

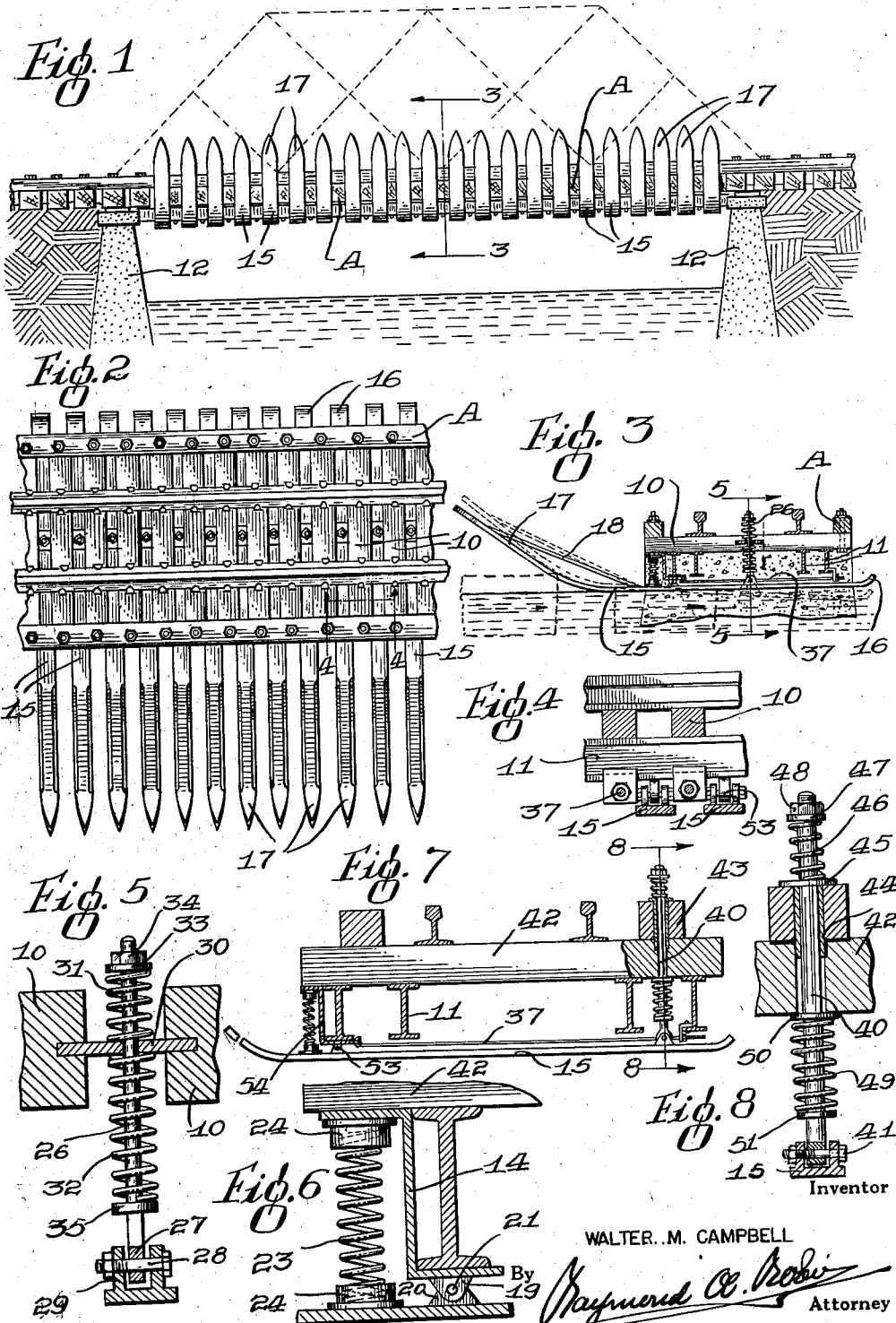
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BRIDGE PROTECTING APPARATUS

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BRIDGE PROTECTING APPARATUS

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5 Claims. (Cl. 14-76)

The present invention relates to apparatus for protecting bridges and the like.

An object of the invention is the provision of apparatus which is adapted to protect bridges and the like from floating bodies.

Another object of the invention is the provision of bridge protecting apparatus embodying means designed to deflect floating bodies which are likely to strike or jam against the bridge structure.

A further object of the invention is the provision of bridge protecting apparatus of the aforesaid character constructed so that the deflecting means are operable to reinforce the bridge upon its supports.

Still another object of the invention is the provision of bridge protecting apparatus of the aforesaid character which is relatively simple and durable in construction and efficient in operation.

Other objects and advantages of the invention will become apparent as the description progresses.

In the accompanying drawing forming a part of this specification and in which like reference characters are employed to designate corresponding parts throughout the same:

Figure 1 is a side elevational view of a bridge equipped with the protecting apparatus,

Figure 2 is a fragmentary top plan view of the same,

Figure 3 is a transverse section taken on the line 3-3 of Figure 1,

Figure 4 is an enlarged fragmentary section taken on the line 4-4 of Figure 2,

Figure 5 is an enlarged section on line 5-5 of Figure 3,

Figure 6 is an enlarged fragmentary section of the structure shown at Figure 3,

Figure 7 is a transverse section showing a modified construction of the protecting apparatus, and

Figure 8 is an enlarged section on line 8-8 of Figure 7.

Referring to Figures 1 to 6 inclusive, wherein is shown a preferred embodiment of the invention, A generally designates a conventional form of simple railroad bridge construction embodying transverse elements 10 supported on longitudinal I-bars 11 extending between supporting piers 12.

Under the bridge structure A, adjacent one side edge, is preferably provided a longitudinally extending Z-bar 14 firmly fastened to the pier heads. Connected to the Z-bar 14, at predetermined longitudinally spaced intervals, are a plurality of deflecting members 15 in the form of elongated shoes. The deflecting shoes 15 may embody elongated flat metallic bars having a

slight upturned curvature 16 at the rear ends and bent to form relatively long front or toe portions 17 at the front ends, these toe portions preferably assuming an upturned obtuse angle with the remaining body portion and being re-inforced by a brace bar 18. The intermediate portion of each deflecting shoe is connected to the bottom flange of the Z-bar 14 by interfitting pivot lugs 19 and 20 formed on the bar and shoes respectively and joined by a pivot pin 21 to permit vertical swinging movement of the shoes.

At the outer side of the Z-bar is mounted a coiled compression spring 23 for each shoe, each spring being disposed vertically and having the ends fitted in sockets 24 fastened to the shoe and to the upper flange of the Z-bar.

To the central body portion of the shoe is pivotally connected the lower end of an upstanding rod 25 formed at the lower end with an eye 27 engaging a pivot pin 28 mounted through a pair of apertured pivot lugs 29. The upper portion of the rod is extended through an aperture in a horizontal plate 30 rigidly mounted between two of the transverse elements 10, as shown to advantage at Figure 5, and carries coiled compression springs 31 and 32 disposed above and below the plate. The upper spring 31 is held in position between the plate and a washer 33 by means of a nut 34 threaded on the upper end of the rod and enabling adjustment of the spring. The lower spring 32 is maintained under predetermined compression between the plate 30 and a collar 35 fastened on the lower part of the rod. The springs 31 and 32, together with the spring 23, are designed to normally maintain the body of the shoe in a horizontal position parallel with the bridge.

As illustrated at Figures 1 to 3 inclusive, the deflector shoes are preferably disposed at longitudinally spaced intervals on the bridge structure with the upper inclined front portions directed upstream. In order to obviate debris entering the space between the shoes and possible interference with proper function thereof, bars 37 or other suitable guard elements are fastened by brackets and hooks in the spaces between the shoes, as clearly shown at Figure 7, and extend transversely below the bridge slightly above the level of the shoes.

Thus, floating bodies such as ice, logs and other debris moving downstream with the current under high water conditions and projecting so as to ordinarily collide with the side of the bridge, possibly damaging or dislodging the bridge due to the jamming, strike against the upturned later-

ally projecting ends of the shoes and swing the shoes about the pivot connections, as shown in dotted lines at Figure 3. The force of the current and the inclination of the shoe deflects the floating bodies and submerges the same with the result that such bodies are carried below the shoes without contact with the bridge proper. As will be noted, the Z-bar 14 is fastened to the bridge supports or piers independently of the bridge structure to provide a re-inforcing element. Thus, when a floating body strikes the upturned toe portion of one of the shoes, the shoe is swung about the connecting pivot so that the toe portion is elevated while the normally horizontal body portion extending beneath the bridge is swung downwardly, as shown in dotted lines at Figure 3. This action will cause downward sliding movement of the rod 26 and compression of the spring 31 on the plate 30, resulting in a lever action which more firmly unites the bridge with the independent re-inforcing Z-bar so as to strengthen the connection of the bridge with the supporting structure when the bridge is subjected to impact.

In a modified construction of the apparatus shown at Figures 7 and 8, the connection between the bridge structure and the deflecting shoes is effected by a rod 40 attached to the shoe by a pivot connection 41 adjacent the rear end and extends upwardly through registering bores in one of the transverse elements 42 and in a longitudinal bridge beam 43. A sleeve 44 is fitted in the upper portion of the bores and is provided at the top with a flange 45 resting on the top of the beam. An upper compression spring 46 is disposed on the rod between the flange 45 and a washer 47 held in adjusted position by a nut 48 threaded on the upper portion of the rod. A lower spring 49 is held in compression on the lower portion of the rod between a washer 50, bearing against the bottom of the transverse element 42, and a collar 51 fastened on the lower portion of the rod.

This provides a connection between each deflecting shoe and the bridge proper at one side margin of the bridge, while the shoe is connected by a pivot 53 to a reinforcing Z-bar 54 extending below the bridge, and connected independently thereof with the supporting piers, at the opposite side margin so as to firmly tie the bridge structure to the reinforcing bar when the shoe is swung from its normal inoperative position to an inclined deflecting position. This mechanism affords a reinforced connection of the bridge with the reinforcing and support structure so as to strengthen the resistance of the bridge to the lateral pressure of the bodies pressing against the deflecting elements. The particular fastening arrangement between the shoe and the bridge

may be varied to suit variations in the width and general construction of the bridge to which the apparatus is applied.

It is to be understood that the forms of my invention herein shown and described are to be taken as preferred examples of the same, and that various changes as to 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.

Having thus described my invention, I claim:—

1. Apparatus of the character described comprising a plurality of deflecting elements, a reinforcing bar extending longitudinally below the bridge, means pivotally connecting the deflecting elements with the reinforcing bar so that the said elements will deflect bodies moving downstream and which will ordinarily strike against the bridge, and a rod attached to each deflecting element having connection with the bridge so as to tie the bridge to the reinforcing bar when the deflecting elements are swung to body deflecting positions.

2. Bridge protecting apparatus comprising a plurality of elongated shoes, each of the said shoes being upturned at one end to form a deflecting projection, a reinforcing bar extending below the bridge fastened to the bridge supports independently of the bridge, means pivotally connecting the deflecting shoes with the reinforcing bar, and means attached to the shoes and engaging the bridge so as to tie the bridge to the reinforcing bar for reinforcement of the bridge when the deflecting shoes are swung to deflecting positions.

3. Bridge protecting apparatus comprising a plurality of deflecting elements adapted to be mounted in spaced transverse positions, the said elements extending at least the full width of the bridge and arranged to deflect floating bodies downwardly under the bridge.

4. Bridge protecting apparatus comprising a plurality of elongated elements adapted to be mounted to extend transversely below the bridge for the full width thereof, the said elements being bent at one end to form upturned portions adapted to deflect downwardly under the bridge floating bodies which will otherwise strike against the bridge.

5. In bridge protecting apparatus, a deflecting element including an elongated flat body curved at one end to provide an upturned deflecting projection, a supporting member having resilient connection with the bridge pivotally connected with the deflecting element, and means pivotally connecting the deflecting element with a reinforcing member attached to the bridge supports.

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