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A. R. WILSON ET AL

1,885,398

METHOD OF REPAIRING FLANGE ANGLES

Filed Nov. 28, 1930

Fig. 1.

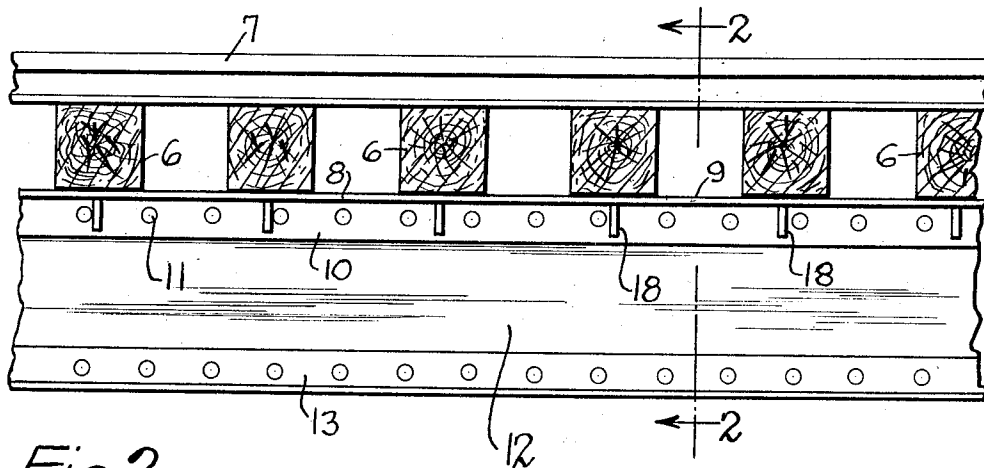


Fig. 2.

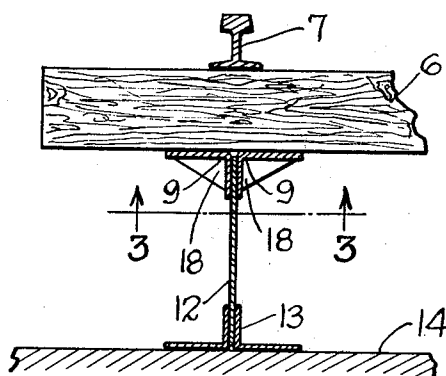


Fig. 3.

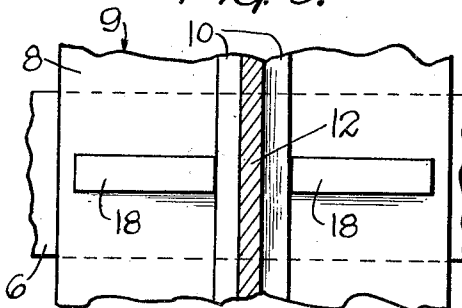


Fig. 4.

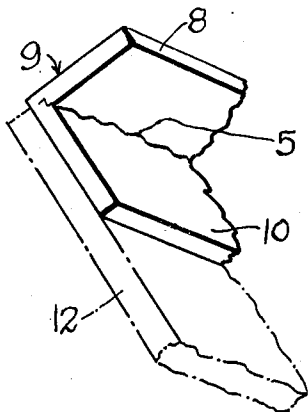


Fig. 6.

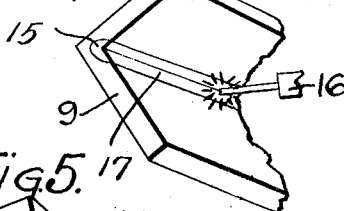


Fig. 5.

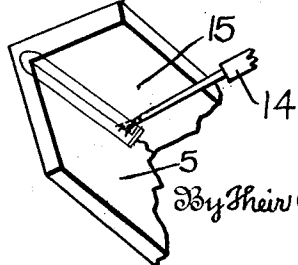
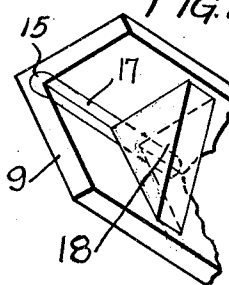


Fig. 7.



Inventors  
R. WILSON  
ROBERT SEEMAN  
MORRIS HALLEN

By Their Attorney

John F. Lynch

## UNITED STATES PATENT OFFICE

ALLEN R. WILSON, OF LANSDOWNE, PENNSYLVANIA, AND ROBERT SEEMAN, OF  
MERRICK, AND MORRIS HALLEN, OF LONG ISLAND CITY, NEW YORK

## METHOD OF REPAIRING FLANGE ANGLES

Application filed November 28, 1930. Serial No. 498,720.

This invention relates to a method of repairing flange angles as employed in built-up stringers, floor beams and girders.

A particular object of our invention is to repair such damaged angles and to prevent further breakage of the flange angles as employed on stringers and girders and in particular in railway work in which the metal is subject to motion and stress which causes cracks and fissures in the supporting flange angles.

A particular object of our invention is to provide a method of quickly repairing flange angles and to reinforce them to prevent further breakage of the angles as employed in railway work or in floor beams and girders.

The horizontal legs of flange angles on stringers and girders are subjected to an up and down motion, the pivot point of which is the heel of the angle. This causes, after a length of time, cracks to appear in the angles which are due to the fatigue of the metal and renders the angle unsuited to support a given load or sustain the stress for which it is designed. In order to maintain the angle in proper condition so that it will support the various loads to which it is subjected, our invention contemplates the use of a method of removing the crack or cracks in the flange angles, the welding up of the removed portion of the angle and the use of a plate bracket, welded in place at the point where the crack or cracks occurred to effectively prevent further breakage of the angle and to reinforce the same at suitable points throughout their length.

With these and other objects in view, the invention comprises certain methods or processes hereinafter described and claimed a preferred embodiment of our invention being illustrated in the accompanying drawing, in which:

Figure 1 is a view in side elevation of a part of a railroad construction employing a running rail, ties, flange angles and a stringer or girder.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1 showing the relative location of the parts.

Figure 3 is an enlarged section taken on

the line 3—3 of Figure 2 showing how the plate brackets are employed beneath a tie or other supporting member to reinforce the flange angle.

Figure 4 is a view in perspective of a flange angle which is employed in connection with any stringer or girder and which is positioned to bear a load, the view illustrating the crack caused by the movement of the horizontal leg of the flange angle under stress due to the fatigue of the metal.

Figure 5 is a view in perspective illustrating the first step in our method of repairing the flange angle.

Figure 6 is a view in perspective similar to Figure 5 showing the second step in our method of repairing the flange angle, and

Figure 7 is a view in perspective similar to Figure 6 showing a completed repair of a flange angle at the point where the crack has appeared therein.

It is to be distinctly understood that while we have made use of a rail construction as an illustration of the method of repairing a flange angle, the same method is employed in the repair of flange angles used in any structure, the flange angles, however, in the particular construction illustrated being subject to greater sudden stresses and having in the horizontal legs thereof, an up and down motion during the passage over the rail of a train. As has been before noted, this up and down motion in the horizontal legs of the flange angles which pivot about the heel of the angles, causes the angles to crack due to the fatigue of the metal and this crack indicated by the numeral 5 may appear in either the under side or the upper side of the flange angles or may be a crack or fissure that extends entirely through the angle.

The cross ties 6 carrying the running rails 7 rest directly on the horizontal legs 8 of the flange angles 9, the vertical legs thereof, as indicated by the numeral 10 being secured as by the rivets 11 to the upper edge of the stringer or girder 12. The lower edge of the girder is supported in the usual manner in the lower flange angles 13 which rest on the supporting surface 14, these latter flange angles 13 being also secured through the medium

of suitable rivets to the stringers or girders 12 to complete the supporting structure.

In order to repair such damaged angles or to prevent breakage of the flange angles at the points where the greatest stress is placed upon them, we have provided a method of repairing flange angles in which cracks appear by first veeing out or cutting out the cracks in the angle by burning out with the burning torch 14 or electric arc, using a carbon electrode to thoroughly remove the cracked portion of the angle as at 15 and in both the horizontal and vertical legs of the angle.

In Figure 5, the crack is shown as a surface crack on the under side of the angle but it is to be understood that should the crack extend all the way through the angle, the burning out would remove all of the metal adjacent the crack instead of just veeing out as illustrated.

The second step in our process contemplates the filling in of the recess or burnt out portion 15 by welding up this burned out or cut out portion of the angle by means of the electric arc welding process employing an electric arc welding tool 16 or oxyacetylene welding tool, either of the processes being adaptable in order to weld up the burned out portion of the angle as at 17. When this welding up or filling in has been completed, the next step is the placing of a plate bracket 18 into the flange angle 9 and welding the same fully to the horizontal and vertical legs 8 and 10 respectively of the flange angles.

The plate bracket is placed at the point where the crack occurred and where the filling was made so that the flange angle is reinforced at this point and cracking is again prevented.

To prevent breakage of angles, our method also contemplates the employment of the plate brackets 18 at spaced points along the flange angle, as illustrated in Figure 1 and Figure 3 in which the plate brackets are disposed beneath the ties 6 which support the running rails 7 and in placing these plate brackets in position, they are, as previously described, welded fully to the horizontal and vertical legs of the flange angles so that they effectively support and maintain in proper relation, the horizontal and vertical legs of the angles and prevent further breakage of them at the point where the greatest stress occurs.

It is evident, therefore, that we have provided a method of repairing flange angles as employed in built-up stringers, floor beams and girders in railway or building construction and a method which can be applied without removing any of the parts of the construction and which adds to the life of the flange angles and eliminates the necessity of removing them which consumes time and is costly, particularly in railroad work.

It is evident, too, that our method of repairing flange angles may be employed to reinforce the angles by welding in place bracket plates at the point in the flange angles where the greatest load occurs and thereby preventing further breakage of the angles.

It is evident, too, that we have provided a method of removing the damaged portions of the flange angles and welding of material in said damaged portion and further reinforcing the same so that subsequent breakage or cracking is guarded against.

Our invention is not to be restricted to the precise details of construction shown since various changes and modifications may be made therein without departing from the scope of the invention or sacrificing the advantages derived from its use.

What we claim is:—

1. The method of repairing and reinforcing the cracked flange angle of a structural unit which consists in removing the metal adjacent the crack, welding in metal to replace the removed metal, and welding a brace in position between and against the legs of the angle and over and in contact with said replaced metal.

2. The method of repairing and reinforcing the cracked flange angle of a structural unit which consists in removing the metal adjacent the crack, welding in metal to replace the removed metal, and welding a plurality of spaced brackets into position at spaced points between and against the legs of the angle and positioning said brackets over and in contact with said replaced metal.

In testimony whereof, we affix our signatures.

ALLEN R. WILSON.  
ROBERT SEEMAN.  
MORRIS HALLEN.