

June 18, 1968

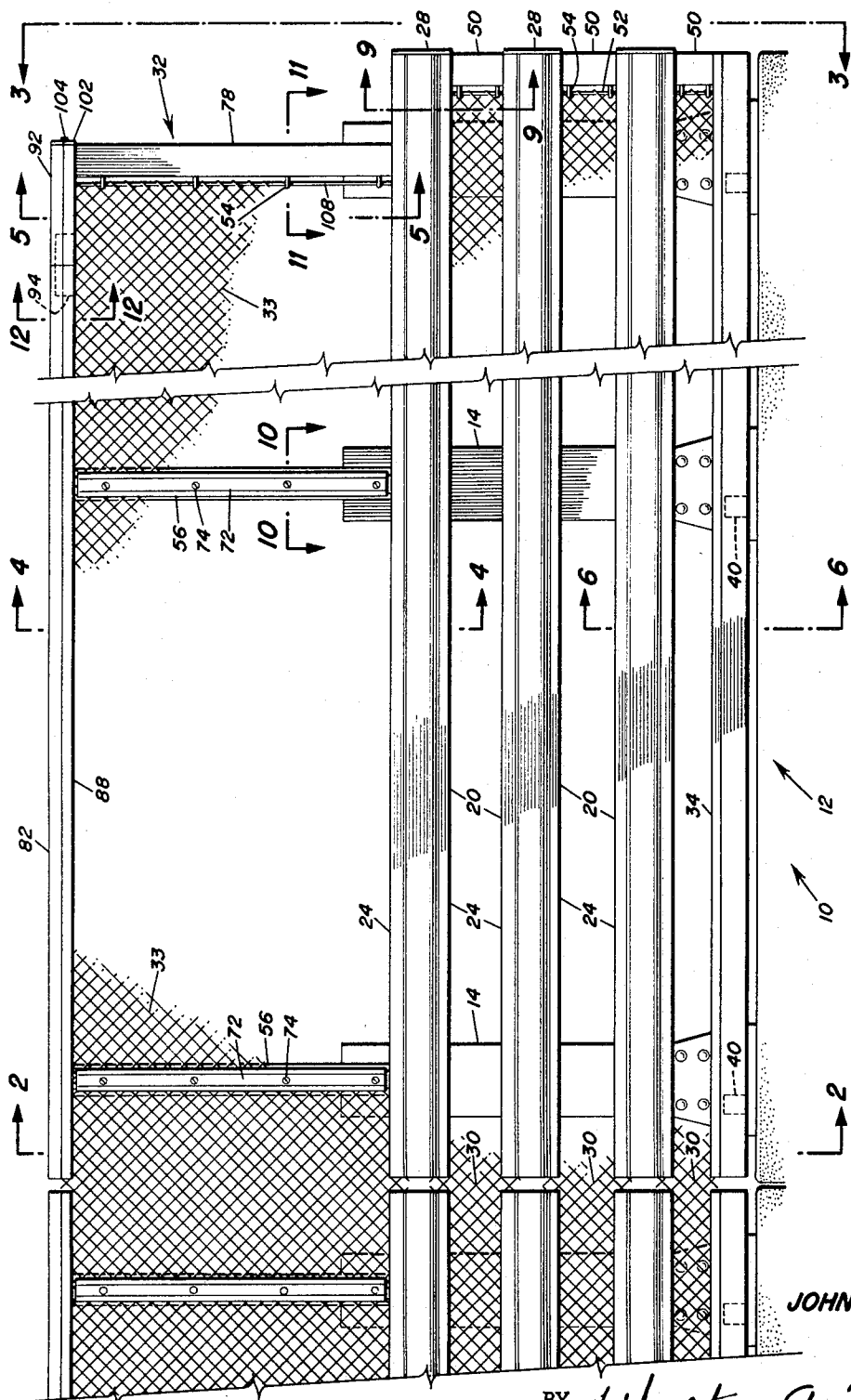
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3,388,892

GUARDRAIL SYSTEM

Filed June 15, 1966

5 Sheets-Sheet 1



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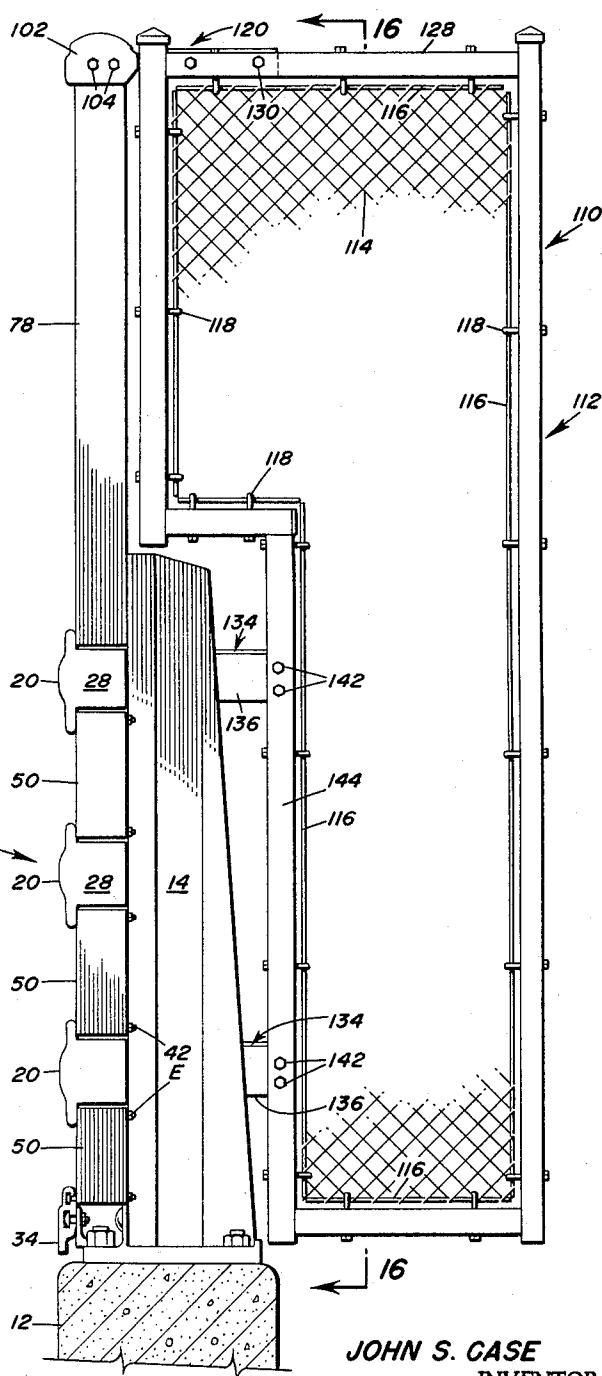
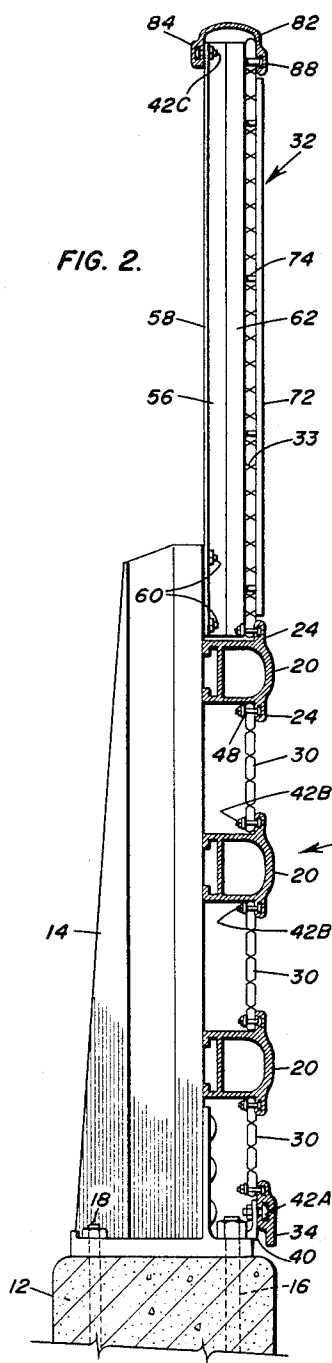
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GUARDRAIL SYSTEM

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FIG. 3.

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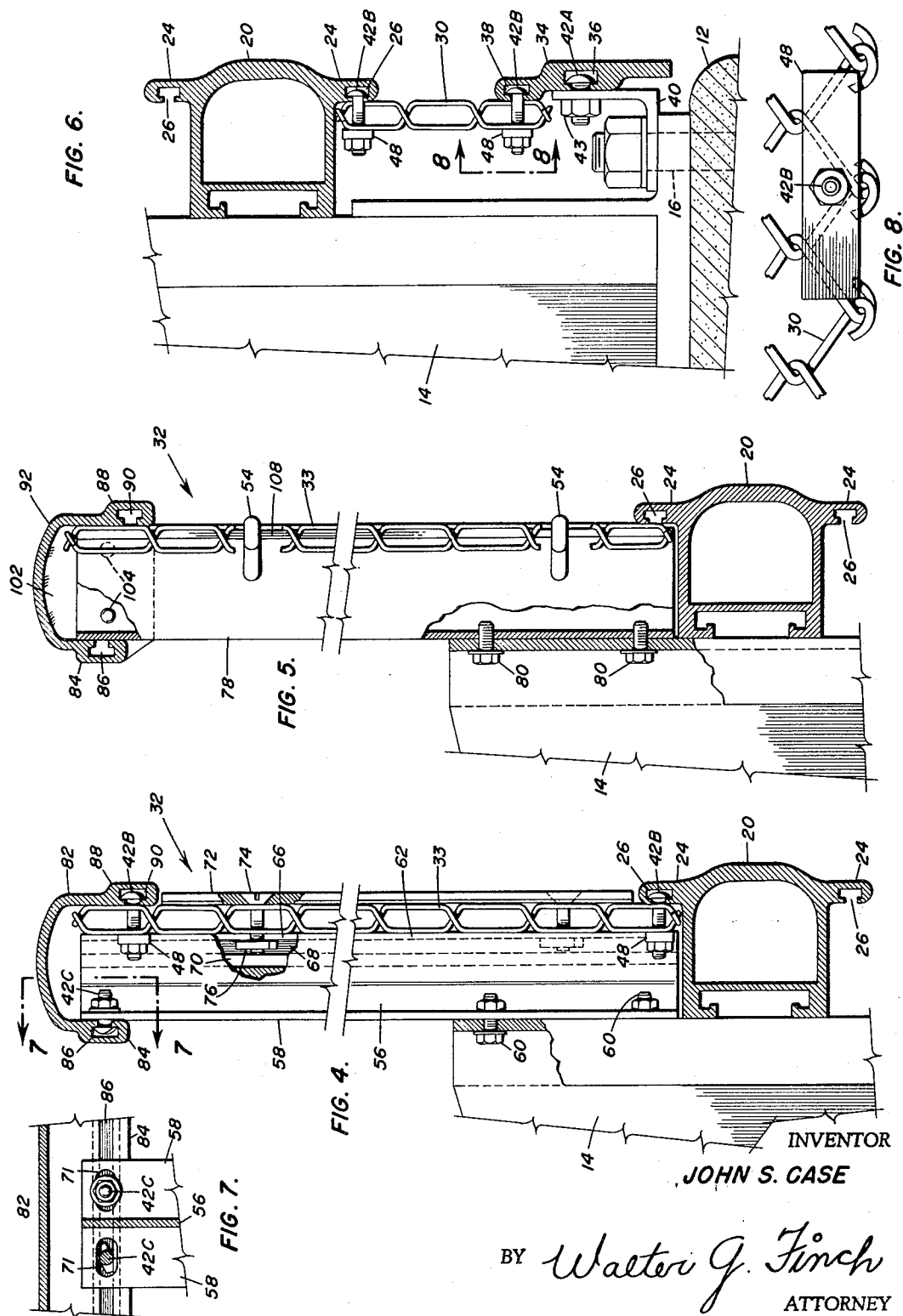
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GUARDRAIL SYSTEM

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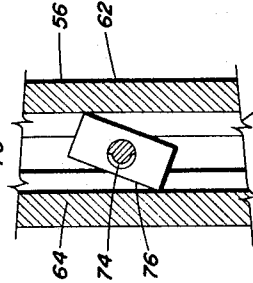
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GUARDRAIL SYSTEM

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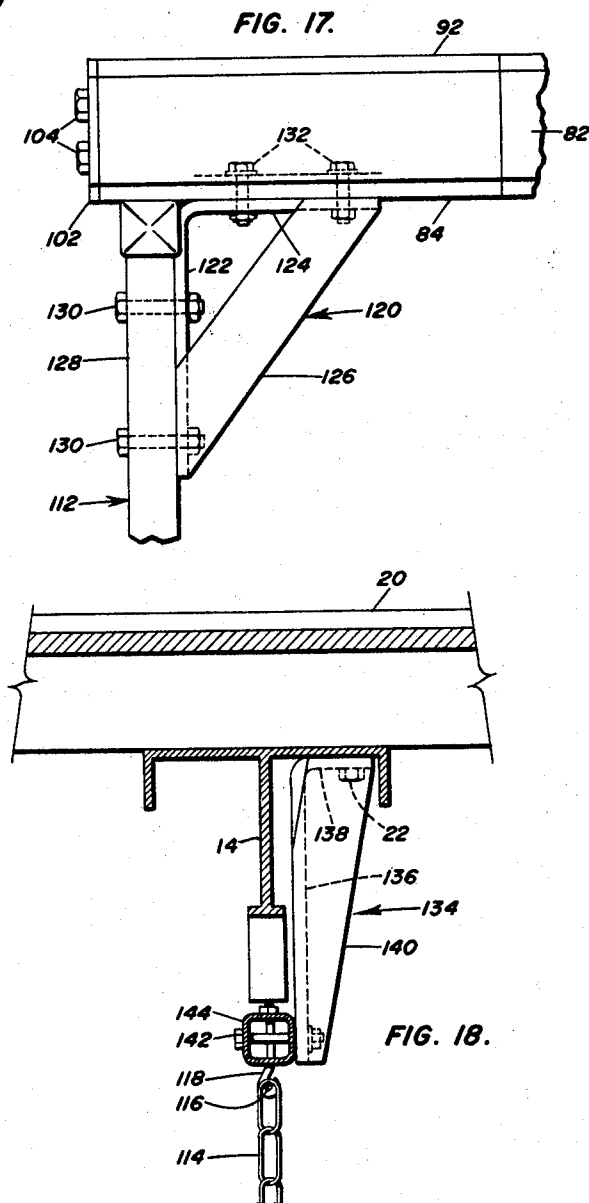
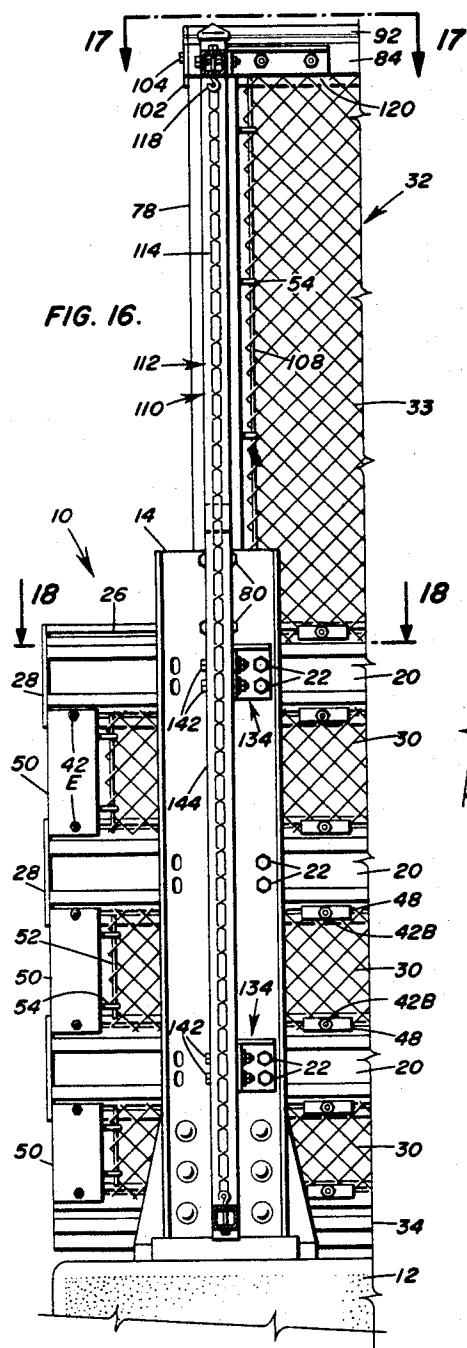
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GUARDRAIL SYSTEM

Filed June 15, 1966

5 Sheets-Sheet 5



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GUARDRAIL SYSTEM

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4 Claims. (Cl. 256-13.1)

ABSTRACT OF THE DISCLOSURE

A screened highway safety rail arrangement is provided for use in locations requiring wire fabric as well as usual collision buffer strips. These buffer strips or rails are mounted on masonry-supported spaced posts and are themselves spaced. Thus the invention utilizes screen strips or panels for use between-the-rails, above the rails, and also for fan guards at the ends of the rails. Special clips and bolts cooperating with bars, T-slots, angle strips, and framing are specially designed for versatile use in differing situations and for safe, easy installation from the roadway side in cases of bridge application.

This invention relates generally to fences, and more particularly it pertains to screen extensions to existing highway bridge railings.

Wherever highway bridges pass over high tension lines, railways, or other highways, it is desirable to screen the normal guard rails so that travelers cannot extend poles or throw articles over the side. Usually it was necessary to build temporary outrigging and barriers to protect the installers because prior erection methods required them to work from both sides of the structure.

An object of this invention is to provide a guard rail screen which can be installed from the safety of the highway area.

Another object of the invention is to provide above-the-rail as well as inter-rail screening for highway railings which is attractive and compatible in appearance to existing rail systems and can be installed thereon without disassembly of same or modification other than drilled holes.

To provide a highway rail barrier screen which has recessed or concealed selvage and relatively simple tamper-proof hardware offering a minimum of projection for safety and to discourage climbing, are other objects of this invention.

Yet another object of this invention is to provide an improved fan guard for the end of a barrier screen.

The essence of the invention lies therefore in provision of an improved post, rail, and screen highway safety guardrail means and method, designed for tamper-proof installation from the bottom up from the safety of the highway and for protecting the public from colliding with protrusions on impact by providing for continuous flush mounting of rail buffer surfaces and interrail screening in guarding, spaced relation to the vertical posts.

Other objects and advantages of this invention will become more readily apparent and understood from the following detailed specification and accompanying drawings in which:

FIG. 1 is an elevation of a bridge railing system, viewed from the driving lanes, incorporating the screening arrangement of the present invention;

FIG. 2 is a vertical section taken along line 2-2 of FIG. 1;

FIG. 3 is a right hand end elevation viewed along line 3-3 of FIG. 1;

FIG. 4 is a vertical elevation, to an enlarged scale, with certain of the elements broken away and is taken on line 4-4 of FIG. 1;

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FIG. 5 is a vertical section somewhat similar to FIG. 4 taken along the line 5-5 of FIG. 1;

FIG. 6 is a fragmentary vertical section taken along line 6-6 of FIG. 1;

FIG. 7 is a fragmentary vertical section viewed along line 7-7 of FIG. 4;

FIG. 8 is a fragmentary detail view taken along line 8-8 of FIG. 6;

FIG. 9 is a fragmentary section taken along line 9-9 of FIG. 1;

FIG. 10 is a horizontal fragmentary section viewed along line 10-10 of FIG. 1;

FIG. 11 is a horizontal fragmentary section taken along line 11-11 of FIG. 1;

FIG. 12 is a vertical fragmentary section with certain elements omitted and is taken along line 12-12 of FIG. 1;

FIG. 13 is a perspective illustrating a form of fastener used throughout the present invention;

FIG. 14 is a perspective with certain details exploded and other broken away;

FIG. 15 is a fragmentary vertical section taken along line 15-15 of FIG. 10;

FIG. 16 is a fragmentary rear elevation as viewed from behind the right-hand end of FIG. 1;

FIG. 17 is a fragmentary plan viewed along the line 17-17 of FIG. 16; and

FIG. 18 is a horizontal section taken along line 18-18 of FIG. 16.

As best shown in FIGS. 1 and 2 of the drawings, there is shown a typical highway bridge railing system 10 comprising a row of railing posts 14 mounted upon a concrete coping 12 and secured thereto by nuts threaded onto studs 16 and 18.

Rails 20 are secured to the posts 14 by bolts 22 where shown in FIG. 16. The bolts 22 are associated with nuts that engage the rearward facing flanges of the rails 20. However, the exact details of this arrangement are of no import to the instant invention and are not illustrated other than as shown in FIG. 16.

Each of the rails 20 is fashioned with a pair of flanges 24, one directed upwardly and the other downwardly, through each of which there runs a T-shaped slot 26 as best shown in FIGS. 4, 5 6 and 9. The function of slot 26 will be discussed subsequently. The rails 20 are closed at their ends by plates 28 which are secured by welding.

In order to avoid the need for the erection of scaffolding outside the bridge railing (to the left in FIG. 2) and to allow all work to be completed from the safe inner side of the railing, the various screening panels or strips and their associated details are installed starting at the bottom and working upward.

As a first step, an angular clip 40, best seen in FIGS. 1, 2 and 6, is secured at the base of each post 14 under the nut of one of the mounting studs 16. Each of the angular clips 40 is provided, in its vertical flange, with a loosely fitted special bolt 42A and a nut 43.

A bottom rail 34, formed with a pair of longitudinal T slots 36 and 38 is secured to the angular clips by the bolts 42A. These bolts 42A, whose details are best seen in FIG. 13, resemble a conventional carriage bolt, with the exception that their heads 44 are fashioned with a pair of opposed flats 46, thus making the thickness of the bolt head equal to the diameter of the shaft 45 of the bolt 42A.

The narrower portion of the T slot 36 is only slightly wider than the head thickness of the bolt 42A, across its flats. Thus, when the bolt head is fully inserted past the narrower slot portion into the wider portion and the nut 43 is tightened, the bolt head will turn and be drawn

up against the flange at each side of the narrower portion of the slot 36.

It should be noted that subsequently to be mentioned bolts 42B through 42E, employed throughout the subject railing screening arrangement, are all similar to bolt 42A differing only in their length; and, in each instance, the bolt head will cooperate with a T slot such as slot 36 described above.

After installation of bottom rail 34, between rail screening strips 30 are installed starting with the bottom-most strip and progressing upwardly. The screening strips are conventional chain link wire fabric with their upper and lower selvages knuckled, as shown in FIGS. 6 and 8. The strip 30 is positioned between rails 20 and 34 and then the installer reaches over and behind rail 20 and installs, at spaced intervals, bolts 42B, each of which has been previously assembled loosely with a tie plate 48 and a nut. The head of the bolt 42B is passed through the screen into the slots 26 and 38 in rails 20 and 34, respectively, and secured upon tightening of the nut as described above.

As shown in FIG. 1, the screening strips 30 are stretched lengthwise between short rods 52 which are secured to filler columns 50, at the rail ends, by hooks 54. The arrangement is similar to that shown in FIG. 11. The filler columns 50 are secured to the flanges 24 of rails 20 by means of long special bolts 42E as shown best in FIGS. 9 and 16.

An above-the-rail structure 32 supports screening 33. This structure 32 consists of a series of line posts 56 and terminal posts 78 supporting at their upper ends the top rail 82 and top rail terminal section 92 respectively, and secured at their lower ends to posts 14.

As best shown in FIGS. 4 and 10, the line posts 56 are fastened at their lower ends by bolts 60, through their side flanges 58, to the post 14.

The top rail 82 is formed with a pair of depending outer and inner flanges 84 and 88 containing T slots 86 and 90, respectively.

As seen best in FIGS. 4 and 7, the upper ends of line posts 56 are fastened to the outer flange 84 by special bolts 42C passing into T slot 86 through slots 71 in the flanges 58.

The terminal posts 78 are secured at their lower ends to their post 14 by means of bolts 80 as shown in FIGS. 5 and 11. At their upper ends, the terminal posts 78 are secured by bolts 104 to an end plate 102, which, in turn, is welded to the short terminal section 92 of the top railing.

The top rail terminal section 92 is made continuous with and secured to the top rail 82 by a coupling 94 illustrated in FIGS. 12 and 14. The coupling 94 is formed with outer and inner flanges 96 and 98, respectively, with each being provided with a plurality of slots 100.

Special bolts 42D are passed through the slots 100 into T slots 86 and 90 and tightened to effectively join section 92 to top rail 82 in one continuous section.

The line posts 56 are fashioned, as shown in FIG. 10, with an enlarged head 62 through which there runs a continuous cruciform slot 64 having an outer section 66, a substantially wider central section 68, and a narrow inner section 70.

As best shown in FIGS. 4, and 10, the upper screening or wire mesh fabric 33 lies against the post head 62 with the upper and lower selvaged edges of the screening lying behind the inner flange 88 of top rail 82 and top flange 24 of the uppermost rail 20, respectively. The selvaged upper and lower screening edges are secured to the adjacent slotted flanges with bolts 42B, tie plates 48, and nuts as previously described for the between-rail screening strips.

The upper screening or wire mesh fabric 33 is further secured by sandwiching between the head 62 of the line posts and a cap strip 72. A plurality of flat-head bolts 74 pass through the capstrip. Each bolt 74 is threaded

several turns into an elongated rectangular nut 76. The nuts are then arranged so that their longer sides run vertically. The bolts 74 and nuts 76 are then passed through the screening beyond narrow forward portion 66 of the cruciform slot 64 into the wider central portion 68. Rotation of the bolt 74 will turn the nut 76, thus causing it to wedge within its slot 64, as shown in FIG. 15, after which the capstrip may be drawn up snug against the screening or wire mesh fabric 33. The narrow rear portion 70 of the slot 64 provides clearance for the bolt end when necessary. The ends of screening or wire mesh fabric 33 are maintained by stretcher bars 108 which are secured to the terminal posts 78 by hooks or clips 54 whose ends pass through holes 106 as shown in FIG. 11.

Fan guards 110 are erected at the railing ends to discourage passage therearound by unauthorized persons. As shown in FIG. 3, the fan guard 110 comprises a welded tubular frame 112 with the area encompassed thereby being closed by screening or chain link fabric 114. The screening or chain link fabric 114 is secured within frame 112 by means of the peripherally arranged stretcher bars 116 which are tied to the framing by hook bolts 118.

The entire fan guard assembly is secured behind the railing, as shown in FIGS. 3 and 16, by an upper bracket 120 and intermediate and lower brackets 134. The upper bracket 120, which is best shown in FIG. 17, consists of a simple angle with a diagonal brace 126 welded to the ends of its legs 122 and 124. Forward leg 124 is secured by bolts 132 to the outer flange 84 of top rail terminal section 92 while end leg 122 is similarly fixed by bolts 130 to an upper member 128 of the frame 112.

The intermediate and lower brackets 134 are fabricated from an L-shaped strap with a short leg 138 and a long leg 136. A brace 140 is welded diagonally across the legs as shown in FIG. 18. The short legs 138 are secured to the rear of the post 14 by railing bolts 22 while the long leg 136 is fixed by bolts 142 to vertical member 144 of the frame 112.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In a highway safety guardrail system of the post, rail and screen type, a projection free stand-off-screen and rail structure including provision for tamper-resistant installation from the highway side of the system, comprising: at least two spaced, horizontally disposed rails with vertically extended buffer faces; rail-standoff members integral with the rails; a plurality of vertical posts adapted to secure on the highway side thereof the said integral rail-standoff members; and inter-rail screening secured between adjacent buffer face extensions of respectively adjacent rails on the off highway side of the extensions; whereby said screening is securely positioned substantially flush with said buffer faces in stand-off relation to said posts, to improve highway safety.

2. In a highway safety guardrail system as recited in claim 1, said buffer-rail shape including a substantially square box cross-section; said buffer face extensions having continuous T-slots disposed longitudinally of said rail and facing away from the highway, and said screening being secured by T-head bolts engaging said slots; whereby the rail and screening are more safely and securely unified, with fasteners and selvages concealed from the highway side.

3. In a highway safety guardrail system as recited in claim 2, a quick engagement tamperproof screening stretchbar assembly for positioning a screen in flush alignment with the rail system, comprising, in combination: a tubular member of substantially the same lateral dimension as said rail vertically affixed between said rails at the ends thereof, the tubular member having a hole therein

opposite the rail proximate the highway side of said member; a stretchbar threaded through the screening; and a laterally bent double hooked rod passing through said hole and curvedly engaging the tubular frame member and the stretchbar, whereby the stretchbar is constrained laterally in flush alignment with the said rail system by the screen and hook, and is constrained longitudinally by the said rails.

4. In a highway safety guardrail system for use on bridges over high tension lines and the like, including at least two spaced horizontally disposed rails with vertically extended buffer faces having T-slots, standoff members integral with the rails, a plurality of vertical posts adapted to secure on the highway side thereof the said integral rail-standoff members, and inter-rail screening secured between adjacent buffer face extensions of respectively adjacent rails on the off-highway sides thereof in spaced relation with the vertical posts; the method of safe installation of the guardrail system using only highway access therefor, comprising the steps: (a) bolting a rail to the respective posts low on the highway side of the posts, using access over the rail for insertion and tightening of the said bolts; (b) bolting the lower edge of a screening to the upper buffer face extension of the rail, using T-headed bolts and access over the rail for engaging the heads of the bolts in the said T-slots and for securing nuts on the bolts; (c) bolting a second rail to the said posts

high on the highway side of the posts, using access over the rail for insertion and tightening of the said bolts; (d) bolting the upper edge of the screening to the lower buffer face extension of the second rail, using T-headed bolts and access over the second rail for engaging the heads of the bolts in the said T-slots and for securing nuts on the bolts; and (e) engaging terminal stretchers to the screening and hooking them to extensions of the rails using access at the ends of the rails thereby safely completing installation of the guardrail system using only highway access therefor.

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