(No Model.) 4 Sheets—Sheet 1.

J. C. JEFFERSON & J. T. PULLON.

ELEVATED SINGLE RAIL RAILWAY.

No. 419,450. Patented Jan. 14, 1890.

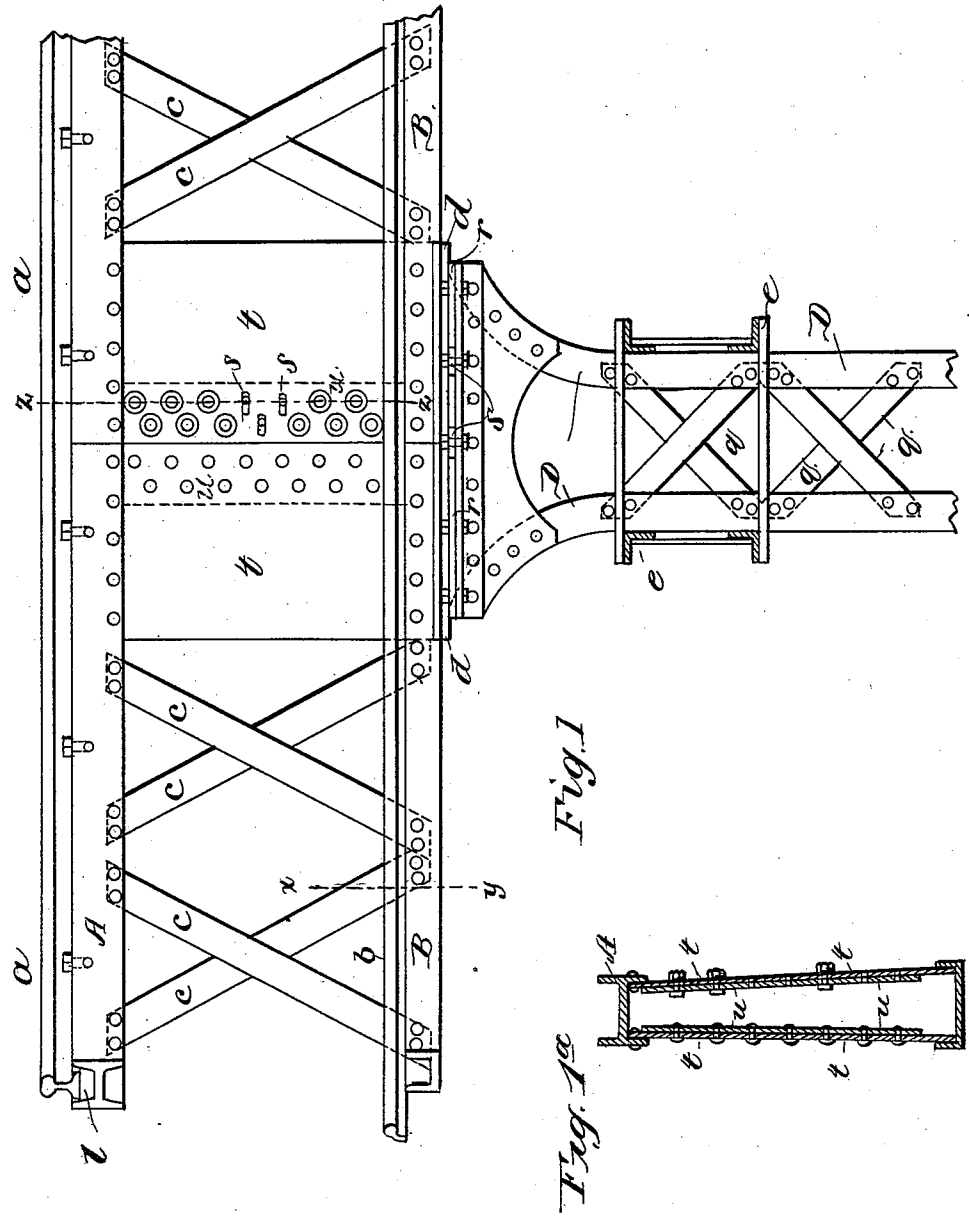


Fig. 1

Fig. 1a

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C. E. Foulds

Inventors.
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Joseph Thomas Pullon
By
James K. Lancaster
Attorney

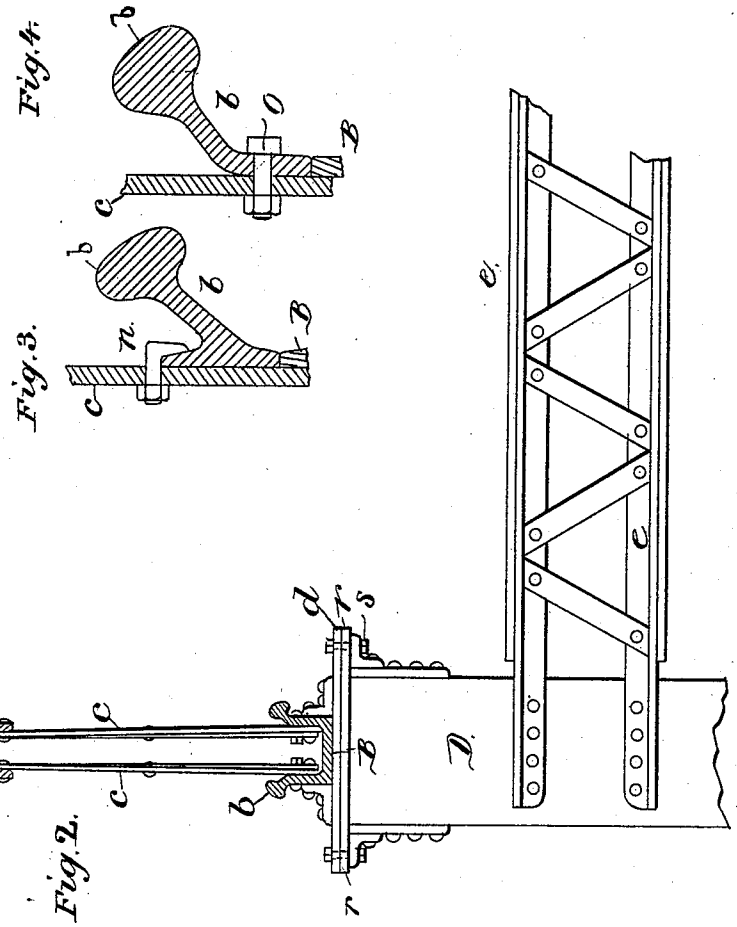
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J. C. JEFFERSON & J. T. PULLON.

ELEVATED SINGLE RAIL RAILWAY.

No. 419,450. Patented Jan. 14, 1890.



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J. C. JEFFERSON & J. T. PULLON.

ELEVATED SINGLE RAIL RAILWAY.

No. 419,450. Patented Jan. 14, 1890.

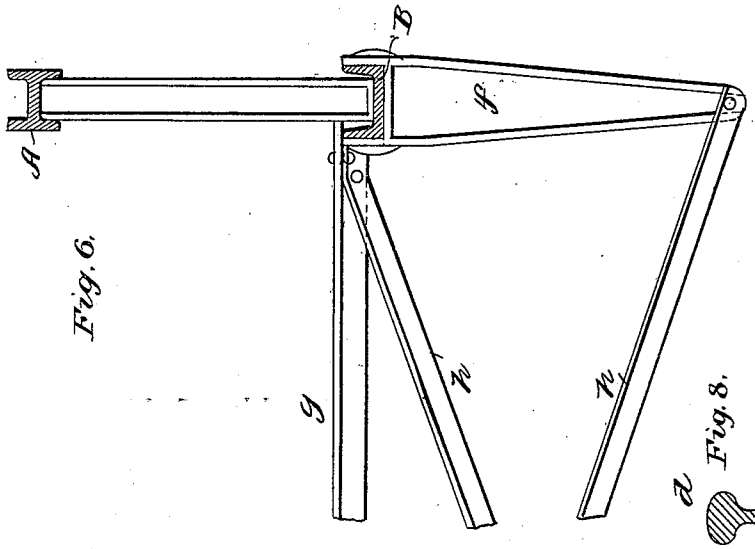


Fig. 6.

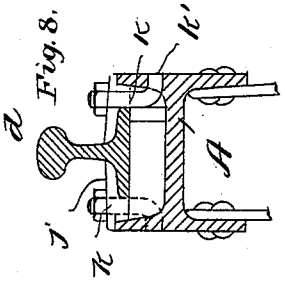


Fig. 8.

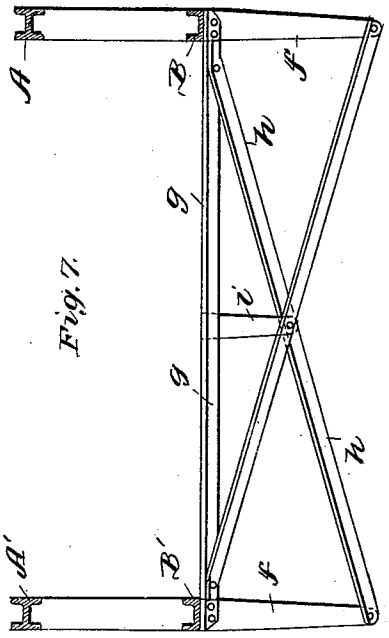


Fig. 7.

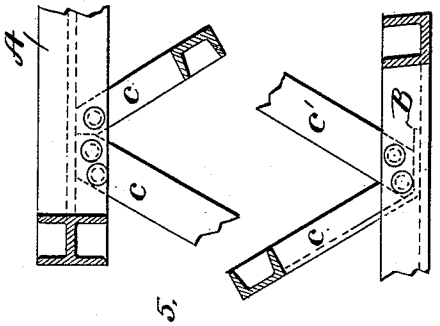


Fig. 5.

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(No Model.) 4 Sheets—Sheet 4.

J. C. JEFFERSON & J. T. PULLON.

ELEVATED SINGLE RAIL RAILWAY.

No. 419,450, Patented Jan. 14, 1890.

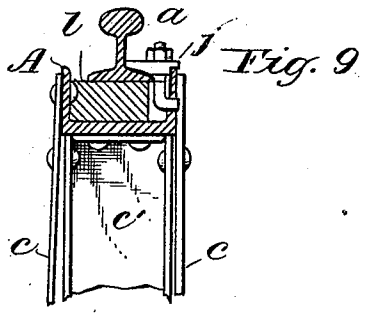


Fig. 9

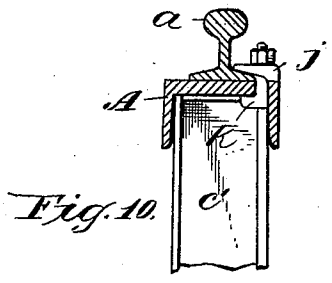


Fig. 10.

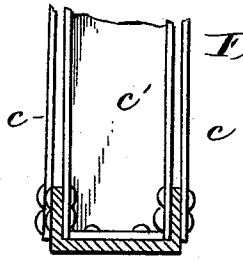


Fig. 11.

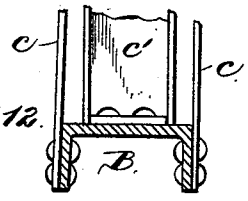
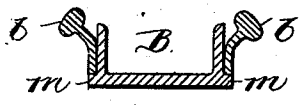


Fig. 12.

Fig. 13.



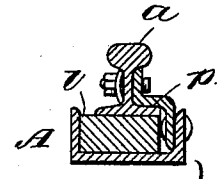


Fig. 14.

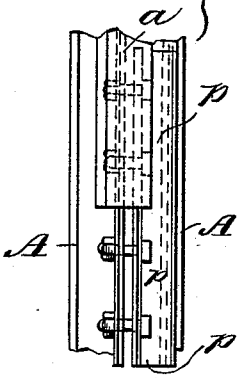
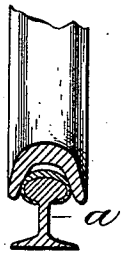


Fig. 15.



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UNITED STATES PATENT OFFICE.

JOHN CLARK JEFFERSON AND JOSEPH T. PULLON, OF LEEDS, COUNTY OF YORK, ENGLAND.

ELEVATED SINGLE-RAIL RAILWAY.

SPECIFICATION forming part of Letters Patent No. 419,450, dated January 14, 1890.

Application filed August 13, 1888. Serial No. 282,663. (No model.) Patented in England September 29, 1886, No. 12,332.

To all whom it may concern:

Be it known that we, JOHN CLARK JEFFERSON and JOSEPH THOMAS PULLON, subjects of the Queen of Great Britain, and residents of Leeds, in the county of York, England, have invented certain new and useful Improvements in Elevated Single-Rail Railways, (for which we have obtained a patent in Great Britain, No. 12,332, dated September 29, 1886,) of which the following is a full, clear, and exact specification thereof.

This invention refers to such elevated single-rail railways in which the carriages and wagons straddle the girder, so that the center of gravity is below the top of the rail, the structure carrying the railway being supported on upright iron posts.

In order that our improvements may be thoroughly understood, reference will be had to the accompanying drawings.

Figure 1 represents a side elevation at the junction of two adjoining girders over one of the uprights; Fig. 1ª, a section on line *z z* of Fig. 1. Fig. 2 represents a cross-section. Figs. 3 and 4 are detailed sectional views on line *x y* of Fig. 1, the last-named figure illustrating a slight modification in the construction of the rail *b*. Figs. 5 to 15 are also detached detail views.

Similar letters refer to similar parts throughout the drawings, in which—

A and B indicate, respectively, the top or bottom flanges or booms of the girder, which are formed the one of H-iron and the other of channel-iron, or both of H-iron or both of channel-iron. The channel-iron may be placed either with the flanges thereof upward or downward, as shown in Figs. 9 to 12. The lower boom or flange B may be rolled with or without special ledges *m* for the support of the rails *b*, as shown in Fig. 13. It will be found preferable to make the lower boom or flange B wider than the top flange or boom A. The two booms A and B of the girder are connected together as a Warren or lattice girder by means of channel, angle, or T iron for the compression members *c'* and angle-iron or flat bars for the tension members *c*. Those forming the compression members *c'* may be placed with the web of the channel (or T) iron crosswise with the girder, as shown, and will then serve in place of vertical stiffeners. Where the railway consists of both an up and down line, we connect the vertical uprights D, supporting the two lines of girders across, by means of short cross-girders *e*, (see Figs. 1 and 2,) in order to insure greater stability.

To stiffen the girders laterally against wind-pressure, we prolong some of the vertical stiffeners (should the girder be provided with any) below the bottom boom B of the girder for the purpose of connecting with the prolongations (diagonals) *h*, as hereinafter referred to; but if the girder is constructed with stiff compression members, as shown in Figs. 5 and 9 to 12, so that the twisting of the lower boom B cannot take place without the lateral bending of the upper boom A, (in which case vertical stiffeners are unnecessary,) we attach brackets *f* rigidly to the lower boom B, as shown in Figs. 6 and 7. The upper ends of these brackets *f* or the lower booms B B' at the same point are connected across by a bar *g*, capable of acting either as a tension or compression member, and the lower end of each of the vertical brackets (or stiffeners) *f* is connected across diagonally to the upper end of the opposite bracket *f*, or, what is practically the same, to the lower boom B or cross-bar *g* at this point by means of the diagonals *h h*, which may be required to act either as compression or tension members. A short vertical strut *i* connects the center of the cross-bar *g* to the diagonals *h h* where the latter cross each other. By this arrangement of wind-bracing the wind-pressure on a train passing along, say, the up-line girder A B is divided or partly transferred to the down-line girder A' B'. (See Figs. 6 and 7.) Where the inclination or gradient of the line is considerable, the section of the main-rail head *a* is made wider than on the level part of the line, and the sides of the head are inclined, so that the double-flanged wheels of the engine bear with the inside faces of their flanges on the inclined sides of the head, thus secur-

ing greater adhesion to the rails, (see Fig. 15,) in which both the ordinary and the enlarged sections of the rail-head are shown.

The guide-rails *b* are preferably formed of a distorted Vignoles section of rail (see Fig. 3) or of a distorted bulb-section. (See Fig. 4.) The main or load rail *a* is fixed to the top flange or boom A by means of clips *j* and hook-headed bolts *k*, the heads *k'* of the bolts passing into holes in the flanges of the channel-iron. (See Fig. 8.) A continuous wooden sleeper *l* is placed beneath the rails, Figs. 1, 2, 8, 9, 10, and 14. The guide-rails *b* of the section shown in Fig. 3 rest on the top of the flanges of the bottom boom B or on the ledges *m*, specially rolled thereon to support them, fastened by hook-headed bolts *n*, passing through the lattice-bars *c*, as shown in Fig. 3. The guide-rails *b* of the section shown in Fig. 4 are attached by ordinary bolts O, passing through the lattice-bars *c*.

The object aimed at in the above-mentioned forms or flanges or booms A and B and struts *c'* is to obtain a narrow girder having considerable lateral and torsional stiffness; also, by connecting the ends of adjoining rails or where they abut end to end near the center of the girder and at an angle thereto with special fish or splice plates *p*, and by not slotting the bolt-holes at this part, the rails are connected so as to form an effective portion of the top boom A of the girder, adding considerably to its strength, and the above-mentioned means of fastening permit of the rails being readily disconnected for repairs or renewals.

The uprights D, for supporting the girder, may be formed by two channel-irons or four angle-irons connected together by short lattice-bars *q*, Figs. 1 and 2.

The ends of the girders A B are provided with horizontal bed-plates *d*, which rest upon the cap-plates *r* of the uprights D, and are connected and secured by bolts S, passing through both plates. The corresponding holes *s* in one of the plates (*i. e.*, *d* or *r*) are slotted to allow for the slight movement due to expansion and contraction of the girders A B. (See Figs. 1 and 2.) The adjoining ends *t* of the girders are connected together over the supports D by two spliced plates *u*, (shown by dotted lines, Fig. 1; see also the cross-section *z z*,) riveted to the end plate *t* of one girder and bolted to the end plate *t'* of the adjoining girder, the holes *s* in one of the plates being slotted to allow for expansion and contraction of the girder. (See also the cross-section on line *z z*.)

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. An elevated railway consisting of a single carrying-rail *a*, attached to the top boom A of a box-lattice girder, and two guide-rails *b b*, attached near the lower boom B, one on each side of the girder, such girder having the top and bottom booms formed of **H** or channel iron connected by lattice-bars *c c'*, the whole supported on uprights or pillars D, all substantially as herein set forth and shown.

2. The means of attaching the carrying-rail *a* to the top boom A of the girder, which consists in the combination, with the boom and rail, of the clips *j* and the hook-headed bolts *k*, the heads thereof being inserted in holes in the flanges of the boom, substantially as described.

3. The means of attaching the bent bulb-section guide-rails *b*, supported by the top edge of the flanges of the lower boom B, to the lattice-bars *c*, which consist in the combination, with said devices, of the bolts O, substantially as set forth.

4. The means of attaching the ends of two adjoining girders, which consist in the combination, with said girders, of end plates *t* and splice-plates *u*, having slotted bolt-holes *s*, substantially as and for the purposes specified.

5. The means of attaching the ends of the lower booms B to the top of the uprights or supports D, which consist in the combination, with said devices, of the bed-plates *d* and cap-plates *r*, having slotted bolt-holes *s*, substantially as and for the purpose specified.

6. The combination of vertical stiffeners or special brackets *f*, projecting below the lower boom B, with the diagonals *h*, cross-bar *g*, and strut *i*, substantially as and for the purpose specified.

In testimony that we claim the foregoing we have hereunto set our hands this 10th day of November, 1887.

JOHN CLARK JEFFERSON.
J. T. PULLON.

Witnesses:
JOHN W. HUBS,
HENRY T. LUTY.