MODULAR RAILING AND BRACKET THEREFOR

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ABSTRACT

A modular railing including a plurality of upright posts and a plurality of hand rails extending between adjacent ones of the upright posts is described. The handrails each include a plastic outer shell. A plurality of lower rails extend between the adjacent ones of the upright posts. At least one of the handrails or lower rails is positioned at an oblique angle relative to the post. A plurality of spindles extend between the handrails and the lower rails. At least one bowed connector couples the at least one obliquely oriented rail to at least one upright post. The bowed connector includes a bracketed end for mounting to a post and an angled end for receiving an end portion of the at least one obliquely oriented rail.
Fig. 1
MODULAR RAILING AND BRACKET THEREFOR

TECHNICAL FIELD

[0001] The present invention relates generally to railing, and more particularly, to indoor and outdoor railing used with steps.

BACKGROUND OF THE INVENTION

[0002] Outdoor decks are extremely popular in residential home construction. Homes and apartments, as well as a variety of other buildings, often incorporate exterior decks into their design. Additionally, decks are commonly added onto existing structures and landscapes. These decks provide convenient spaces for a variety of outdoor activities, including cookouts, dining and sunbathing, as well as other leisure activities. Moreover, decks typically are provided with a railing or perimeter fence to keep people from falling over the edge of the deck.

[0003] Wood products traditionally have been the primary source of materials for use in decking construction. However, wood products are becoming increasingly scarce due to the harvesting of trees at ever faster rates and the rather limited rate at which timber resources can be replenished. Also, environmental concerns and regulations directed to conservation or preservation of forests tend to restrict the availability of wood products. With the diminishing availability of timber resources, wood products are becoming increasingly expensive. There is, therefore, a substantial need for long-lasting substitute construction materials that can reduce harvesting of timber. One potential approach to addressing the above need is to provide substitute decking products made of plastic, rather than wood. However, because deck products must be capable of sustaining certain loads, replacement products need to be stable and rigid. The material should also be capable of economical manufacture and be relatively inexpensive. It also needs to be easily installed and used in the field.

[0004] A variety of plastic building products are known. For example, U.S. Pat. No. 4,045,603 describes a three-layer synthetic construction material made from recycled waste thermoplastic synthetic resin material and cellulose fiber aggregate. This material includes face surfaces consisting essentially of re-hardened fused and rolled thermoplastic synthetic resin material bits, and an intervening core material consisting essentially of a compressed non-homogenous mixture of cellulose aggregate material bits and re-hardened fused thermoplastic synthetic resin material bits. U.S. Pat. No. 3,764,245 describes an apparatus for producing a light structural board of thermoplastic resin.

[0005] U.S. Pat. No. 5,253,458 describes a simulated log made from a cast polyvinylchloride (PVC) pipe, selectively filled with a hard cast foam or bead type foam. This patent further describes that the cast PVC pipe is first manufactured and then subsequently filled with the foam filler.

[0006] U.S. Pat. No. 5,617,697 of Erwin describes a composite deck post for use with a wood joist of wood deck which includes an elongate, hollow, extruded plastic shell in which an elongate tubular metal stiffening member is positioned there within and is rigidly secured thereto using a metal fastener that extends through the plastic shell and the stiffening member.

[0007] U.S. Pat. No. 5,626,331 of Erwin describes a composite spindle for use in a fence or deck railing and comprises a plastic outer shell having a first end section, a second end section opposite the first end section, and a middle section. An elongate metal reinforcing element is positioned within the outer shell and extends from the first end section to the second end section. A rigid plastic foam is placed within at least a portion of the first and second end sections and substantially surrounds portions of the metal reinforcing element. Moreover, it is known in the art to construct railings out of plastic. For example, U.S. Pat. No. 4,477,058 of Lowery discloses a fence comprising plastic vertical posts, plastic horizontal rails interconnected to the posts by pins which pass through holes formed in the posts and in the ends of the horizontal rails, and plastic vertical fence boards having holes formed therein for receiving pegs extending from the horizontal rails for snapping the fence boards onto the horizontal rails.

[0008] U.S. Pat. No. 4,809,955 of Veilleux discloses a plastic fence or railing assembly comprising extruded plastic posts having U-shaped open-ended channels formed therein which function as guide slots for receiving the ends of horizontal rails inserted into the channels and held in a desired spatial relationship by separator elements.

[0009] U.S. Pat No 5,161,783 of German relates to a fence rail construction comprising hollow tubular PVC posts having openings formed therein for receiving a hollow tubular PVC rail. Prior to inserting the rail into the openings formed in the posts, a hollow tubular PVC sleeve having flanges is inserted within the posts in alignment with the openings formed in the posts. The ends of the rails are then inserted into the openings and the sleeves to form a rigid connection between the rails and the posts. In order to assemble the fence, openings are cut in the posts at the required heights. Adhesive is then applied to the sleeves which is then inserted into the hollow openings formed in the top of the posts, such that the sleeves are aligned with the openings formed in the posts. Adhesive is then applied to the ends of the horizontal rails which are then inserted into the openings formed in the posts and into the sleeves.

[0010] U.S. Pat. No. 6,017,019 of Erwin relates to a modular railing that includes a plurality of upright posts and a plurality of composite handrails extending between adjacent ones of the upright posts. Each of the composite handrails has a plastic shell and an internal metal reinforcing element that extends longitudinally inside the plastic shell of the handrails. A plurality of lower rails extend between adjacent posts. A plurality of brackets couple the handrails and lower rails with the upright posts. The brackets are adapted to be slipped over end portions of the handrails and lower rails and are adapted to be fixed to the upright posts. At least some of the brackets have a nonrectangular shaped opening matching a cross-sectional profile of the handrails to allow the brackets to be slipped over end portions of the handrails. At least one of the handrails is oriented at an oblique angle relative to one of the upright posts. At least one of the brackets has an elongated non-rectangular shaped opening to receive the obliquely oriented handrail.

[0011] The plastic fencing or railing of the types just described represent a substantial improvement over earlier wood products in many respects. But they leave room for improvement in the area of connecting railings to posts at oblique angles.
Accordingly, it can be seen that there is a need yet in the art for plastic railing which provides a strong finished product at minimal cost, is weather-resistant, and adapts easily when connecting railings to posts at oblique angles, such as with stairs. It is to the provision of such a railing and a bracket therefor that the present invention is primarily directed.

SUMMARY OF THE INVENTION

Briefly described, the present invention comprises a modular railing including a plurality of upright posts and a plurality of handrails extending between adjacent ones of the upright posts. A plurality of lower rails extend between the adjacent ones of the upright posts. At least one of the handrails or lower rails is positioned at an oblique angle relative to one of the posts. A plurality of spindles extend between the handrails and the lower rails. At least one bowed connector couples the at least one obliquely oriented rail to at least one upright post. The bowed connector includes a flanged end for mounting to a post.

In another form, the invention comprises a modular railing of the type having a plurality of posts, a plurality of rails extending between adjacent ones of the upright posts, wherein at least one of the rails is positioned at an oblique angle relative to an adjacent post. The improvement therein comprises at least one bowed connector coupling the obliquely oriented rail to at least one post. The bowed connector has a flanged end for mounting to a post and an elongated end for receiving an end portion of the at least one obliquely oriented rail therein.

In another form, the invention comprises a plastic mounting bracket for securing a railing to an upright post at an oblique angle thereto. The mounting bracket includes a first portion adapted to be secured to the upright post. A second portion extends from the first portion at an oblique angle thereto and the second portion includes a shaped opening for receiving an end of the railing therein.

With this construction, the resulting structure is easily manufactured and installed, is very strong and sturdy, is quite weatherable, and effectively connects angled rails. The modular railing is very easy to manufacture, provides excellent appearance, and provides good strength (both in terms of bending resistance and compression load-carrying capability).

These and other advantages, and features of the present invention will become more apparent upon reading the following specification in conjunction with the accompanying drawing figures.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

FIG. 1 is a perspective, partially exploded view of a portion of the modular composite railing according to a preferred form of the invention.

FIG. 2 is a front view of a bracket portion of the modular composite railing of FIG. 1.

FIG. 3 is a perspective illustration of a portion of the modular composite railing of FIG. 1, showing the bracket portion of FIG. 2 shrouding an end of a handrail portion.

FIG. 4A is a partial side view of another portion of the modular railing of FIG. 1 for use with steps illustrating bowed connectors that couple angled rails with an upright post.

FIG. 4B is a cross-sectional view of the bowed connector of FIG. 4A viewed along lines 4B-4B of FIG. 4A.

FIG. 5 is an enlarged side view of the bowed connector of FIG. 4A illustrating the position of a railing within the bowed connector.

FIG. 6 is an alternate construction of the bowed connector of FIG. 5.

FIG. 7 is another alternate construction of the bowed connector of FIG. 5.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in detail to the drawing figures, wherein like reference numerals represent like parts throughout the several views, FIG. 1 shows a modular railing 10 according to a preferred form of the invention. The modular railing is in the form of an assembly of individual components which are manufactured as separate components and then can be assembled in the field by an installer or a do-it-yourselfer. The modular railing assembly 10 includes a number of upright posts, such as post 11 and post 12. Extending between adjacent ones of the posts are upper rails or handrails, such as handrails 13, 14, and 15. Also extending between the adjacent ones of the upright posts are lower rails, such as lower rails 16, 17, and 18. It is to be understood that the individual components can be made of a single plastic material, can be formed from different plastics, or can be a composite of plastic and non-plastic elements (even some metal components can be employed).

Extending between the handrails 13-15 and the lower rails 16-18 preferably are a plurality of spindles, such as spindles 21-27. The spindles are fitted into holes formed in the lower rails, such as holes 32-36 for spindles 22-26 and unshown holes formed in the underside of the handrails. Preferably, the spindles are made in accordance with U.S. Pat. No. 5,626,331 of Erwin by which each spindle includes a plastic outer shell having a first end, a second end, and a middle section. An elongate metal reinforcing element is positioned within the outer shell and extends from the first end to the second end. A rigid plastic foam is placed within at least a portion of the end sections and substantially surrounds portions of the metal reinforcing element.

As shown in FIG. 1, the handrails preferably have an attractive, contoured profile or shape, while the lower rails are simple rectangular elements. It will be appreciated by those skilled in the art that the profiles of the handrails and the lower rails can be modified as desired. Moreover, as shown in the figures, the handrails can be composite units having a plastic outer shell and a metal reinforcing element placed therewithin. This will be described in more detail in connection with FIG. 3. Similarly, the lower rails 16-18 could be reinforced, if desired.

The upright posts, such as posts 11 and 12, each preferably have a plastic outer shell reinforced by a metal stiffening element, as generally indicated in connection with
post 11 of FIG. 1. This feature will be described in more
detail below. To keep out moisture and debris, decorative
cap bands or finials, such as finials 38 and 39, are placed atop
the posts.

[0030] To couple the handrails to the posts, upper brackets
are provided, such as brackets 41, 43, 45, and 47. The upper
brackets or handrail brackets are slipped over the ends of the
handrails during assembly and then fastened to the faces of the
upright posts 11 and 12 to secure the handrails in place.
Likewise, lower brackets 42, 44, 46, and 48 are provided for
coupling the lower rails to the upright posts. As shown in
FIG. 1, the lower brackets have an opening which is
configured to closely receive the ends of the lower rails,
while the upper brackets have openings which are adapted to
closely receive the ends of the handrails.

[0031] As shown in FIGS. 1-3, each of the brackets, such
as upper bracket 43, includes upper and lower flanges 51 and
52 which are provided to be placed flat against one of the
side faces of the upright posts for mounting thereto. In this
regard, the flanges 51 and 52 each include a pair of mounting
holes for receiving screws or bolts or rivets therethrough
for fastening the mounting bracket to the upright post. For
example, see fastening holes or mounting holes 53, 54, 55,
and 56. Each bracket also includes an offset face 57 which
is parallel to and offset from the flanges 51 and 52. The offset
face 57 includes a shaped opening 58 which is adapted to
closely receive a handrail. Of course, if one changes the
shape of the handrail, the shape of the shaped opening 58
should be changed correspondingly. Likewise, the rectang-
gular shape of the lower rail 17 indicates the use of a
rectangularly shaped opening in the lower brackets 42, 44,
46, and 48.

[0032] Ramps or angled faces 61 and 62 extend between
the flanges 51 and 52 and the offset face 57. Also, side
covers, such as side cover 63 and an unshown side cover,
cooperate with the other portions of the bracket to form a
box-like enclosure for housing the ends of the rails.
Preferably, the brackets, both the upper brackets and the
lower brackets, are made of metal and are stamped and bent
into shape. Most preferably, the brackets are made of flat
aluminum stock which is formed into shape and then
is powder coated (painted) to match the color of the plastic
PVC components. As shown in FIG. 3, bracket 43 is adapted
to cooperate with and receive handrail 14 when oriented
perpendicularly relative to the upright posts, that is when
angle 64 is 90 degrees.

[0033] Handrails, such as handrail 14, are preferably com-
posite constructions including an outer PVC shell, such as
shell 66, and an internal metal reinforcing element 67. The
metal reinforcing element 67 is generally trapezoidal with
one side thereof being partially open. The metal reinforcing
element 67 is made by folding flat stock and is sized and
adapted to be closely fitted into the interior of the hollow
plastic shell 66. The metal reinforcing element 67 runs
longitudinally within the plastic shell 66.

[0034] As shown in FIG. 4A, a bowed connector 405
includes a mounting flange 435, a perpendicular bracket end
portion 445, and an angled portion 440. The mounting flange
435 is integrally formed with the end portion 445 and angled
portion 440. In this regard, it is preferred that the bowed
connector 405 is injection molded as a unitary element. The
mounting flange 435 includes fastener holes, not shown in
this figure, for securing the mounting flange 435 to the
upright post 412. It should be understood by those skilled in
the art that other means of attaching the bowed connector
405 to the upright post can be employed.

[0035] The bowed connector 405 is hollow and generally
tubular in construction. The end portion 440 has an opening
which matches in profile the handrail 420 and the lower rail
422. It should be noted that if the handrail 420 has a different
profile (cross-section) than the lower rail 422, the upper and
lower bowed connectors would have slightly different con-
figurations. That is, the profile opening in the bowed con-
nectors should match the cross-sectional profile of the
particular rail to be received therein. On the other hand, if
the handrails and the lower rail have the same profile, then
the upper and lower bowed connectors can be identical in
their construction.

[0036] Furthermore, as shown in FIG. 4A, the bowed
connectors are useful for coupling an angled railing to a
lower upright post 410 and to an upper upright post 412. If
the railings have top-to-bottom symmetry such that the
railing has the same profile when inverted, identical bowed
connectors can be used on the lower upright post 410 as on
the upper upright post 412. The bowed connectors attached
to the upright post 410 are oriented with the angled end
division 440 pointed up, while the bowed connectors
attached to the upper upright post 412 are oriented with the
angled end portion 440 pointed downward.

[0037] FIG. 4B is a cross-sectional view of an example of
a bowed connector 405 illustrating a bread loaf shaped
opening 450. In this example, the opening 450 matches the
cross-sectional shape of the handrail 420.

[0038] FIG. 5 is an enlarged side view of the bowed
connector 405 illustrating the relationship between the
bowed connector 405 and railing 500. The railing 500 could
either be either the handrail 420 or the lower rail 422. The bowed
connector 405 is generally hollow and includes a cavity 510
defined by non-parallel walls 515. As the railing 500 is
inserted within the bowed connector 405, the railing 500
slides against the walls 515. These walls guide the railing
500 towards the bend 520 in the bowed connector 405.
Because the walls 515 are not parallel, the railing 500 slides
until it becomes firmly secured between the walls 515,
which secures the railing 500 within the connector 405.
While this is effective for securing the railing, it requires
relatively close correspondence between the angle of the
railing and the angle of the end of the bowed connector.
Alternatively, the cavity 510 could include a wall that
encloses the cavity 510 and serves as an anti-jamming
mechanism. For example, the wall can hinder the railing 500
from being inserted too far within the bowed connector 405.
In another alternative construction, the angled end 440 of the
bowed connector 405 could be smaller than the railing 500.
Such a bowed connector 405 could be inserted into the
railing 500 until secure.

[0039] FIG. 6 shows an alternate construction of the
bowed connector 405. In comparison to the construction
shown in FIG. 5, in which a relatively long corresponding
bore is provided to match the profile of the railing, in the
construction shown in FIG. 6 a relatively short profile
opening is provided. The profile opening is defined by the
annular shoulders 605 which define a bore having a face or
surface 606 for receiving and engaging side surfaces of the
railing. One disadvantage to the arrangement of FIG. 6 versus that of FIG. 5 is that in order provide a good fit, the dimensions of the opening defined in the bowed connector must be carefully matched to the profile of the railing. On the other hand, this construction allows for a greater degree of variance of the angle. In other words, the axis of elongation of the railing 500 can be different from the axis of elongation of the end portion or bent portion of the bowed connector 600 to a greater extent than in the prior embodiment. This is so because by guiding the railing only at the surface 606, the railing has clearance within the bowed connector 600 and therefore can be tilted more upright or less upright and still be accommodated within the bowed connector 600.

[0040] FIG. 7 shows another alternate construction of the bowed connector. In this figure, the annular shoulders are shown as having a radiused surfaces. This further helps provide greater annular flexibility, while still maintaining a reasonably good gripping securement of the railing 500. For example, as shown in dashed lines in FIG. 7, the railing 500 can have a substantial angular deflection from the angled portion of the bowed connector.

[0041] While the invention has been disclosed in preferred forms, it will be apparent to those skilled in the art that many modifications, additions, and deletions can be made therein without departing from the spirit and scope of the invention as set forth in the following claims.

What is claimed is:

1. A modular railing comprising:
   a plurality of upright posts;
   a plurality of handrails extending between adjacent ones of the upright posts;
   a plurality of lower rails extending between the adjacent ones of the upright posts, wherein at least one of the handrails or lower rails is positioned at an oblique angle relative to the post;
   a plurality of spindles extending between the handrails and the lower rails;
   at least one bowed connector coupling the at least one obliquely oriented rail to at least one upright post, wherein the bowed connector has a bracketed end for mounting to a post and an angled end for receiving an end portion of the at least one obliquely oriented rail.
2. A modular railing as claimed in claim 1 wherein the angled end of the bowed connector is oriented at an oblique angle relative to the bracketed end of the bowed connector.
3. A modular railing as claimed in claim 1 wherein the angled end of the bowed connector is oriented at an oblique angle relative to the bracketed end of the bowed connector.
4. A modular railing as claimed in claim 1 wherein the handrails, lower rails, and bowed connector have a weather resistant exterior surface.
5. A modular railing as claimed in claim 1 wherein the bracketed end of the bowed connector includes flanges to allow the brackets to be fastened to the upright posts with fasteners.
6. In a modular railing of the type having a plurality of posts, a plurality of rails extending between adjacent ones of the upright posts, wherein at least one of the rails is positioned at an oblique angle relative to an adjacent post, the improvement therein comprising:
   at least one bowed connector coupling the obliquely oriented rail to at least one post, wherein the bowed connector has a bracketed end and an angled end for receiving an end portion of the at least one obliquely oriented rail therein.
7. The improvement as claimed in claim 6 wherein the angled end of the bowed connector has a shaped opening matching a cross-sectional profile of the rails to allow the bowed connector to be slipped over end portions of the rails.
8. The improvement of claim 7 wherein the bowed connector includes a first portion and a second portion oriented at an oblique angle relative to said first portion.
9. The improvement of claim 8 wherein the bowed connector is made of a weatherable plastic.
10. The improvement of claim 6 wherein the bowed connector comprises an outer surface made of weatherable PVC.
11. A plastic mounting bracket for securing a railing to an upright post, said plastic mounting bracket comprising:
   a first portion adapted to be secured to the upright post; and
   a second portion extending from the first portion at an oblique angle thereto, said second portion including a shaped opening for receiving an end of the railing therein.
12. The plastic mounting bracket as claimed in claim 11 wherein at least an exterior surface of said plastic mounting bracket comprises a weatherable PVC.
13. The plastic mounting bracket as claimed in claim 11 wherein said first portion includes a mounting flange for mounting to the upright post.

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