top portions **34***a*, **34***b* and **44***a*, **44***b*.

[0022] Although the top surface of the lower member **12** and surface member **14** may be flat, the present invention preferably incorporates a slope for assisting with drainage of surface water. Thus, in still a further aspect of the invention, as can be seen from **FIG. 2**, T-shaped vertical struts **40***a*, **40***b* are taller than T-shaped vertical struts **30***a*, **30***b*. More particularly, vertical portions **42***a*, **42***b* of T-shaped vertical struts **40***a*, **40***b* are longer than vertical portions **32***a*, **32***b* of T-shaped vertical struts **30***a*, **30***b*. Furthermore, vertical portions **32***a*, **32***b* of T-shaped struts **30***a*, **30***b* are longer than vertical portions **22***a*, **22***b* of side struts **20***a*, **20***b*. The top surface **26***a* of side strut **20***a*, top surface **36***a* of T-shaped vertical strut **30***a*, and top surface **46***a* of T-shaped vertical strut **40***a* are aligned to provide a downward side slope toward the direction of side strut **20***a*. Similarly, on the other side of the plank, top surface **26***b* of side strut **20***b*, top surface **36***b* of T-shaped vertical strut **30***b*, and top surface **46***b* of T-shaped vertical strut **40***b* are aligned to provide a downward side slope toward the direction of side strut **20***b*. By way of example and not limitation, for a 5½ inch wide plank, the total height between the bottom of base **16** and the top of L-shaped side struts **20***a*, **20***b* may be between about 0.40 to 0.60 inches, and more preferably between about 0.45 and 0.55 inches, and more preferably yet, about 0.50 inches. In addition, the total height between the bottom of base **16** and the top of T-shaped vertical struts **30***a*, **30***b* maybe between about 0.45 to 0.65 inches, and more preferably between about 0.50 and 0.60 inches, and more preferably yet, about 0.55 inches. The total height between the bottom of base **16** and the top of T-shaped vertical struts **40***a*, **40***b* may be between about 0.50 to 0.70 inches, and more preferably between about 0.55 and 0.65 inches, and more preferably yet, about 0.575 inches. Accordingly, for a 5½ inch wide plank, the struts are manufactured to provide between about $^{0}/_{1000}$ to $^{300}/_{1000}$ inch slope, and more preferably between about $^{50}/_{1000}$ to $^{100}/_{1000}$ inch slope, and more preferably yet, about $^{75}/_{1000}$ of an inch slope or crown from the side to the center-most T-shaped strut of the plank. Of course, the amount of crowning can be adjusted to accommodate the width of planks desired. The particular dimensions can also be modified as desired for each of the struts.

[0023] The above described extrusion manufacturing process lends itself to the relatively precise production of the various strut structures and heights previously described. Accordingly, following connection of overlying surface member **14**, the top of surface member **14** mirrors the influence of the length of the side struts **20***a*, **20***b* and T-shaped vertical struts **30***a*, **30***b*, and **40***a*, **40***b*. As a result, the top surface of surface member **14** is slightly sloped to provide improved surface drainage off of each individual decking plank.

[0024] As noted above, upon installation, surface member **14** overlies lower member **12**. Surface member **14** is preferably manufactured using a flexible material that lends itself to forming a relatively snug fit over lower member **12**. More preferably, surface member **14** is constructed of a material having some resilient characteristics, so that its structural components "grasp" or frictionally resist movement after placement over the underlying lower member **12**. Accordingly, in a preferred embodiment, surface member **14**

is constructed of a plastic material. Still more preferably, the surface member is manufactured of polyethylene material in an extrusion process, whereby relatively tight manufacturing tolerances are possible, such that surface member **14** frictionally grasps side struts **20***a*, **20***b*, and T-shaped vertical struts **30***a*, **30***b* and **40***a*, **40***b* of lower member **12**. The use of a plastic material also offers the added benefit of providing a relatively maintenance free surface that does not absorb moisture, and which does not readily stain or become unsightly. In addition, the use of plastic in the surface member **14** allows the appearance of the surface member to be custom manufactured. Thus, another aspect of the invention involves that method or process of providing variation of color and overall surface appearance. For example, various color tan and brown resins may be used to produce a material with a wood appearance. In addition, supplemental pellets with higher melting points and different colors may be added in the mix during the manufacturing process to render a streaked appearance that is indicative of natural wood-grain textures. Alternately, bright colors could be used, for example, red, yellow or orange colored plastic could be used at locations where it is desirable to warn pedestrians of a potential hazard, such as a step, or for trademark logos.

[**0025**] Prior art designs rely on interlocking close tolerance extensions to secure the two members together. These designs do not compensate for the potential extreme temperature variations, and corresponding expansion and contraction problems at the decking surface. The present invention incorporates several locking extensions, or clips, which are unique compared to prior art. The clips are designed to flex together, and expand when pressed into the lower member **12**. This flexibility lessens the requirement for maintaining and controlling close tolerances for securing the assembly of the two members. Also, as previously noted, the lower member **12** of the present invention is preferably fabricated from a rigid material, such as aluminum. This assists with addressing expansion/contraction problems that may be observed if both members of the decking system **10** were constructed of thermoplastics.

[**0026**] Referring now to **FIG. 3**, surface member **14** includes top surface **50** that extends the entire width of surface member **14**. Top surface **50** possesses an upper wearing surface **52** and a bottom surface **54**. As shown in **FIG. 3**, upper wearing surface **52** may include longitudinal texturing to aid in traction. Alternately, upper wearing surface **52** may include side-slope texturing to aid in dissipating surface moisture. Of course, surface texturing may be purely random or may be patterned in decorative styles. In addition, texturing offers the added benefit of dissipating heat from exposure to the sun. That is, the texturing provides an increased surface area for heat to dissipate. Furthermore, the surface member **14** is in contact with the struts of the lower member **12**, which provides further heat dissipating potential to the decking system, because heat is transferred from the surface member **14** directly to the lower member **12**, where heat can dissipate to the surrounding atmosphere via the struts **20***a*, **20***b*, **30***a*, **30***b*, and **40***a*, **40***b*, as well as the base **16**.

[**0027**] Surface member **14** includes side panels **60***a*, **60***b*. Side panels **60***a*, **60***b* fit over the outer exterior of side struts **20***a*, **20***b*. Therefore, upon installation, the entire upper exposed surface of lower member **12** is covered by surface member **14**, including the sides of lower member **12**. This feature lends itself to an attractive appearance upon completion of the plank installation, because the aluminum appearance of lower member **12** is no longer visible. Furthermore, since surface member **14** completely covers the lower member **12**, the attachment devices such as screws that are driven through the lower member **12** into the underlying joists are completely hidden.

[**0028**] Surface member **14** also includes a number of biased side clips attached to its bottom surface **54**. More particularly, biased side clip **28***a*' is positioned on the bottom surface **54** of surface member **14** to correspond to the location of the interior side **29***a*' of lateral portion **24***a* of L-shaped side strut **20***a*. The shape of the biased side clips is preferably convex on the side of the strut to which it acts. For example, biased side clip **28***a*' is convex relative to interior side **29***a*' of lateral portion **24***a* of side strut **20***a*. Similarly, on the other side of the plank, biased side clip **28***b*' is convex relative to interior side **29***b*' of lateral portion **24***b* of side strut **20***b*.

[**0029**] For each T-shaped vertical strut **30***a*, **30***b* and **40***a*, **40***b* there are preferably two biased side clips. For example, biased side clips **38***a*, **38***a*' grasp T-shaped vertical strut **30***a*. More specifically, biased side clip **38***a* grasps the exterior side **39***a* of top portion **34***a* of T-shaped vertical side strut **30***a*. As described above, the convex side of biased side clip **38***a* is closest to the strut it is grasping, that is, T-shaped vertical strut **30***a*. Biased side clip **38***a*' grasps the interior side **39***a*' of top portion **34***a* of T-shaped vertical strut **30***a*. From **FIG. 4**, it can be seen that top portion **34***a* of T-shaped vertical strut **30***a* fits between biased side clips **38***a*, **38***a*'.

[**0030**] In a similar manner to that previously described, biased side clips **38***b*, **38***b*' grasp T-shaped vertical strut **30***b*; biased side clips **48***a*, **48***a*' grasp T-shaped vertical strut **40***a*; and finally, biased side clips **48***b*, **48***b*' grasp T-shaped vertical strut **40***b*. As illustrated in **FIG. 4**, utilizing the biased side clips in conjunction with the struts, surface member **14** interlocks with lower member **12**. The biased clip mechanism for interlocking the surface member to the lower member **12** enables the surface member **14** to freely slide along the lower member **12** to allow for thermal expansion and contraction that occurs as a result of heating and cooling the plastic of the surface member **14**. This reduces the occurrences of warping of the surface member **14**, which is both a visual distraction and a potential tripping hazard. In addition, the use of clips along the entire width of the plank ensures that the surface member **14** is soundly attached to the lower member **12**, thereby eliminating the sensation of unsecured or loose portions of the surface member **14** when crossed by a person walking on the surface member **14**.

[**0031**] End pieces or caps of plastic covering that match the appearance of the surface member **14** may be installed to provide a finished appearance to the ends of the planks that exist at the edge of the deck. Preferably, the end pieces would simply snap over the end of each plank.

[**0032**] The above text describes a preferred embodiment for a plank having a width of about 5½ inches. However, a narrower or wider width plank may also be produced using a fewer number or greater number of struts, as may be appropriate for the desired plank width. For example, if a narrow plank is desired, a plank could be produced with a set

of side struts **20***a*, **20***b*, and only one T-shaped vertical strut located in the center of the plank. Alternately, a plank could be manufactured using side struts **20**, **20***b* and two, three, four (as previously described), five, or any number of T-shaped vertical struts. Accordingly, in a preferred method of manufacture, use of fewer or greater numbers of struts than those earlier described would simply entail extruding the lower member with the desired number of T-shaped vertical struts distributed relatively evenly between side struts **20***a*, **20***b*, so as to provide a relatively even support for surface member **14**. Furthermore, the production of surface member **14** will necessarily require modification so as to provide corresponding biased side clips at appropriate locations so as to grasp the various struts of lower member **12**.

[**0033**] Referring now to **FIG. 5**, in a separate aspect of the invention, webbing **70** can be provided between the biased clips of the surface member **14** to prevent the biased clips from undergoing excessive movement during installation. Webbing **70** may be provided between only two biased clips, or it may be provided between a plurality of biased clips. As an example where four T-shaped vertical struts are used, webbing **70** is preferably located between biased clips **28***a*' and **38***a*, **38***a*' and **48***a*, **48***a*' and **48***b*', **48***b* and **38***b*', and **39***b* and **28***b*'. Webbing **70** may be a solid structure along the entire length of the surface member **14**, or it may take the form of intermittent structural members that are placed at various distances along the length of the surface member **14**.

[**0034**] While the above description and the drawings disclose and illustrate numerous alternative embodiments, one should understand, of course, that the invention is not limited to these embodiments. Those skilled in the art to which the invention pertains may make other modifications and other embodiments employing the principles of this invention, particularly upon considering the foregoing teachings. Therefore, by the appended claims, the applicant intends to cover any modifications and other embodiments as incorporate those features which constitute the essential features of this invention.

What is claimed is:

1. An artificial decking assembly for attachment to decking joists, comprising:

a lower member attachable to the decking joists, said lower member including a base, two side struts connected to said base, and a plurality of T-shaped vertical struts connected to said base and positioned interior to said side struts;

a surface member having a top surface and a plurality of biased clips interconnected to a bottom surface of said top surface;

wherein upon assembly, said biased clips of said surface member frictionally engage said side struts and said T-shaped vertical struts of said lower member to form a decking surface.

2. The decking assembly as claimed in claim 1, wherein said surface member further comprises side panels.

3. The decking assembly as claimed in claim 2, wherein said side panels substantially cover said side struts.

4. The decking assembly as claimed in claim 1, wherein said lower member is made of extruded aluminum.

5. The decking assembly as claimed in claim 1, wherein said surface member is made of extruded plastic.

6. The decking assembly as claimed in claim 1, wherein said plurality of T-shaped vertical struts are taller than said two side struts.

7. The decking assembly as claimed in claim 1, wherein said side struts have a height of between about 0.40 and 0.60 inches.

8. The decking assembly as claimed in claim 1, wherein said T-shaped vertical struts have a height of between about 0.50 and 0.70 inches.

9. The decking assembly as claimed in claim 1, wherein said decking surface is crowned.

10. The decking assembly as claimed in claim 1, wherein said decking surface has a slope of between about $^{5}/_{1000}$ to $^{100}/_{1000}$ of an inch.

11. The decking assembly as claimed in claim 1, further comprising at least one webbing between at least two of said plurality of biased clips.

12. A decking assembly comprising:

a lower member including a base connected to two side struts and at least one T-shaped vertical strut having a height greater than a height of either of said side struts;

a surface member having a top surface interconnected to a plurality of biased clips for frictionally engaging said side struts and said at least one T-shaped vertical strut of said lower member;

wherein said surface member frictionally engages said lower member upon interconnecting said surface member to said lower member.

13. The decking assembly as claimed in claim 12, wherein a decking surface formed by said surface member and said lower member is crowned.

14. The decking assembly as claimed in claim 12, further comprising at least one webbing between at least two of said plurality of biased clips.

15. The decking assembly as claimed in claim 12, wherein said surface member further comprises side panels and wherein said side panels substantially cover said side struts.

16. The decking assembly as claimed in claim 12, wherein said lower member is made of extruded aluminum.

17. A method of attaching surface decking to decking joists, said method comprising:

affixing a lower member to the decking joists, the lower member having a base connected to a plurality of struts, said plurality of struts including two side struts and at least one T-shaped vertical strut;

interconnecting a surface member to the lower member, the surface member having biased clips connected to a top surface such that said biased clips frictionally engage said plurality of struts, and wherein said interlocking step further comprises sliding or downwardly forcing the biased clips of the surface member to frictionally engage the struts of the lower member.

18. The method as claimed in claim 17, wherein said affixing step further comprises screwing or nailing the lower member to the decking joists.

19. The method as claimed in claim 17, wherein said T-shaped vertical strut is taller than either of said two side struts.

20. The method as claimed in claim 19, wherein said surface member is sloped after said interconnecting step.

* * * * *