(No Model.) 5 Sheets—Sheet 1.

G. A. LANCASTER.

ELEVATED RAILWAY.

No. 574,807. Patented Jan. 5, 1897.

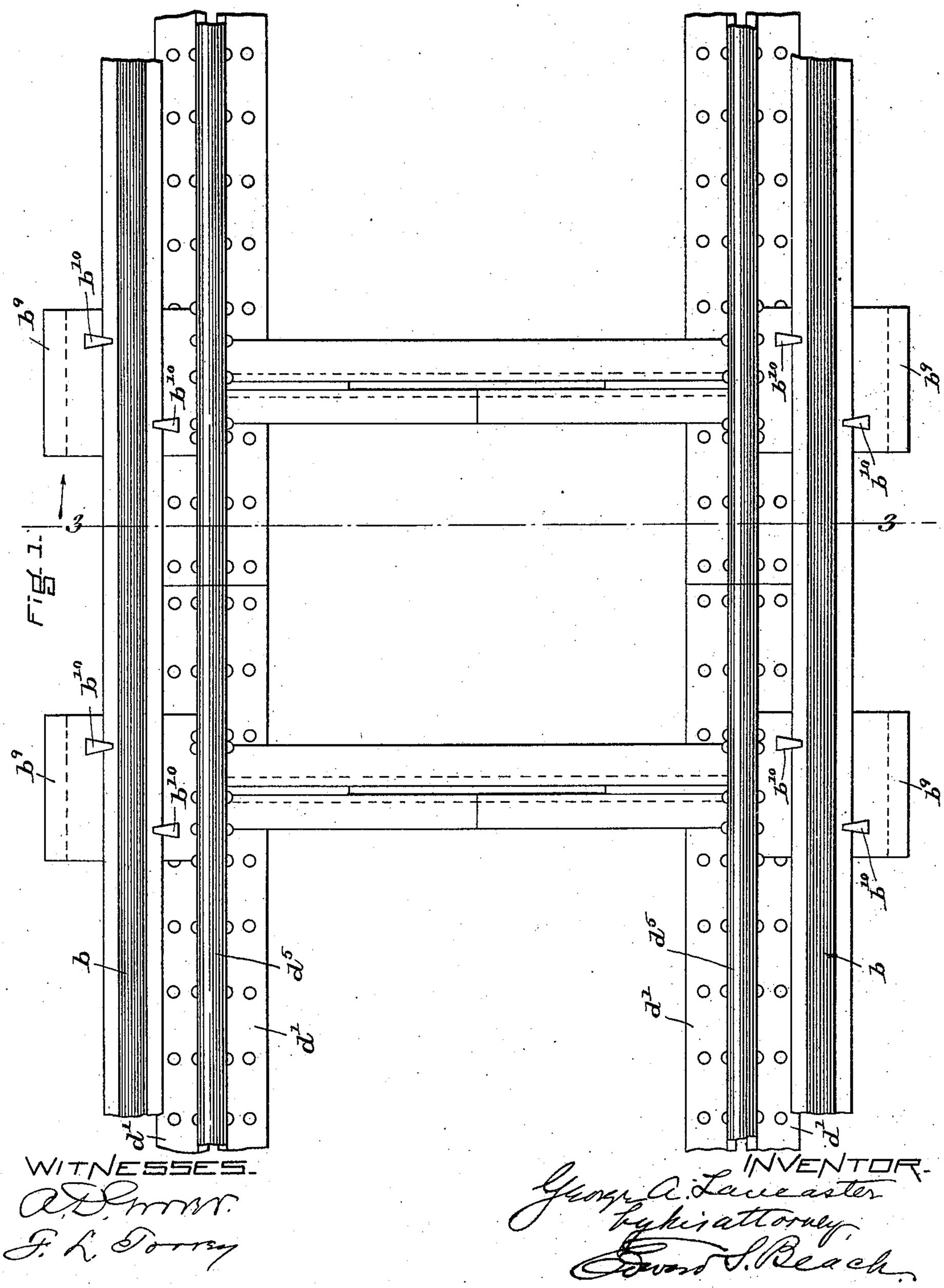

Fig. 1.

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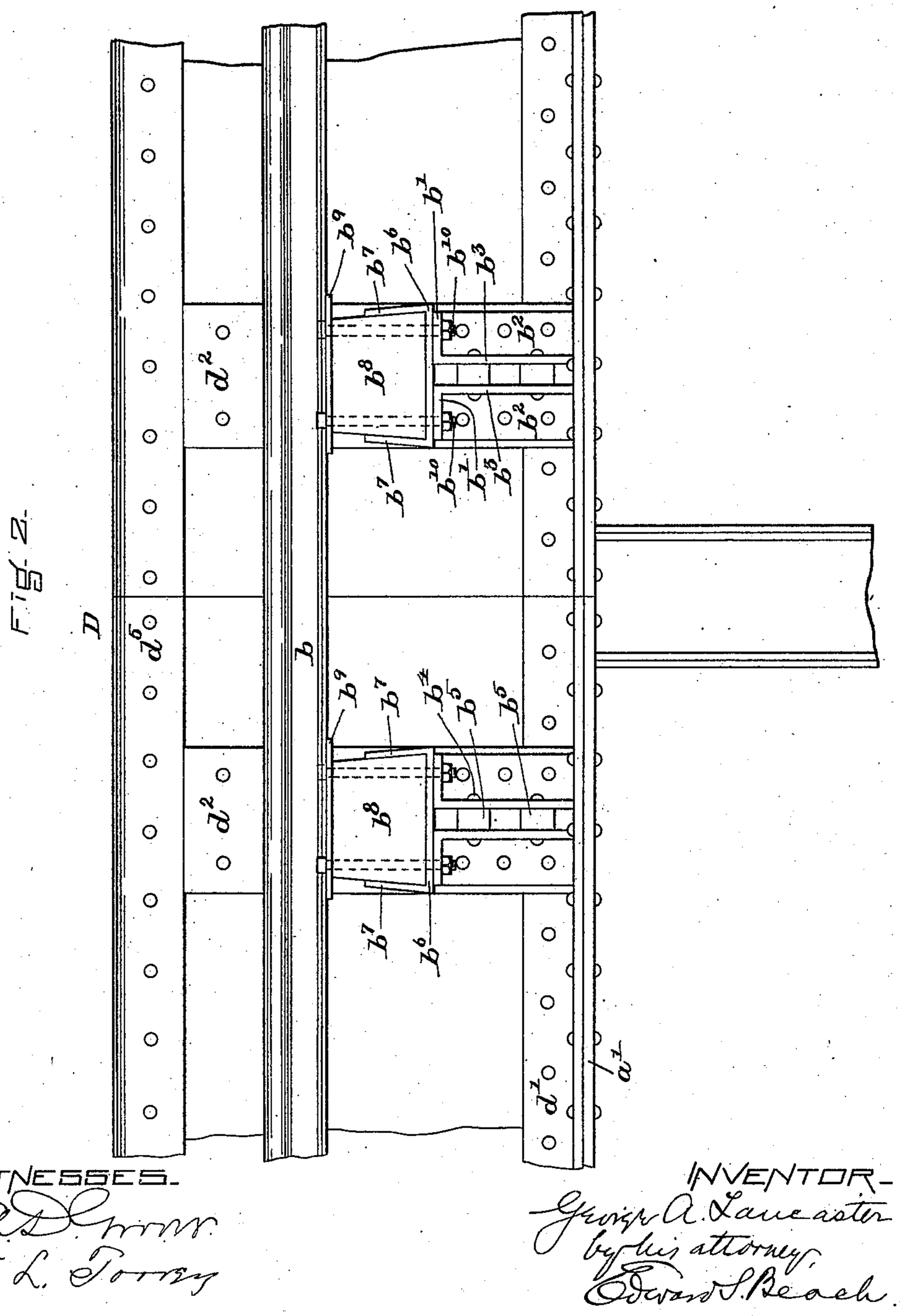

FIG. 2.

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(No Model.) 5 Sheets—Sheet 3.

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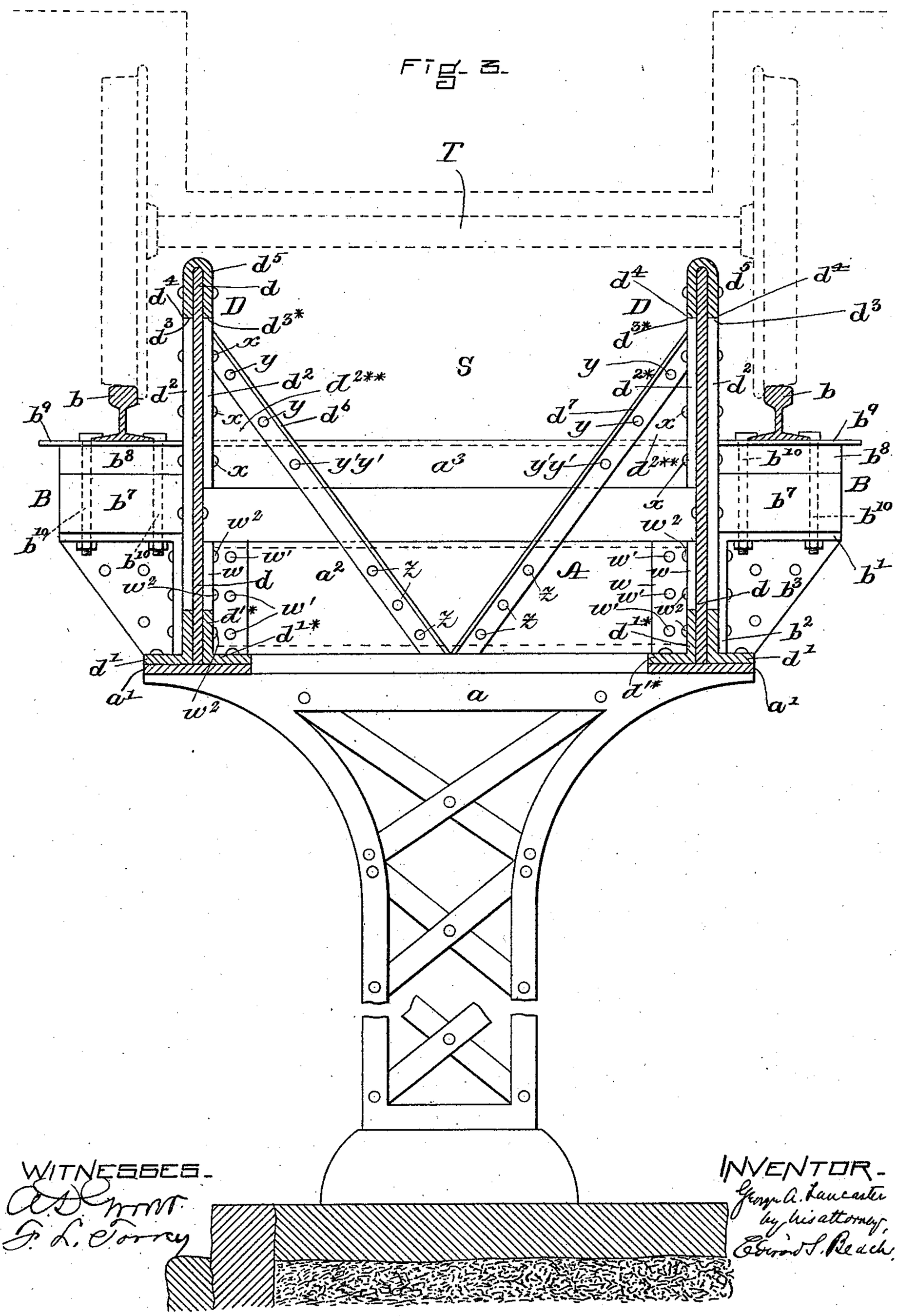
ELEVATED RAILWAY.

No. 574,807. Patented Jan. 5, 1897.

Fig. 5.



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(No Model.) 5 Sheets—Sheet 4.

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ELEVATED RAILWAY.

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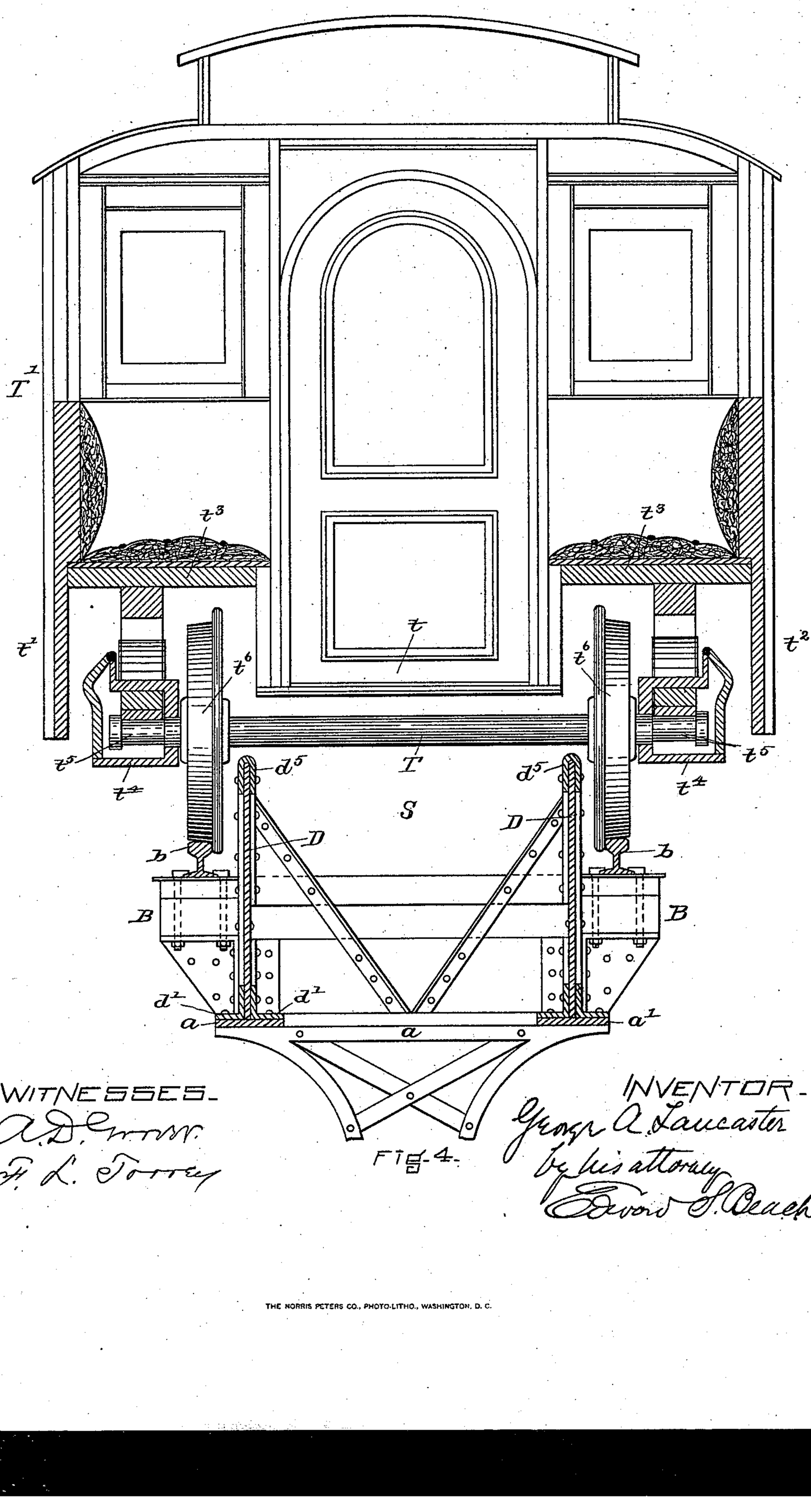

FIG. 4.

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(No Model.) 5 Sheets—Sheet 5.

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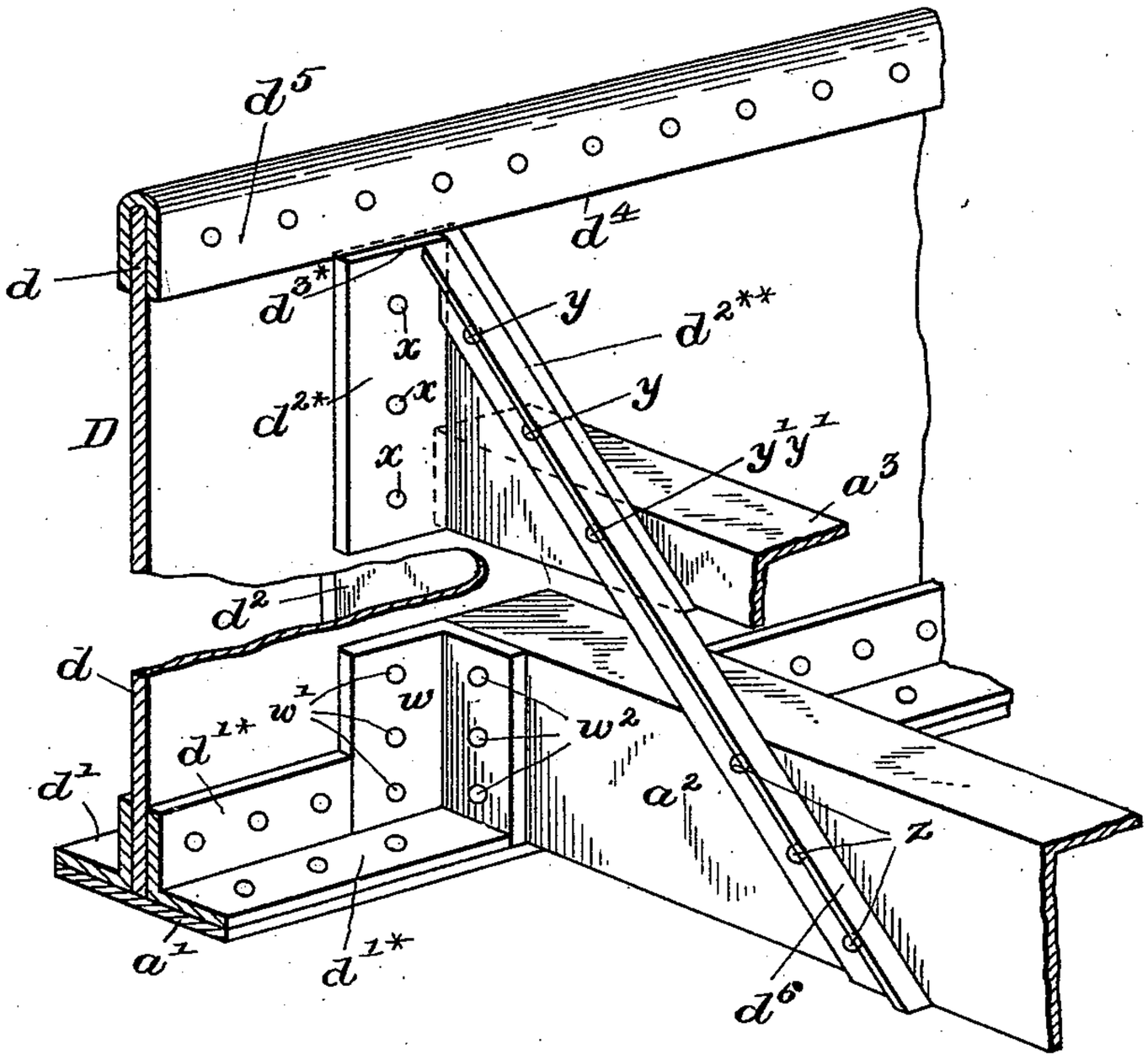
ELEVATED RAILWAY.

No. 574,807. Patented Jan. 5, 1897.

Fig. 5.



WITNESSES

E. A. Allen.

H. P. Deichert.

INVENTOR

George A. Lancaster

by his attorney,

Edward S. Beach.

UNITED STATES PATENT OFFICE.

GEORGE A. LANCASTER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO EDWARD S. BEACH, TRUSTEE, OF SAME PLACE.

ELEVATED RAILWAY.

SPECIFICATION forming part of Letters Patent No. 574,807, dated January 5, 1897.

Application filed March 4, 1896. Serial No. 581,828. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. LANCASTER, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Elevated Railways and Rolling-Stock Therefor, of which the following is a specification.

Referring to the accompanying drawings, Figure 1 is a top plan view of a section of my improved superstructure; Fig. 2, a side elevation of the superstructure; and Fig. 3, a cross-sectional view of the superstructure on line 3 3 of Fig. 1, showing also in dotted lines a portion of a truck. Fig. 4 is a view showing one form of car-body in combination with the superstructure. Fig. 5 is a detailed view, partly in section, illustrating the interior bracing and construction of my new superstructure.

The objects of my invention are to produce a strong and safe and economically-constructed elevated railway and car therefor, the superstructure interfering in a minimum degree only with light for the street, retaining the least possible amount of snow and ice, being readily cleaned of snow and ice, and permitting track-repairs without interruption of or interference with traffic.

My invention consists in the hereinafter-described features of construction whereby the objects of my invention are effected.

In the drawings illustrating the principle of my invention and the best mode known to me of applying that principle, A is the superstructure, and B its rail-supporting projections, which are exterior to the guard-rails D D, the tops of which are in a higher plane than the tops of the track-rails *b*, so as to form spaces (between the guard-rails on each side, the axle T, and the interior braces of the superstructure) for passage of motors or other apparatus under the cars or engine.

In the present preferred embodiment of my invention superstructure A is erected on the heads *a* of a series of T-like posts. The guard-rails D are built up of planes *d*, set edgewise and secured at their lower ends by angle-irons *d'*, which are bolted to plates *d*, as well as to the horizontal base-plates *a'*, that connect the heads *a* of the posts near the outer ends of the arms of the posts. The lower edges of the plates *d* rest vertically on the base-plates *a'*. Guard-rails D also comprise exterior reinforcing side plates d^2, (their lower edges resting on the top of the angle-irons *d'*,) which are bolted to the plates *d* and terminate short of the top edges of plates *d*, forming horizontal bearing-surfaces d^3, on which rest the edges d^4 of the inverted troughed or U-shaped cap d^5. On the inner surface of the guard-rails D (or girders) are placed at intervals angle-irons d^{2*}, having upper bearing-surfaces d^{3*}, on which rests the inner edge d^4 of each troughed cap d^5. That part of each plate *d* which projects above its reinforcing side plates d^2 fits in the recess between the legs of the U-shaped cap-rail, which is held in place by bolts through its sides and the intermediate projecting portion of plate *d*. The outer edge or back of the cap is laterally curved and smooth, and if, by reason of the breakdown of a truck or any other cause, a car-body or locomotive while in motion falls on the tops of the guard-rails it slides along on them without breaking or tearing up the superstructure by reason of engagement with projecting parts.

Guard-rails D are tied in vertical position by suitable braces d^6 d^7, which are secured to the inner side of the guard-rails near the tops thereof and extend downwardly and inwardly to middle longitudinal line of the superstructure, where they are secured to the cross-plates a^2. They are also fastened to the transverse plates or braces a^3, set edgewise and secured at their ends to the guard-rails. The details of this interior bracing will be best understood by reference to Fig. 5, where the angle-irons d^{2*} are clearly shown, and they are seen to be provided with right-angular extensions d^{2**}, the body portion being bolted to plate *d* by bolts *x x*. The upper ends of the inclined braces d^6 d^7 are bolted to the angular inward projection d^{2**} of angle-irons d^{2*} by bolts *y*, and these braces d^6 d^7 are each bolted to the transverse brace a^3 at *y' y'*. The lower portions of the braces d^6 d^7 are bolted to the transverse angle-iron a^2 at *z*. This brace or angle-iron a^2 is secured at each end to the parallel guard-rails or girders D by angle-irons *w*, one web of the angle-irons *w* being bolted to the guard-rails

D by bolts w', while the other web is bolted to the angle-irons a^2 by bolts w^2, and angle-iron d'^* is secured to the plate d and to the plate a' with an end in contact with the guard-rail member of the angle-iron w. In this description I have referred to the use of bolts, but of course any suitable fastening may be used. Track-rails b are supported outside the guard-rails upon a series of removable bearing-blocks, preferably of wood, which are in turn supported by a series of projections B from the sides of the superstructure and below the tops of the guard-rails. Each projection B is preferably made up of a pair of angle-iron brackets, each having, preferably, a horizontal top flange b', vertical back flange b^2, and vertical body-plate b^3. Back flanges b^2 of each pair are bolted to the lower portions of the guard-rails, with their lower ends resting on the horizontal flanges of angle-irons d', with their body-plates opposed one to the other and secured together by transverse bolts b^4 through the plates and preferably intermediate blocks b^5, and with their top flanges b' projecting outward and horizontally to support the U-shaped block-cases b^6, which are secured to flanges b' b' with their legs b^7 pointing upwardly. Between the legs b^7 of the block-cases b^6 rail-blocks b^8 are mounted. These rail-blocks stand at right angles to the guard-rails and are inserted on and removed from the brackets in a path at an angle to the guard-rail, the legs or upwardly-pointing webs b^7 of the block-cases standing at right angles to the guard-rails, so that all tendency of the rail-blocks, which are rail-cushioning devices, to creep in a direction lengthwise with the track-rails is prevented. Between the upper surface of these blocks and the bottom of the rails I prefer to place shoe-plates b^9, on which the rail directly rests, the shoe-plates b^9 preventing the rail from being pounded into blocks b^8, which are preferably of wood or some other non-metallic material, so as to lessen the noise of the train running on the tracks.

The block-cases, blocks, and shoe-plates are secured in place and preferably together by bolts b^{10}, whose heads engage the bottom flanges of the rails and whose shanks pass through the shoe-plates, blocks, block-cases, and flanges b'. By removing bolts b^{10} blocks b^8 are readily removed and replaced by others, and in case of a sag in the track-rails the rail can be readily raised by putting in new blocks of greater height. In general the blocks can be removed and replaced and the track be thereby adjusted or repaired without removing a rail and interfering with traffic. It is to be noted that in this preferred construction the rail-supporting projections are not, as heretofore, the ends of transverse cross-beams of the superstructure, but are brackets secured to the superstructure without the guard-rails. By this construction I produce a superstructure which is free from the multiplicity of rail-supporting cross beams or ties, which have heretofore greatly interfered with the passage of light to the street below and unnecessarily increased the multiplicity of parts required for strength and durability. The combined plates d d^2 d^{2*} rise above the base-plates a' and form posts (see Fig. 2) on which the cap d^5 or top of the guard-rail is supported, the cap and plate d being continuous in the direction of the rails b, but the plates d^2 d^{2*} non-continuous.

The cap d^5 and the angle-irons d' d'^* form the top and bottom chords, respectively, of girders whose web verticals are formed of the plates d and reinforcing-plates d^2. It is of course immaterial to the main features of my invention embodied in the superstructure proper how the girders or trusses are constructed, but the construction shown and described is simple, cheap, and strong. The fact that stringers for the rails are dispensed with is important, because the stringers serve for the collection of snow and ice. Projections B are preferably cantalivers and may be constructed otherwise than as described, if desired.

To bring the car platforms or floors as low as possible (for the height of the posts or other superstructure-supports in elevated railways is generally governed by municipal regulations) and to decrease the number of steps in stairs to stations, and also for the sake of getting rid of the exterior guard-rails or stringers in substantially the same plane as the track-rails, these being obstructions to light and lodging-places for snow and ice, the tops of the track-rails are as far below the tops of the guard-rail D as the radius of the car-wheels will permit and yet allow the axle T to pass over and just above the caps d^5 of the guard-rails or girders between the track-rails. By this simple arrangement the guard-rails D between the wheels, as they reach well nigh to the axle T, are alone sufficient to prevent the cars being thrown from the superstructure. The center of gravity of the cars and locomotive is lowered in relation to the rails and exterior guard-rails rendered unnecessary. To decrease the width of the cars, I locate the car-floor t between the wheels and as near the axle T as is practical, the upper half of the wheels extending upwardly between the side lines t' t^2 of the car-body, preferably under the car-seats t^3. In this instance I mount the car-body T' on trucks which comprise boxes t^4, on which ends t^5 of the axle T are mounted on the outer side of the wheels t^6 on axle T.

All details of construction may be changed, if desired, without departure from my invention, the novel feature of which is hereinafter concisely stated.

What I claim is—

1. The combination of a pair of parallel girders, each having an outwardly-projecting lower flange; and a series of exterior upright plates; a series of exterior brackets mounted

on said flange and secured to said upright plates and connected girders; a series of block-cases mounted on said brackets; a series of blocks mounted in said cases; and track-rails, said track-rails being exterior to and in a lower plane than the tops of said girders.

2. The combination of parallel girders; a series of projections mounted on and projecting from the outer sides of each of the girders; a series of separate blocks detachably connected with and supported separately on said projections and movable in a path at right angles to the girders for renewal, and rails mounted on said blocks.

3. The combination of a girder with a projection at the side thereof, a block-case; a block removably secured in said case and a track-rail with or without a shoe-plate between the rail and the block.

4. A girder guard-rail having a continuous smooth-surfaced top cap formed of an inverted troughed rail, the sides of which are secured to the body of the girder-rail.

5. The combination of a wheeled vehicle having its floor between its wheels and seat-spaces over the wheels with wheel journal-box and connections for the vehicle-body and said box extending upwardly above the vehicle-floor under the seats.

6. In a railroad for quick and safe transportation, the combination with a superstructure comprising parallel girders, the upper portions of which form guard-rails, track-rails exterior to said girders with their tops in a lower plane than the tops of the said girders, and a series of cushioning adjustably-mounted rail-blocks and brackets therefor, said brackets being attached to and projecting from said parallel girders, of a wheeled vehicle having axles to connect its wheels which run on said track-rails, and having its axle in close proximity to the tops of said girders, and its floor in close proximity to said axle and between said wheels.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 26th day of February, A. D. 1896.

GEORGE A. LANCASTER.

Witnesses:

EDWARD S. BEACH,

E. A. ALLEN.