Sept. 12, 1939. M. W. WERTMAN 2,172,919

HIGHWAY GUARDRAIL

Filed Dec. 23, 1936

Fig. 1.

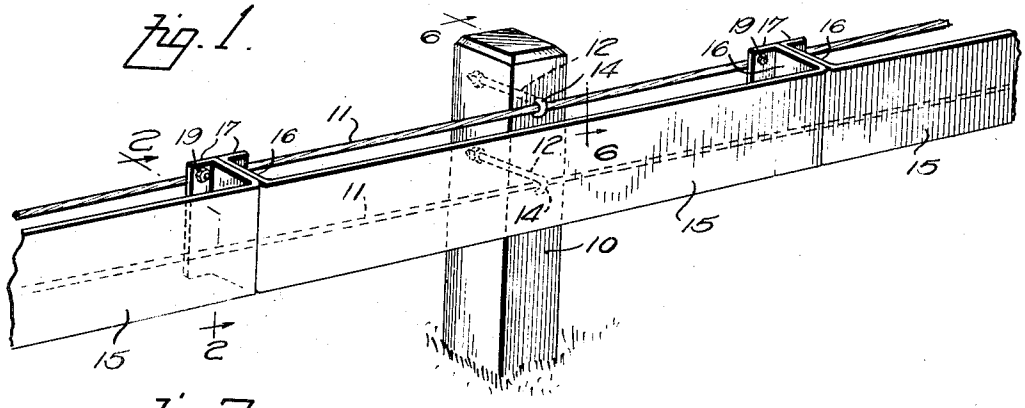


Fig. 2.

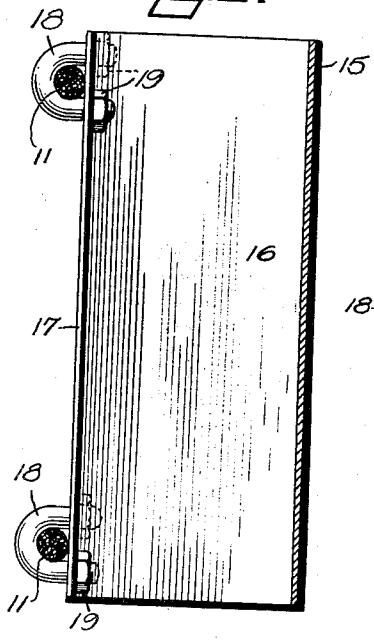


Fig. 3.

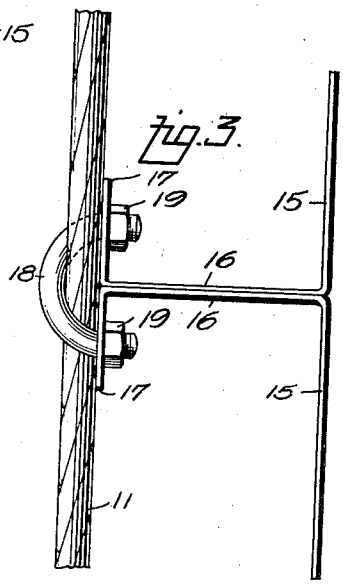


Fig. 4.

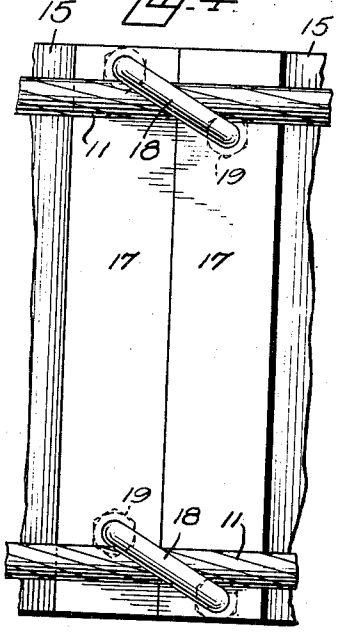
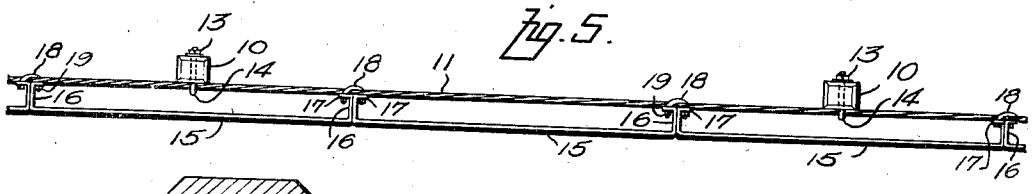


Fig. 5.



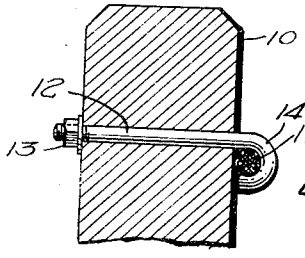


Fig. 6.

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HIGHWAY GUARDRAIL

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Application December 23, 1936, Serial No. 117,395

9 Claims. (Cl. 256—13.1)

This invention relates to highway guard rails.

As is well known, highway guard rails are in common use as means of protection adjacent curves and fills on highways, and it has become the increasing practice to use elongated steel plates in the making of such guard rails. Such plates usually are directly supported at their ends by spaced relatively heavy vertical posts, and while such a device is a substantial improvement over the older method of connecting horizontal wooden rails between the posts, it is open to several objections. For example, steel guard rails of the character referred to possess a substantial degree of resiliency between the supporting posts and their resiliency decreases toward the posts. The guard rails having their ends directly connected to the supporting posts, it is apparent that they possess substantially no resiliency at their points of connection with the posts.

To overcome such difficulty, some steel guard rail installations are now made with the rails spaced from the supporting posts, and connected with respect thereto by steel cushioning members. While such construction is advantageous over the direct connection of the rails to the posts, the cushion supporting members possess a very greatly reduced resiliency as compared with the resiliency of the guard rails intermediate the posts.

A further disadvantage of many steel guard rail installations lies in the fact that they frequently present substantial projections or indentations which engage portions of a vehicle contacting with the guard plates. Thus unnecessary damage results to a vehicle striking against the guard rails and the latter are subjected to unnecessarily great destructive forces.

An important object of the present invention is to provide a steel guard rail installation made up of a plurality of steel or similar sections arranged in end to end relation and presenting a substantially continuous and unbroken surface throughout the length of the installation.

A further object is to provide an installation of this character wherein the guard rails possess substantially uniform resiliency throughout their length, thus minimizing the transmission of destructive forces to the installation as a whole, and particularly to the supporting posts thereof.

A further object is to provide a guard rail installation wherein steel buffer plates are supported by relatively heavy cables extending between the supporting posts, the plates being wholly free from the supporting posts to prevent any reduction in the resiliency of the plates.

A further object is to provide an installation of this character wherein the structure is greatly simplified and the number of parts and time involved in the installation are minimized.

A further object is to provide an installation which has a high degree of adaptability to plain rope guards by a simple relocation of one or more of the old ropes.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawing I have shown one embodiment of the invention. In this showing:

Figure 1 is a perspective view of a portion of a guard rail installation,

Figure 2 is an enlarged sectional view on line 2—2 of Figure 1,

Figure 3 is a plan view showing the connection of a pair of adjacent buffer plate sections to the supporting cables,

Figure 4 is a rear elevation of the same,

Figure 5 is a reduced plan view of a portion of the installation, and,

Figure 6 is a detail horizontal sectional view on line 6—6 of Figure 1.

Referring to Figures 1, 5 and 6, it will be noted that the present invention employs a plurality of relatively heavy vertical supporting posts 10 of the usual type, embedded in the ground in accordance with the customary practice. A plurality of vertically spaced horizontal relatively heavy cables 11 extend between the supporting posts. In the drawing, two of the cables 11 are illustrated, and while two cables are preferably employed, it will become apparent that three or more cables may be used if desired. These cables are connected to the posts 10 by means which permits quick and easy installation, and which permits ready replacement of a post if a guard rail adjacent the post should be subjected to such an impact as to break the post and require its replacement. For such purposes, bolts 12 extend through the posts and are threaded at their outer ends for reception in nuts 13. The inner ends of the bolts are provided with open hooks 14 engageable with the cables to support them in position with respect to the posts. Beyond the end posts, it will be apparent that the cables may be anchored in any suitable manner.

A plurality of elongated buffer plates 15 are arranged in end to end relation inwardly of the cables 11. Each of these plates has its two end portions extending outwardly as at 16, to space the body of the plate from the cables 11. The extremities of the plates are turned back

upon themselves to form attaching ends 17 which are parallel to the bodies of the plates, as clearly shown in Figure 3.

It will be apparent that each spacing member 16 of each plate lies in contact with the adjacent spacing member 16 of the next adjacent plate, as also shown in Figure 3, and since these members are bent substantially at right angles to the bodies of the plates 15, the successive plates have their outer faces forming substantially a single continuous and unbroken buffer surface. The attaching ends 17 of the plates are secured to each of the cables 11 by U-bolts 18. These U-bolts are angularly arranged as clearly shown in Figure 4 to straddle the respective cables 11 and to permit the ends of each U-bolt to extend through the respective adjacent attaching ends 17. Each U-bolt is provided at its ends with nuts 19 engageable against the inner faces of the respective adjacent attaching ends 17.

It will be apparent that the buffer plates are supported solely by the cables 11, the points of connection of the plates with the cables being preferably spaced a substantial distance from the posts 10 to take advantage of the substantial lateral resiliency offered by the cables 11. In practice, it is preferred that the individual plates 15 be equal in length to one-half the distance between the centers of the posts 10. This proportion permits the connection of the ends of each adjacent pair of plates 15 to the pair of cables 11 at a point spaced one-quarter of the distance between the adjacent post 10 and the next post, as shown in Figure 5.

The operation of the device is as follows:

As previously stated, the arrangement of the adjacent plates 15 with respect to each other provides a guard rail having a smooth unbroken surface throughout its length and accordingly there are no projections or substantial depressions in which parts of a motor vehicle can solidly engage when striking the buffer plates at an angle. When a vehicle, leaving the road, is impacted against the guard rail, the particular plate 15 which is struck possesses a substantial degree of resiliency intermediate its length to greatly cushion the force of the blow. While the resiliency of each plate decreases toward its ends, this reduction in resiliency is compensated for by the fact that the plates are resiliently supported at their ends by the cables 11. In an impact of given force, the cables 11 will be deflected laterally to a greater extent when the blow occurs adjacent the end of one of the plates 15, as will be apparent.

It will be apparent that no steel cushioning member of the type referred to is employed for supporting the individual plates 15, each of these plates having the integral spacer portions 16 which space them the desired distance away from the cables 11. Instead of employing steel cushioning members for both spacing and cushioning the plates, the cushioning is provided by the supporting cables 11.

The attachment of the plates 15 to the cables is accomplished by the use of standard U-bolts 18. Since the U-bolts are angularly arranged as shown in Figure 4, the attaching ends 17 are provided with bolt receiving openings unequally spaced from the top and bottom edges of the attaching ends, as will be obvious. Each buffer plate is formed from a single sheet of flat metal, thus permitting them to be economically manufactured. Any suitable material may be employed in the manufacture of the plates, and it is preferred that the plates be made of steel possessing a substantial degree of resiliency.

As previously stated, the length of each plate is preferably one-half the distance between centers of the posts 10, thus permitting the contacting ends of each pair of plates to be spaced from the adjacent posts a distance approximately equal to one-quarter the distance between the posts. This arrangement permits the ends of the plates to be connected to the cables 11 at sufficient distances from the posts to utilize the desired lateral resiliency of the cables 11. Moreover, each plate will have its ends connected the same distance from the adjacent posts, and it will be apparent that the cables 11 provide the same degree of lateral resiliency at the ends of all of the plates 15.

In the event the impact of a vehicle against the guard rail occurs adjacent one of the posts 10 and is sufficiently great to deflect the center of the plate against the post and break the latter, the destroyed post may be quickly and easily replaced without destroying any of the other parts of the device. Upon the breaking of a post, the bolts 12 thereof are removed from the post, and the base of the post is removed from the ground. A new post is placed in position, whereupon bolts 12, which may have been previously loosely inserted in the new post, may be tightened to engage the cables 11.

Moreover, it will be apparent that in the event one of the plates should be broken or substantially deflected beyond its elastic limit so as to render it unsuitable for further use, it may be readily replaced. It merely is necessary to remove the nuts of the U-bolts by means of which the damaged plate is secured in position, whereupon the plate may be withdrawn inwardly, and a new plate placed in position. The nuts which have been removed from the U-bolts then may be replaced, and the original condition of the guard rail accordingly may be quickly and easily restored.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A guard rail comprising a plurality of fixed vertical posts, flexible means connected between said posts, and a plurality of buffer plates spaced from said flexible means, the adjacent ends of said plates being turned inwardly substantially at right angles thereto and then turned back in the direction of the bodies of the plates to provide attaching ends parallel thereto, and means for securing said attaching ends to said flexible means at points spaced from said posts.

2. A highway guard rail comprising a plurality of fixed vertical posts, a plurality of flexible cables connected between said posts and lying in a vertical plane, and a plurality of buffer plates arranged end to end in spaced parallel relation to said cables, each buffer plate having its end portions turned toward said cables substantially at right angles to the body of the plate to form spacing members, the extremity of each plate adjacent each spacing member extending parallel to the body of the corresponding buffer plate to form an attaching end, and means for securing adjacent pairs of attaching ends to said cables.

3. A highway guard rail comprising a plurality

of fixed vertical posts, a plurality of cables extending between said posts, and a pair of buffer plates arranged end to end in spaced parallel relation to said cables, the adjacent end portions of said plates being turned toward said cables, and means for securing such end portions directly to said cables.

4. A highway guard rail comprising a plurality of fixed vertical posts, a plurality of cables extending between said posts and secured thereto, a pair of buffer plates having their body portions arranged in contacting end to end relation parallel to said cables, the end portions of said plates being offset therefrom toward said cables and engaging the latter to provide spacing and attaching portions, and means for securing the latter portions of the plates to said cables.

5. A highway guard rail comprising a plurality of fixed vertical posts, a plurality of cables extending between said posts and secured thereto, and a pair of buffer plates having their body portions arranged in contacting end to end relation parallel to said cables, each plate having end portions offset toward and engaging said cables to space said plates from said cables, and common means for securing the adjacent end portions of said pair of plates to said cables.

6. A highway guard rail comprising a plurality of fixed vertical posts, a plurality of cables extending between said posts, hook bolts for attaching said cables to said posts, and a pair of buffer plates arranged end to end in spaced parallel relation to said cables, the adjacent end portions of said plates being turned toward said cables substantially at right angles to the bodies of the respective plates to form parallel spacing members contacting with each other, the extremities of the plates being turned away from each other in a plane substantially parallel to the plane of the bodies of the plates to form attaching ends, and means for securing said attaching ends to said cables.

7. A highway guard rail comprising a plurality of fixed vertical posts, a plurality of cables extending between said posts and secured thereto, a pair of buffer plates having their body portions arranged in contacting end to end relation parallel to said cables, said plates having their adjacent extremities offset from the body portions of said plates parallel thereto and contacting with said cables, and a U-bolt for attaching said extremities of said plates to each of said cables, each U-bolt being angularly arranged to straddle one of said cables and to extend through the respective extremities of said plates.

8. A highway guard rail comprising a plurality of rigid posts, a plurality of vertically spaced flexible members connected between said posts, a plurality of flexible metallic bumper plates having their body portions arranged in contacting end to end relation parallel to and spaced from said flexible members, each buffer plate being of a length approximately equal to one-half the distance between the centers of said posts and each alternate plate having its ends equidistantly spaced on opposite sides of one of said posts, each buffer plate having its extremities extending toward said flexible members, and means for connecting the extremities of said plates to said flexible members.

9. A highway guard rail comprising a plurality of fixed vertical posts, a pair of flexible structures one formed of a plurality of cables and the other formed of a plurality of buffer plates having their body portions arranged in contacting end to end relation parallel to said cables, each plate having end portions offset toward and engaging said cables to space said plates from said cables, means for securing the offset portions of said plates to said cables, and means for connecting one of said flexible structures to said posts at points equidistantly spaced from the offset ends of alternate plates.

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