

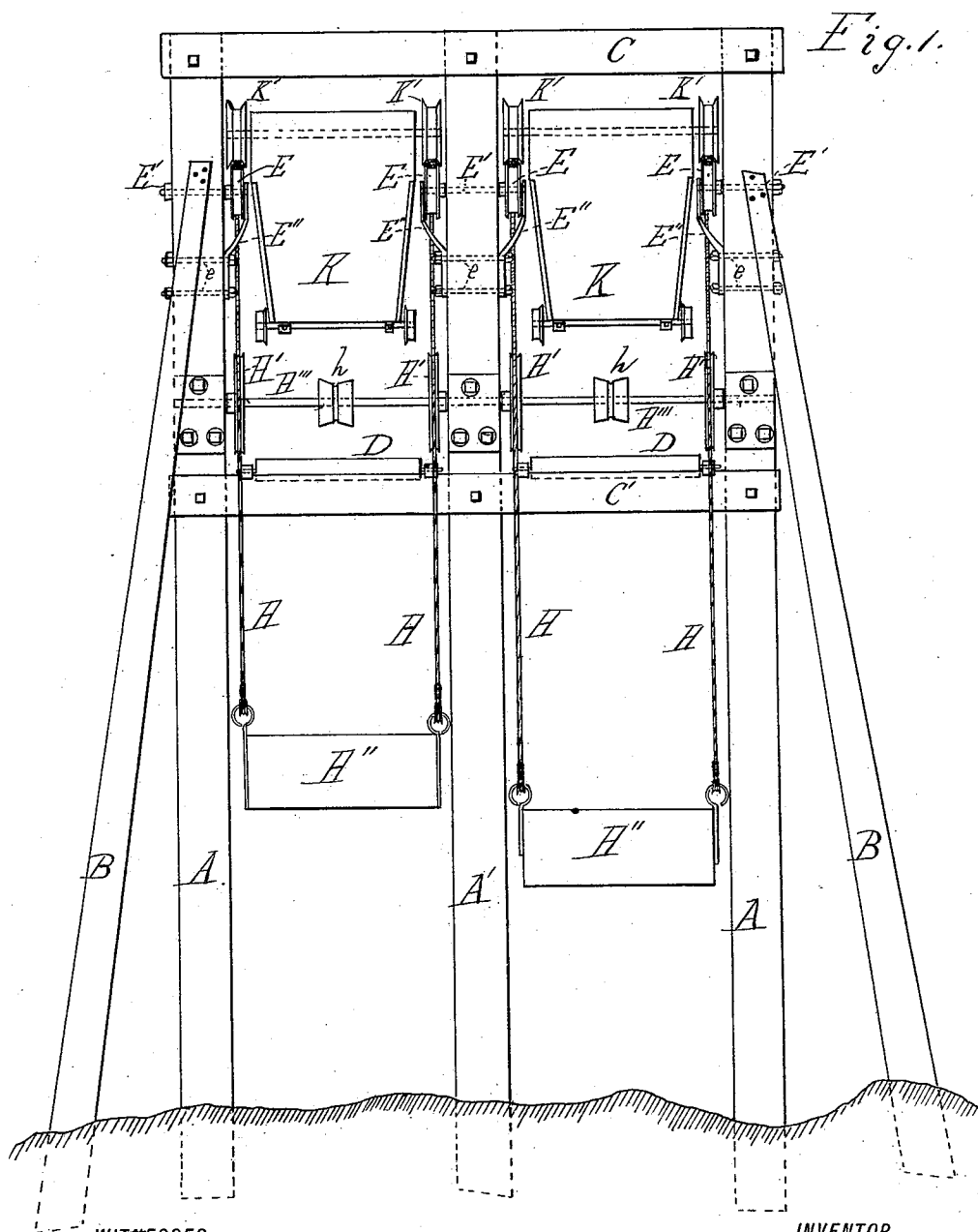
(No Model.)

3 Sheets—Sheet 1.

A. H. DE CAMP.
AERIAL TRAMWAY.

No. 469,908.

Patented Mar. 1, 1892.



WITNESSES:
E. A. De Camp.
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Alfred H. De Camp

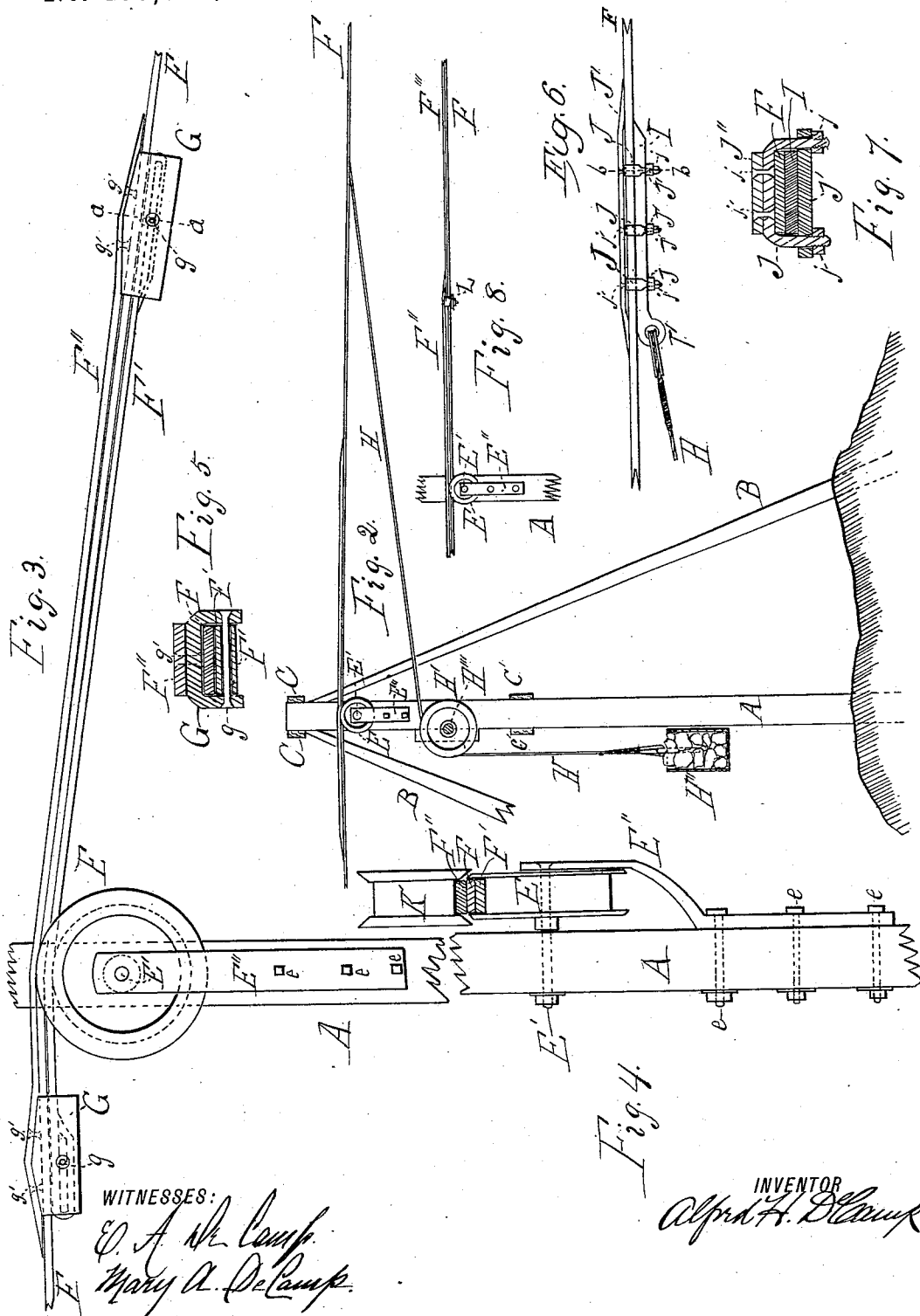
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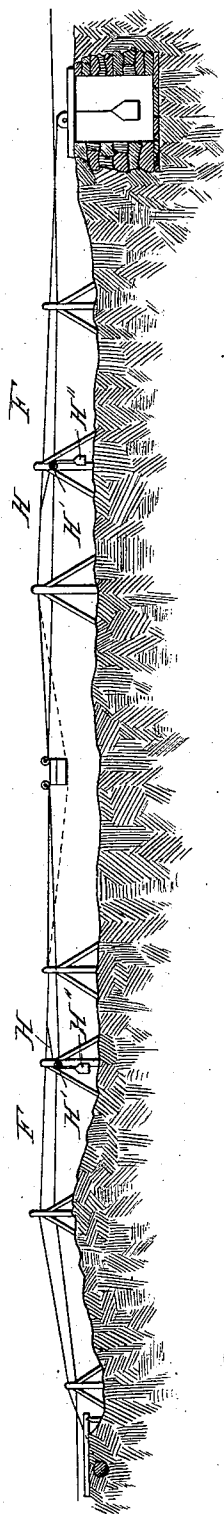
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Fig. 9.



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UNITED STATES PATENT OFFICE.

ALFRED H. DE CAMP, OF BOONTON, NEW JERSEY.

AERIAL TRAMWAY.

SPECIFICATION forming part of Letters Patent No. 469,908, dated March 1, 1892.

Application filed May 6, 1890. Serial No. 350,950. (No model.)

To all whom it may concern:

Be it known that I, ALFRED H. DE CAMP, a citizen of the United States, and a resident of Boonton, in the county of Morris and State of New Jersey, have invented certain new and useful Improvements in Aerial Tramways, of which the following is a specification.

The objects of my invention are to simplify the construction and increase the efficiency of aerial tramways.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 represents a front elevation of a tramway embodying parts of my invention. Fig. 2 is a side elevation and part section of tramway and support, showing the general arrangement of the parts. Fig. 3 is a side view of the upper part of one of the supporting-posts, showing how the track is supported and protected. Fig. 4 is a front view of Fig. 3, showing the rail and its protecting parts in section and a car-wheel passing over the same. Fig. 5 is a cross-section on the line *a a* of Fig. 3, showing how the protecting-pieces are secured to the rails. Fig. 6 is a side view showing how the equalizing-weights are secured to the rails. Fig. 7 is a cross-section on the line *b b* of Fig. 6, showing method of securing the equalizing devices to the rails. Fig. 8 is a side view of upper part of a supporting-post, showing one rail laid upon another in the same supporting-wheel. Fig. 9 is an elevation showing the general features of a tramway of this sort and the relation of intermediate tension-weights to each other and to the general system.

Any suitable supporting-frame for maintaining the rails of this tramway in an elevated position may be used. That shown in Fig. 1, consisting of the uprights *A A'*, braces *B B*, cross-braces *C C'*, and rollers *D D* for carrying the drawing-cable, is essentially the same as that shown in my application for United States Letters Patent, dated April 23, 1890. The uprights *A A'* in this case, however, are provided on their inner sides, near their tops, with the wheels *E*, upon which wheels or rollers the rails of the tramway rest. These rollers are pivotally mounted upon the short shafts *E'*, which shafts are supported at one end by

the posts, which they enter, and at the other end by the bent arms *E''*, securely bolted to the posts below the wheels, as by bolts *e e*, and extending upward to the opposite side of wheels *E* sufficiently to receive the inner ends of shafts *E'*, as clearly shown in Fig. 4. The rollers *E* are flanged to a depth greater than the depth of the rail, as shown in Fig. 4, where the rail *F* is seen inclosed between the flanges, as well as a like section *F'* beneath the rail, while the section of *F''* is shown as above the flanges. The method of combining these three parts *F F' F''* at the supports will be readily understood by reference to Figs. 3, 4, and 5. The piece *F'*, looped at both ends to receive the bolts or rivets *g*, Figs. 3 and 5, rests directly on the roller *E*. Upon *F'* rests the rail *F* of the tramway, and as it bears with considerable weight at all times it will be seen that there will be no longitudinal slip between the rail and *F'*, provided the wheel *E* turns freely on its shaft, but they will play back and forth upon the wheel as one. As the tramway-rail is included between the wheel-flanges, Fig. 4, of course lateral displacement of the same is prevented. The piece *F''* lies above the rail and *F'*, and is secured to each as follows: The inverted loop *G*, Figs. 3 and 5, with its upper part and two dependent sides loosely incloses the rail *F* on three sides. The rivet *g*, secured transversely in each dependent side of *G*, passes loosely through the loop in *F'*. The rivets *g' g'* rigidly secure the piece *F''* to the upper side of the loop *G*. The adjacent ends of *F' F''* at both sides of the supporting-rollers are connected together by the loops *G G* encircling the rail, their respective ends being secured to the loops, as described, and shown in Fig. 3. The loops and the ends of *F'* secured in the loops are not supposed to bind the rail, so that when bent by loads passing over there will be neither buckling nor undue strain in either *F'* or *F''*. *F''* is tapered at its ends, as shown in Fig. 3, to afford easy passage of the wheels of the car from the rail to it and from it to the rail, and is also of sufficient depth or thickness to elevate the flanges of the car-wheels *K'* over the flanges of the supporting-wheels *E*, Fig. 4, performing the same office, of course, when the car-wheels have to pass over the loops *G*, Fig. 5.

The method of attaching what I call the "equalizing-weights" to the rails and to the frame will be readily understood by reference to Figs. 1, 2, 6, and 7. The ropes H are secured to the rails at some distance from the supports. Leading back to the supports they pass over pulleys H', suitably supported in the frame-work, and have attached to their dependent ends weights or weight-boxes H'', Figs. 1 and 2. The pulleys H' are mounted within the frame-work, one below each rail, Fig. 1. Said pulleys are so mounted as not to interfere with the passage of cars K through the bents, as seen in Fig. 1. The method preferred for mounting them is also shown—viz., the shaft H''', passing across the bent from side to side and secured to the upright posts horizontally in any convenient way. The small sheaves h for carrying the hauling-cable may also be mounted directly on this shaft, if preferred, in bents having this attachment, as shown in Fig. 1. All the pulleys can of course revolve freely on said shaft, and may be prevented from lateral play by any of the well-known methods.

The dependent ends of the chains or ropes H may be secured to the weight-boxes H'' in any convenient way. The method of securing their outward ends to the rails will be understood by reference to Figs. 6 and 7. There it will be seen a bar I, of the same width as the rail and having an eye I' formed in one end, is bound to the under-side of the rail by the clips J, having screw-threaded ends passing through the cross-bars J' below the eye-piece. It will be readily seen that by setting up the nuts j, with which the screw-threaded ends of the clips J are provided, the rail and the eye-piece become clamped together between the cross-bars and the upper part of the clips. To the upper sides of the clips, above the rails, the pieces J'', having tapered ends, Fig. 6, are riveted to enable the wheels of cars to pass smoothly over said clips. In the eye I' of the piece I the chain or rope H may be readily secured by any of the well-known methods, Fig. 6, thus making the connection between the rails F and weight-boxes H'' complete.

By reference to Fig. 8 it will be seen that one rail F''' may be laid above another F, each supposed to be secured at the terminals of the tramway, as hereinafter described. This arrangement of the rails will be found of great benefit in lines designed to carry very heavy loads, the placing of one rail above the other preserving the advantages of the shallow section of each, while great strength of rail may be attained without unduly widening it and the tread of car-wheels.

It is evident that, if desired, the protecting-pieces F' F'' may be applied as well to a double rail of this description and in the same way as to a single rail. It is also evident, Fig. 8, that a single piece F'' above may be applied to the tramway-rail, if desired, and secured thereto at one side of the support by

the inclosing clip L, which clip would be similar to that shown fully in section, Fig. 7, and at the other side of the support by a similar clip with the nuts, preferably not set up tight. The clip which would be tightened would be on that side of the support toward which the cars approach. The top piece F'', Fig. 8, would have taper ends and be secured to each clip firmly the same as to the loops in Fig. 5 or as to clips in Fig. 7. It is also evident that the top and bottom rail can be secured together as often as desired between supports by similar clips bearing top covers, as in Fig. 6.

The operation is as follows: The rails are supposed to be fixed immovable at one end (to the left in Figs. 2, 3, and 6) and at the other to be connected over suitable pulleys to dependent weights, as clearly set forth in my application for Letters Patent, dated April 23, 1890, the composite rail formed of one rail laid above another similar rail being treated in this regard the same as a rail of only one member. There are supposed to be a number of supports for the rails similar to the ones shown in Figs. 1 and 2, but not necessarily having any such equalizing arrangement as here shown. There would be naturally some of these supports both to the right and left of Fig. 2, the weighted or movable ends of the rails being to the right. If the movable weighted ends of the rails are to the right, it is evident that a car passing over the rails from right to left would each successive span it traversed be able to raise the weights attached to the rails at the terminal to the right a less height each span because of the friction of moving the rails over the supports to the right. If the weights H'', attached to the rails F, are drawing to the left with a force equal to the resistance due to friction in the supports to the right, it is evident that after the car has passed to the left of the support it will, assisted by the weights H'', again raise the terminal weights to the same degree it did when passing over the span nearest the weighted ends. It is also evident that similar weights can be arranged in separate supports, one set drawing toward the right and the other toward the left, as H'' H'' in Fig. 9, stretching the intervening spans with greater tension, without in any way interfering with the general movements of the track. The protecting-pieces F' F'' are shown as extending but a short distance to the left in Fig. 3. That being supposed to be the direction of the immovable ends of the rails, it is evident that the track cannot travel to the right. While a number of cars to the left may cause the rails to move from right to left a considerable distance, the pieces F' F'' are extended to the right therefor a sufficient distance, so that the clips by which they are connected may not come in contact with the support.

The advantage of rollers instead of sliding surfaces for the supports is evident.

The advantage of having the pieces F' F''

below and above the rail at the support is that the rail is protected from the concussion of the wheels of cars passing the supports and is also prevented sharp bending, the said pieces being preferably spring-steel.

The rail or rails, if more than one is used, is preferably of the design shown and claimed in my United States Letters Patent, No. 411,584, dated September 24, 1889, and jointed as set forth in my application, dated April 23, 1890, already referred to.

Having fully described my invention, I claim as new, and desire to secure by Letters Patent, the following:

1. In an aerial tramway, a composite rail consisting of several like members laid in the supports one directly over the other, substantially as set forth.

2. In an aerial tramway, a composite rail formed of two or more similar rails laid one above the other in the supports, each member consisting of strips of less vertical measurement than any other dimension, substantially as set forth.

3. In an aerial tramway, the combination, with a composite rail formed of two or more similar rails laid in the supports one above the other, of clips encircling and clamping the members, and riders secured to the upper sides of said clips, substantially as set forth.

4. In an aerial tramway, the combination, with upright supporting-posts, of shafts E' , secured in said posts, rollers E , pivotally mounted on said shafts, and the tramway-rails resting upon said rollers, substantially as shown and described.

5. In an aerial tramway, the combination, with upright supporting-posts, of the upright arms E'' , secured to said posts, the horizontal shafts E' , secured in the upright arms and in the posts, the supporting-rollers E , mounted upon said shafts and revolving thereon, and the tramway-rail resting upon said rollers, substantially as set forth.

6. In an aerial tramway having the rails so spaced horizontally that the body of the car may pass between, the combination therewith of sliding supports for the rails and the rails, substantially as shown and described.

7. In an aerial tramway, the combination, with a suitable frame having attached to it flanged supports for the tramway-rails, in which the rails may freely slide, of the loop-ended piece F' , resting in and upon said flanged way, the rail F , resting upon said loop-ended piece F' and between the flanges of the support, the loops G , having the trans-

verse rivets g , secured in their sides and passing through the loops in ends of F' , and the piece F'' , resting above the rail F and secured near its tapered ends to the loops G , substantially as set forth.

8. In an aerial tramway having supports in which the rails may freely slide, the combination, with said supports, of the rail resting upon the supports between their flanges, and a covering-piece mounted above said rail and support and secured directly to the rail by clips, rivets, clip-bars, and nuts, substantially as set forth.

9. In an aerial tramway having rails anchored at one end and stretched by weights or their equivalent attached to the other end, the combination therewith of intermediate weights acting through pulleys and ropes secured to the rails, substantially as set forth.

10. In an aerial tramway, the combination, with the rails forming the track and suitably supported, of the intermediate weights H'' , suitably supported and secured to the rails, substantially as set forth.

11. In an aerial tramway, the combination, with the frame and supports for the rails, with the rails resting in said supports, of pulleys H' , suitably mounted below the rails, ropes or chains passing over said pulleys and having weights attached to their depending ends and their outward ends secured to the rails, the eye-piece I , to which said ropes are secured, the cross-bars J' , the clips J , having screw-threaded ends passing through said cross-bars and provided with the nuts j , and the piece J'' , with tapered ends, secured to the upper sides of said clips, substantially as set forth.

12. In an aerial tramway, as a means of stretching intermediate portions of the track with greater power, the weights H'' , secured to ropes H and held dependent by them, the pulleys H' , guiding and supporting said ropes, the pulleys being properly supported in the line of the tramway and the ropes being secured to the rails substantially as shown, in combination with similar weights, pulleys, ropes, and attachments mounted likewise in the line of the tramway, but oppositely placed, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 29th day of April, 1890.

ALFRED H. DE CAMP.

Witnesses:

E. A. DE CAMP,
MARY A. DE CAMP.