3 Sheets—Sheet 1.

A. BRANDON.

Elevated Railway.

No. 200,969. Patented March 5, 1878.

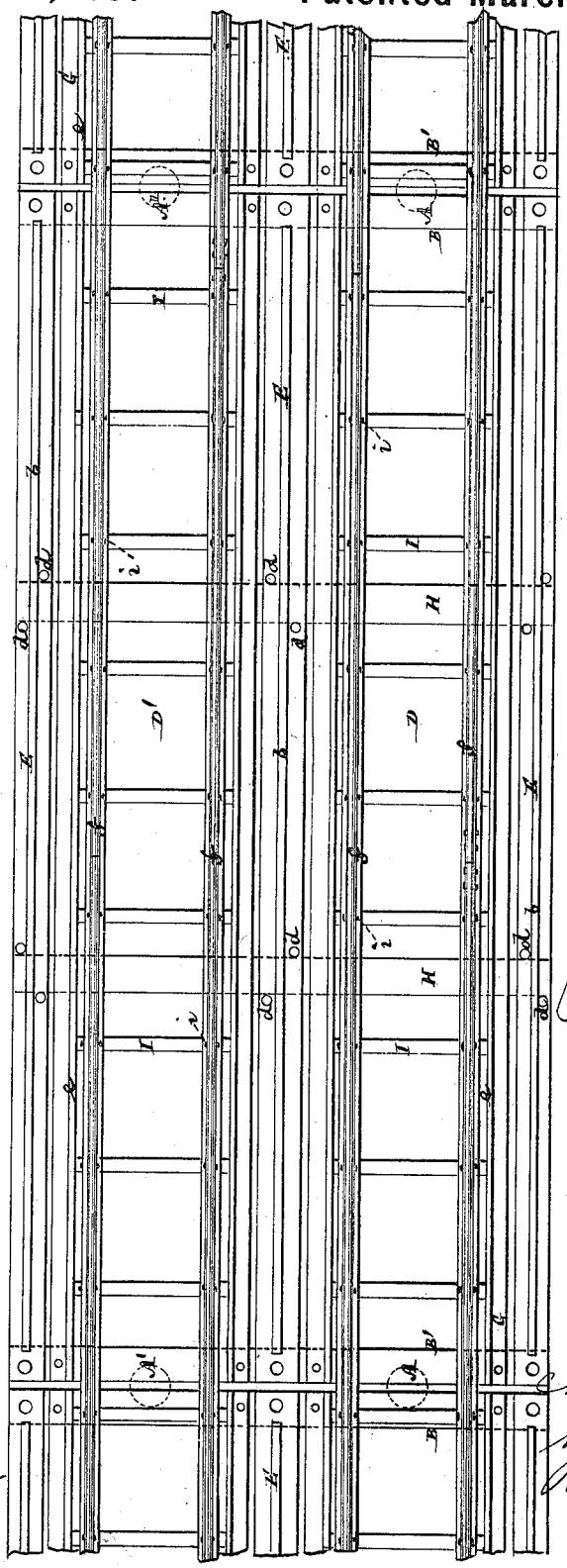

Fig. 1.

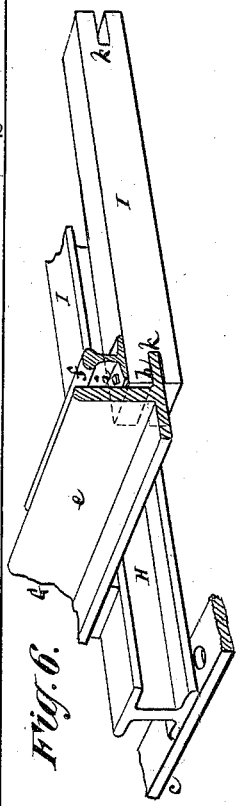

Fig. 6.

Witnesses
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Brown + Allen

3 Sheets—Sheet 2.

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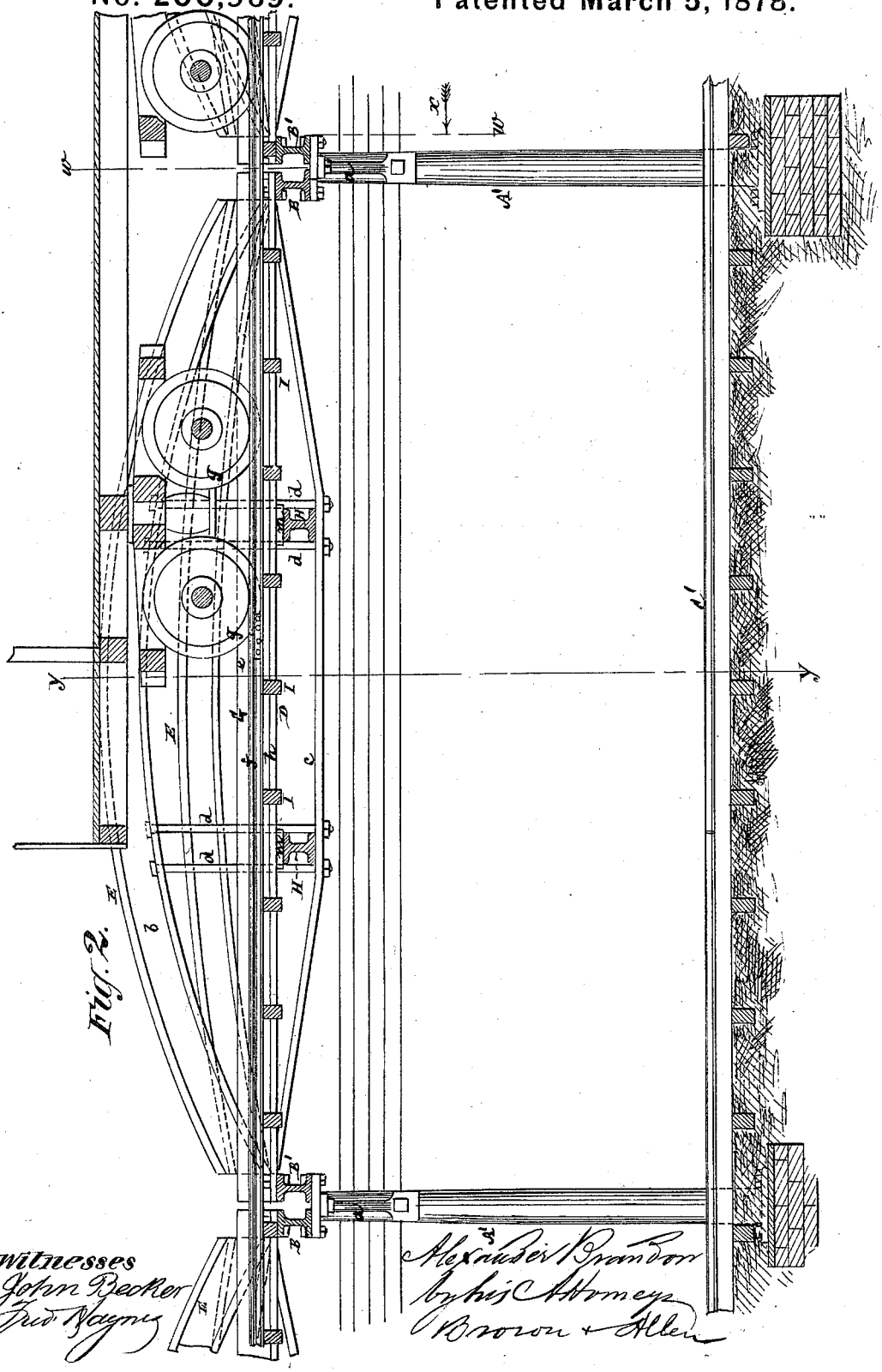

Fig. 2.

Witnesses
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Fred Haynes

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3 Sheets—Sheet 3.

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Fig. 4.

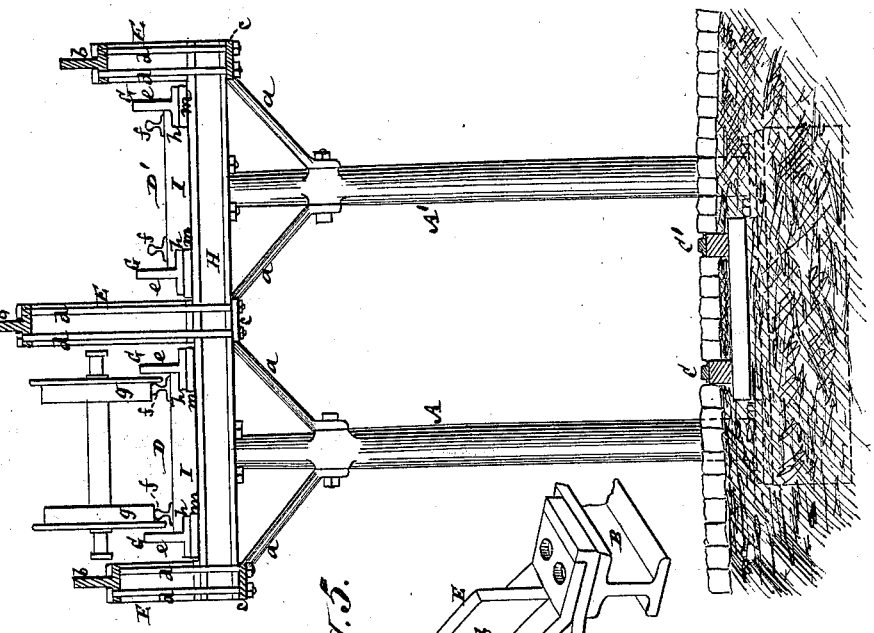


Fig. 5.

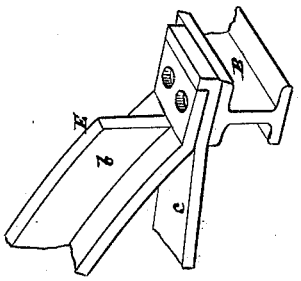
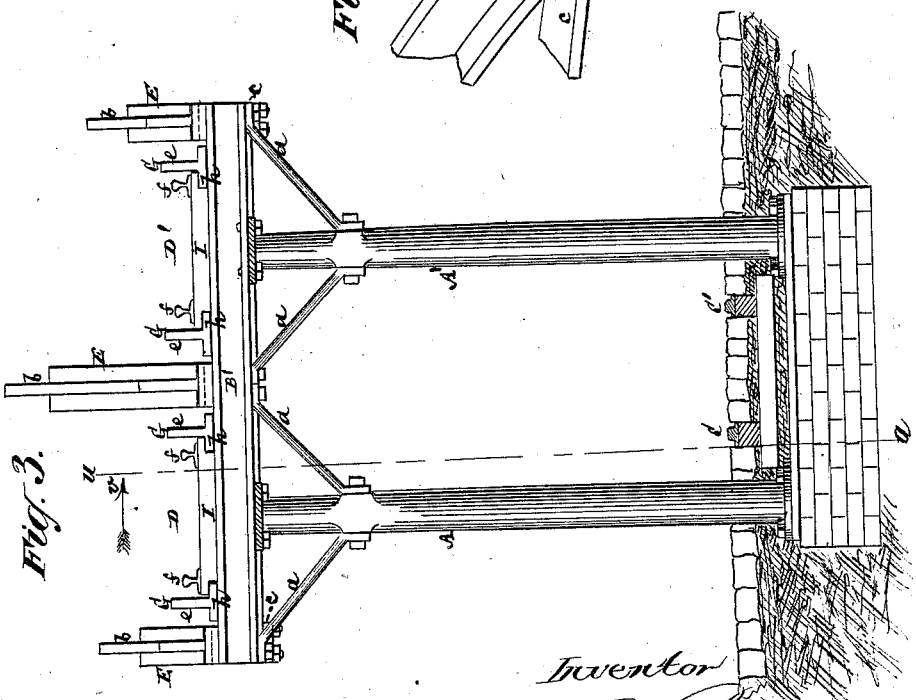


Fig. 3.



Witnesses
John Becker.
Fred. Haynes

Inventor
Alexander Brandon
by his Attorneys
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UNITED STATES PATENT OFFICE.

ALEXANDER BRANDON, OF NEW YORK, N. Y.

IMPROVEMENT IN ELEVATED RAILWAYS.

Specification forming part of Letters Patent No. **200,969**, dated March 5, 1878; application filed November 14, 1877.

To all whom it may concern:

Be it known that I, ALEXANDER BRANDON, of the city and State of New York, have invented certain new and useful Improvements in Elevated Railways, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

This invention consists in various novel constructions and combinations of parts in an elevated railway, whereby lightness and symmetry are combined with safety, durability, and strength, tie and holding bolts to a large extent are dispensed with, and increased facilities are afforded for repair when necessary.

Figure 1 represents a plan of a short portion or length of an elevated railway constructed in accordance with my invention. Fig. 2 is a longitudinal vertical section of the same on the line *u u*, Fig. 3, looking in direction of the arrow *v*. Fig. 3 is a vertical transverse section thereof on the line *w w*, Fig. 2, looking in direction of the arrow *x;* and Fig. 4, a further vertical section on the line *y y*, Fig. 2. Fig. 5 is a view, in perspective, upon a larger scale, of an end portion of one of a series of main girders and cross-beam supporting said girder; and Fig. 6 a view, in perspective, of one of a series of intermediate cross-beams carried by the main girders, a longitudinal safety beam or girder which is supported by the cross-beams, and a portion of one of the upper tracks carried by said safety-beam.

A A′ represent duplicate columns, arranged at any desired distance apart—say, ten feet, more or less—in direction of the width of the road. These columns, thus disposed in pairs, are situated at a much greater distance apart in direction of the length of the road, and, in case of being erected along an avenue or wide street, may occupy the center portion thereof, and should be secured at their base upon any suitable substantial foundation. Said columns may either be of cast-iron, wrought-iron, or both metals combined, and each pair A A′ of them is made to support on its upper end, both directly and indirectly, by laterally-disposed diagonal braces *a a*, duplicate transverse beams B B′, which are bolted to the columns and their braces, but otherwise are independent of each other, to provide for independent expansion and contraction of certain longitudinal girders or beams which rest upon them and reach from one pair of columns A A′ to another or succeeding pair thereof. The lateral braces *a a* admit of the columns A A′ being arranged in close relation with each other and under the centers of the upper tracks, which they assist in supporting.

The space between the columns A A′ is utilized by a track, C C′, on the ground-surface, which track may form a freight-car line in connection with the road, and which is protected by the columns and their superstructure.

The elevated portion of the railway has duplicate tracks D and D′, which may be used mainly for the transportation of passengers.

The columns and their diagonal braces may, in addition to their primary function, be used to carry telegraph-wires, thus doing away with special poles for said wires.

The transverse beams B B′ may be made of rolled wrought-iron and extend wholly across both columns A A′ and their braces. The independent support of these transverse beams B B′ on the same columns provides for the independent expansion and contraction of the main longitudinal girders E, and of certain longitudinal safety-girders G, which carry the track.

The several main girders E, which extend from one pair of columns, A A′, to the next pair thereof, form what may be termed a "single span," or one of a series of spans extending throughout the length of the road. They may be made of rolled wrought-iron, and are of a compound or truss construction, being composed of arched inverted-T-shaped beams *b*, lower chords *c*, and tension-rods *d*, the latter being arranged either centrally in relation to the web of the girder or on opposite sides of said web, and provided either with heads and nuts, or with nuts at both of their ends. The lower chords *c* are turned up at their ends to receive within them the ends of the arched beams *b*, and are thus made to support one another as regards their opposite tendencies to lengthen and contract under weight or pressure applied to the arched beam. Such construction dispenses, to a large extent, with tie and holding bolts. Said girders E may be

three in number for each span—that is, one girder on either side of the span and an intermediate or central girder. These girders, which are supported by the transverse beams B B′, and so that the same pair of said beams support two adjacent spans, serve to support, in their turn and between their respective ends, other transverse beams, H, which also extend wholly across the span.

The longitudinal safety-girders G are of the length of the span, and are independently supported by the transverse beams B B′ and H of the span. Said girders are of a flanged construction, and are arranged inside of the main girders E, between the latter and the tracks D D′, and so that the webs *e* of said girders are outside of the rails *f* of said tracks, and project above the upper levels of the rails. The webs *e* of the girders G are thus made to serve as a guard outside of the wheels *g* of the vehicles which run on the tracks D D′, to prevent jumping of the latter by the vehicles, and the flanges *h* of said girders are made to project under the rails, whereby said flanges become a support to the wheels in case of the breaking of a rail. It is preferred to have the flanges of the wheels on the outside of the latter, so that in case of the breaking of a rail the flanges of the wheel will come down on the flanges *h* of said girders; but this construction of the wheels with outside flanges for use in concert with a guard or safety rail is not claimed here, but may be made the subject of a separate application for Letters Patent by me.

Combined with the longitudinal flanged girders G are the cross-ties or sleepers I, which may be made of wood, and which are grooved at their ends to receive within them the flanges *h* of the girders. On these grooved sleepers the rails *f* are secured by means of spikes *i*. This combination affords every facility for replacing the sleepers or rails when worn or broken, the grooves *k* in the ends of the sleepers allowing of the latter being easily removed or entered to their places by simply skewing them on removal or before entering the spikes.

Where the longitudinal and transverse supports cross each other, there is interposed between them a piece of india-rubber or other soft material, *m*, of a sufficient size to cover the intersecting surfaces. Such intermediate soft or yielding piece or pieces may be applied not only to the girders G and beams H, but also, and more particularly, to the other cross-supports—that is, the girders E and cross-beams B B′ over the columns A A′—to reduce jar or shock as the trains are run over the tracks.

An elevated railway constructed as described is secure against lateral deflection of its longitudinal girders, and, though possessing the merits of lightness and symmetry, is stable and durable, requires but few tie or holding bolts, is easy of repair, and affords every possible convenience and great safety.

I claim—

1. The combination of the flanged longitudinal safety-girders, the cross-ties or sleepers supported on the flanges of said girders, and the rails supported on said ties or sleepers inside of the webs of the said girders, substantially as and for the purpose herein described.

2. The combination of the cross-ties or sleepers, having grooves at their ends, with the longitudinal flanged girders, constructed to enter by their flanges within the grooves of said sleepers, the rails supported by said sleepers, and spikes or means for securing the rails to the sleepers, substantially as specified.

3. The combination, with the longitudinal compound main girders, constructed as described, of the transverse beams arranged between the ends of said girders and carried by the lower chords of the latter, substantially as and for the purpose herein set forth.

ALEX. BRANDON.

Witnesses:

FRED. HAYNES,

EDWARD B. SPERRY.