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INTERCHANGEABLE FENCE AND GUARD RAIL SECTION

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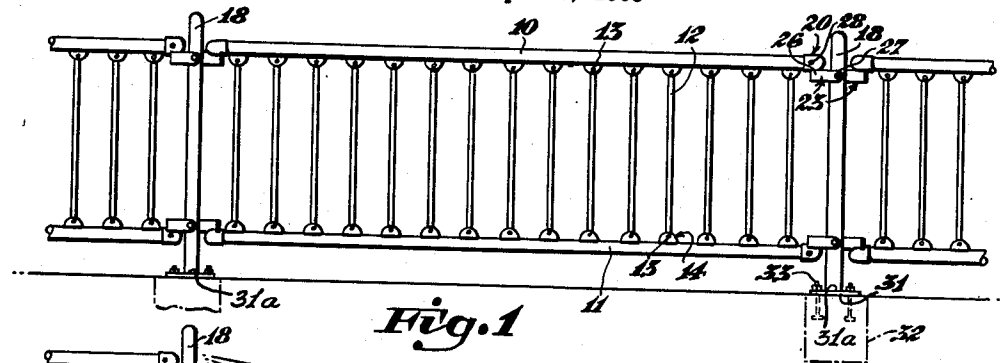


Fig. 1

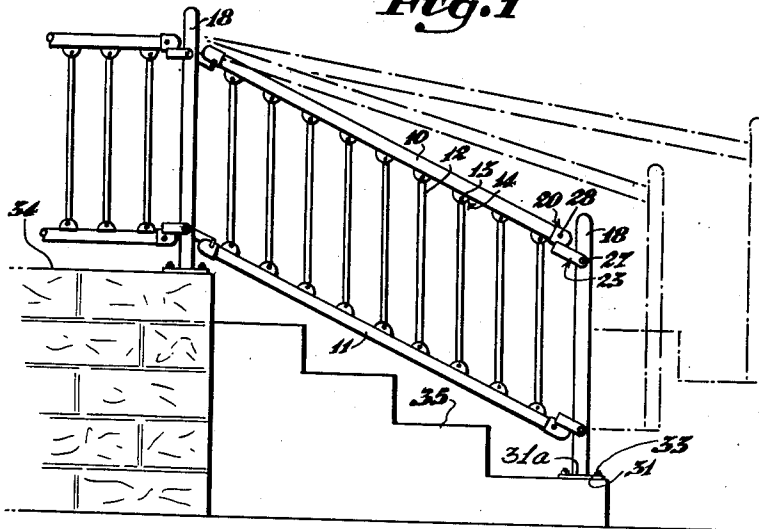


Fig. 2

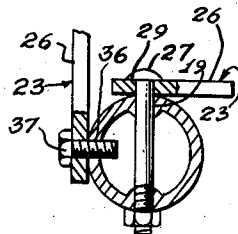


Fig. 7

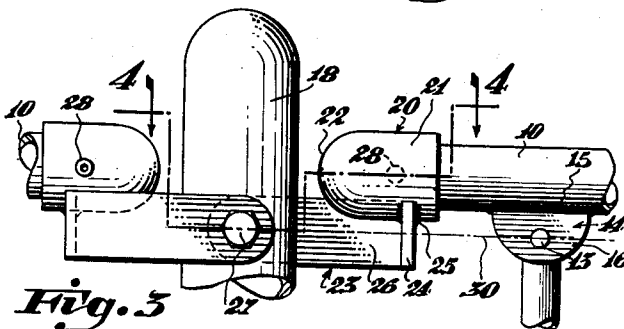


Fig. 5

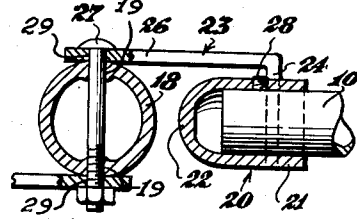


Fig. 4

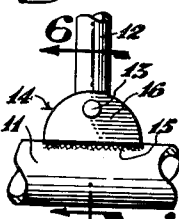


Fig. 5

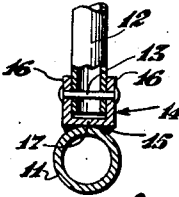


Fig. 6

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INTERCHANGEABLE FENCE AND GUARD
RAIL SECTION

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5 Claims. (Cl. 256—21)

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This invention relates to a prefabricated rail structure for interchangeable use as fence section or guard railing, the section being arranged to articulate to a horizontal or to an inclined plane to conform to the grade of the surface upon which it is erected.

A structure of this general character is disclosed in the copending application of Winford L. Enghauser, Serial No. 326,965, filed on December 19, 1952, now abandoned. The structure of the prior application consists essentially of a pair of longitudinal stringers or rails, having pivotally connected along one side, a series of spaced vertical palings, with the upper and lower ends of the palings projecting outwardly beyond the stringers. The opposite ends of the stringers are pivotally connected to a pair of vertical posts which may be mounted either upon a level or inclined supporting surface.

This structure, by virtue of the pivotal connections of the palings and posts, is capable of being articulated in parallelogram fashion either to a level or inclined plane, while the posts and palings are maintained in vertical position. Accordingly, the sections may be utilized interchangeably as inclined stair guards or as horizontal fence or porch rail sections without any alteration in construction. The structure is self-adjusting and generally practical except that the palings project alongside and above the top stringer as in the usual picket fence because of the mounting arrangement of the palings. Therefore in order to adapt the structure for use as a stair guard it is provided with an additional hand rail or banister which is in the form of a third stringer mounted above the tops of the palings and pivotally connected to the posts. This third rail obviously serves no useful purpose when the sections are utilized for fencing.

A primary object of the present invention has been to provide an improved railing section in which the upper stringer itself is utilized as a hand rail, thereby eliminating the third rail but retaining the desirable self-compensating features of the articulated construction for selective erection.

Briefly, each railing section of the present invention comprises a pair of longitudinal rails or stringers spaced one above the other and joined by vertical palings extending between and within the confines of the stringers (as distinguished from alongside) in a plane common to the axes of the stringers. The opposite ends of the palings are pivotally connected at points along the surfaces of the stringers which face inwardly toward one another, whereby the two stringers overlie the opposite ends of the palings. Accordingly, the sides and top of the stringers are entirely unobstructed so as to allow the upper stringer to

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serve both as a mounting for the palings and as a sturdy hand rail. The pivotal connections of the palings are provided by a series of clips which are welded directly to the surfaces of the stringers, with the clips at top and bottom facing toward one another and connected to the palings by pivot members passing through the clips and ends of the palings.

The opposite ends of the stringers are attached to the posts by means of connector sleeves which are telescopically engaged upon the ends of the stringers in a manner generally similar to the connectors of the copending application. Each sleeve includes an angle bracket projecting outwardly beyond the end of the sleeve and connected by pivot screw to the post to form the articulated connection. The connectors at opposite ends of the stringers are identical in construction and the angle brackets of adjoining sections are arranged to engage the opposite sides of the mounting post when several sections are installed as a fence in end-to-end relationship.

In order to allow the rail section to be adjusted selectively to a level or inclined plane, the pivot screws of the connectors must be located upon a plane which is common, or nearly so, to the pivot points of the palings. If the pivots of the connectors and palings were out of line, then the assembled section would bind when swivelled toward an inclined plane. For this purpose the angle bracket of the connector is displaced laterally from the axes of the connector and is provided with a mounting hole disposed in alignment with pivot members of the palings at top and bottom.

The rail sections are fabricated preferably from commercial iron pipe stock and are neat and trim in appearance. When erected as a porch railing and stairway guard the inclined and horizontal sections harmonize with one another and provide a finished architectural appearance. When used for fencing, the sections are erected in end-to-end relationship and accommodate themselves to hilly or level ground from section-to-section by virtue of their articulated construction.

A further object of the invention has been to provide a simplified connector which is detachable with respect to the ends of the stringers to allow the stringers to be trimmed to length, particularly when utilized as stair guards; also to provide a minor length adjustment to compensate for variations in the spacing of the posts. The railing sections are furnished in a basic or modular length best suited for fencing or side railings, while the detachable connectors are locked in longitudinally adjusted position by set screws to accommodate minor variations in post spacing and thereby facilitate erection or trimming if necessary.

By operation of its articulated joints and adjustable connectors, the rail sections may be installed by the average workman or householder without special skill or equipment. By virtue of the improved mounting of the palings, the top stringer forms a hand rail corresponding to the inclination of the stairway and the section in its inclined position has essentially the appearance and utility of a conventional stair guard but requires no special fitting to accommodate the pitch and length of various stairways.

Other features and advantages of the structure will be more fully apparent from the following detailed description taken in conjunction with the drawings.

In the drawings:

Figure 1 is a side elevation illustrating the railing sections installed in the form of fencing.

Figure 2 is a side elevation illustrating the sections erected upon a porch slab and steps as a stairguard and as a side railing.

Figure 3 is an enlarged fragmentary view of the upper portion of one of the mounting posts, illustrating in greater detail the adjustable connectors.

Figure 4 is a sectional view taken on line 4—4, Figure 3, further detailing the connector and its attachment to the post.

Figure 5 is an enlarged fragmentary view taken from Figure 1, detailing one of the mounting clips which connect the palings to the stringers.

Figure 6 is a sectional view taken on line 6—6, Figure 5, further detailing the mounting clip.

Figure 7 is a sectional view similar to Figure 6, showing the connection of the sections to a corner post.

Referring to the drawings, the present rail section is shown in Figure 1 in its utility as an outdoor fence and in Figure 2 as a guard rail for a stairway and porch slab to illustrate its articulating action and length adjustment. The individual sections are furnished to the user preferably in assembled condition ready for erection upon the posts which, according to the usual practice, are installed in advance. As explained later in detail, pivotal connectors are used to connect the ends of the sections to the posts and these connectors allow the sections to be trimmed to length and also provide a minor length adjustment, such that the posts need not be precisely located center to center.

When utilized for fencing, the posts usually are located at centers corresponding to the full length of the sections, and the connectors are adjusted to accommodate minor variations in post locations. On the other hand, when installed upon porches, steps, terraces and the like to provide guard rails of shorter length, the sections are fitted simply by removing the connectors at one end, cutting the sections to the required length, then replacing the connectors and attaching them to the posts. In either type of installation the individual sections, by virtue of their articulated connections, are flexible and will accommodate themselves to the grade or contour whether level or inclined. The several inclinations and length variations are indicated in broken lines in Figure 2 which discloses the rail section applied to several types of stairways as a guard rail.

Described in detail with reference to Figure 1, each rail section consists of a top and bottom stringer indicated at 10 and 11 and a series of spaced vertical palings or pickets 12 having their

upper and lower ends pivotally connected to the stringers as at 13. The stringers and palings are preferably fabricated from commercial iron pipe stock, suitably finished to prevent corrosion. It will be noted in Figure 6, that the palings are located in a horizontal plane common to the axes of the stringers such that the upper and lower ends of the palings are disposed between and within the confines of the upper and lower stringers. By virtue of this arrangement, the ends of the palings do not project above or alongside the stringers; therefore the upper stringer forms an unobstructed hand rail when the section is installed as a stair guard or porch rail.

In order to mount the palings in this manner, the upper and lower ends of the palings are pivotally connected to the respective stringers by means of clevis members or mountings clips 14 which are welded as at 15 to the respective stringers. It will be understood that the clips 14 are located at uniform spacing and that the clips of the top and bottom stringers face toward one another in vertical registry.

Described in detail with reference to Figures 5 and 6, each clip 14 consists of a sheet metal stamping generally U-shaped in cross section providing a pair of spaced vertical ears 16—16 joined by a transverse section 17 which is welded to the stringer as indicated previously. The paling 12 is confined loosely between the spaced ears and is anchored pivotally to them by the headed rivet 13 (Figure 6) passing through matching holes in the ears and tubular paling. In its preferred form as shown in Figure 5, the ears 16 are generally semi-circular in configuration in order to confine the palings and prevent any interference between the clips and palings when the railing section is adjusted to its inclined positions.

It will be understood from the foregoing that the assembled palings and stringers are free to articulate in parallelogram fashion and by their geometric relationship, the palings are maintained in vertical position corresponding to the mounting post whether the section is installed in the horizontal plane as shown in Figure 1 or in any of the inclined planes shown in Figure 2.

The opposite ends of the stringers are pivotally connected to the posts 18 by means of the adjustable connectors which are indicated generally at 20. The posts are furnished with a pair of holes 19 to receive the pivot screws of the top and bottom stringers as explained later. The posts are also fabricated from pipe stock and preferably have their upper ends closed to provide a neat appearance and for weather protection. It is to be noted at this point, that the posts are located at sufficient spacing to provide a space intervening between the ends of the stringers as shown in Figure 4. This space allows the connectors to be adjusted longitudinally upon the ends of the stringers to compensate for variations in the spacing between adjacent posts. Also, as noted earlier, the connectors are arranged to be detached from the stringers to allow the rail section to be trimmed to a shorter length when necessary.

The connectors 20 for the upper and lower stringers are identical in construction and are illustrated in detail in Figures 3 and 4. Each connector consists of a sleeve or thimble 21 adapted to telescopically receive the end of the stringer and having a closed end 22 for weather protection. The sleeve is pivotally connected to the posts by an angle bracket 23 which includes a

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limb 24 extending laterally across the axis of the sleeve. The limb 24 is configured to nest partially around the periphery of the sleeve and the sleeve is permanently welded to this portion of the limb as indicated at 25. Bracket 23 further includes an outwardly projected shank 26 which is offset laterally from the axis of the sleeve. The outer end of the shank includes a hole 29 providing a pivotal connection to one side of the post by means of the pivot screw 27 passing through the mounting holes 19 and 29 of the post and shank. As indicated in Figure 4, the projecting shank, by virtue of its lateral position, locates the stringer on an axis corresponding to the center of the post. It will also be noted in this view, that the sleeve is locked permanently in its longitudinal position of adjustment by a socket type set screw 28 passing through the sleeve into pressure engagement with the stringer.

In order to allow the rail section to be adjusted selectively to a level or inclined plane with respect to its posts, the pivot screw 27 is located upon a plane which is common, or nearly so, to the centers of the rivets 13 of the palings. This relationship is indicated by the broken line 30 in Figure 3, the alignment being the same at the lower end of the post.

As noted earlier, the posts are usually installed before the railing sections are attached and thereafter the connectors are adjusted and attached to the posts by the pivot screws 27. If the section is to be installed upon a stairway or the like, one end of the section is usually connected to one post, then the section is adjusted angularly to bring the connectors at the opposite end into alignment with the mounting holes of the second post for attachment.

If the connector pivots were not located in planes common to the rivets of the palings, then the assembled section would bind when shifted to an inclined position relative to the post which is located at a different elevation. In other words, if the pivots of the connectors and palings were out of line, then the arc of motion at the top and bottom pivot points of the palings would not correspond with one another. The non-uniform arcs would therefore tend to develop a force reacting between the palings and post effective to lock the section against articulation. The angle bracket 23 thus provides the proper pivot locations to allow the section to be adjusted freely to any desired angle of inclination at installation without requiring any refabrication of the parts, whether the section be utilized for fencing or as a stair guard rail.

As noted earlier, a connector of identical form is used at top and bottom and at opposite ends of the stringers. The adjoining ends of the stringers which terminate on opposite sides of a given post are made to accommodate the post by positioning the shank 26 of the connectors on opposite sides of the post. Thus a single pivot screw 27 is utilized to attach the two mating connectors to the post. In order to so locate the offset shanks, the connector at one end of the stringer is rotated a half turn with respect to the connector at the opposite end thus bringing its mounting hole into registry with the mounting hole of the post on the opposite side.

In the preferred arrangement as illustrated in Figure 1, the connectors at a given end of the section are located on the same side of the post. As indicated in Figure 7, the connection to a corner post is similar to the straight section except that the mounting holes for the pivot screws are drilled at right angles to provide the corner con-

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nection without any change in the relationship of the connectors. Since the two pivot screws intersect at the corner, at least one of the holes may be tapped as at 36 and a short screw 37 threaded in as indicated.

In order to provide convenient installation, the posts preferably include at their lower ends mounting plates 31 which are permanently attached by welding as at 31a. These plates are arranged to be attached to concrete footings 32 by anchor bolts 33 embedded in the footing. The posts are thus rigidly mounted in upright position by applying nuts to the anchoring bolts in the usual way. When installed upon the concrete slab 34 or upon concrete steps 35 as a guard rail, the anchor bolts 33 are embedded directly in the slab and steps either when the concrete is poured or by drilling holes in existing structures. As indicated in the broken lines, the inclined guard rail section is simply cut to required length and its angle of inclination will correspond automatically to the pitch of the steps upon installation.

From the foregoing, it will be apparent that the railing sections adjust themselves to practically any combination of slopes and horizontal planes which are encountered in the field. This, in combination with the adjustable connectors, makes it possible for the average workman or householder, without special skill or equipment, to install the posts and trim and erect the sections. In its utility as a stair guard, the direct connection of the palings to the top stringer converts the stringer into a sturdy hand rail providing a convenient gripping surface.

Having described my invention I claim:

1. A fence or railing section arranged to be erected selectively in a horizontal or inclined plane comprising, a pair of spaced vertical posts, a pair of stringers disposed generally in parallelism and spaced one above the other, said stringers extending longitudinally between said posts, respective connectors attached to the opposite ends of the stringers, each of said connectors having an end portion projecting outwardly beyond the end of the stringer and disposed alongside one of said posts, respective post pivots attached to the posts and engaging the end portions of the connectors and providing articulated connections between the ends of the stringers and posts, a series of paling mounting elements spaced from one another longitudinally and extending toward one another from the inwardly facing surfaces of the spaced stringers, a plurality of spaced vertical palings extending in parallelism with one another between said stringers in a plane generally common to the vertical axes of the stringers, the opposite ends of the palings terminating at the said paling mounting elements, respective paling pivots extending through the ends of said palings and said paling mounting elements providing respective articulated connections between the ends of the palings and stringers, the paling pivots being located in longitudinal planes common to the post pivots, said stringers being articulated to a plane determined by the relative elevations of said posts while said paling members are maintained in parallel vertical relationship.

2. A fence or railing section arranged to be erected selectively in a horizontal or inclined plane comprising, a pair of spaced vertical posts, a pair of stringers disposed generally in parallelism and spaced one above the other, the upper of said stringers providing a hand rail, said stringers extending longitudinally between said

posts, post pivot elements at the opposite ends of the stringers engaging the posts and stringers and pivotally connecting the stringers to the posts, a plurality of spaced vertical palings extending in parallelism with one another and having their opposite ends terminating between the spaced stringers, said palings being located in a vertical plane generally common to the axes of the stringers, respective paling mounting elements for said palings, said mounting elements secured to the stringers in vertical registry with the upper and lower ends of the palings, and pivot paling elements extending through the opposite ends of the palings and through the paling mounting elements, the paling pivot elements being located upon longitudinal planes common to the post pivot elements, said stringers being articulated to a plane determined by the relative elevations of the posts while said paling members maintain their vertical parallel relationship relative to one another with the upper stringer providing an unobstructed hand grip surface.

3. A fence or railing section arranged to be erected selectively in a horizontal or inclined plane comprising, a pair of spaced vertical posts, a pair of stringers disposed generally in parallelism and spaced one above the other, said stringers extending longitudinally between said posts, respective connectors attached to the opposite ends of the stringers, each of said connectors having an end portion projecting outwardly beyond the end of the stringer and disposed alongside one of said posts, respective post pivot elements attached to the posts and engaging the end portions of the connectors and providing articulated connections between the ends of the stringers and posts, a series of longitudinally spaced clip members attached to said stringers upon the inwardly facing surfaces thereof, said clip members being disposed in vertical alignment one above the other on said stringers and having ears spaced transversely to the longitudinal axes of the stringers and extending inwardly toward one another, a plurality of spaced vertical paling members extending in parallelism with one another between said stringers in a plane generally common to the central axes of the stringers, the opposite ends of the paling members extending between the spaced ears of the clip members, and respective paling pivot elements extending transversely through the ends of said paling members and the spaced ears of the clip members providing respective articulated connections between the ends of the paling members and clip members, the paling pivot elements being located in planes generally common to the post pivot elements, whereby the stringers assume a horizontal or inclined plane as determined by the relative elevations of said posts while said paling members are maintained in parallel vertical relationship.

4. A fence or railing section arranged to be erected selectively in a horizontal or inclined plane comprising, a pair of spaced vertical mounting posts, a pair of stringers disposed generally in parallelism one above the other and extending longitudinally between said posts with their axes in a plane generally common to the axes of the posts, respective connector sleeves attached to the opposite ends of the stringers, each of said connector sleeves telescopically engaged upon an end of the stringer and adjustable longitudinally relative to the stringer, a respective shank member attached to the connector sleeves, the shank members being displaced laterally from the axes of the stringers, said shank members

projecting outwardly beyond the ends of the stringer, and residing alongside the mounting posts, respective post pivot elements attached to the posts and passing through the ends of said shanks thereby providing respective articulated connections between the ends of the stringers and posts, a series of longitudinally spaced clip members attached to said stringers upon the inwardly facing surfaces thereof and projecting toward one another, said clip members being disposed in vertically aligned pairs disposed one above the other on said stringers, a plurality of spaced vertical palings extending in parallelism with one another between said stringers in a vertical plane common to the axes of the stringers, the opposite ends of said palings being projected to said clip members, and respective paling pivot elements extending through said clip members and palings providing respective articulated connections therebetween, the paling pivot elements being located in planes common to the post pivot elements, said stringers assuming a horizontal or inclined plane as determined by the relative elevations of said mounting posts while said paling members are maintained in vertical position relative to the stringers.

5. A fence or railing section arranged to be erected selectively in a horizontal or inclined plane comprising, a pair of spaced vertical mounting posts, a pair of stringers extending between said posts and disposed generally in parallelism one above the other with their axes in a plane generally common to the axes of the posts, respective connector sleeves attached to the opposite ends of the stringers, an angle bracket attached to each of said connector sleeves, the angle bracket comprising a transverse limb attached to the connector sleeve and a shank member at the outer end of the limb, said shank members projecting outwardly from the sleeves on an axis parallel to the axis of the sleeves and displaced laterally therefrom, whereby the shank members reside alongside the mounting posts, each of said shank members having a mounting hole in the outer end portion thereof, respective post pivot elements attached to the posts and passing through said mounting holes and providing respective articulated connections between the ends of the shank members and posts, a series of longitudinally spaced clip members attached to said stringers upon the inwardly facing surfaces thereof and having transversely spaced ears, said ears being disposed in vertically aligned pairs on said stringers, a plurality of spaced vertical palings extending in parallelism with one another between said stringers, the opposite ends of said palings being projected between the spaced ears of the clip members, and respective paling pivot elements extending transversely through said spaced ears and palings providing respective articulated connections therebetween, the paling pivot elements being located in planes common to the post pivot elements, said stringers assuming a horizontal or inclined plane as determined by the relative elevations of said mounting posts while said paling members are maintained in vertical position relative to the stringers.

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