F. O. BUTLER & S. C. ROCKMAN.

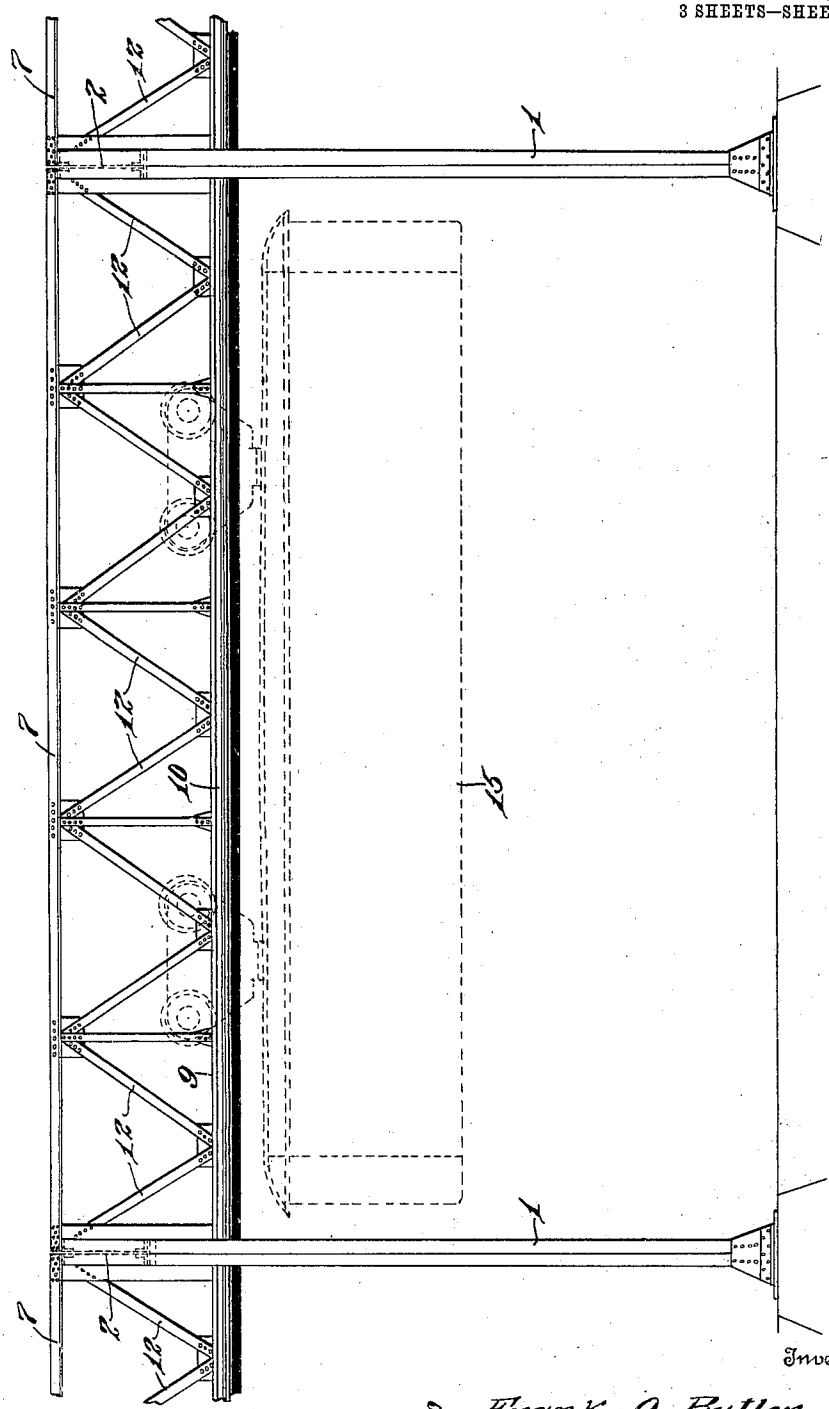
SUSPENSION RAILWAY STRUCTURE.

APPLICATION FILED MAY 17, 1909.

945,751. **Patented Jan. 11, 1910.**

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

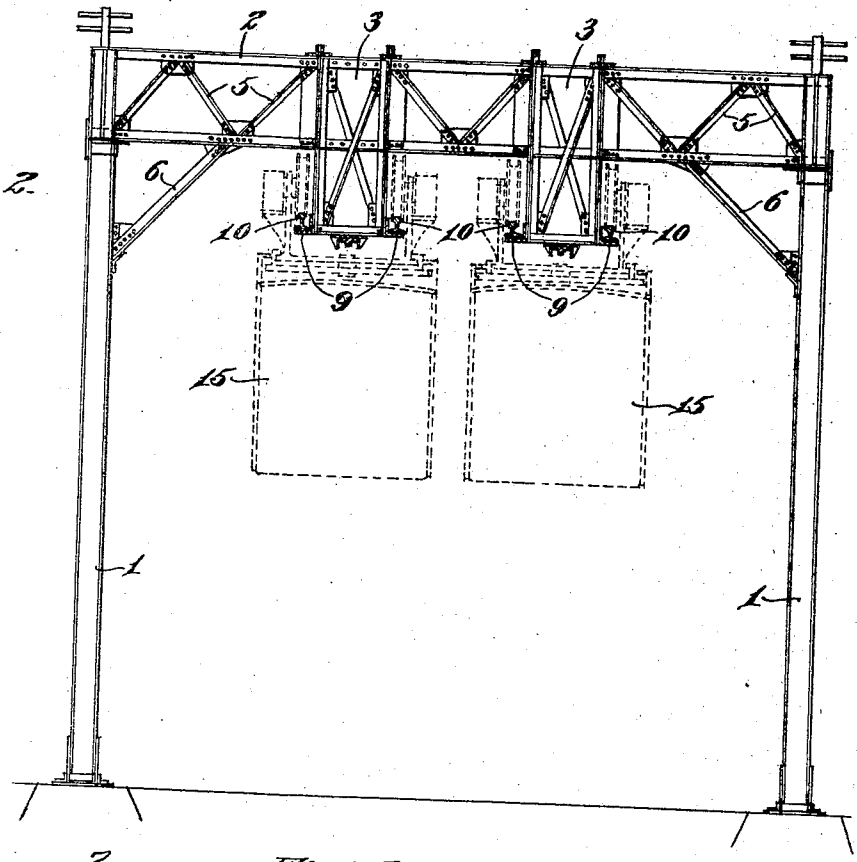
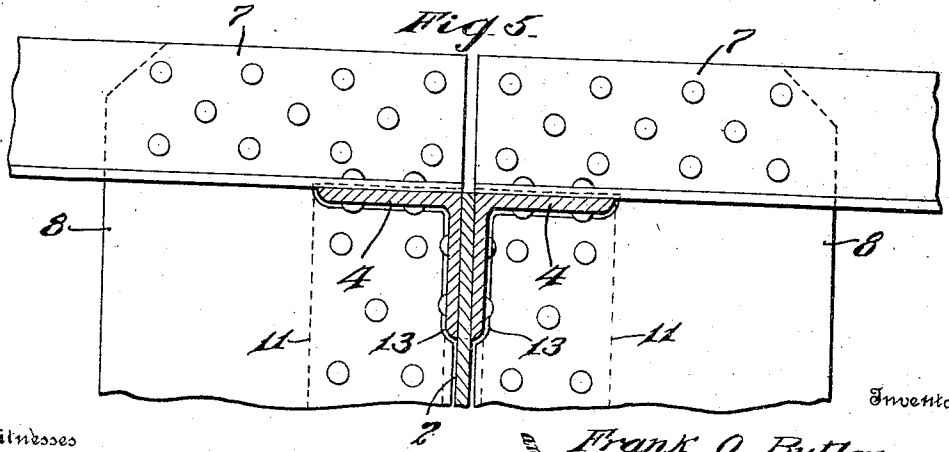


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 3.

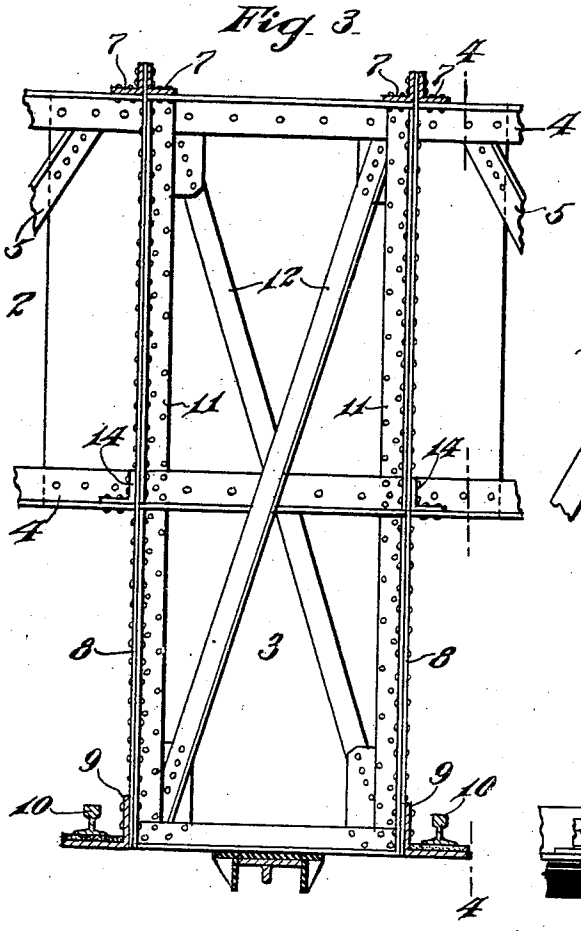


Fig. 4.

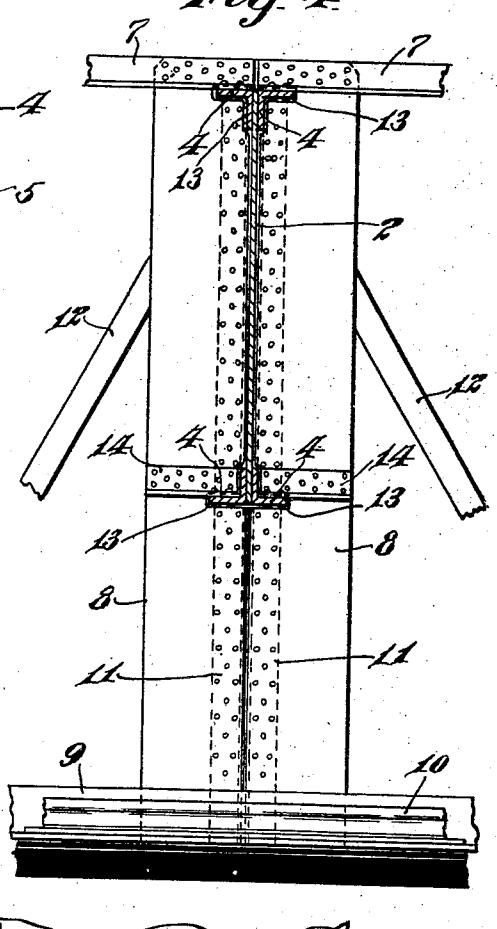
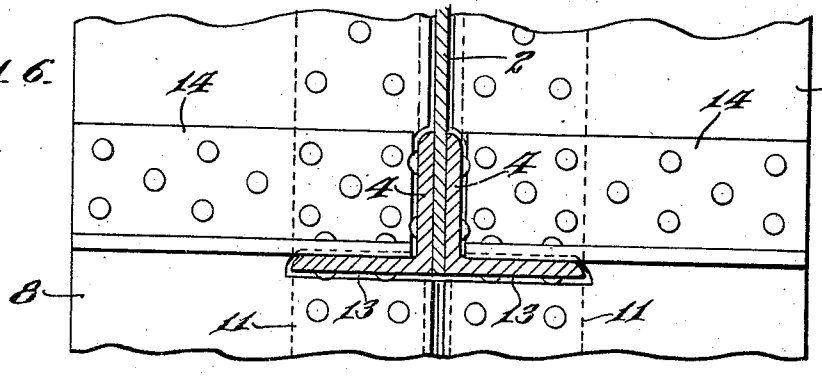


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANK O. BUTLER AND SOREN C. ROCKMAN, OF PHILADELPHIA, PENNSYLVANIA.

SUSPENSION-RAILWAY STRUCTURE.

945,751. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed May 17, 1909. Serial No. 496,370.

To all whom it may concern:

Be it known that we, FRANK O. BUTLER and SOREN C. ROCKMAN, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Suspension-Railway Structures, of which the following is a specification.

Our invention relates to improvements in suspension railway structures, and more particularly to an improved construction of longitudinal and cross girders, the object of the invention being to so connect the longitudinal girder with the cross girders as to support the longitudinal girder upon flanges or angles at both the upper and lower edges of the cross girders, thereby affording a rigid connection between the girders of maximum strength, and resulting in a suspension railway structure, which embodies the maximum of strength with the minimum weight of metal.

With these and other objects in view, the invention consists in certain novel features of construction, and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings, Figure 1, is a view in side elevation illustrating our improvements. Fig. 2, is a view in cross section. Fig. 3, is an enlarged fragmentary view in cross section. Fig. 4, is a view in section on the line 4—4 of Fig. 3. Figs. 5 and 6, are enlarged views illustrating the connection between the upper and lower portions of a cross girder with a longitudinal girder.

1 represents columns supporting transverse or cross girders 2, and 3, 3, are our improved longitudinal girders secured to and supported upon the cross girders 2. The cross girders are made up of angle irons 4, 4, at top and bottom, and connected at regular intervals by diagonal braces 5, and preferably braced at the columns by diagonal braces 6, 6, extending down from the lower angle irons and secured to the columns.

The longitudinal girder 3, which is of appreciably greater depth than cross girders 2, comprises a rectangular frame work made up of two pairs of angle irons 7 at the top, secured back to back and to plates 8, the latter also secured to angle irons 9 at the bottom, supporting rails 10, and angle irons 11 are secured back to back and against the inner faces of said plates 8, and said plates and angle irons are connected by diagonal braces 12 to strengthen the girder and tie the several parts rigidly together. The girder 3 is supported upon the cross girders 2 at the upper and lower angle irons 4 of the cross girder, as will now be explained in detail.

The plates 8 adjacent the cross girders are notched or recessed as shown at 13, to fit around the angle bars 4, and short angle bars 14 are riveted to said plates 8 and rest upon the outwardly projecting flanges of the lower angles 4, while the upper longitudinal angles 7 of the longitudinal girder rest upon the outwardly projecting flanges of the upper angle irons 4 of the cross girder, so that it will be seen that the longitudinal girder at every cross girder is supported upon the upper, as well as the lower angles of the cross girder, and hence any possibility of the longitudinal girder separating from the cross girder is an absolute impossibility, and one girder serves to strengthen the other and a rigid structure is the result.

As shown in Fig. 1, our improvements are adapted for a double track road, and it will be understood that the junctures between the two parallel girders and the cross girders are exactly alike, and for the purpose of illustration, we have shown in dotted lines cars 15 suspended from the track rails 10.

Various slight changes might be made in the general form and arrangement of parts described without departing from our invention, and hence we do not restrict ourselves to the precise details set forth, but consider ourselves at liberty to make such changes and alterations as fairly fall within the spirit and scope of the claims.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is:

1. In a suspension railway structure, the combination with cross girders having flanges at their upper and lower edges, of a longitudinal girder of greater depth than the cross girders, and supported at its upper edge upon the upper flanges of the cross girders, and between its upper and lower edges upon the lower flanges of the cross girders.

2. In a suspension railway structure, the combination with cross girders having

flanges at their top and bottom, of a longitudinal girder having flanges at its top supported upon the top flanges of the cross girders, and flanges between the upper and lower longitudinal girders supported upon the lower flanges of the cross girders.

3. In a suspension railway structure, the combination with cross girders having angle irons at their upper and lower edges, of a longitudinal girder having angle irons at its upper edge supported upon the upper angles of the cross girders, and angle irons secured to said longitudinal girder and supported upon the lower angles of the cross girders.

4. In a suspension railway structure, the combination with cross girders having angle irons at their upper and lower edges, of a longitudinal girder of appreciably greater depth than the cross girders, and having angle irons at its upper edge supported upon the upper angle irons of the cross girders, angle iron bars secured to said longitudinal girder and supported upon the lower angle irons of the cross girders, and rail-supporting angles secured to the lower edges of the longitudinal girder.

5. In a suspension railway structure, the combination with cross girders comprising upper and lower angle irons, and diagonal braces connecting said angle irons, of a longitudinal girder comprising two pairs of angles at the top, secured back to back, vertical plates secured between said angles, said plates and angles connected by diagonal braces, and said longitudinal girders supported upon the upper and lower flanges of the cross girders.

6. In a suspension railway structure, the combination with cross girders comprising upper and lower angle irons, and diagonal braces connecting said angle irons, of a longitudinal girder comprising two pairs of angles at the top, secured back to back, vertical plates secured between said angles, said plates and angles connected by diagonal braces, said upper angle irons of the longitudinal girder supported upon the upper angle irons of the cross girders, and angle bars secured to the longitudinal girder and supported upon the lower angle irons of the cross girder.

7. In a suspension railway structure, the combination with cross girders having angle irons at their upper and lower edges, of a longitudinal girder having angle irons at its upper and lower edges, said longitudinal girder being of appreciably greater depth than the cross girders, vertical plates secured to the angle irons of the longitudinal girder, and notched or recessed to receive the angle irons of the cross girders.

8. In a suspension railway structure, the combination with cross girders having angle irons at their upper and lower edges, of a longitudinal girder having angle irons at its upper and lower edges, said longitudinal girder being of appreciably greater depth than the cross girders, vertical plates secured to the angle irons of the longitudinal girder, and notched or recessed to receive the angle irons of the cross girders, and angle irons secured to said plates and supported upon the lower angles of the cross girders.

9. In a suspension railway structure, the combination with vertical columns, and cross girders supported upon said columns, of a longitudinal girder of greater depth than the cross girders, and supported at two points upon each cross girder.

10. In a suspension railway structure, the combination with vertical columns, cross girders supported upon the columns, and having upper and lower flanges, longitudinal girders of greater depth than the cross girders and supported upon both of the flanges of the cross girders.

11. In a suspension railway structure, the combination with vertical columns, cross girders supported upon the top of the columns, and having pairs of angle irons at the top and bottom secured together, a longitudinal girder of greater depth than the cross girders, and having angle irons at its upper edge supported upon the upper angles of the cross girders, and devices on said longitudinal girder supported upon the lower angles of the cross girders.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FRANK O. BUTLER.
SOREN C. ROCKMAN.

Witnesses:
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J. A. L. MULHALL.