

Aug. 17, 1937.

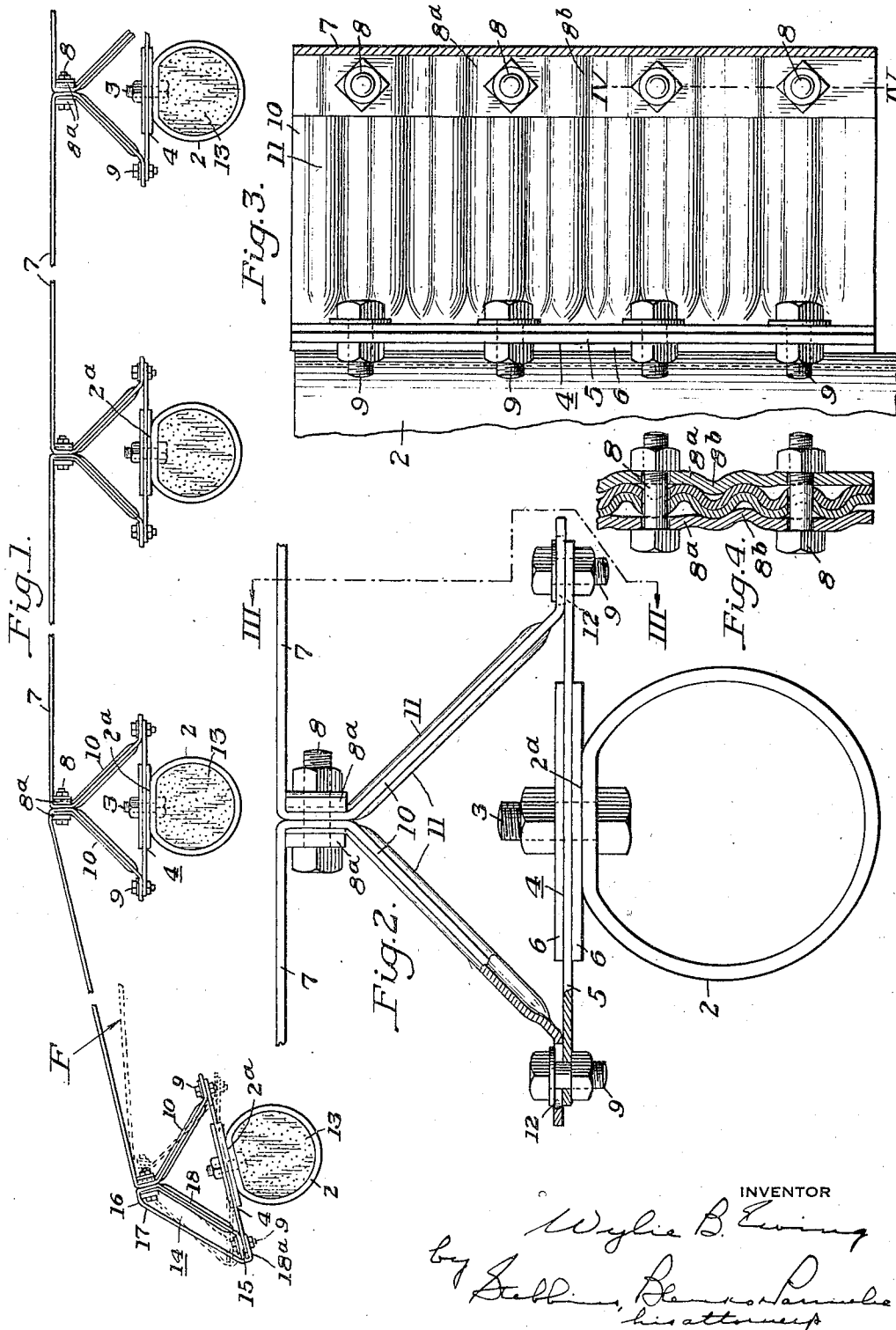
W. B. EWING

2,090,115

GUARD STRUCTURE

Filed Oct. 14, 1935

2 Sheets-Sheet 1



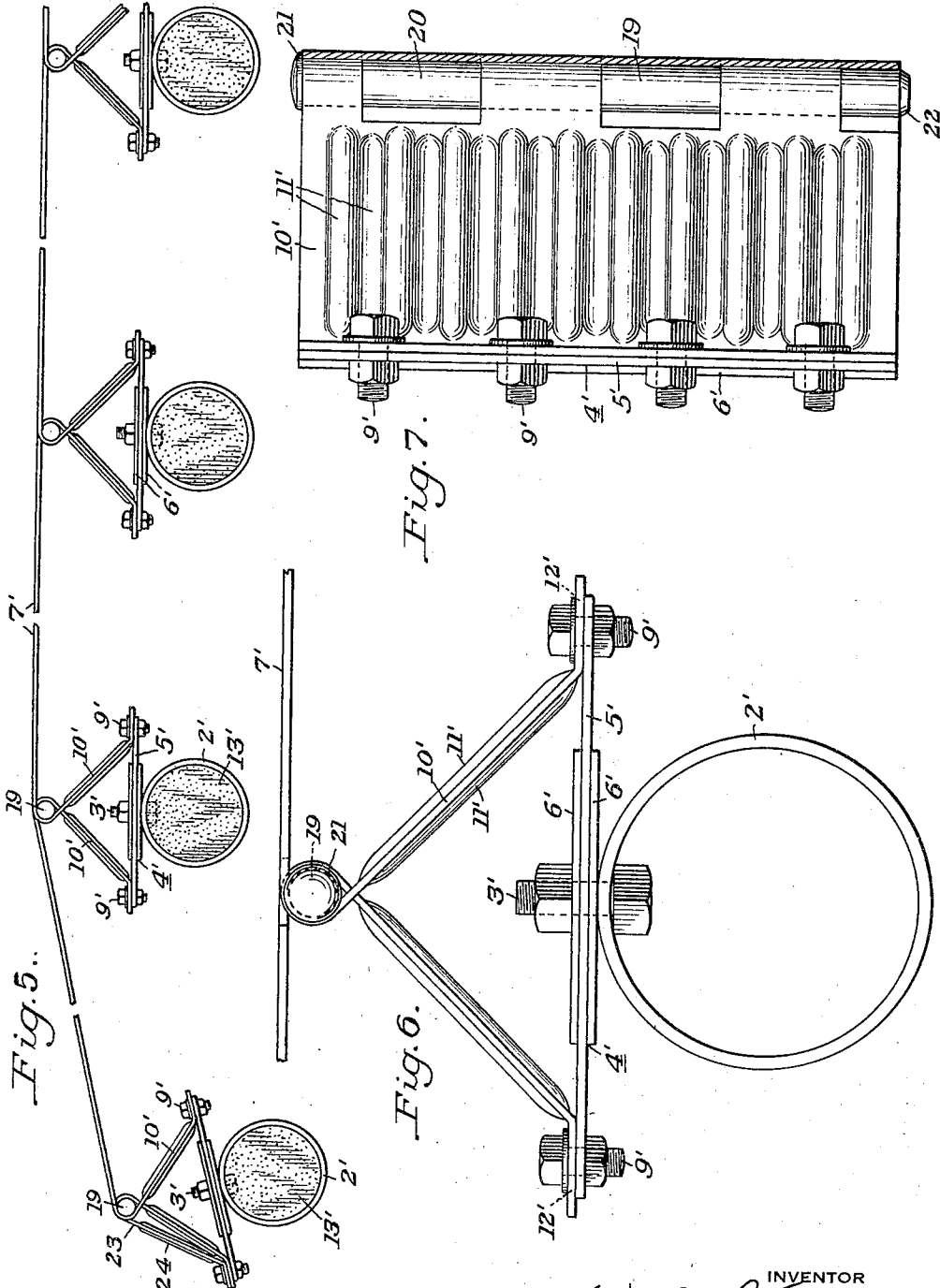
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,090,115

GUARD STRUCTURE

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17 Claims. (Cl. 256—13.1)

This invention relates to guard structures, and more particularly to guard structures such as are used at the sides of highways and with which vehicles moving laterally of the highways are adapted to come in contact. It relates still more particularly to safety guard structures of the resilient type adapted to yield under impact and to tend to restore the vehicle to its proper position on the highway.

Numerous attempts have been made to provide a fully satisfactory yieldable or resilient guard structure of the type in question, but those which have functioned satisfactorily have been relatively expensive to manufacture and those whose cost has been sufficiently low to warrant their commercial use have not functioned as desired. Efforts have been made to place the guard means permanently under tension so as to insure a resilient action upon impact of a vehicle thereagainst, but the cost of the provision of the tensioning means is excessive.

I provide a resilient guard structure which is highly effective in use and of low cost. No special means for maintaining the guard means under tension at all times are provided, yet upon impact the guard means yields resiliently and tends to return the vehicle to its proper position on the highway. The parts normally are substantially free from tension, which aids materially in erection. The guard structure is made up of a few simple parts and is easily fabricated and assembled. The parts are all rigidly connected with one another, thus doing away with the disadvantages incident to structures employing slip and lost motion joints. The parts are strong enough to withstand heavy impact forces and still return to their normal position after impact.

I preferably provide a series of spaced supports each having a flexible connecting member, such as a leaf spring, and preferably a leaf spring of the type having its central portion heavier than its extremities, attached thereto and guard means spaced outwardly from the supports and connecting members and joined to the connecting members by rigid means so that when the guard means is subjected to impact the ends of the flexible connecting member will yield, permitting limited yielding of the guard means, and will then return to normal position. I prefer to use integral portions of the guard means as the rigid means for connecting the guard means with the connecting member, although this is not essential. Preferably adjacent guard means are also brought together and either connected as by

bolting or interlaced, in which latter case a pin is provided about which the interlaced guard means pass before joining the connecting member.

Other details, objects and advantages of the invention will become apparent as the following description of certain present preferred embodiments thereof proceeds.

In the accompanying drawings I have shown certain present preferred embodiments of the invention, in which

Figure 1 is a top plan view of a guard structure with portions cut away;

Figure 2 is an enlarged plan view of a portion of the guard structure shown in Figure 1, partly in horizontal cross section;

Figure 3 is an elevational view of a portion of the structure shown in Figure 2, partly in vertical cross section;

Figure 4 is a vertical cross-sectional view taken on the line IV—IV of Figure 3; and

Figures 5, 6 and 7 are views corresponding, respectively, to Figures 1, 2 and 3 and showing a modified form of structure.

Referring first to the form of structure shown in Figures 1, 2 and 3, there is provided a series of spaced supports or posts 2 which may conveniently be in the form of pipe and may either be set in concrete in the ground or otherwise suitably anchored or supported along the side of a highway. The posts 2 are shown as being in the form of metal tubular members each flattened along one side as shown at 2a to provide a surface for attachment of a flexible connecting member 4 shown as being in the form of a relatively deep leaf spring and which comprises a central member or leaf spring 5 and outer relatively short members or leaves 6. Each member is connected with its post 2 by means of a series of bolts 3. The particular structure of the flexible connecting members or leaf springs may be varied to suit conditions, although it is ordinarily preferable to utilize a leaf spring of the type having its central portion heavier than its extremities. The bolts 3 preferably pass through the wall of the post 2 and through the connecting member associated therewith substantially along its vertical center line.

There is provided guard means 7 preferably in the form of a series of metal strips of sufficient depth and gauge to serve the desired purpose. Preferably each strip terminates at its opposite ends at adjacent supports, although, if desired, the length of a strip may be a multiple of the distance between supports. The strips are spaced

outwardly, or toward the highway, from the supports and connecting members and both ends of each strip are preferably generally reversely turned in the direction of the supports and adjacent strips are brought together and connected or fastened, as by bolts 8, strengthening or reinforcing means in the form of steel bars 8a being optionally provided at one or both sides of the laterally turned portions of the strips which are brought together. The extremities of the respective strips then separate and are connected with the end portions of the connecting members by bolts 9. The portions 10 extending between the face of the guard structure and the bolts 9 are preferably rendered rigid or substantially so, which may, for example, be accomplished by ribbing or corrugating them as shown at 11. This forms a substantially rigid connecting and spacing structure between the guard means proper and the connecting member so that the guard means is positively spaced and maintained in proper position relative to the supports.

The reinforcing bars 8a may, if desired, be ribbed or corrugated as shown at 8b (Figure 4), such ribs or corrugations interfitting at least partially with the ribs or corrugations 11 to provide a very strong structure. The reinforcing bars 8a are preferably not corrugated where the bolts 8 pass therethrough so as to afford proper cooperation with the bolts and avoid danger of loosening thereof. Although the corrugations 10 are shown as extending to the face of the guard structure, these corrugations may, if desired, terminate just outside the portions of the guard means engaged by the reinforcing members 8a. The structure shown in Figures 1 to 4, inclusive, is, however, preferred because of its relatively great strength and rigidity.

Elongated slots 12 may be provided in the ends of the strips for cooperation with the bolts 9 to provide for adjustment during assembly. In some instances when the guard means is subjected to unusually severe impact force there may be some relative movement between the ends of the strips and the connecting members by reason of the provision of the elongated slots 12, although normally this will not be the case. The posts or pipes 2 may if desired be filled with concrete as shown at 13.

At the opposite ends of the guard structure brackets 14 are provided which cooperate with the adjacent strip in a manner similar to that in which the respective strips cooperate with each other at the intermediate supports. The portion of each bracket 14 extending from the extremity 15 thereof to the point 16 (Figure 1) may be substantially identical with an end of one of the strips 7, and comprises a stiffened leg 18 bolted at its outer extremity to the adjacent strip. The portion 17 of the bracket extending toward the left and downwardly from the point 16 thereof, viewing Figure 1, lies substantially parallel with the leg 18 and then has its extremity 18a bent around the outer end of the corresponding connecting member 4 and bolted thereto by the same bolts 9 which bolt the opposite extremity 15 of the bracket 14 to the connecting member 4. There is thus provided a strong end portion which effectively cooperates with the remainder of the guard structure and which is also adapted to withstand shocks to which such end portion may be subjected in use.

When the guard means is subjected to an impact force such, for example, as a force F (see Figure 1) the strip against which the force acts

will be forced away from the highway, which will result in yielding of the adjacent connecting members generally in the manner indicated in dotted lines at the left-hand extremity of Figure 1. It will be understood that the nearest connecting members in both directions from the point of application of the force will yield toward such point of application and the connecting members more remote therefrom will also yield to some extent, although, because of the elasticity of the structure and the material employed, not to so great an extent as those nearest the point of application of the force. The yielding will result in absorbing the impact shock and stopping the lateral movement of the vehicle and the reaction of the parts returning to normal position will tend to restore the vehicle to its proper position on the highway. A smooth substantially uninterrupted guard surface is provided which very effectively insures against serious accidents, as in many cases vehicles skidding into the guard structure will be automatically returned to their proper position on the highway without substantial damage either to the vehicles or the guard structure. The parts of the guard structure are not normally under substantial tension, but the application of the impact force places them immediately under tension so that upon reaction to the impact force they tend to return to normal position and thus to return the skidding vehicle to its proper position on the highway.

The structure shown in Figures 5, 6 and 7 is similar to that of Figures 1 to 4, inclusive, except for the manner of interconnection of the strips and the fact that the posts are not flattened. Parts shown in Figures 5, 6 and 7 which correspond to parts of Figures 1 to 4, inclusive, are correspondingly numbered but with a prime affixed. As shown in Figures 5, 6 and 7, the adjacent strips, instead of being bolted together as at 8 in Figures 1 to 4, inclusive, are interlaced about pins 19 each of which has a generally cylindrical body portion 20 and a head 21 and is slightly tapered at its bottom as shown at 22 to facilitate insertion. The interlaced portions of the strips are cut away to provide for the interlacing as shown in Figures 6 and 7. This provides a structure which is very easily assembled and which is highly effective. At each outer extremity of the structure a bracket or strap 23 is provided which cooperates with the adjacent strip, the strap passing about the pin and having its opposite ends bolted to the connecting member, both legs of the strap being ribbed or stiffened as shown at 24.

While I have shown and described certain present preferred embodiments of the invention, it is to be distinctly understood that the same is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. Guard structure, comprising spaced supports, guard means extending therebetween, at least one of said supports having a flexible connecting member attached thereto and extending generally parallel to the guard means, said guard means being generally reversely turned adjacent an end thereof and having its reversely turned portion connected with the portion of said connecting member extending generally in the direction of the guard means from the support to which the connecting member is attached, and means for supporting the guard means at a point offset from the connecting member.

2. Guard structure, comprising spaced supports, guard means extending therebetween, at least one of said supports having a flexible connecting member attached thereto and extending generally parallel to the guard means, rigid means connecting an end portion of the guard means with an end portion of the connecting member and spacing the same relatively to such latter mentioned end portion, and means connected with said rigid means limiting movement thereof relatively to the connecting member when the guard means is subjected to impact.

3. Guard structure, comprising spaced supports, guard means extending therebetween, at least one of said supports having a flexible connecting member attached thereto and extending generally parallel to but spaced from the guard means and projecting from the support, rigid means connecting an end portion of the guard means with a projecting portion of the connecting member and spacing the same relatively to such projecting portion, and means connected with said rigid means limiting movement thereof relatively to the connecting member when the guard means is subjected to impact.

4. Guard structure, comprising a support, a flexible connecting member attached thereto and projecting in opposite directions therefrom, guard means spaced from the connecting member, and rigid means connecting the guard means with the projecting portions of the connecting member.

5. Guard structure, comprising a support, a flexible connecting member attached thereto and projecting therefrom, guard means extending generally parallel to the connecting member and spaced therefrom, rigid means connecting the guard means with and spacing the same relatively to a projecting portion of the connecting member, and means connected with said rigid means limiting movement thereof relatively to the connecting member when the guard means is subjected to impact.

6. Guard structure, comprising a support, a flexible connecting member attached thereto and projecting in opposite directions therefrom, and separate guard means extending in opposite directions from said support and having their body portions spaced from said connecting member, said guard means having their end portions generally reversely turned and respectively connected with the projecting portions of the connecting member.

7. Guard structure, comprising a support, a flexible connecting member attached thereto and projecting in opposite directions therefrom, and separate guard means extending in opposite directions from said support and having their body portions spaced from said connecting member, said guard means having their end portions brought together and each generally reversely turned and connected with one of the projecting portions of the connecting member.

8. Guard structure, comprising a support, a flexible connecting member attached thereto and projecting in opposite directions therefrom, and separate guard means extending in opposite directions from said support and having their body portions spaced from said connecting member, said guard means having their end portions bolted together and each generally reversely turned and connected with one of the projecting portions of the connecting member.

9. Guard structure, comprising a support, a flexible connecting member attached thereto and projecting in opposite directions therefrom, and

separate guard means extending in opposite directions from said support and having their body portions spaced from said connecting member in a direction generally normal to the guard means, said guard means having their end portions interlaced and each generally reversely turned and connected with one of the projecting portions of the connecting member.

10. Guard structure, comprising a support, a flexible connecting member attached thereto, guard means extending from said support and having the body portion thereof spaced from said connecting member, an end portion of the guard means being rendered substantially rigid and being extended generally laterally from the guard means and connected with said connecting member, and means connected with said substantially rigid end portion of the guard means limiting movement thereof relatively to the connecting member when the guard means is subjected to impact.

11. Guard structure, comprising a support, a flexible connecting member attached thereto and projecting in opposite directions therefrom, and separate guard means extending in opposite directions from said support and having their body portions spaced from said connecting member, said guard means having their end portions brought together and each having an extremity extended generally laterally and rendered substantially rigid and connected with one of the projecting portions of the connecting member.

12. Guard structure, comprising a support, a flexible connecting member attached thereto and projecting in opposite directions therefrom, and separate guard means extending in opposite directions from said support and having their body portions spaced from said connecting member, said guard means having their end portions brought together and each having an extremity generally reversely turned and rendered substantially rigid and connected with the projecting portion of the connecting member extending generally in the direction of the corresponding guard means.

13. Guard structure, comprising a support, a leaf spring rigidly connected with the support and having a portion projecting therefrom, guard means spaced from the leaf spring in a direction generally normal to the guard means, rigid means connecting the guard means with a projecting portion of the leaf spring, and means connected with said rigid means limiting movement thereof relatively to the leaf spring when the guard means is subjected to impact.

14. Guard structure, comprising a support, a flexible connecting member attached thereto, and separate guard means extending in opposite directions from said support, the adjacent end portions of said guard means being generally reversely turned and interlaced and having their extremities connected with said connecting member.

15. Guard structure, comprising a support, a flexible connecting member attached thereto and projecting in opposite directions therefrom, and separate guard means extending in opposite directions from said support, having their body portions spaced from said connecting member and having their end portions connected directly together, and reinforcing means for strengthening such connection, each of said guard means having its end portion generally reversely turned and connected with one of the projecting portions of the connecting members.

16. Guard structure, comprising a support, a substantially planar leaf spring of the type having its central portion reinforced relatively to its extremities attached to the support at said
5 central portion and having its extremities projecting therefrom, and guard means spaced from the support and connected with the extremities of said leaf spring.

17. Guard structure, comprising a support, a
10 substantially planar leaf spring of the type hav-

ing its central portion reinforced relatively to its extremities attached to the support at said central portion and having its extremities projecting therefrom and separate guard means extending in opposite directions from said support, 5 said guard means having their adjacent end portions connected together and connected with the extremities of said leaf spring.

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