

[54] **SIMPLIFIED RELATIVELY HEAVY
DUTY RAILING CONSTRUCTION**

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[58] Field of Search..... **256/21, 22, 24, 65-70, 256/59**

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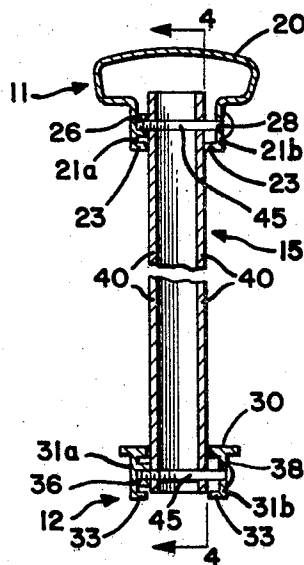
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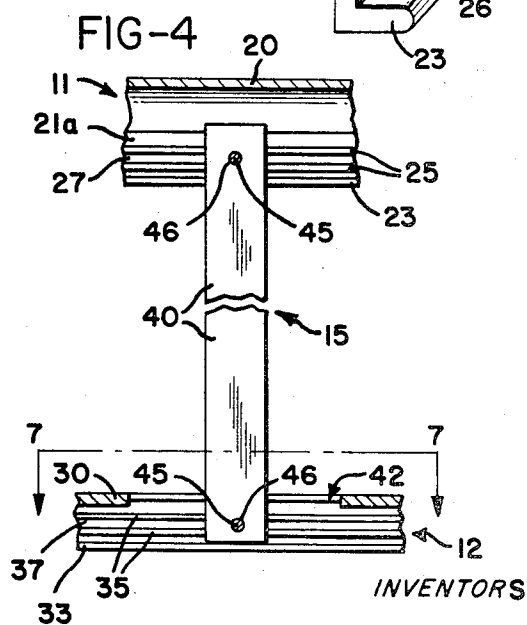
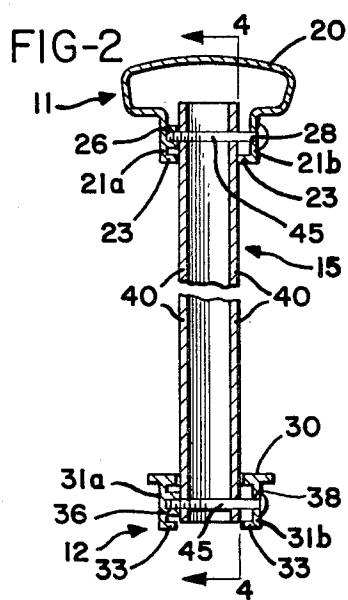
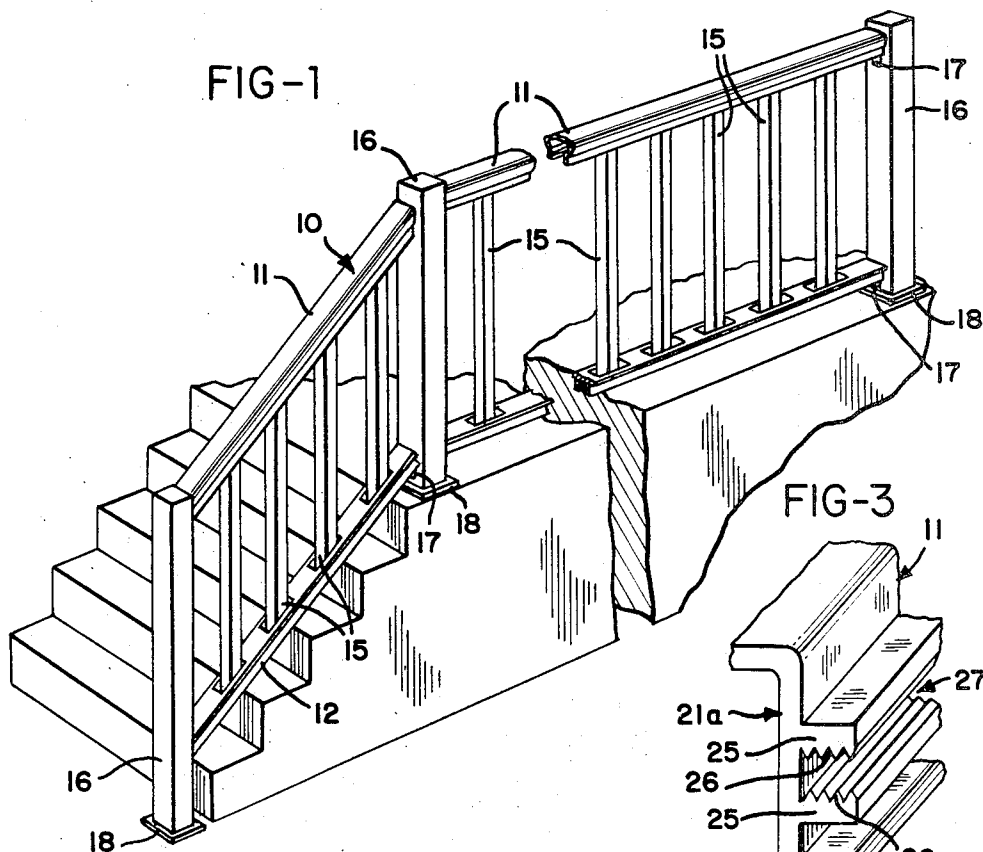
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[57] **ABSTRACT**

Relatively heavy duty aluminum top and base rail extrusions are disclosed for railing constructions. Each extrusion includes an intermediate top portion and a pair of spaced and downwardly extending first and second side flanges. A pair of vertically spaced and inwardly extending rib-like jaws having internal serrated gripping teeth are continuously formed during the extrusion process on the first side flanges, and a plurality of openings are formed in the second side flanges diametrically opposed to the teeth of the first side flanges. Pickets are pivoted to the rails at their upper and lower ends by bolts extending through the pickets from the openings in the second side flanges into the teeth on the first side flanges.

7 Claims, 9 Drawing Figures

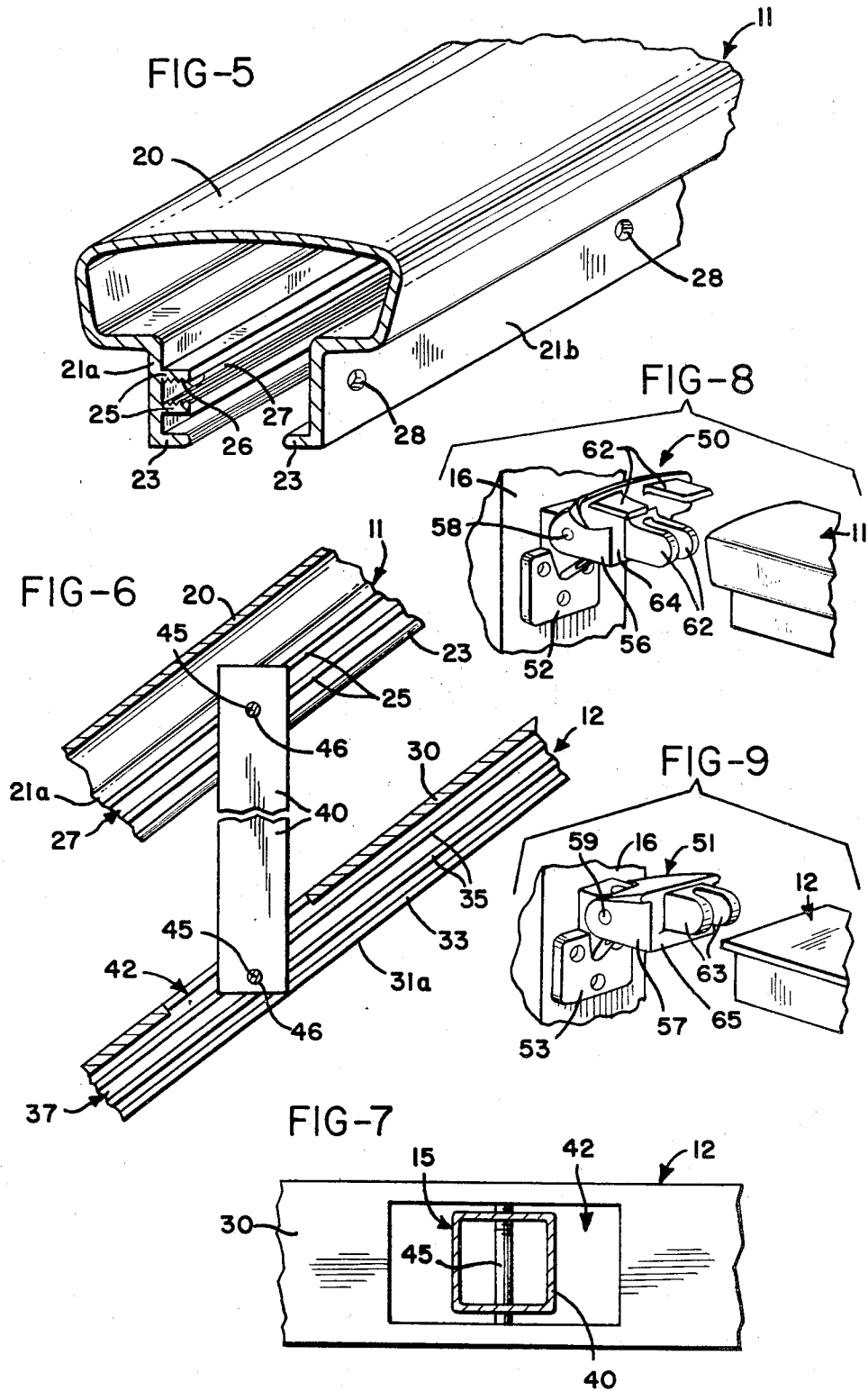




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SIMPLIFIED RELATIVELY HEAVY DUTY RAILING CONSTRUCTION

BACKGROUND OF THE INVENTION

There is a considerable need for heavy duty railing constructions which are easy to assemble and which are substantial enough to be more than merely decorative. Railings commonly consist of a plurality of pickets extending between a top rail and a base rail, and considerable effort has been expended in trying to develop top rail, base rail, and picket configurations which may be readily assembled in cooperating, interlocking fashion. The problem is further complicated when the railings are to be heavy duty and maintenance free as well.

Various arrangements exist for joining top rails, base rails, and pickets to form a railing. These prior art designs, however, are relatively complicated and become even more involved if the railing is capable of being arranged both horizontally and on an incline, as would be the case for a hand railing used on a flight of stairs. Typical of prior art railings are those shown in U.S. Pat. Nos. 3,113,760 of 1963; 3,306,641 of 1967; 3,385,567 of 1968; 3,414,236 of 1968; 3,481,585 of 1969; 3,491,984 of 1970; and 3,522,933 of 1970. However, these constructions are either relatively expensive to manufacture, complicated and difficult to assemble, or are not capable of being installed in horizontal and/or inclined planes. These constructions therefore lack the low cost flexibility desired and frequently required for a durable railing construction allowing relatively easy assembly at the site.

SUMMARY OF THE INVENTION

The present invention is therefore directed to an improved, heavy duty, maintenance free, simplified and low cost railing construction which is particularly well adapted for easy and rapid assembly. In general, the invention provides a plurality of transversely spaced points of support along the longitudinal length of extruded aluminum top and base rails. The support points accommodate transverse bolts which pivotally mount pickets to the top and base rails, the pivotable mounts allowing for assembly in horizontal or inclined planes.

In accordance with the invention, the top and base rails include intermediate top portions and pairs of spaced and downwardly extending first and second side flanges. Each first side flange includes a pair of vertically spaced and longitudinally extending rib-like jaws having internal teeth. The rails are preferably continuously extruded aluminum, and the teeth are integrally formed during the extrusion process.

The second side flanges include a plurality of longitudinally spaced-apart openings in diametrically opposed relation to the teeth on the first side flanges. The number of openings corresponds to the number of pickets to be used. Machine bolts having threads at the one end are inserted through the openings in the second side flanges, through holes formed in the pickets, and into end interlocking and supporting engagement within the teeth of the jaws.

The top portion of the base rails includes a plurality of longitudinally elongated apertures corresponding to the number of pickets to be used, and the lower ends of the pickets are inserted through the apertures for connection with the bolts extending between the side

flanges of the base rail. The apertures are large enough to permit the rails to be angled to the right or left, should it be desired to mount the railing on right or left inclining stairs or the like. In addition, the top portion of the top rail has an enlarged configuration to accommodate pickets which are severed square at their ends.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary perspective view in side elevation of railings constructed according to the present invention and installed on a porch and on steps leading up to the porch;

FIG. 2 is a sectional view showing transverse bolts retained within the side flanges of the top and base rails and forming pivot supports for a swinging pivot;

FIG. 3 is an enlarged fragment of the top rail showing the rib-like jaw formed on a side flange thereon;

FIG. 4 is a view taken on the line 4—4 of FIG. 2, showing the rib-like jaws on the top and base rails in side elevation, and showing the rails disposed perpendicular to a picket;

FIG. 5 is a fragmentary perspective view of the top rail of the present invention, showing the openings formed in the side flange thereof;

FIG. 6 is a view similar to that of FIG. 4, but showing the rails inclined with respect to a picket;

FIG. 7 is a sectional view taken on the line 7—7 of FIG. 4;

FIG. 8 is an exploded fragmentary perspective view of a hinge adapted to join the top rail to an end post; and

FIG. 9 is an exploded fragmentary perspective view of a hinge adapted to join the bottom rail to an end post.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, a pair of railings 10 constructed according to the present invention are shown, one railing being mounted on a flat surface such as a porch and the other being inclined and mounted on steps leading up to the porch. Each railing 10 includes a top rail 11, a base rail 12, and a plurality of pickets 15 extending therebetween. The railings 10 are commonly mounted between vertical end posts 16 by using end brackets 17 or the like. End posts 16 are attached to the steps and porch by means of end post plates 18.

The railings 10 are not only designed for easy manufacture and assembly, but the same railing elements may be mounted in either horizontal planes (porches) or inclined planes (steps). Thus, the railing shown in FIG. 1 as mounted on the porch could have been mounted or assembled on the stairs, and vice versa.

Aluminum is used throughout because of its strength, durability, lightness in weight, and because such a railing will remain virtually maintenance free. Other materials could of course be substituted.

Referring to FIG. 2, the top rail 11 is an aluminum extrusion including a generally enlarged and rounded intermediate top portion 20 which functions as a handrail, and a pair of vertical and downwardly extending first and second side flanges 21a and 21b. The top rail 11 also includes inwardly extending lip portions 23 which extend the length of the rail at the lower extremities of the side flanges 21a and 21b.

A pair of vertically spaced and inwardly extending rib-like jaws 25 (FIG. 3) are longitudinally and continuously extruded with the side flange 21a and have facing gripping teeth 26 in the form of serrations disposed in a generally horizontal plane and facing each other to form a continuous gripping space 27 along the longitudinal length of the rail. In the preferred embodiment, the jaws 25 extend inwardly a distance generally corresponding to that of the lip portions 23 so as to support the side of the pickets. A plurality of longitudinally spaced and circular openings 28 (FIG. 5) are formed in the side flange 21b and are transversely aligned in diametrically opposed relation to the space 27 defined by the gripping teeth 26. The openings 28 are preferably preformed, but may also be formed as needed, in accordance with the picket spacing desired.

The base rail 12 is also an aluminum extrusion and includes a generally flat top portion 30 and a pair of vertical first and second side flanges 31a and 31b spaced inwardly a short distance from the transverse extremities of the top portion 30 and having inwardly extending lip portions 33. As with the top rail 11, a pair of vertically spaced and inwardly extending rib-like jaws 35 are longitudinally and continuously extruded with the side flange 31a and have facing gripping teeth 36 forming a gripping space 37. The side flange 31b also includes a plurality of circular openings 38 spaced apart in diametrically opposed relation to the space 37 defined by the teeth 36, and the longitudinal spacing of the openings 38 corresponds to the longitudinal spacing of the openings 28 in the side flange 21b of the top rail 11.

The pickets 15 are also aluminum extrusions, and preferably have square cross-sections defined by side walls 40 (FIG. 7) to accommodate the lip portions 23 and 33. The top portion 30 of the base rail 12 is provided with a plurality of longitudinally elongated apertures 42 which are rectangular in shape, having transverse dimensions for receiving the pickets 15 and longitudinal dimensions for enabling the pickets 15 to pivot and incline to the right or left, as discussed below.

Transverse machine bolts 45 pivotally interconnect each picket 15 with the top rail 11 and base rail 12, respectively. With reference to FIGS. 2 and 3, this is easily accomplished by inserting the bolts 45 through the circular openings 28 and 38 in the side flanges 21b and 31b, through circular holes 46 in the side walls 40 of the pickets 15 at their upper and lower ends, and into the gripping spaces 27 and 37 between the jaws 25 and 35, respectively.

The transverse screwhead type round bolts 45 are formed with threads on their outer ends adapted to intermesh with the teeth 26 and 36 and to form a rigid threaded connection which prevents the bolts 45 from turning or working loose. Contrary to U.S. Pat. Nos. 3,385,567 and 3,414,236, the bolts 45 in the present invention engage the teeth horizontally to provide pivot connections between opposing side flanges. Thus, the longitudinal gripping spaces 27 and 37 and the longitudinally spaced openings 28 and 38 cooperate to define pairs of transversely aligned and longitudinally spaced points of support which enable a plurality of pickets to pivot with respect to the top and base rail extrusions 11 and 12.

Due to the above arrangement the bolts and railing have a streamlined appearance since only the rounded bolt heads are seen and no nuts are used as such. The appearance may be further improved if openings 28 and 38 are countersunk. Appropriately compatible bolts 45 may then be used to provide a completely flush outer wall on both sides of the railing.

FIGS. 8 and 9 illustrate an alternative means of joining the top rail 11 and base rail 12, respectively, to the end posts 16. When the railing is used on inclined planes, such as steps, it is generally necessary to miter the ends of rails 11 and 12 in order to attach them to the end posts 16 by means of end brackets 17. FIGS. 8 and 9, on the other hand, illustrate respectively a top hinge assembly 50 and a base hinge assembly 51 which eliminate the need for mitering the rails. With these assemblies top rail 11 and base rail 12 may be quickly and easily attached to end posts 16 regardless of the angle at which the rails meet the end posts.

The top hinge assembly 50 and the base hinge assembly 51 have bracket portions 52 and 53 for attachment to end post 16 similarly as end brackets 17 are attached. The hinge assemblies also include a top rail end piece 56 or a base rail end piece 57. The end pieces 56 and 57 are pivotally connected to their respective bracket portions 52 and 53 by top hinge 58 or base hinge 59.

The top and base end pieces 56 and 57 are provided with tongue portions 62 and 63 for receiving the top rail and base rail respectively. The tongue portions 62 and 63 are spaced to fit snugly within the interior of the ends of rails 11 and 12.

The faces 64 and 65 of the end pieces butt directly against the ends of the rails. Faces 64 and 65 are therefore dimensioned so that the edges of the faces coincide with the exterior of the top and base rails 11 and 12 respectively. Thus when the rails are pressed into place over the tongues of the end pieces they will meet flush with the faces thereof, providing a smooth and continuous exterior configuration to the entire railing assembly 10.

To assemble a railing 10 by use of hinge assemblies 50 and 51 it is thus necessary only to assemble the top rail 11, bottom rail 12, and pickets 15, and then to press the rails 11 and 12 home respectively on their hinge assemblies 50 and 51. When both end posts are properly in place, the hinges will pivot to the desired angle and the need for mitering the rails has thus been eliminated.

A railing constructed in accordance with this invention may therefore be seen to provide numerous advantages. A primary advantage relates to the transversely aligned points of support for the bolts 45 which enable the rail to be pivoted and which provide for ease of assembly. Assembly requires only that the bolts 45 be inserted through the openings in the second side flanges, through the pickets, and into end engaging relation with the jaws on the first side flanges. An entire railing can be assembled, tilted if need be for stairs or the like, and then assembled to the end posts. Thereafter, bolts 45 are tightened causing lips 23 and 33 to grip the pickets, and the railing becomes rigid.

A comparison with the prior art, referred to in the "Background of the Invention," reveals the simplicity of the construction of the present invention.

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Other advantages are also apparent. For example, the railing requires only four parts — top rail, base rail, pickets, and bolts. Three of the parts are aluminum extrusions which may be cut to proper lengths without need of further processing. With reference to FIGS. 4 and 6-7, the pickets 15 may be conveniently severed at right angles to their longitudinal axis. They do not require rounded ends for pivotal clearance with the enlarged top portion 20 of the top rail. This feature adds to the simplicity of assembly and low cost. Moreover, the longitudinally elongated apertures 42 enable the rails to be inclined either to the right (FIG. 6) or to the left (not shown), while maintaining the pickets in vertical disposition.

It should be especially noted that the railing of the present invention is strong and particularly well adapted for heavy duty applications. Due to its aluminum construction it is also light in weight and maintenance free. Additionally, as may be seen in the drawings, the assembly has a pleasingly symmetrical and streamlined appearance.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of this invention.

What is claimed is:

1. A simplified railing construction comprising an aluminum top rail extrusion having a top portion and spaced apart and depending first and second side flanges, an aluminum base rail extrusion having a top portion with at least one aperture therein and spaced apart and depending first and second side flanges, means forming longitudinally continuous and inwardly extending gripping means on said first side flanges, means forming at least one opening on said second side flanges transversely aligned with said gripping means, at least one picket having upper and lower ends with transverse holes therethrough, said upper end being disposed between said side flanges of said top rail extrusion and said lower end being inserted through said aperture and disposed between said side flanges of said base rail extrusion, and bolts extending through said holes in said picket and retained on said first side flanges by said gripping means and on said second flanges by said openings to define at least two pairs of transversely spaced points of support for pivotally sup-

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porting said picket between said top and base rail extrusions and for providing for ease of assembly and inexpensive manufacture.

2. The railing of claim 1 wherein said gripping means comprises a pair of longitudinally continuous and vertically spaced rib-like jaws, said jaws including facing gripping teeth, and wherein said bolts include threaded ends for forming a rigid threaded connection with said jaws when in threaded engagement with said teeth.

3. The railing of claim 1 wherein said picket is severed square at its upper end, and said top rail extrusion has an enlarged top portion accommodating said squared upper end and permitting said upper end to pivot within said extrusion.

4. The railing of claim 1 wherein said picket is an aluminum extrusion.

5. The railing of claim 1 including a plurality of said pickets, bolts for pivotally mounting said pickets on said top and base rail extrusions, and longitudinally spaced openings in said second side flanges for accommodating said bolts, said openings forming with said gripping means on said first side flanges a plurality of longitudinally spaced and transversely aligned points of support for pivotally supporting said pickets between said top and base rail extrusion.

6. The railing of claim 1 including at least one hinge assembly for attaching one of said rails at an adjustable angle to a supporting structure.

7. In railing construction of the type including a top rail, a base rail, and a plurality of pickets extending between said top and base rails, the improvement comprising spaced apart side flanges on each of said top and base rails, a continuous vertically spaced and inwardly extending rib-like jaw on a first side flange of each rail and having facing gripping teeth thereon, a plurality of longitudinally spaced openings in a second side flange of each rail, each rail including an intermediate top portion between said side flanges and said base rail top portion having a plurality of longitudinally elongated apertures therein corresponding to the number of openings in the second side flange thereof, and a plurality of transverse bolts extending through said pickets and retained on said first side flanges by said jaws and on said second side flanges within said openings to provide an adjustable structure for use on horizontal surfaces and capable of pivoting on said bolts for use on inclined surfaces.

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