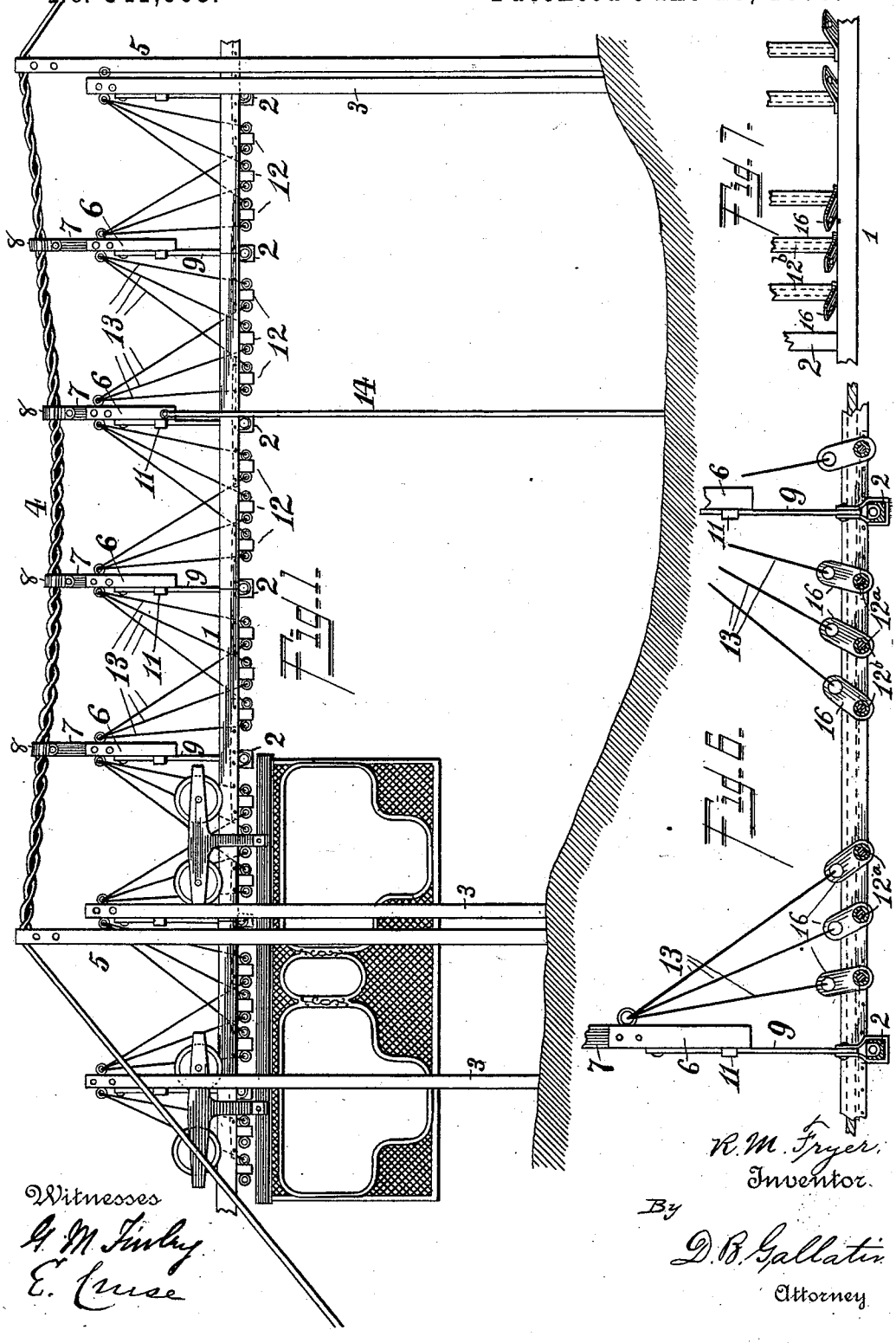
(No Model.) 3 Sheets—Sheet 1.

R. M. FRYER.

ELEVATED RAILWAY.

No. 541,663. Patented June 25, 1895.



Witnesses
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(No Model.) 3 Sheets—Sheet 2.

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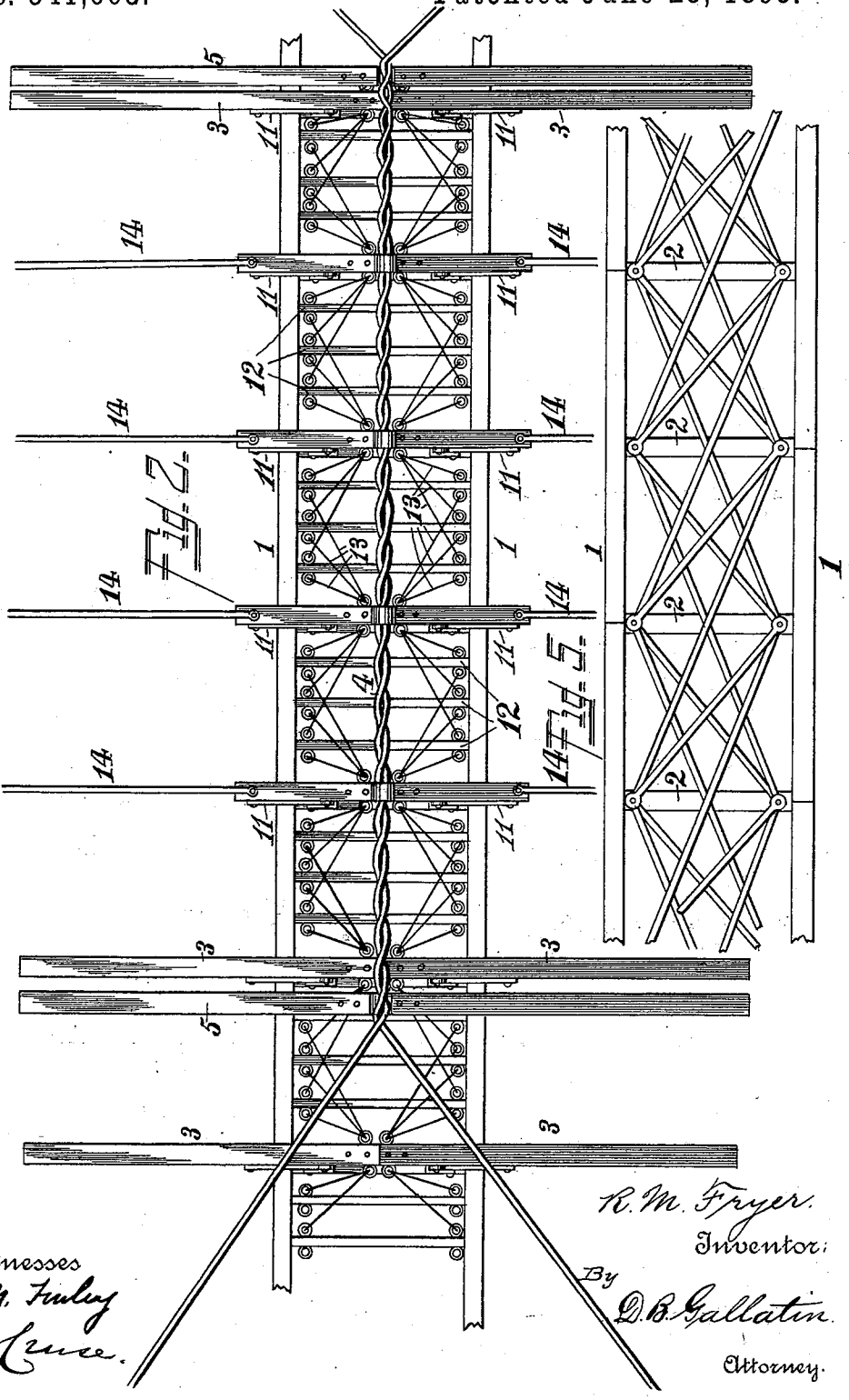

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(No Model.) 3 Sheets—Sheet 3.

R. M. FRYER.

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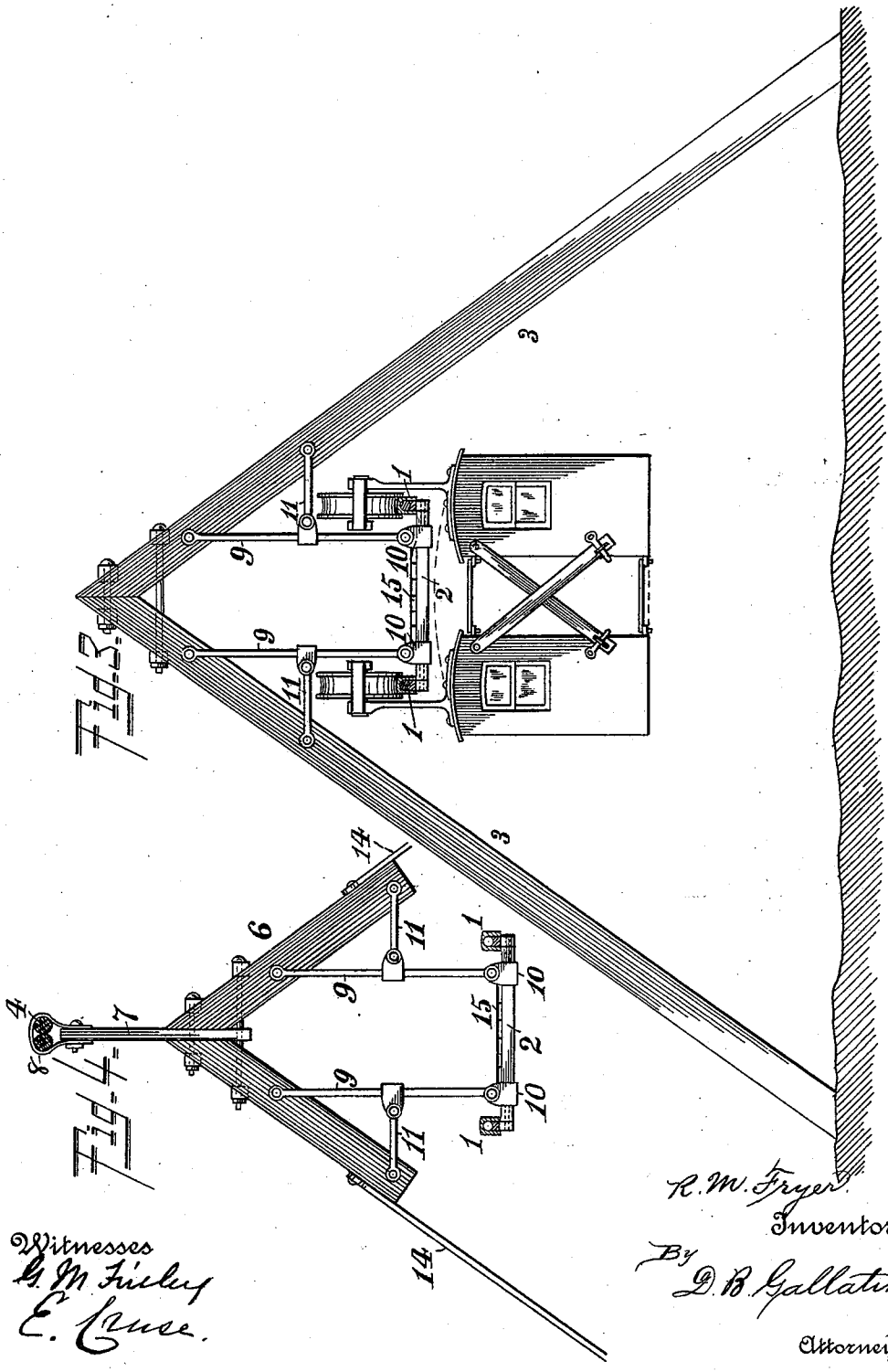

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UNITED STATES PATENT OFFICE.

ROBERT M. FRYER, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO THE INTERNATIONAL CONSTRUCTION COMPANY, OF ARIZONA.

ELEVATED RAILWAY.

SPECIFICATION forming part of Letters Patent No. 541,663, dated June 25, 1895.

Application filed February 20, 1895. Serial No. 539,042. (No model.)

To all whom it may concern:

Be it known that I, ROBERT M. FRYER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Elevated Railways; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My present invention relates to elevated railways in which the cars are suspended from, and travel below, the track, and it has for its objects, first, to provide an elevated structure of a portable character adapted to be conveniently, economically, and expeditiously erected in countries and localities where the topographical conditions are unfavorable to the construction and maintenance of surface roads; second, to provide a combined elevated railway and footway, and to utilize for the footway the space between the track rails of the railway without interfering with the running of cars thereon, and, third, to construct and provide an elevated railway in which two parallel track rails are adapted to be used as a single track, or as two independent tracks for cars running in opposite directions.

To these ends the invention consists in the construction and arrangement hereinafter fully described with reference to the accompanying drawings which form a part of this specification, and in which—

Figure 1 represents a side view of a section of the elevated roadway, showing the manner of supporting the same, and showing also a car in its relation to the track; Fig. 2, a plan view without the car; Fig. 3, a vertical transverse section showing the manner of supporting the track from the ground; Fig. 4, a similar section showing the manner of supporting the track from above, as in localities where ground supports are impracticable; Fig. 5, a plan view of the track or roadway independent of the supports therefor, showing the manner of trussing the structure to render it rigid; Fig. 6, a longitudinal section, and Fig. 7 a broken plan view, showing a modification.

Referring to the drawings, 1, 1, designate the track rails which may be of any suitable construction or pattern, but preferably of the construction shown and described in an application for Letters Patent of the United States filed by me on the 12th day of November, 1894, Serial No. 528,541, to which reference may be had. The rails are held in fixed relation, parallel to each other, by cross-bars or ties 2 disposed at suitable intervals and supported from above, the rails being connected with, and in turn supported by, said cross-bars or ties substantially in the manner shown and described in my prior application referred to.

When practicable I support the track from the ground by angular frames, each comprising two legs 3, 3 extending above the track at opposite sides thereof and bolted or otherwise secured together at their upper ends, as shown in Fig. 3, but where the elevation above the ground is too great to permit the use of ground supports, as in crossing streams, valleys, or ravines, or where a firm foundation is not obtainable, as in crossing swamps or morasses, I suspend the track from an overhead cable 4, as represented in Figs. 1 and 4, said cable being supported at feasible points by angular frames 5, 5, similar to, but higher than, the frames 3.

Mounted on, or rather, sustained by, the the cable 4 at suitable intervals are small angular frames 6, these being connected with the cable by means of hangers 7 bolted into the angles, as represented in Fig. 4 and provided at their upper ends with clips 8 which embrace the cable.

The track is connected with, and suspended from, the frames 3 and 6 by means of hanger rods 9, 9, bolted to, or otherwise suitably connected with, the legs of said frames (see Figs. 3 and 4) and connected at their lower ends, by means of clips 10,—or otherwise,—with the cross-bars or ties 2 at the inner sides of, and near, the respective rails 1, 1. There is thus a clear and unobstructed space from within the rails entirely around beneath the track, the purpose and utility of which will appear presently.

The hanger rods 9 are braced at a sufficient height above the track rails to accommodate the car wheels by brace rods 11 extending horizontally therefrom to the respective legs of the frames, whereby lateral swaying of the track relatively to the frames is prevented.

Under the construction and arrangement thus described there is an open space between the hangers 9, 9, and this I utilize by laying therein a floor 15 to form a footway or bridge for pedestrians or light vehicles, said floor being laid on, and supported by, the cross-ties 2 and intermediate auxiliary ties hereinafter referred to and designated. It will thus be seen that the track constructed and supported as shown and described is adapted to be used as a single track for cars provided with double trucks adapted to run on both rails, or as a double track for cars provided with single trucks adapted to run on one rail.

In Fig. 3 I show two single cars coupled together, but it is to be understood that this coupling is intended to represent a double car adapted to run on both rails, the two rails in such case constituting a single track. By uncoupling the cars they are rendered independent of each other and may then run independently of each other either in the same direction or in opposite directions. The broken lines connecting the two cars are also intended to represent a double car. Thus, whether the track be occupied by single cars running in opposite directions, or by double cars running on both rails, there is an open and unobstructed passage between the rails, and between the truck wheels running thereon, which passage I am enabled to utilize without additional expense—excepting the cost of flooring—as a foot-walk for pedestrians or as a roadway for light vehicles (provided the track be of sufficient width).

I am not aware that it has ever been attempted, or even proposed, to so construct an elevated railway as to enable, or adapt, the space between the rails of a single track to be utilized and occupied as a roadway without interfering with the running of cars on the track, nor am I aware that it has ever been attempted or proposed to so construct a two-rail track as to adapt double trucks connected below the track to run on both rails, and I therefore believe myself entitled to claim these features broadly, and without reference to details of construction.

With the view of rendering the track firm and rigid I propose to locate between the cross-bars or ties 2 several auxiliary ties 12 (three being shown under each span) with their ends projecting under the track rails to give support thereto, the said auxiliary ties being sustained by stay rods or cables 13 connected therewith and with the frames 3 or 6 at or near the top thereof (see Figs. 1 and 2) each of said ties being supported at each end by two rods running in opposite directions to the nearest frames.

Long sections of track supported by cable are liable to swing or sway laterally, especially under the weight of single cars running on one rail, and in order to prevent such swinging or swaying I propose to employ stay-rods or cables 14 connected to the legs of the frames 6 and extending to the ground and suitably anchored.

In the modification illustrated in Fig. 6, in place of the auxiliary ties 12 extending beneath the track rails, as above described, I show tie-rods 12^a and thimbles or sleeves 12^b thereon, the said rods extending through the rails and secured therein to hold them together and the sleeves or thimbles serving to hold them apart. In this case I propose to dispense with one half of the stay rods or cables 13, using only one of the latter at each end, this being sufficient by reason of the said rods 12^a being secured in place in the rails, whereas the ties 12 simply lying against the under sides of the rails require double supports to hold them in place.

As a convenient means for connecting the rods 13 with the tie rods 12^a I propose to employ plates 16 punched out or otherwise formed with suitable eyes or openings for the reception of said rods, the said plates being placed on the tie rods 12^a between the rails 1 and sleeves 12^b.

For light roads and light traffic I prefer the construction and arrangement first above described, but for lighter structures the modification shown in Fig. 6 is deemed preferable.

For the supporting cable 4 I propose to use two strands,—preferably of wire rope—twisted together as represented in Figs. 1 and 2. Then by separating the strands beyond the supports 5 I carry them to ground at opposite sides of the track and anchor them, thus equalizing or neutralizing lateral strains.

Having now described my invention, I claim—

1. In a railway the combination of an elevated track, supports therefor outside of the same, a suspensory cable comprising two main strands mounted on said supports centrally above the track, the ends of said strands being separated and anchored at opposite sides of the track, and connections at intervals between the cable and the track for sustaining the latter.

2. In a railway the combination of an elevated track, supports extending above the same at the sides thereof, a suspensory cable mounted on said supports centrally above the track, connections between said cable and track for sustaining the latter from the former, and a bridge or foot-way between the track rails.

3. In an elevated railway the combination of an elevated track, supports extending above the same at opposite sides thereof and united at the top, a suspensory cable mounted on said supports centrally above the track, connections between the cable and track for sus-

taining the latter from the former, and stays between the track and the upper ends of the supports, the said stays diverging from their points of attachment with the supports toward the respective track rails, whereby lateral swaying of the track is prevented.

4. A combined elevated railway and footway comprising a double-rail track sustained by depending connections between the track rails and a footway between said connections, in combination with supports outside of the track, substantially as shown and described.

5. In an elevated railway the combination of a track comprising cross-ties and track rails, the said track rails constituting the longitudinal girders of the structure, elevated supports at the sides of the track extending above the latter, and depending connections between said supports and cross-ties, said connections being located between the track rails.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT M. FRYER.

Witnesses:
ALICE J. FRYER,
GRACE M. FINLEY.