Jan. 25, 1938. P. E. HUNTER 2,106,601

FENCE

Filed July 18, 1936 2 Sheets-Sheet 1

Fig. 1.

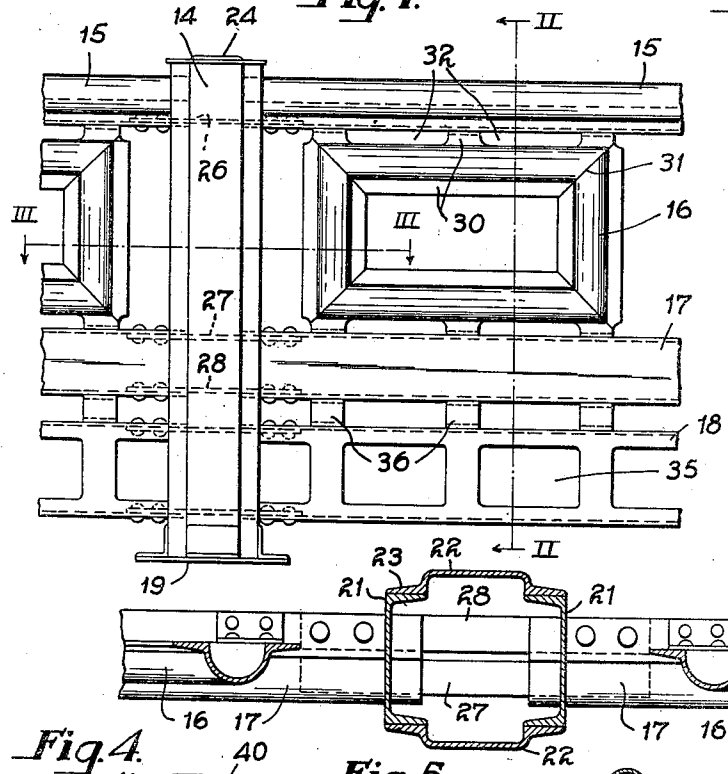


Fig. 2.

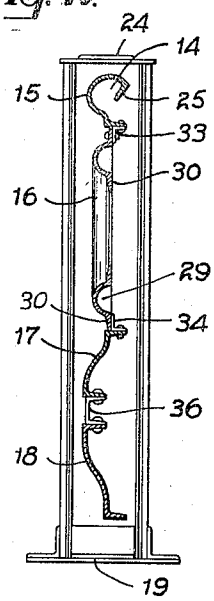


Fig. 3.

Fig. 4.

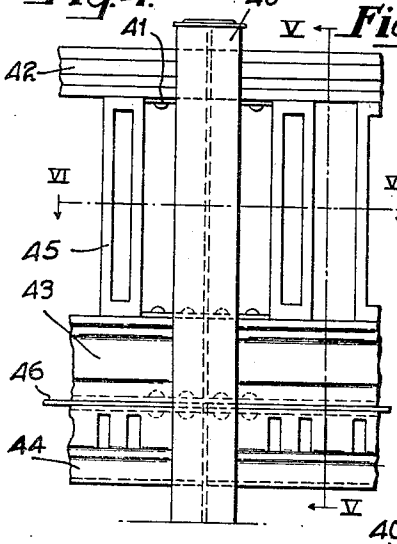


Fig. 5.

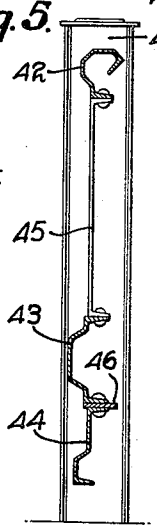


Fig. 6.

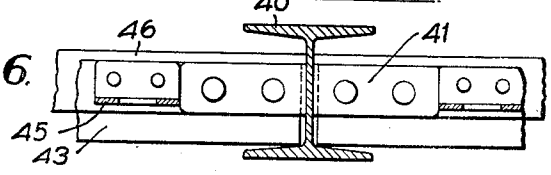


Fig. 8.

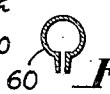


Fig. 9.



Fig. 10.



Fig. 11.

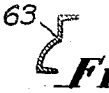
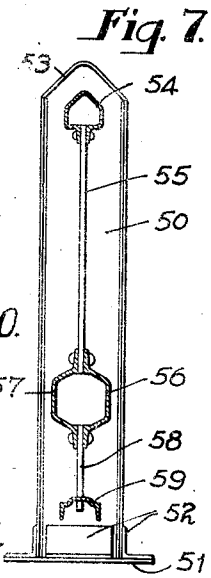


Fig. 12.



Fig. 7.



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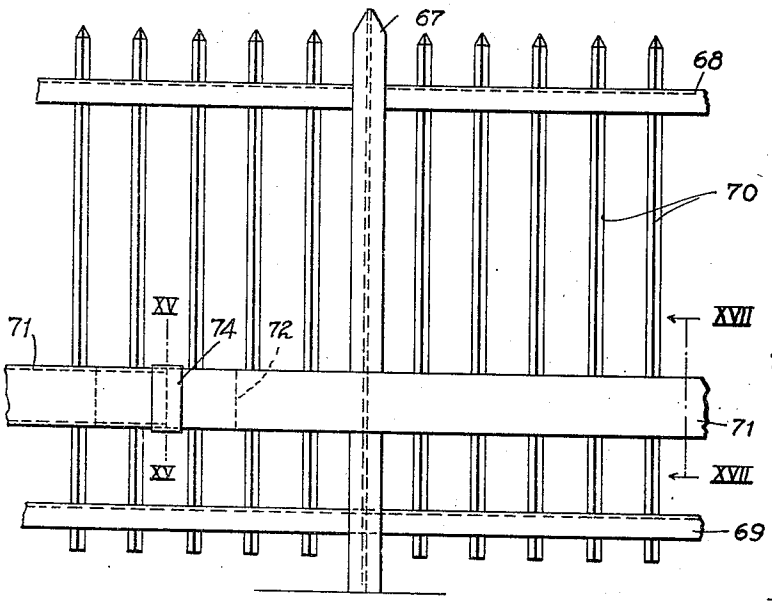


Fig. 13.

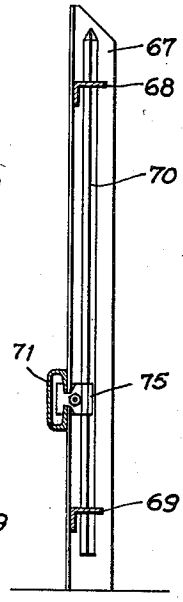


Fig. 14.

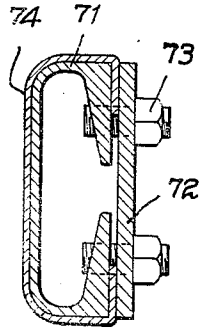


Fig. 15.

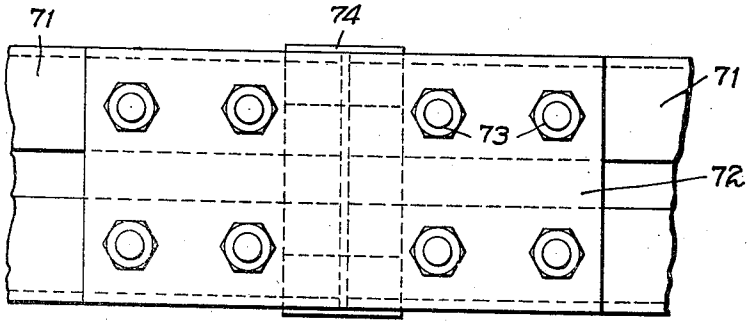


Fig. 16.

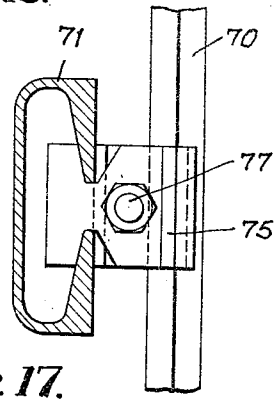


Fig. 17.

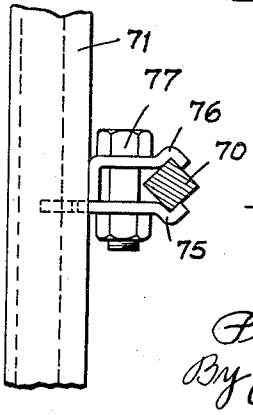


Fig. 18.

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UNITED STATES PATENT OFFICE

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Percy E. Hunter, Pittsburgh, Pa., L. T. Copeland and Fidelity Trust Company, administrators of said Percy E. Hunter, deceased, assignors to Hunter Steel Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application July 18, 1936, Serial No. 91,309

4 Claims. (Cl. 256—13.1)

My invention relates to structures for use as bridge railings, fences etc. and has for its primary object the provision of a protective railing structure constructed mainly of commercial rolled metal channels or other shapes of such form that the structure will be effective to resist high velocity impacts and destructive shocks without failure, and yet will be economical to construct without employing an excessive amount of metal, will be ornamental in appearance and readily accessible for maintenance and repair.

Another object of my invention is to provide, in a structure of the character referred to, members originally of standard channel form that have been reshaped in such manner as to render them suitable for use as railing members, and to provide therein increased strength or resistance to bending stresses as compared to the resistance to bending stresses of the channel in its original form.

Still another object of my invention is to provide a fence or railing structure comprising members which consist of standard channels which have their flanges bent to such positions that they can be more conveniently attached to other members of the structure, in the forming of posts, rails and panels.

A further object of my invention is to provide a fence or railing structure that can be cheaply constructed and which for a given weight of metal will have greater strength than other types of structures heretofore employed.

Another object is to provide a buffer rail and attaching means therefor, of such form that the rail can readily be attached to ordinary picket or panel fences, so as to receive and resist the impacts of hubs and bumper bars of motor vehicles, etc.

Some of the forms which my invention may take are shown in the accompanying drawings wherein Figure 1 is a face view of a portion of a fence structure; Fig. 2 is a view taken on the line II—II of Fig. 1; Fig. 3 is a view, on an enlarged scale, taken on the line III—III of Fig. 1; Fig. 4 is a face view of a modified form of fence structure; Fig. 5 is a view taken on the line V—V of Fig. 4; Fig. 6 is a view, on an enlarged scale, taken on the line VI—VI of Fig. 4; Fig. 7 is a vertical sectional view showing still another modification; Figs. 8 and 9 are cross-sectional views respectively showing modified forms of top rails; Fig. 10 shows a modified form of buffer rail; Figs. 11 and 12 show still other forms of rails; Fig. 13 is a face view of a portion of a picket fence to which any buffer rail is applied; Fig. 14 is a vertical sectional view thereof; Fig. 15 is an enlarged view, taken on the line XV—XV of Fig. 13; Fig. 16 is a rear view, on an enlarged scale, of the connection between two buffer rail sections; Fig. 17 is an enlarged view taken on the line XVII—XVII of Fig. 13; and Fig. 18 is a sectional plan view thereof.

Referring first to Figs. 1, 2 and 3, I show a structure comprising a post 14, a top rail 15, panels 16, an intermediate or buffer rail 17, and a bottom rail or skirt 18.

The post 14 at its lower end has a base 19 secured thereto by welding or riveting, and which may be either bolted to the structural work of a bridge, or embedded in concrete. The post is composed of a pair of channels 21, and a pair of channels 22 that are suitably welded or bolted to the channels 21. The channels 21 are of standard commercial shape, wherein the flanges are somewhat tapered in that they are thinner at their edges than at their bases. The channels 22 may initially be of the same form as the channels 21, but the flanges 23 thereof are bent backwardly to a plane substantially at right angles to their original planes, so that they can conveniently be secured to the flanges of the channels 21. A cap plate 24 of suitable form is placed upon the upper end of the post and secured thereto in any convenient manner.

The top rail 15 is formed of a standard channel, with its web portion deflected to convex form, as shown more clearly in Fig. 2, and with its upper flanges 25 partially closing the space at the rear side of the rail. This rail, as well as the post channels 22, can be formed or shaped by bending the original channels about a suitable die or mandrel, by the use of pressing members or rolls. The bending of the web of the rail 15 to convex form so increases the section modulus thereof that it will offer much greater resistance to thrusts exerted against the face of the same, than if the channel in its original form were positioned with its web in a vertical plane. Also, the rail presents a much better and more finished appearance than would a plain channel. The rail is ordinarily viewed only from its front side. The open rear side of the rail permits convenient access thereto for painting, and the relative positions of the flanges thereof are such that pickets or panels can be conveniently attached to the lower flange.

The rails 15 extend into openings which may be cut through the webs of the post members 21, and are connected by a tie plate or splice bar 26

which extends through the post and is riveted or bolted to the bottom flanges of the rails 15.

The intermediate rail 17 is preferably placed at such height that it can be engaged by the hubs or bumper bars of motor vehicles and thus serve as a buffer rail. This rail also may be formed of a standard channel that may be of greater size and strength than is necessary for the top rail. The web of the rail 17 is offset from its normal plane relative to its flanges, so that not only is its section modulus increased to more effectively resist impacts from vehicles, but it slopes downwardly somewhat so that hubs or bumper bars can readily slide from a raised position down the said sloping surface, instead of being held suspended by the rail. The rails 17 extend into posts 14 as do the rails 15, and the upper flanges of the rails are connected by a splice bar 27, and the lower flanges by a splice bar 28. The splice bars are formed of metal which has great tensile strength, so that even if the posts are broken, the rails will still be held firmly in assembled relation and continue to function as an effective barrier which will prevent vehicles from leaving the roadway.

The panels 16 may also be formed of standard channel sections of light weight whose webs are displaced inwardly, as shown at 29, and whose flanges 30 are bent backwardly into parallelism with one another. The channels constituting the panels 16 are mitred at their ends, and such ends are welded together along the lines 31. The upper and lower channels may have portions of their flanges cut away, as shown at 32, for decorative effect, and the unsevered portions of the upper flanges are secured to the bottom flange of the top rail 15 by angles 33 which are riveted or bolted to said flanges. The flange portions at the lower edge of the panel are secured to the buffer rail 17 by angle brackets 34.

The bottom or skirt rail 18 is formed from a standard channel in somewhat the same manner as the rail 17, and has spaces cut out therefrom at 35 for decorative effect. The adjacent flanges of the rails 17 and 18 are connected together by splice members 36, which are of channel form and have their flanges riveted or bolted to the flanges of the rails. The bottom rails 18 are secured together by splice bars or tie plates in substantially the same manner as are the rails 17.

Referring now to Figs. 4, 5 and 6, I show a structure wherein the posts 40 are of I-beam form with suitable openings through the webs thereof for receiving tie plates or splice bars 41 that connect the ends of top rails 42, and also connect the ends of buffer rails 43 and bottom rails 44. In this structure, the top rails 42 are formed from standard channels in somewhat the same manner as the top rails 15, and pickets or panels 45 have their upper ends laterally turned and riveted to the bottom flanges of the top rails. The lower ends of the pickets are fastened to the upper flanges of the buffer rails 43.

The rails 43 have their webs deflected to a greater degree of convexity than the rails 17 and are therefore more resistant to thrusts imposed against the faces thereof. Both the rails 43 and 44 are formed of standard channels and they may be directly riveted together, or they may have a stiffening bar 46 interposed between the same, to increase the resistance of the structure to lateral thrusts.

In Fig. 7, I show a structure wherein posts 50 are of H-beam or I-beam form which may be imbedded in concrete, or connected at their bottoms to a base plate 51 by angles 52, which are riveted or bolted to the post and to the said base plate. A cap 53 is provided for the post.

The top rail 54 is formed of a standard channel whose web is bent completely back upon itself until the outer sides of the flanges thereof are in approximately back-to-back relation. Pickets or panels 55 are riveted or bolted at their upper ends between the said flanges. The buffer rail is composed of channels 56 and 57, each of whose flanges are bent backwardly into parallelism and whose webs are shaped to convex form, thus not only providing for greatly increased strength, but giving a finished appearance to the structure at both the front and rear sides thereof. The lower ends of the pickets 55 are fastened by rivets or bolts, between the upper flanges of the channels 56 and 57, and pickets 58 are secured between the lower edges thereof. The bottom or skirt rail 59 is formed of a standard channel, and is welded or otherwise suitably secured to the pickets 58.

Fig. 8 shows a top rail 60 which is formed in somewhat the same manner as the top rail 54, but is bent to circular contour instead of polygonal form. The rail 61 of Fig. 9 may be employed as a top rail and will present a curved, finished appearance from the front side thereof, and may also be employed as a buffer rail.

The rail 62 of Fig. 10 is of particular utility as a buffer rail, since it has a wide face and great convexity. The rail 63 of Fig. 11 may be either a top, buffer or bottom rail, while the rail 64 of Fig. 12 is more suitable as a top rail.

All of the rails above described can, of course, be formed of standard channel sections bent to the desired shapes to produce increased strength, better appearance, and to facilitate their connection to other parts of the structure. The use of standard channels having flanges of generally tapered form and of somewhat greater thickness than the webs, as is usual in structures of this kind, is of utility as compared to shapes which might be formed of ordinary sheet metal, because the thickened flanges provide greater strength at points where the members are riveted or bolted together.

Posts and rail structures formed of rolled channels which have angular corners, instead of pressed members which necessarily have rounded corners, are also more desirable in that there is better fitting together of the parts and fewer open crevices. For example, as shown in Fig. 3, the flanges of the post members at 23 fit snugly together throughout their widths, and there are no crevices along their edges such as would be the case if such edges had curved or rounded corners. Similarly in Fig. 5, there is full contact throughout the widths of the flanges of the top rail 42 and the pickets 45.

In Figs. 13 to 18, I show an arrangement whereby buffer rails may be applied to either old or new fences such as those of the picket type. The fence proper is shown as comprising posts 67, top rails 68, bottom rails 69 and pickets 70. When fences of this type are placed along a highway, the pickets and posts are frequently damaged and broken through impacts of vehicles, and furthermore, the fences are comparatively weak.

In order to accommodate such fences to traffic conditions, I provide a buffer rail 71 which is shown as composed of a rolled channel whose flanges are bent inwardly into parallelism with one another, the rail being placed at about the normal height of vehicle hubs and bumper bars. The buffer rail arrangement hereinafter de-

scribed is, however, not limited to rail sections of this particular form.

The buffer rail sections **71** are connected in end-to-end relation by a splice bar **72**, which is secured thereto by bolts **73**. A finish plate **74** overlies the outer side of the joint, and its inner ends are clamped between the splice plate **72** and the flanges of the rails **71**.

The rails **71** are connected to the pickets at suitable intervals by brackets consisting of clip members **75** and **76**, which are held in clamping engagement with the pickets by means of a bolt **77**. The member **75** has a head of T shape that extends into and engages the flanges of the buffer rails to hold said rails in place. The bracket members **75** and **76** are of such length that the buffer rails can be placed against the outer faces of the posts **67**, which usually project outwardly farther than the pickets.

The ends of the rail **71** are so securely connected with splice plates **72** of sufficient strength that the buffer rail structure as a whole will present a continuous barrier, and each rail section will assist in supporting the adjacent rail sections against impact forces, even independently of the pickets and posts. Thus the buffer rails not only protect the pickets and posts from damage through impacts of vehicles, but also constitute an effective barrier to prevent vehicles breaking through the fence.

I claim as my invention:—

1. A fence comprising posts, vertically spaced metal rails connected to the posts, the rails being formed of standard channels having their webs bent backwardly along longitudinally extending lines to bring their flanges into parallel planes, and pickets secured to said flanges.

2. A fence comprising posts and vertically spaced metal rails connected to the posts, the rails being formed of standard channels having their web portions deflected to convex form throughout the major portions of their widths, and pickets secured to the flanges of said channels.

3. A fence comprising posts, a rail carried by the posts, a buffer rail formed of a standard rolled metal channel having its web portion bent about longitudinally-extending axes to increase the sectional modulus of the rail, and vertically-extending members connected to the said rails at points between the said posts.

4. The combination with a fence structure having posts, rails and picket elements, of a buffer rail formed of a standard rolled metal channel having its web portion bent around longitudinally-extending axes to increase the sectional modulus of the rail, and means for connecting the buffer rail to the fence structure.

PERCY E. HUNTER.