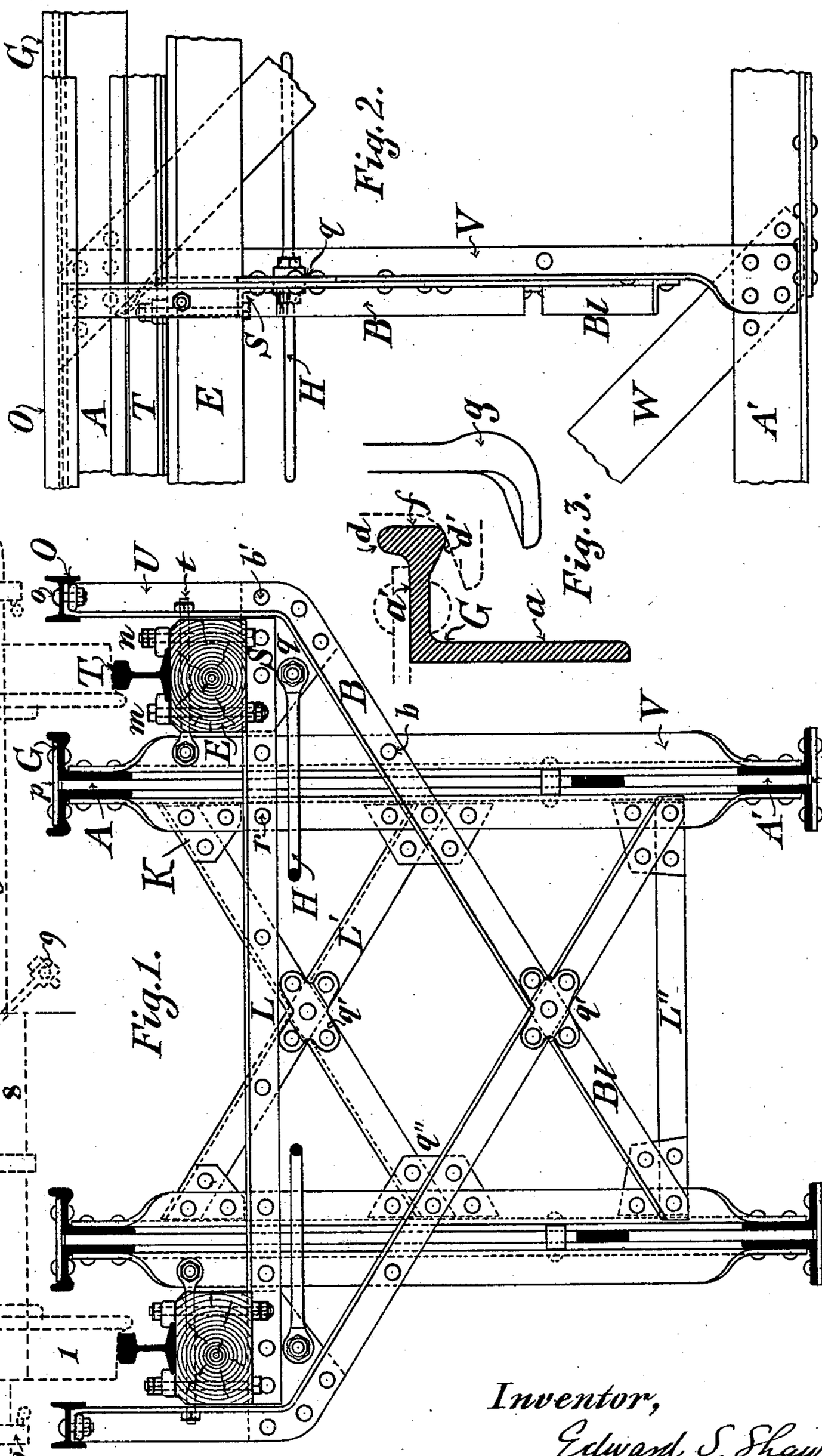
(No Model.) 3 Sheets—Sheet 1.

E. S. SHAW.

ELEVATED RAILWAY SUPERSTRUCTURE.

No. 361,029. Patented Apr. 12, 1887.



Inventor,
Edward S. Shaw.

Witnesses, { C. C. W. Hammatt.
B. R. Felton.

(No Model.) 3 Sheets—Sheet 2.

E. S. SHAW.

ELEVATED RAILWAY SUPERSTRUCTURE.

No. 361,029. Patented Apr. 12, 1887.

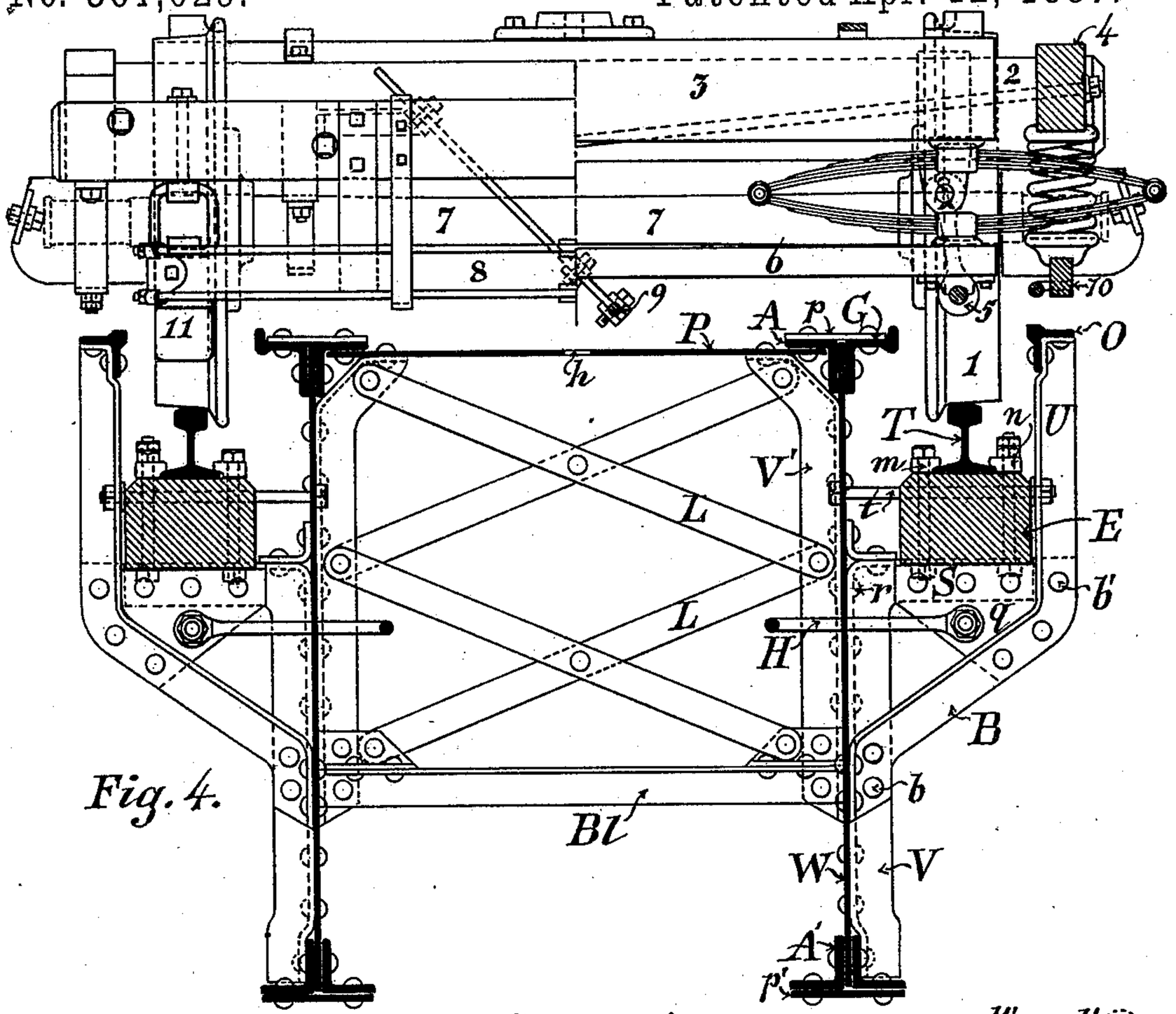


Fig. 4.

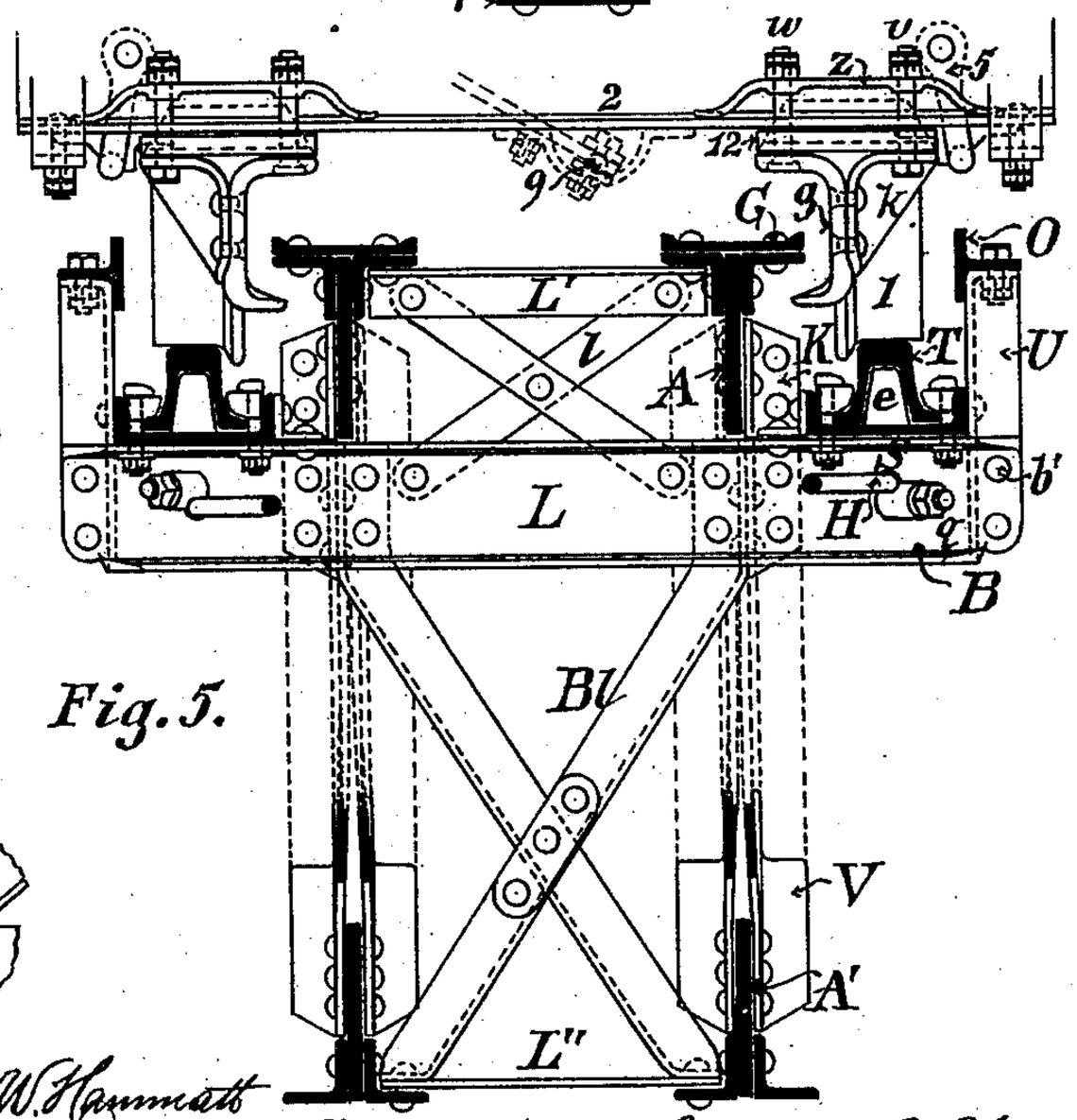


Fig. 5.

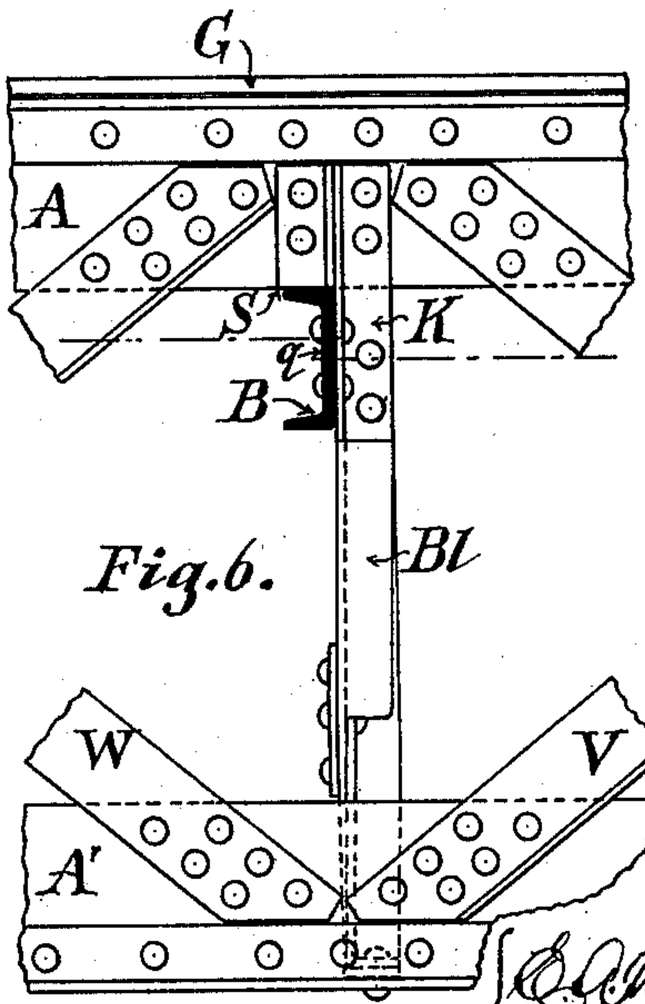


Fig. 6.

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(No Model.) 3 Sheets—Sheet 3.

E. S. SHAW.

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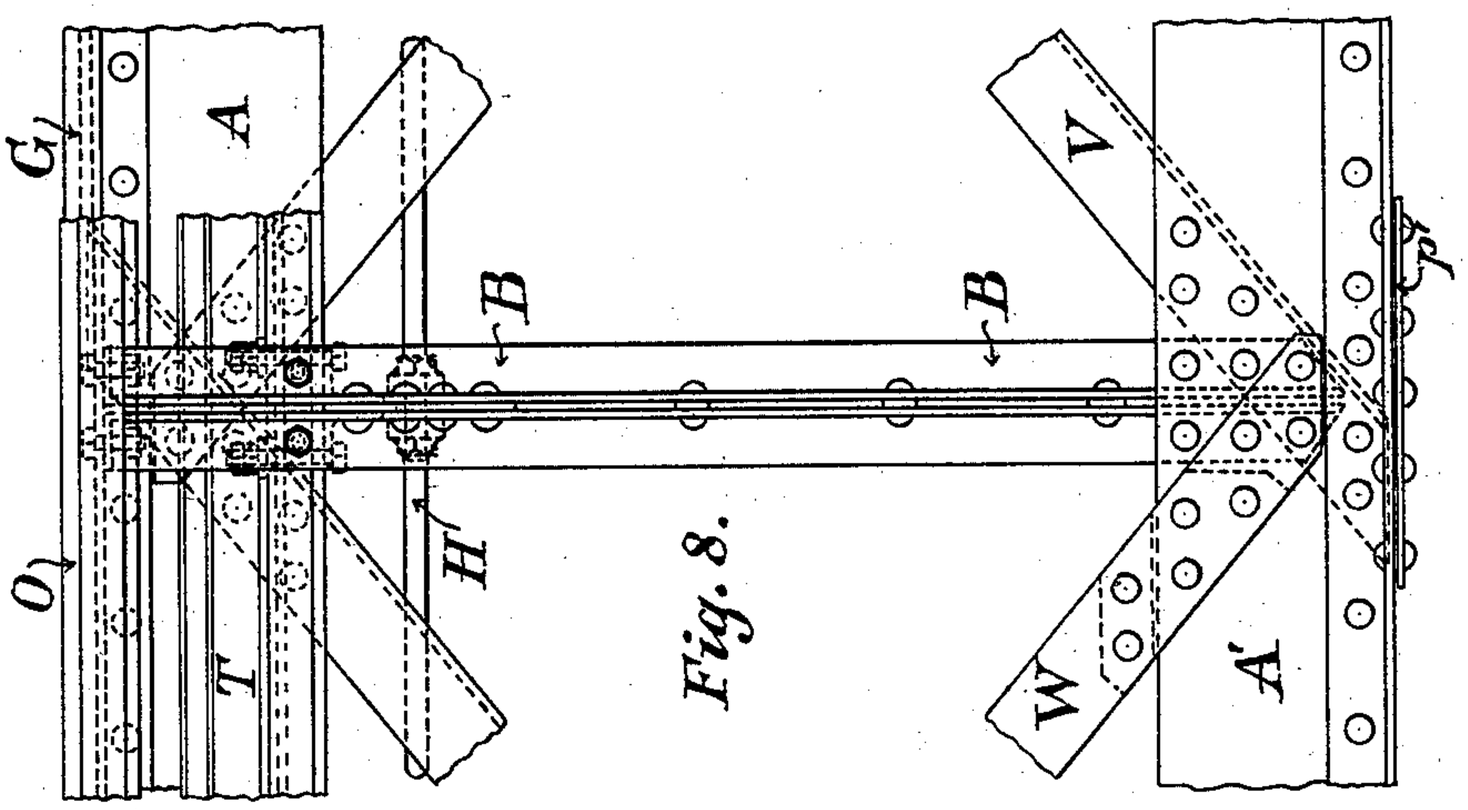

Fig. 8.

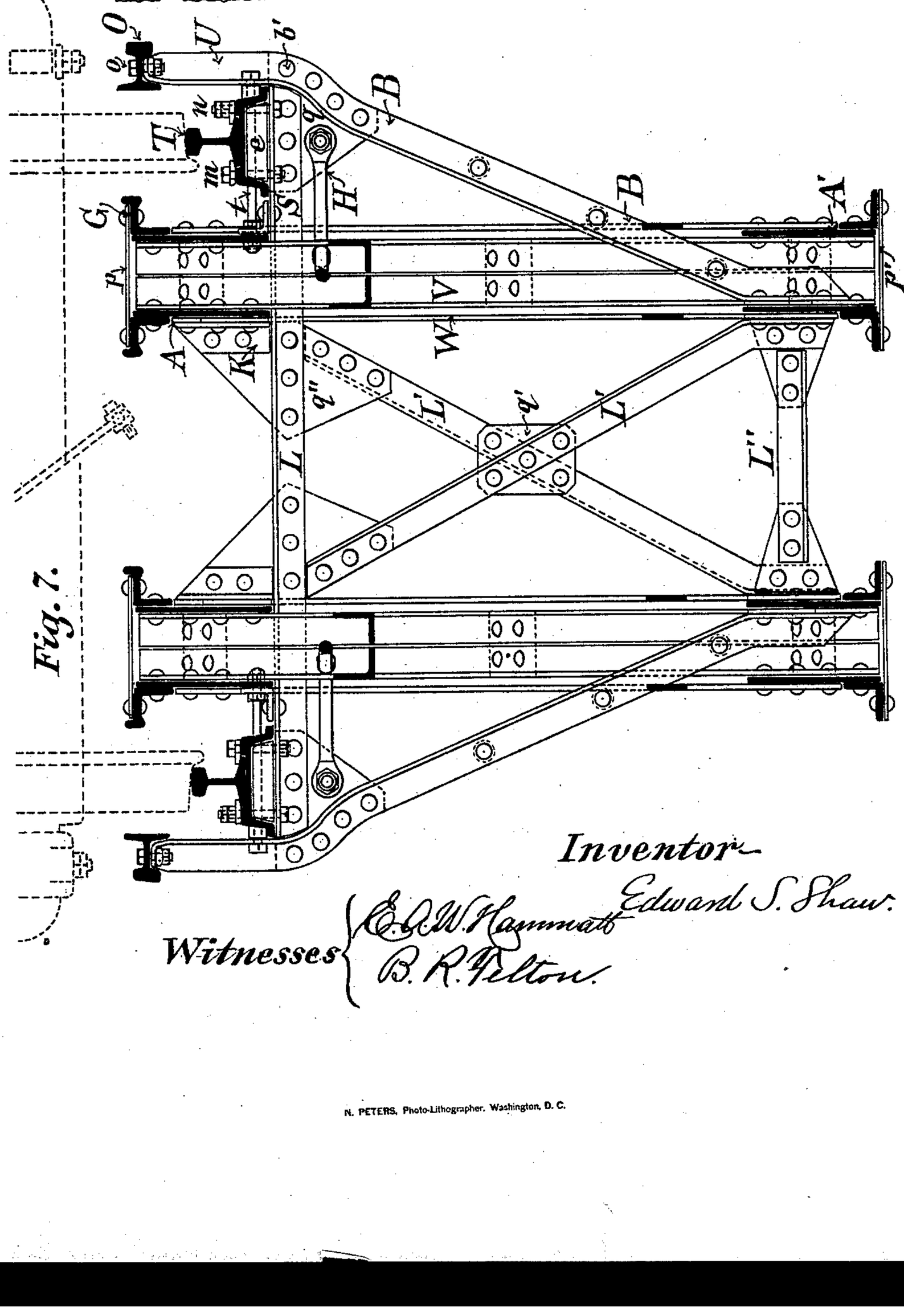

Fig. 7.

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UNITED STATES PATENT OFFICE.

EDWARD S. SHAW, OF CAMBRIDGE, MASSACHUSETTS.

ELEVATED RAILWAY SUPERSTRUCTURE.

SPECIFICATION forming part of Letters Patent No. 361,029, dated April 12, 1887.

Application filed January 17, 1887. Serial No. 224,617. (No model.)

To all whom it may concern:

Be it known that I, EDWARD S. SHAW, a citizen of the United States, residing at Cambridge, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Elevated Railway Superstructures, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to the longitudinal superstructure or permanent way of elevated railways, and is an improvement upon the superstructure described and claimed in my United States Patent No. 353,086, dated November 23, 1886. Its principal objects are, first, to insure greater safety from derailment, especially when the structure is used in combination with trucks built in the usual manner of surface railroads, or of the elevated railways of New York and Brooklyn; second, to attach the transverse cantalevers or brackets which support the track-rails to girders or trusses not provided with vertical webs or web members, and, third, to increase the lateral strength and stiffness of the superstructure and provide a means of aligning it.

I accomplish the above ends by means of the combinations, methods of construction, and the details described and claimed in this specification, and illustrated in the accompanying drawings, in which—

Figure 1 is a transverse section, and Fig. 2 a partial side elevation, of the improved superstructure as adapted to open-web girders having vertical web-posts. Fig. 3 is a section in detail of a portion of the upper chord of the girder comprising the inner longitudinal guard-rail. Fig. 4 is a cross-section of a plate-girder superstructure, showing the details of a car-truck similar to those of the New York elevated railways placed upon it. Fig. 5 is a cross-section of a narrow-gage superstructure with lattice girders not provided with vertical web members. It also shows the lower part of a car-truck, and safety-truck guards constructed according to my Patent No. 353,086. Fig. 6 is a partial side elevation of the superstructure shown in Fig. 5. Fig. 7 is a transverse section, and Fig. 8 a partial side elevation, of a superstructure designed to carry the standard passenger-cars of surface railroads.

In all of the figures the same letters or numbers are used to denote similar parts.

Referring to the drawings, it will be noticed that the transverse cantalevers or brackets S *q* B, which support the longitudinal track-rails T, carry upon their outer extremities upright posts or standards extending up a few inches above the level of the tops of the track-rails and supporting upon their upper extremities longitudinal guard-rails O, attached to the standards by bolts or rivets *o*. These longitudinal guard-rails form one of the principal features of the present improvement, and are for the purpose of confining a loose wheel, whether caused by a broken axle or otherwise, within the way or channel formed between them and the inner guard-rail, G, on the top of the girders.

So long as a pair of wheels are firmly fixed upon and confined together by their axle the inner guard-rails will be sufficient to prevent derailment caused by lateral pressure or impact, and are preferable to outer guard-rails, because they do not tend to slue the trucks or turn them at an angle to the structure; but in case of a loose or broken wheel or axle, and especially with trucks constructed in the ordinary manner and not provided with my safety-truck guards, the outer guard-rail would give increased safety. This member O may be formed of an L, T, I, or other shape of rolled metal, or it may be of hard wood or of wood and metal combined. Its uppermost edge or surface should preferably be placed at about the same height above the track-rails as the tops of the girders—that is, usually, from five to seven inches.

The standard U, supporting the outer guard-rail, may be bolted or riveted to the ends of the transverse brackets; or it may be in one piece with and form an extension of the lower member, B, of the bracket. In either case I would preferably connect it with the web or upper chord of the girder by means of the transverse bolt *t*, which may pass through the track-stringer or rail.

I am aware that longitudinal guards placed above and outside of the track-rails are in common use on elevated railways and bridges, being either attached to the cross-ties or to girders extending up on the outside of the rails.

The object of my invention is to provide a suitable and secure attachment for outer guard-rails in structures in which the longitudinal supporting-girders are situated entirely within and between the track-rails, and also to provide open spaces below the guard-rails to prevent the lodgment of obstructions or accumulation of snow or ice. These ends are accomplished by supporting the guard-rails upon separate and individual posts or standards, each attached, as above described, to the extremity of a transverse bracket.

Another part of my improvement, relating to the increased safety and durability of the structure, consists in forming upon the outer edge of the inner guard-rail, G, a flat surface, *f*, of considerable depth compared with the thickness of the horizontal flange *a'* upon which it is placed. This I would preferably accomplish by rolling an additional flange, *f d d'*, Fig. 3, upon the outer edge of the horizontal flange *a'* of the guard-rail G. This flange *f d d'* should be provided with a flat and approximately vertical surface, *f*, with rounded edges *d* and *d'*. The entire depth of this flange may be about two inches, the lower extremity, *d'*, extending about one-half inch below the lower surface of the horizontal flange *a'*, and thus permitting the use of a truck-guard, *g*, having a long and flat lower flange, without coming in contact with the rivets in the horizontal flange *a*, as shown by the dotted lines in Fig. 3.

The object of the flange *f d d'* is to present a smooth surface and a greater bulk of metal to the surfaces or edges of wheels or truck-guards coming in contact with it, and thus diminish the wear, indentation, and consequent jarring motion which might result with the thin and sometimes irregular or jagged edges of ordinary plates and angle-bars.

It is to be understood that actual contact between the wheels or truck-guards and the guard-rails seldom occurs; but it is nevertheless desirable to provide a structure which may be subjected to such contact and abrasive tendency without evil effect.

Another feature of my improvement consists in the provision of an open space or way between the upper chords of the girders and extending a few inches, at least, below their tops, as shown in Figs. 1 and 7, where A indicates the upper chords of the girders. This is to allow the passage of low-hung brake-rods or levers without coming in contact with the structure. I accomplish this end by omitting the horizontal lateral bracing connecting the upper chords and using vertical diagonal lateral braces L', consisting of angle-bars or other stiff shapes securely attached at their upper ends to the upper chords or upper part of the web members of the girders. They are connected at their lower ends to the lower chord or web of the girders and at their intersection by the plate *q'*, being also attached to the horizontal lateral member L.

With rolling-stock having high-hung brake-gear, or whose rods and levers can be raised at a moderate expense and without detriment to their action, I should prefer to use the horizontal upper lateral bracing, as in Figs. 4 and 5.

The second object of my improvement is illustrated by Figs. 5, 6, 7, and 8. Here the longitudinal girders consist of an upper and lower chord, A and A', respectively, and diagonal web members W V. In this case the horizontal member S L of the transverse bracket passes across directly beneath the upper chords of the girders, to which it is attached by angle-bars K, which serve to suspend a part of the weight of the rails from the upper chord. The horizontal member S L is further braced and a portion of the weight transmitted to the lower chord by the braces B L' or B *l*, as the case may be. In either case the construction of the brackets is similar to and their position with relation to the girders is nearly the same as with vertical web members.

In the structures shown in Figs. 5 and 7 it is important to condense the height of the rail and stringer as much as possible, in order to bring the upper member, S, of the transverse bracket directly under the upper chord of the girder without necessitating too deep a chord. I accomplish this by means of the compound rail or rail and stringer constructions shown in Figs. 5 and 7, consisting of a T or U rail combined with a channel or trough-shaped base member and an elastic block or filling, *e*. These methods of constructing the rail and stringer are not specifically claimed in this application.

In order to increase the transverse strength and stiffness of the structure I have provided horizontal lateral rods, H, which are attached at their extremities to vertical plates or webs *q*, connecting the upper and lower members, S and B, of the transverse brackets. These lateral rods are provided with screw and nut or turn-buckle adjustments, so that their lengths may be slightly altered, and the superstructure may thereby be drawn into a straight line or a slight curve, as the case may be.

In the accompanying drawings I have used the same letters and figures to denote the same or corresponding parts to those of my original patent, No. 353,086, above mentioned, and for a description of any parts or functions not fully or elaborately explained in this specification, and for purposes of comparison, I hereby refer to the above-named patent.

I am aware that certain characteristics and combinations of the present invention—notably, the position of the track-rails with relation to the upper and outer corners of the girders and the combination of the transverse cantalevers or brackets with the web or web members of the girders—are identical with or similar to the corresponding features in my original patent. Therefore I do not claim such features and combinations, broadly and separately, in this specification.

What I now claim is—

1. A longitudinal superstructure or permanent way for an elevated railway, consisting of a double girder or of a pair of connected girders or trusses placed between two track-rails and supporting the track-rails in proximity to the upper and outer corners of the girders by means of cantalevers or brackets attached to and projecting transversely from the girders or trusses and also supporting a pair of longitudinal guard-rails placed above and outside of the track-rails by means of upright posts or standards attached to the outer extremities of the transverse cantalevers or brackets, substantially as and for the purposes herein set forth.

2. In an elevated railway superstructure, the combination of a longitudinal double girder, or of a pair of connected girders or trusses placed between a pair of track-rails, with cantalevers or brackets supporting the track-rails in proximity to the upper and outer corners of the said girder or girders and projecting at intervals transversely therefrom, each cantalever or bracket being provided with a single or individual upright post or standard supporting a longitudinal guard-rail situated above and outside of the track-rail, substantially as set forth.

3. In an elevated railway superstructure, the combination of a longitudinal double girder, or of a pair of connected girders or trusses, placed between a pair of track-rails, cantalevers or brackets supporting the track-rails in proximity to the upper and outer corners of the said girder or girders and projecting at intervals transversely therefrom, several or individual upright posts or standards attached to the outer extremities of the said cantalevers or brackets, and longitudinal guard-rails placed parallel with, above, and outside of the track-rails and attached to the upper extremities of the said posts or standards, substantially as specified.

4. In an elevated railway superstructure, the combination, substantially as herein shown and specified, of a pair of longitudinal guard-rails situated above and outside of the track-rails, with separate and distinct vertical posts or supports placed at intervals beneath the guard-rails and attached to cantalevers or brackets projecting transversely from the longitudinal girder or girders of the superstructure.

5. The combination, substantially as herein set forth, of the guard-rail O, standard U, and transverse bracket S *q* B.

6. In combination with the longitudinal girders and track-rails of an elevated railway superstructure, a pair of longitudinal guard-rails, G, situated between and above the inner and upper surfaces of the track-rails and attached to the girders, or forming a part thereof, each guard-rail being provided with a horizontal outwardly-projecting flange, bearing at its outer extremity a vertical flange having an outer flat surface, substantially as set forth.

7. In the guard-rail G, the combination of the horizontal flange *a′* and the flange *d d′*, having a flat outer surface, *f*, substantially as set forth.

8. In the guard-rail G, the combination of the vertical flange *a*, the horizontal flange *a′*, and the flange *d d′*, having a flat outer surface, *f*, substantially as shown and described.

9. The combination of two special shapes, *a a′ d d′*, of metal in the upper chord of each longitudinal girder, substantially as illustrated.

10. The combination of the longitudinal girders A V W A′, transverse cantalevers or brackets S *q* B, track-rails T, inner guard-rails, G, and outer guard-rails, O, arranged substantially as shown and described.

11. The combination, substantially as set forth, of the longitudinal girder A V W A′, bracket S *q* B, standard U, and transverse bolt *t*, connecting the girder and standard above the bracket.

12. In an elevated railway superstructure, the combination of a pair of longitudinal girders, transverse brackets supporting the track-rails in proximity to the upper and outer corners of the girders and vertical lateral bracing connecting the girders and brackets and arranged so as to leave an open space between the tops of the girders to allow the passage over the structure of cars having low-hung brake-rods and levers, substantially as set forth.

13. In combination with the longitudinal girder or girders of an elevated railway superstructure, cantalevers or brackets attached to and projecting transversely from the girder or girders, each cantalever consisting of an upper horizontal member or flange, S, supporting a longitudinal track stringer or rail, a lower member, strut, brace, or flange, B, re-enforcing the upper member, S, and a plate or web, *q*, connecting the members S and B and serving for the attachment of the lateral adjusting-rods H, the relative position of the brackets, girders, and rails being substantially as herein set forth.

14. In combination with longitudinal track-rails or stringers situated in proximity to the upper and outer corners of the longitudinal girders of an elevated railway superstructure, transverse cantalevers or brackets attached and braced to the chords of the girders, substantially as herein shown and specified.

15. In combination with the longitudinal girder or girders of an elevated railway superstructure, cantalevers or brackets attached to and projecting transversely from the girders, each bracket consisting of an upper horizontal member or flange, S, attached to or suspended from the upper chord of the girder and supporting a longitudinal track stringer or rail, and a lower inclined member, strut, or brace, B or B *l*, connecting the upper member, S, with the lower chord, A, of the girder, substantially as set forth.

16. In an elevated railway superstructure,

the combination of the chords A A′ of the girders, the transverse brackets S *q* B, track-rails T, suspension member K, and vertical diagonal bracing L′ or B *l*, substantially as set forth.

17. In an elevated railway superstructure, consisting, substantially, of a pair of track-rails, supported in proximity to the upper and outer corners of the girders by means of transverse cantalevers or brackets, the combination of the track-rail with a comparatively shallow metallic base plate or stringer, so that the upper surface of the brackets may be brought close to the lower edge of the upper chord.

18. In combination with the longitudinal girders and transverse brackets of an elevated railway superstructure, as herein described, horizontal diagonal lateral rods H, attached to the brackets, near the extremities thereof, the rods being provided with a means of adjusting their length, substantially as set forth.

19. The combination, substantially as and for the purposes set forth, of the horizontal diagonal adjusting-rod H and the vertical connecting plate or web *q* of the bracket S B.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD S. SHAW.

Witnesses:

JOS. O. BURDETT,

WALTER L. BOUVÉ.