(No Model.)

6 Sheets—Sheet 1.

E. B. MEATYARD.

RAILWAY CAR.

No. 293,265. Patented Feb. 12, 1884.

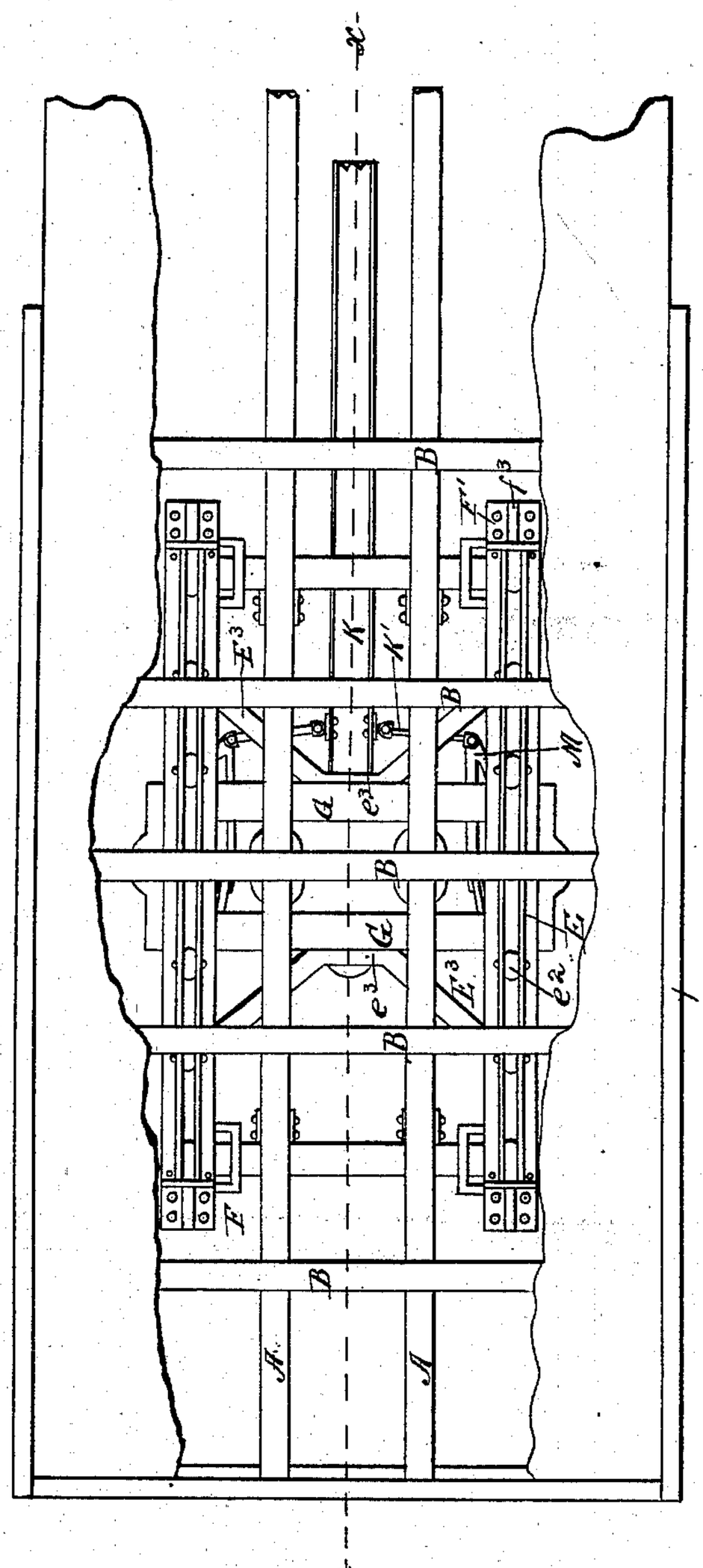

Fig 1

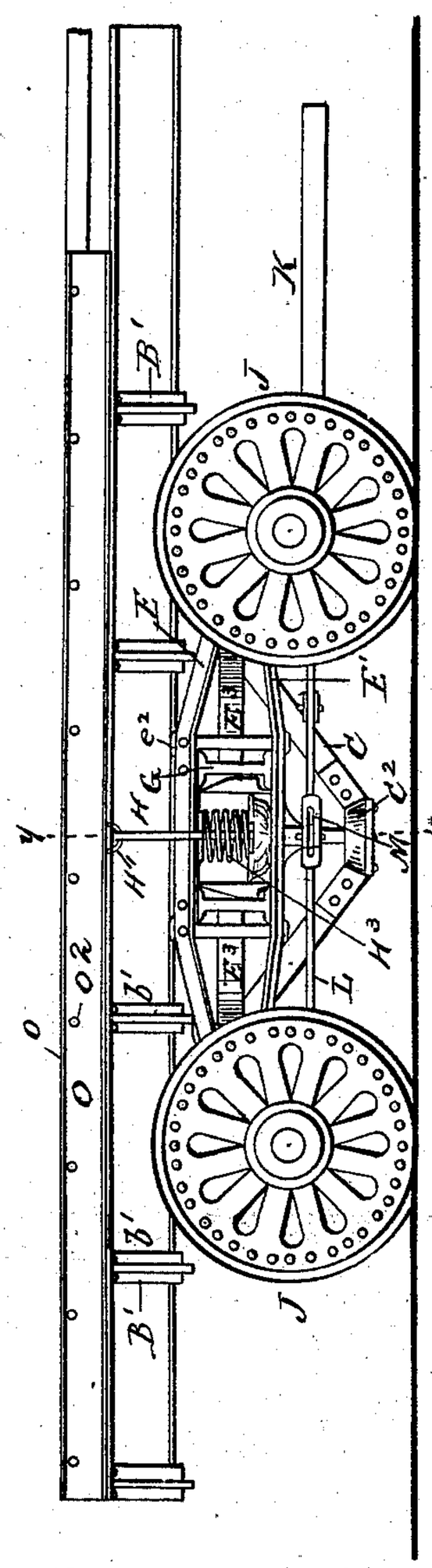

Fig 2

Witnesses
W. C. Corlies
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Inventor
Edward B. Meatyard
By Coburn & Shaeber
Attorneys

(No Model.)

6 Sheets—Sheet 2.

E. B. MEATYARD.

RAILWAY CAR.

No. 293,265. Patented Feb. 12, 1884.

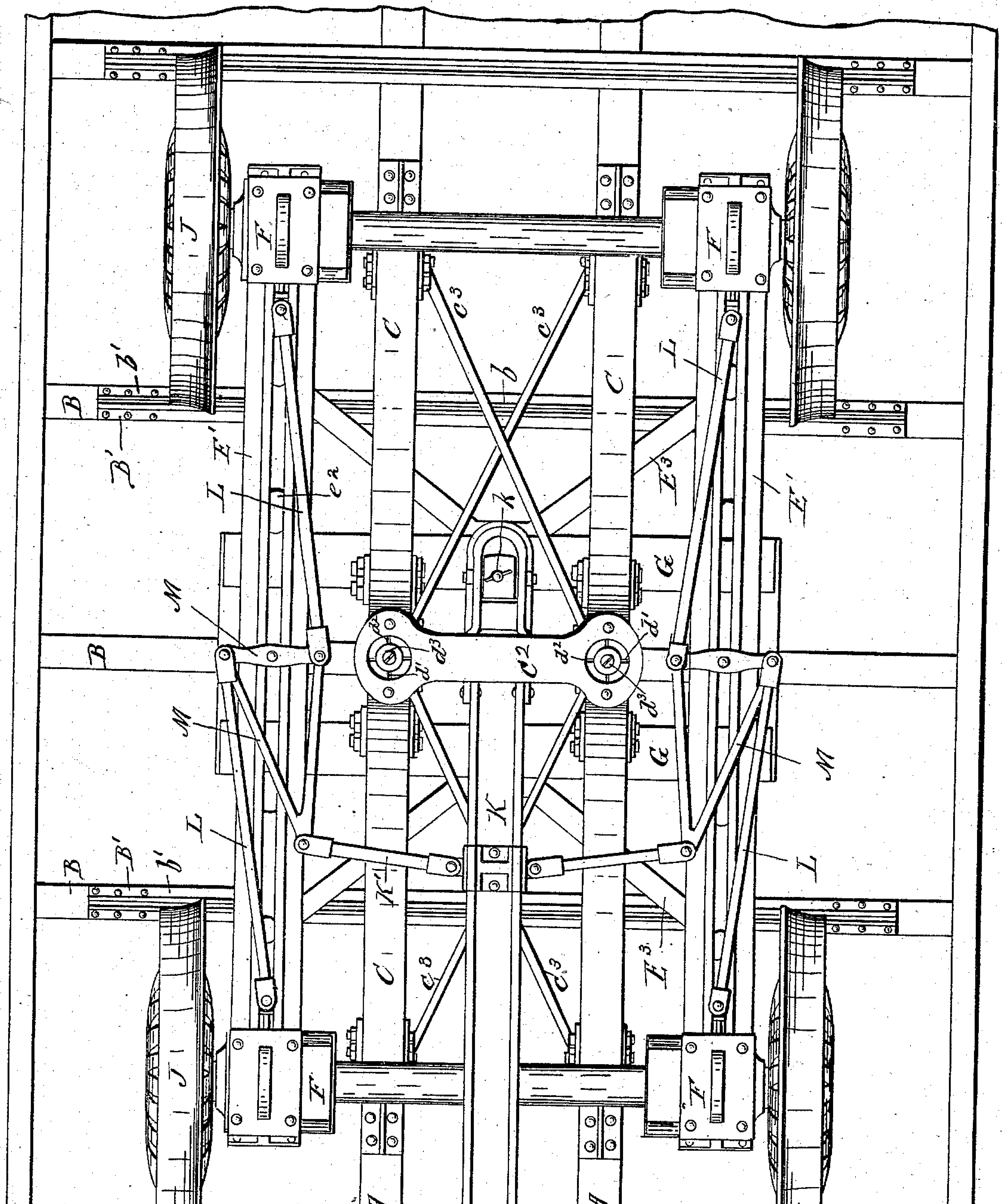

Fig 3

Witnesses
W. C. Corlies
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(No Model.)

6 Sheets—Sheet 3.

E. B. MEATYARD.

RAILWAY CAR.

No. 293,265. Patented Feb. 12, 1884.

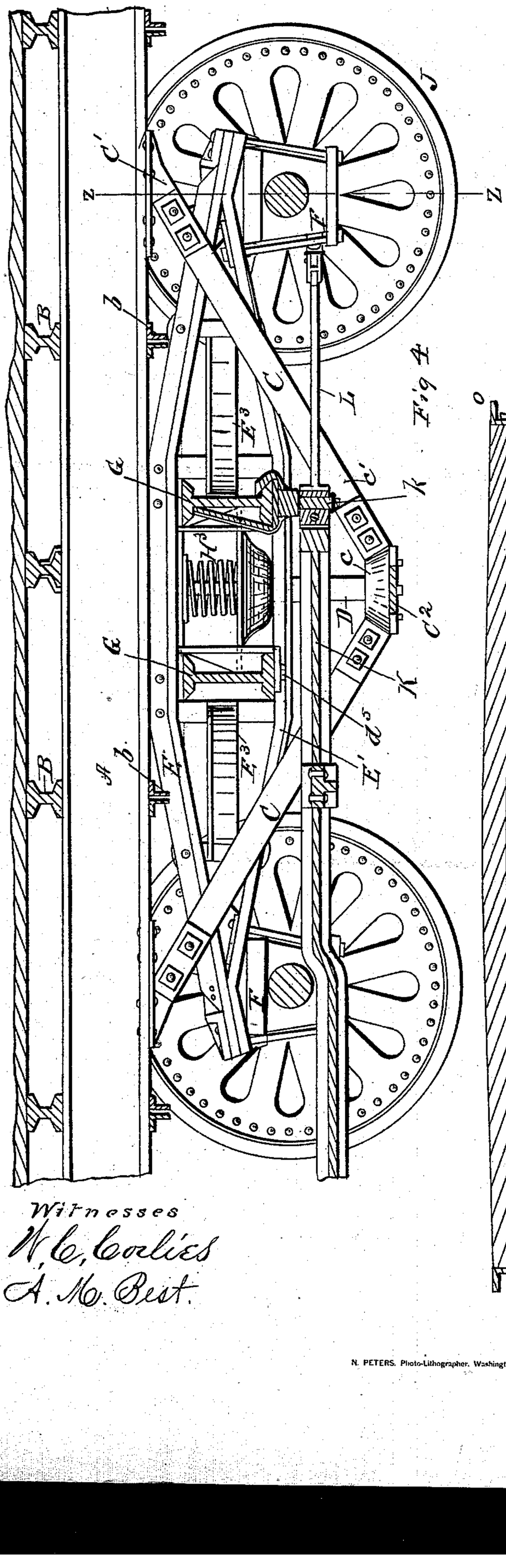

Fig 4

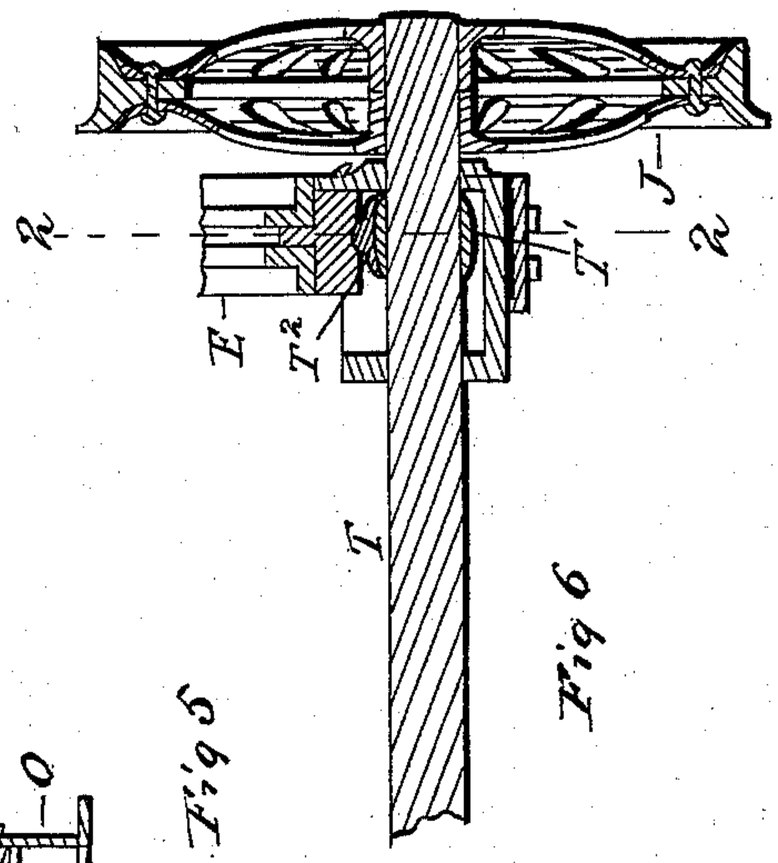

Fig 6

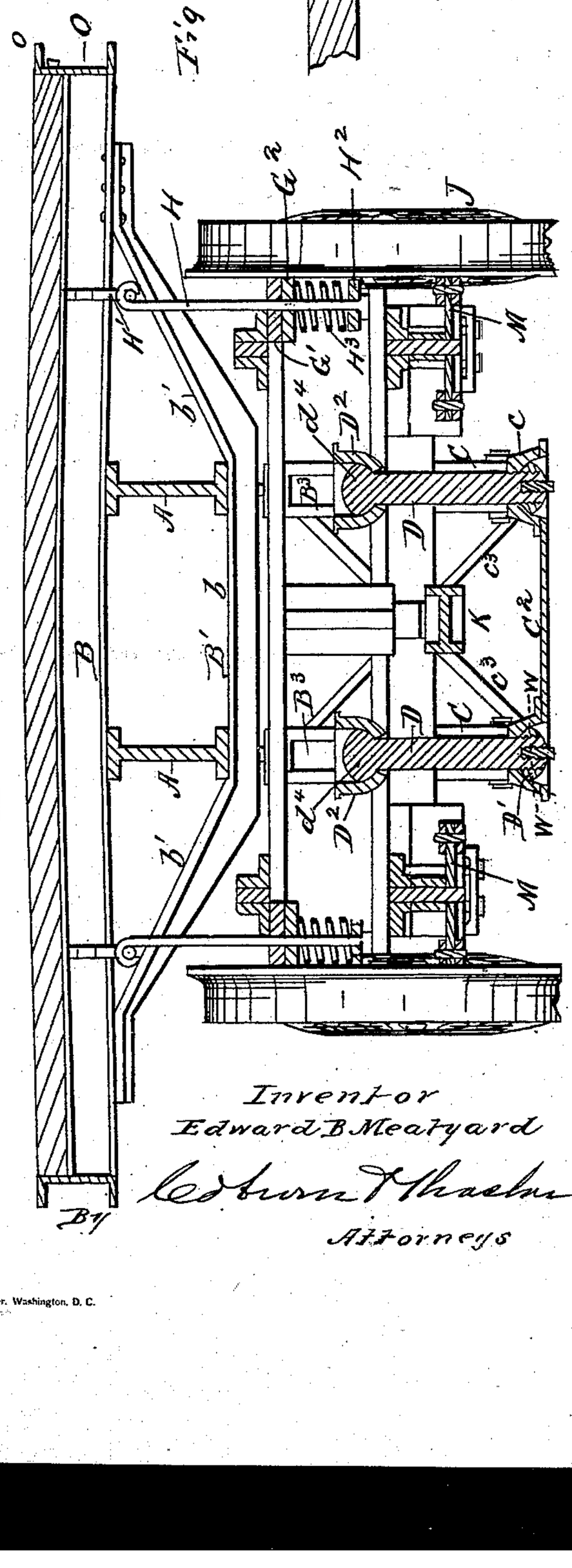

Fig 5

Witnesses
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(No Model.)

6 Sheets—Sheet 4.

E. B. MEATYARD.

RAILWAY CAR.

No. 293,265. Patented Feb. 12, 1884.

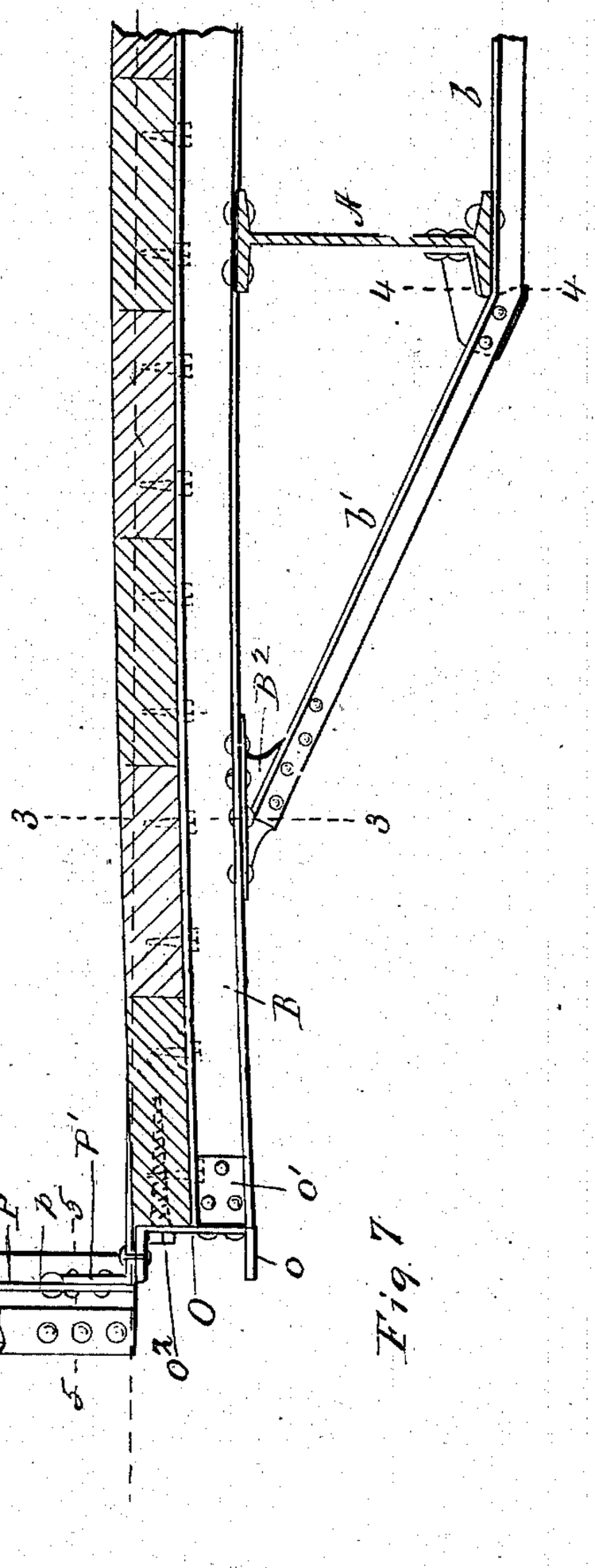

Fig. 7

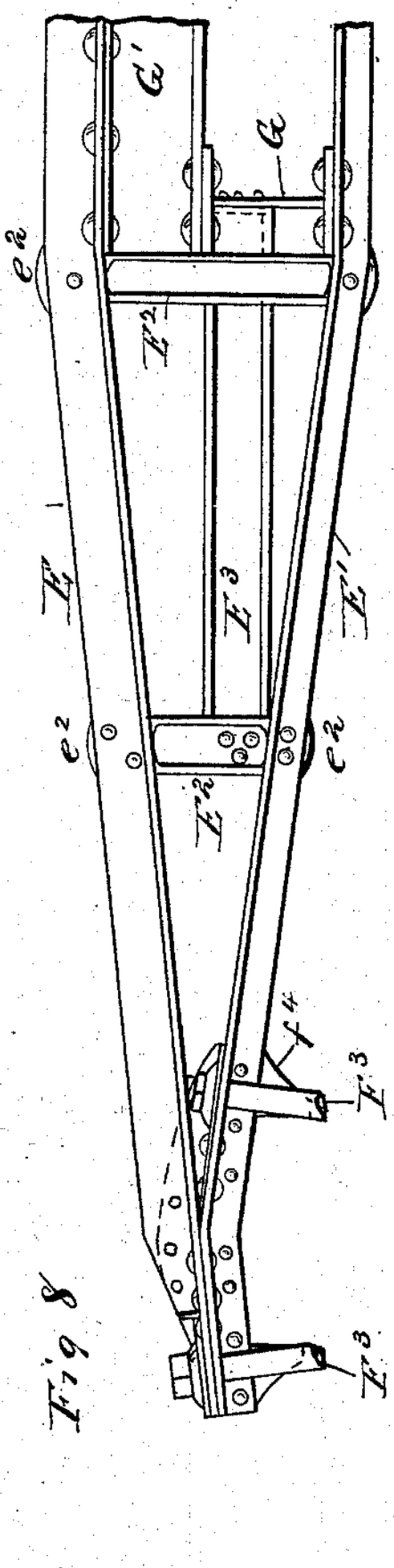

Fig. 8

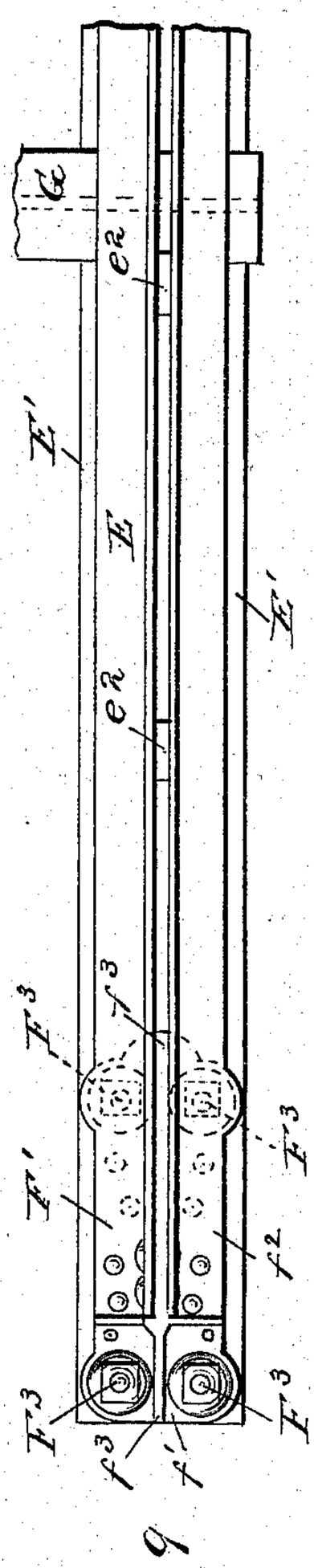

Fig. 9

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(No Model.) 6 Sheets—Sheet 5.

E. B. MEATYARD.

RAILWAY CAR.

No. 293,265. Patented Feb. 12, 1884.

Fig 11

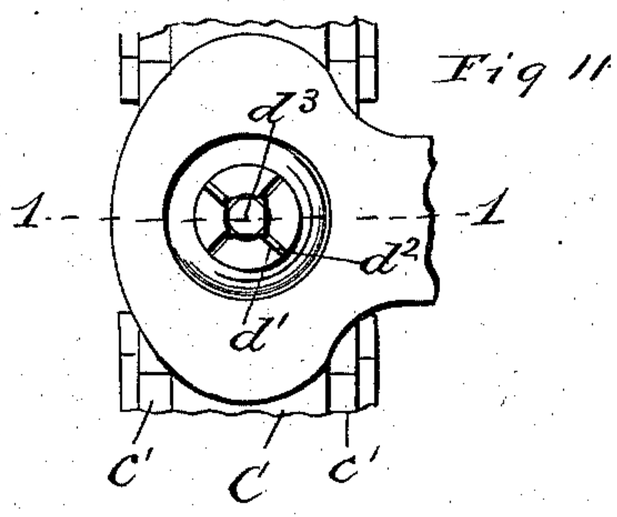


Fig 12

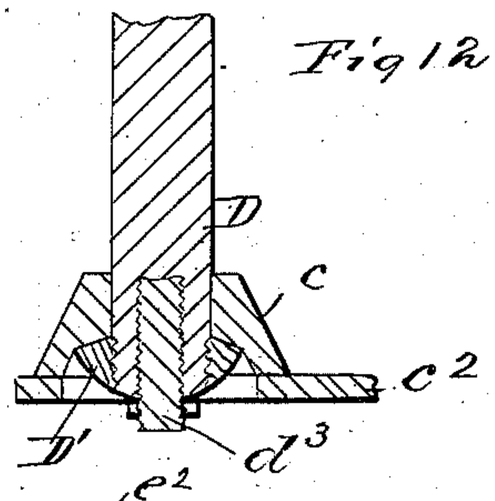
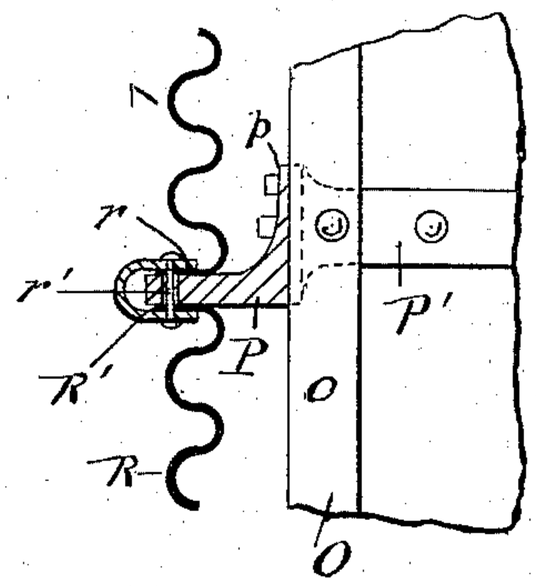


Fig 10



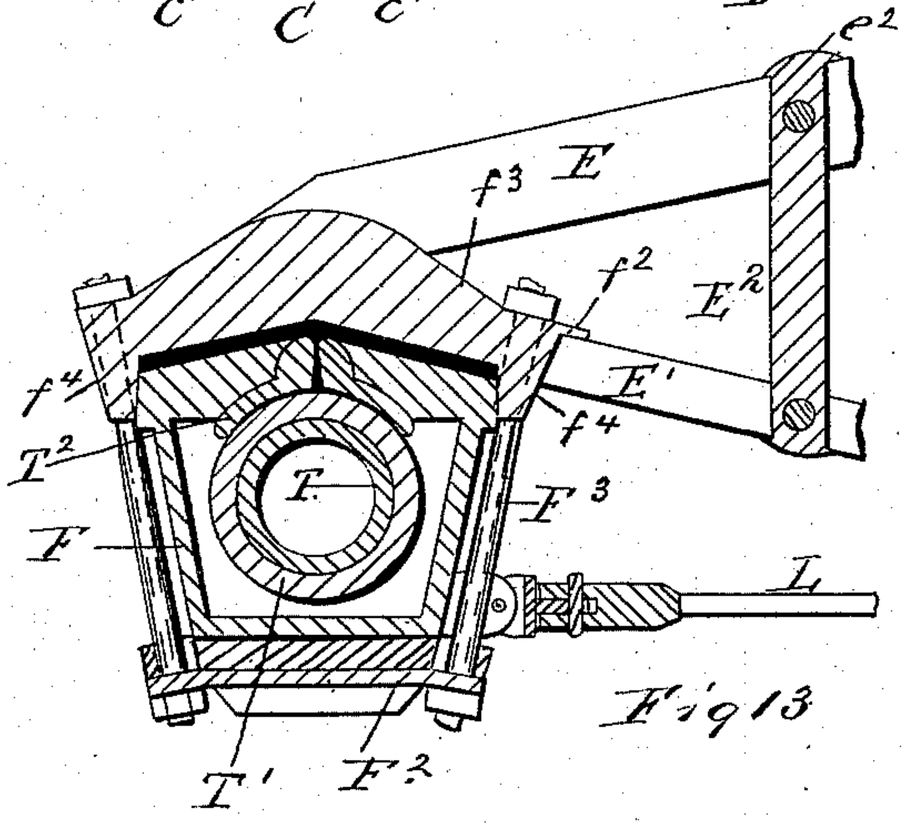


Fig 13

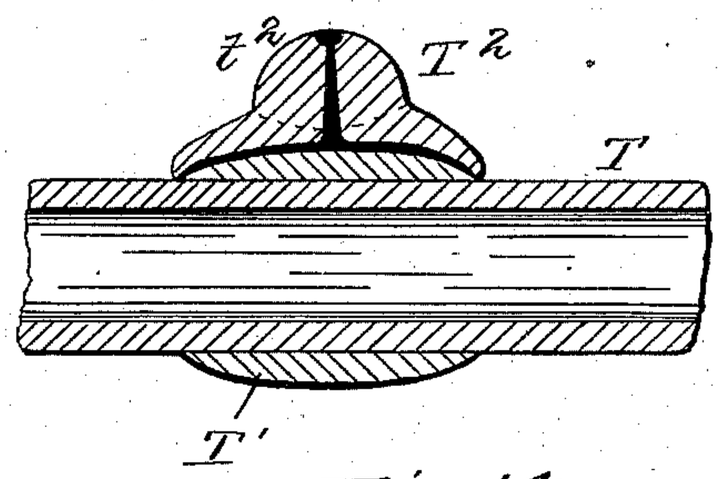


Fig 14

Fig 15.

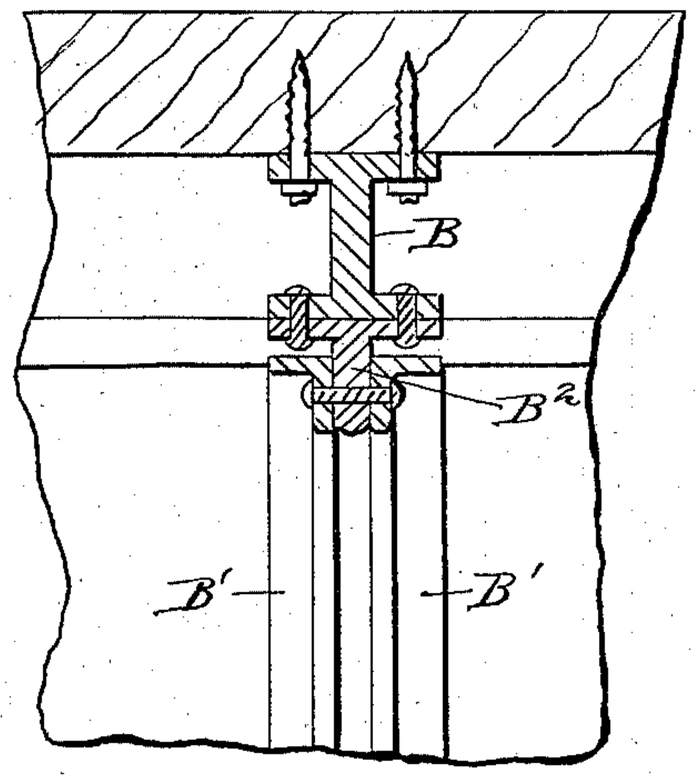
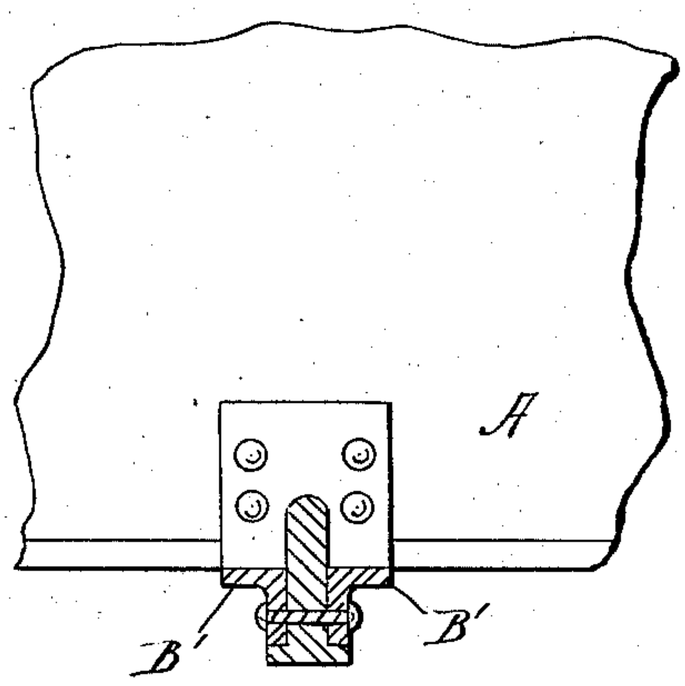


Fig 16.



Witnesses
H. C. Coles
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(No Model.)

6 Sheets—Sheet 6.

E. B. MEATYARD.

RAILWAY CAR.

No. 293,265. Patented Feb. 12, 1884.

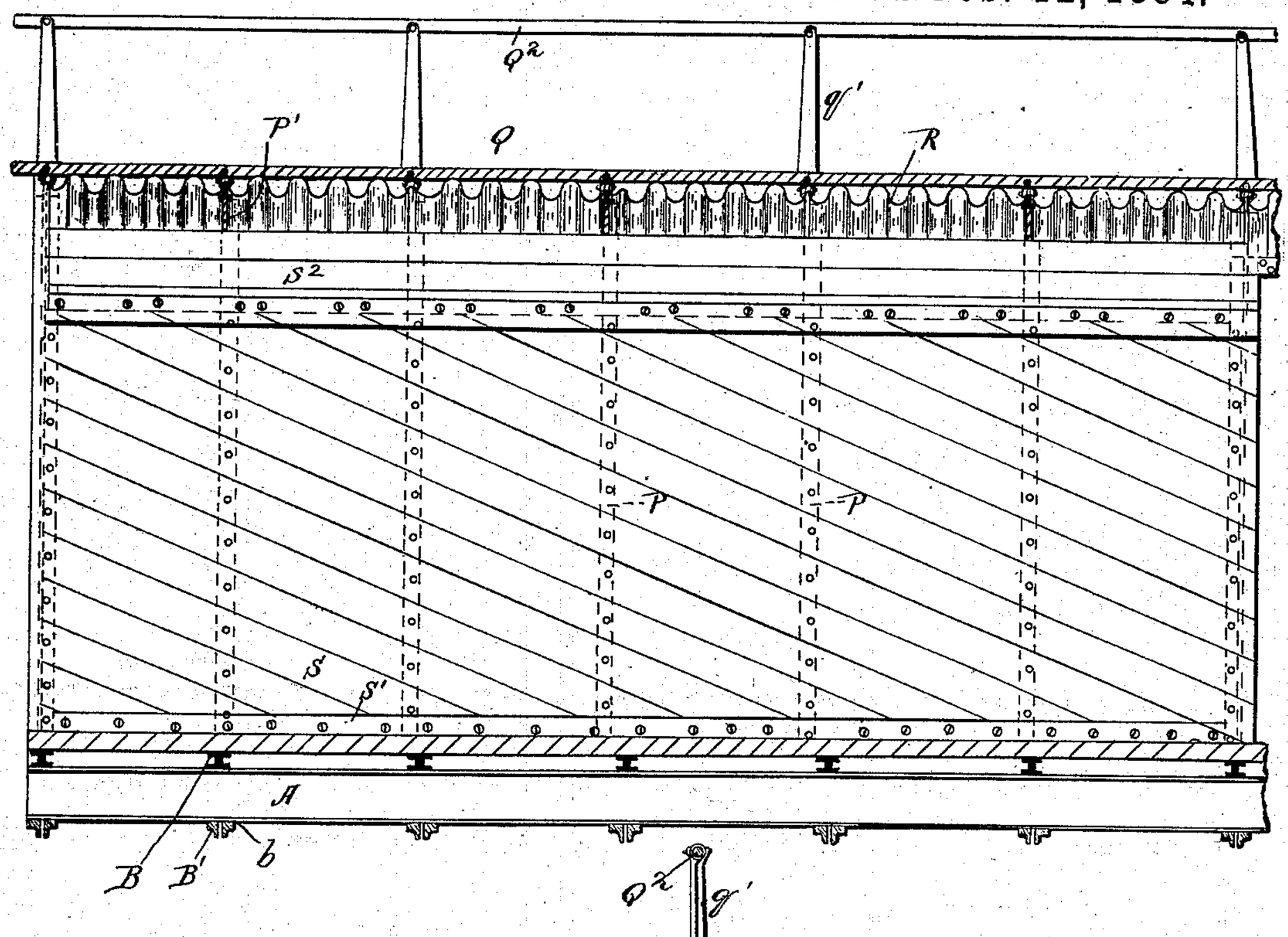

Fig 17

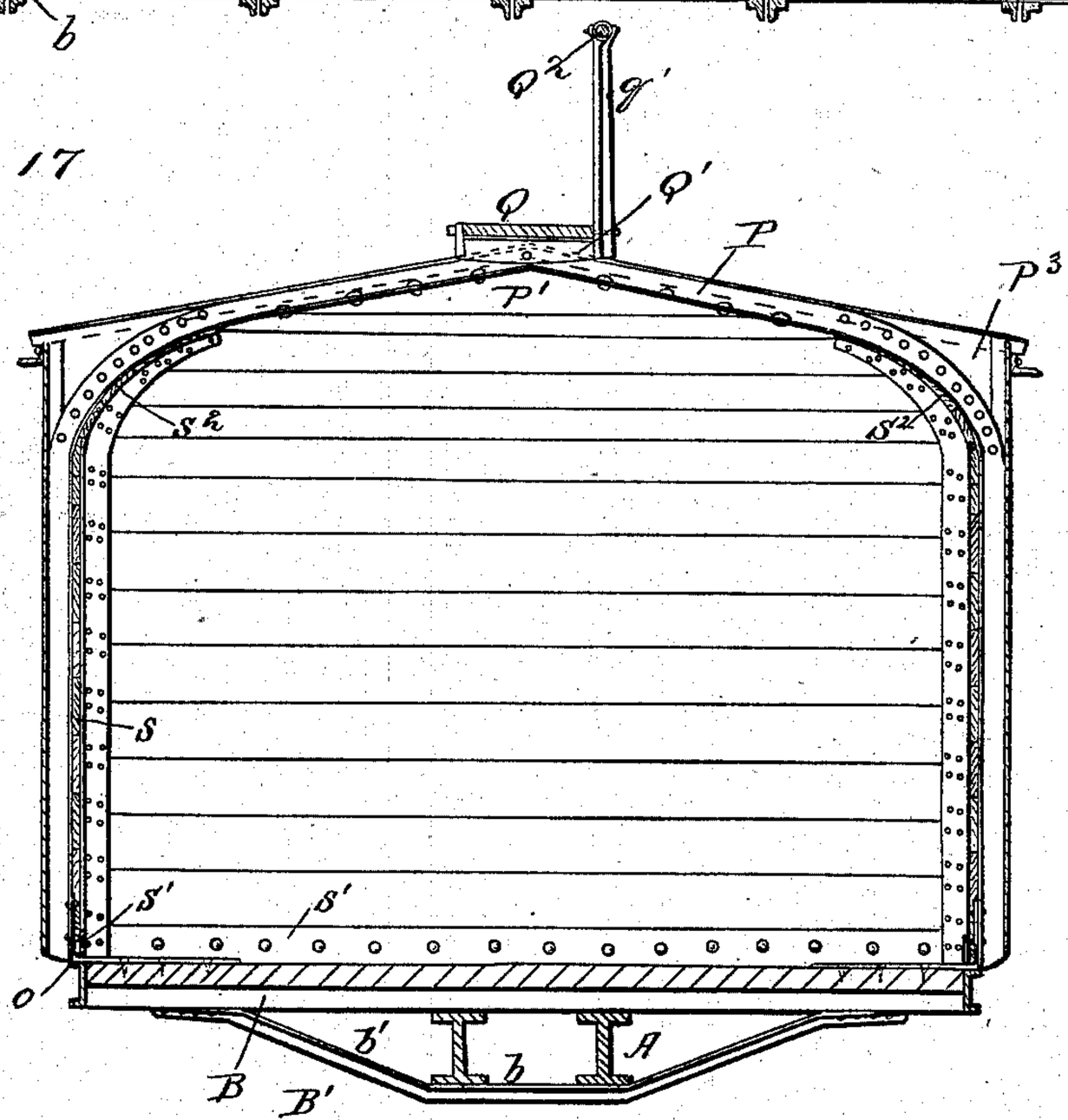

Fig 18

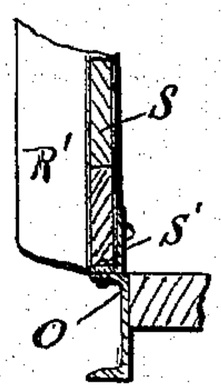

Fig 19

Witnesses
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UNITED STATES PATENT OFFICE.

EDWARD B. MEATYARD, OF LAKE GENEVA, WISCONSIN.

RAILWAY-CAR.

SPECIFICATION forming part of Letters Patent No. 293,265, dated February 12, 1884.

Application filed May 7, 1883. (No model.)

To all whom it may concern:

Be it known that I, EDWARD B. MEATYARD, a citizen of the United States, residing at Lake Geneva, in the county of Walworth, in the State of Wisconsin, have invented certain new and useful Improvements in Railway-Cars, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of one truck, with the corresponding part of the floor-supports, of a car having my improvements. Fig. 2 is a side elevation of the same. Fig. 3 is an enlarged bottom view of the same. Fig. 4 is a section on the line *x x* in Fig. 1. Fig. 5 is a section on the line *y y* in Fig. 2. Fig. 6 is a detailed section on the line *z z* in Fig. 4. Fig. 7 is a detailed and enlarged cross-section (extending about half-way across the car) of the floor and the lower part superstructure, showing also in side elevation one of the truss-bars which aid in supporting the floor. Fig. 8 is an enlarged side elevation of one of the side beams for about half its length, showing also its connection with the axle-box and cross-beam. Fig. 9 is a plan view of the same. Fig. 10 is an enlarged detailed section on the line *v v* in Fig. 7. Fig. 11 is an enlarged detailed section on the line *w w* in Fig. 5. Fig. 12 is a section on the line *l l* in Fig. 11. Fig. 13 is an enlarged detailed section in the line 2 2 in Fig. 6. Fig. 14 is a detailed axial and vertical section of the axle-bearing. Fig. 15 is an enlarged detailed section on the line 3 3 in Fig. 7. Fig. 16 is an enlarged detailed section on the line 4 4 in Fig. 7. Fig. 17 is a longitudinal vertical section of the floor and superstructure. Fig. 18 is a section on the line 5 5 in Fig. 7. Fig. 19 is a detailed and enlarged section, showing the junction of the ceiling with the floor.

The same letters denote the same parts in all the figures.

My invention relates to railway-cars; and the object of it is to increase the stability of the car on its trucks, the strength of the trucks themselves, the stability and durability of the axle-bearings, and the strength and lightness of the superstructure, and generally to perfect the adaption of the car to its work.

To these ends it consists in the several devices and combinations of devices which will be fully set forth hereinafter, and definitely pointed out in the claims.

In the drawings, A denotes a pair of parallel longitudinal beams, preferably I-beams, of wrought iron or steel, which extend from end to end of the car, near its middle, each being about three times as far from the nearest outer edge of the superstructure as from the middle. On these two beams the whole superstructure is supported. On them rest the transverse floor-joists B, which are also preferably I-beams, of wrought iron or steel. They are riveted or bolted to the upper sides of the longitudinal beams. Truss-bars B′, each composed of a middle part, *b*, about as long as the distance between the outside edges of the longitudinal beams, and a part, *b′*, at each end, bent at an obtuse angle to the middle part, the two angles being equal, are then in like manner riveted or bolted through the parts *b* to the under sides of the longitudinal beams opposite to the joists. The parts *b′* in each truss-bar are purposely made not quite long enough to reach the under side of the corresponding joist when the bar is fastened under the longitudinal beams in the manner described, but must be long enough to reach within the distance to which the ends of the joists can be bent down without impairing their elasticity. The ends of the joists are then subjected to pressure sufficient to force them down into contact with the ends of the truss-bars, which are then riveted or bolted to the under sides of the joists by means of intervening angle-plates, B^2. The joists are thus cambered, so that when the car is empty the upward tendency of their ends, in counteraction to the downward pull of the truss-bars, holds the fastenings of the two perfectly tight. When, on the other hand, the car is loaded, the weight is partly borne by the stiffness of the joists, any excess operating to convert the tension on the truss-bars into compression. This construction is shown in Figs. 7, 15, and 16. The truss-bars are preferably formed each of a pair of angle-bars arranged side by side. Each joist and truss-bar is arranged either before or behind the wheels, so that the floor of the car may be as low as is consistent with clearing the wheels. The construction of these

parts, except the cambering just described, is mainly the same as that shown in my Patent No. 274,805, dated March 27, 1883.

The longitudinal beams are supported at the ends of the truck by a V-shaped longitudinal bolster, C, sloping down from each end to a point as low as is consistent with clearing the track. The bolster is double, each of the longitudinal beams being supported by a corresponding half of the bolster. At the apex of each half is a shoe, *c*, of cast metal, with a pair of flanges projecting forward and similar pair projecting backward, each pair receiving between them one end of a bar, *c'*, (preferably an I or channel beam,) whose other end is held by a similarly-flanged shoe, C', bolted or riveted to the lower flange of the corresponding longitudinal beam A. The bar *c'* is fastened in the shoes by bolts or rivets, or in any other suitable manner. The two shoes *c* are joined together by a horizontal brace, c^2, of rolled iron or cast-steel, and each bar *c'* is joined to the opposite bar by a pair of cross-braces, c^3, the junctions being effected by means of angle-plates and bolts or rivets, or in any other suitable manner. The parts are thus consolidated into one bolster firm against lateral as well as longitudinal shocks. Each of the shoes *c* has between the pairs of flanges which embrace the bars *c'* a circular aperture, with a countersunk or chamfered margin. The aperture is large enough to allow the lower end of a cylindrical hanger, D, to pass freely through and oscillate in it. The hanger is threaded at its lower end and receives there a nut, D', which fits easily in the chamfered or countersunk portion of the casting *c*. The hanger has radial slots *d* in its lower end, and the nut has corresponding slots, *d'*, in its outer end, the slots in each case being about half as deep as the nut. The nut being turned so that one or more of its slots register with those of the hanger, one or more keys, d^2, of soft metal, may be inserted in the slots thus registering, and will prevent the nut from turning on the hanger. The hanger has a threaded bore in its lower end, in which is inserted a set-screw, d^3, whose thread cuts into the keys, and thus holds them from falling out. The screw must be of such dimensions as to crowd the thread of the hanger into that of the nut. This construction is shown in detail in Figs. 11 and 12. At its upper end the hanger has a spherical enlargement, d^4, which fits easily in a correspondingly-formed seat, d^2, which is supported between the cross-beams of the truck. The hanger can thus turn in its seat in any direction. The seat has an aperture in its bottom, through which the cylindrical part of the hanger can freely pass. This longitudinal bolster and its support in the cross-beams of the truck are similar in principle to the bow-shaped hanger described in my Patent No. 274,805, already referred to. The details of construction, however, are materially different, and are promotive of increased strength and economy and accuracy of adaptation of strength to strain.

The arched bar E and the truss-bar E' of each side beam of the truck are composed each of a pair of channel or angle bars arranged side by side a little distance apart. Upright braces E^2, passing between the components of the truss-bar below, and those of the arch-bar above, and secured at each end by bolts or rivets passing through the flanges of the beams and the enlarged button-like heads e^2 of the braces, hold the entire side beam firmly together. Each bar of the side beam extends in a straight line from the cross-beam each way to the point of first attachment to the axle-box, these points being at opposite ends of the axle-box, and the axle-box F sloping from the middle to each end, to correspond with the directions of the side bars, respectively, as shown in my Patent, Reissue No. 10,289, of February 20, 1883. Immediately over each axle-box F the side beams are re-enforced by a horn-plate, F', which consists of a broad, flat portion, *f'*, covering the outer end of the box and abutting against the end of the arch-bar, a similar but larger flat portion, f^2, covering the truss-bar just back of its junction with the arch-bar, a web, f^3, connecting the two flat portions extending over them in the form of a rib, and also filling the space between the two parts of both arch-bar and truss-bar, and two horns, f^4, projecting downward in front and rear of the axle-box. This construction is illustrated partly by dotted lines in Figs. 8 9 of the drawings. Each plate is fastened by bolts F^3 to the usual plate, F^2, under the axle-box. The cross-beams are double, consisting of a pair of I-beams, G, supported in the usual manner between the arch-bar E and the truss-bar E'. The depth of the cross-beams between the flanges is made as small as is consistent with due strength, in order that the flooring of the car may be as low as possible, and that there may be sufficient room for the longitudinal bolster C below them. A piece of T-iron, or two pieces of channel or angle iron, G', rest upon the cross-beams at each end, being just long enough to cover them, for the purpose of giving an increased depth where the arch-bar rests on the cross-beams, so that the divergent parts of the arch-bar and truss-bar may make a sufficient angle with each other.

Each of the seats D^2, in which the upper ends of the hangers D of the longitudinal bolster C are supported between the cross-beams, is itself pivoted in a pair of brackets, D^3, each of which embraces the upper and lower flanges of the corresponding cross-beams, and is secured to it by bolts or rivets d^5. Both side beams and cross-beams are secured against lateral deflection by means of horizontal braces E^3, preferably of angle-bar iron, which may be roughly described as V-shaped, the apex of the V being affixed to the outer side of web of one of the cross-beams G, and the sepa-

rated ends being in like manner joined each to one of the side beams by being bolted or riveted to that one of the braces E^2 joining the arch-bar E and truss-bar E′, which is nearest the axle-box. Instead of the apex of the V, however, there is a short straight side, e^3, riveted or bolted to the web of the cross-beam, and at each of the separated ends the bar is bent so as to be parallel with the brace E^2 where the two are similarly fastened together. The arch-bars are liable to lateral strains, which very often break them. By the horizontal bracing which I have described they are effectually secured against such strains.

To preserve the lateral balance of the car, a hanger, H, on each side hooks into a loop, H′, affixed to one of the floor-joists B, and passes down through an opening on the bar G′, which joins the cross-beams, and through a washer, G^2, which is fastened on the under side of that bar. The hanger also carries on its lower end a stop or washer, H^2, affixed to it. A coiled spring, H^3, confined between the two washers, tends by its elasticity to hold the car level on the truck, while it admits of yielding temporarily to any sudden shock in a vertical line on either side, and thus mitigates the jar therefrom. The same effect is aided by the construction of the wheels J, which have bodies or webs of elastic metal, substantially as described, in my Patent No. 260,593, of July 4, 1882. I also provide cushions above and below the axle-boxes, substantially as set forth in my application for a patent, No. 63,912, filed June 12, 1882. I believe that these devices will make the ordinary springs unnecessary; but, if desired, they or equivalent supporting-cushions may be inserted in the usual place between the cross-beams.

I connect the two trucks of each car by a reach, K, vertically and horizontally pivoted at each end to a cross-beam, as shown at *k* in Fig. 3. The two axle-boxes F on each side of each truck are pivotally connected with each other by means of a pair of rods, L, which also have a pivotal connection with a pivoted arm, K′, projecting from the corresponding side of the reach. The construction is in these respects substantially the same as that shown in my Patent No. 274,805, before referred to. Instead, however, of pivoting the two rods L to each other and to the arm K′, in accordance with that patent, I connect the two rods by a triangular bell-crank, M, which is itself pivoted to the arm K′, the pivoting of the two rods being at opposite ends of one side of the triangle, and that of the arm K′ at the angle opposite that side. The parts of the bell-crank are all rigidly connected with each other.

The planks of the floor run lengthwise of the car, and the floor is boarded with channel-beams O, whose flanges project outwardly. They are bolted or riveted through angle-plates O′ to the joists B, and are also fastened by screws O^2, or other suitable means, to the edges of the planking, as shown in Fig. 7, in such a position that their upper flanges form an extension of the floor. I thus not only secure great strength of the floor, but also a firm threshold for the doors—a very important matter in freight-cars.

The frame of the superstructure consists of arching ribs P, of flanged iron, whose ends respectively rest against the upper flanges of the channel-beams O, which form the side edges of the floor. The ribs are fastened to these flanges and to the floor-planks by means of angle-plates P′, each having an upright side bolted or riveted to the flange *p* of the rib, and a horizontal side bolted or riveted to the channel-beam and screwed to the planking, as shown in Fig. 7. The bend in the roof is preferably not a true arch, but an obtuse angle, and at its apex all the ribs are connected with the usual running-board, Q, by suitable castings, Q′, riveted or bolted to both. I use, by preference, bars whose length somewhat exceeds the breadth of the running-board, so that they may be turned up at each end to clasp the running-board between them, while the main part of the length of the bar passes under the running-board from side to side, and is grooved on its under side to embrace the corresponding rib P, near its apex, in front and rear. Each bar is fastened to the corresponding rib by a rivet, and to the running-board by a bolt running through the upturned ends of the bar and transversely through the board. About half of these castings have one of their upturned ends continued far enough up to form one of a series of supports, *q*′, for a hand-rail, Q^2, which passes through an eye in the upper end of each support, and is fastened there by a rivet passing through a transverse aperture in the support and a corresponding aperture in the rail. Many injuries to brakemen result from the absence of any means by which they can steady themselves in passing along the roofs of the cars; and to remedy these some freight-cars have been equipped with hand-rails, the rail being composed (as is preferable) of lengths of gas-pipe, and these being fastened to their supports by screws, so that they can readily be detached. This has resulted in thefts of the gas-pipe to such an extent that the attempt to introduce the hand-rails has been abandoned. With the method of fastening by rivets which I use such thefts are made practically impossible, and an important means of saving life and limb is made practicable. Transverse beams P^2 also subtend the middle third of each rib.

The covering of the superstructure, both walls and roof, are formed of sheets R, of corrugated metal, arranged so that the elevations and depressions shall run continuously from side to side of the car. There are four plates between every two ribs, two covering the roof and one each wall. Each plate is of suitable breadth to cover the space between two ribs, and has at each side a flange, *r*, which is applied to the side of the adjoining rib. To avoid the tearing of the plates and starting of the fastenings, which would result from riveting

or bolting the plates to the ribs, I cover each rib and the flanges of the two adjoining plates with a strip, R′, of tough metal, U-shaped in cross-section, and fasten the rivets or bolts r' in this and the ribs, the holes in the flanges r being made large enough to let the bolts or rivets pass through without contact. By this construction, which is illustrated in Fig. 10 of the drawings, I obtain a comparatively light and exceedingly durable covering, more especially, though not exclusively, useful for freight-cars, and free from that tendency to tear away from the fastenings which has heretofore been a serious and practically conclusive objection to all coverings of plate or sheet iron. Owing to the difficulty of bending the corrugated metal to follow the curvature of the ribs at the eaves, angle-plates P^3 are placed over the ribs at this point, thus giving a perpendicular support to the side sheathing for its full height to the point where it meets the roof-sheathing. The lower margin of each angle-plate is bolted to one side of the corresponding rib, while the upper part of it is bent sidewise, so as to form a continuation of the upright part of the rib. The U-shaped strips R′ are continued over the angle-plates in the same way as over the ribs. The stopping or starting of a laden car causes an outward thrust on the front or rear end, respectively. To resist this with the utmost possible strength, each end is secured to half the length of the floor by arranging the ceiling along the sides of the car in diagonal strips S, extending upward from the side door each way. The shock of stopping or starting thus causes a pull on that half of the ceiling which is connected with the end of the car on which the thrust comes, the shock being thus communicated to the ceiling in that way in which it can be most effectually resisted, and through the ceiling to the floor, which is supported against it by the whole weight of the cargo. The strips S are bolted or screwed at their lower ends to the upright sides of strips S′ of angle-plate, whose horizontal sides are riveted to the upper flanges of the channel-beams O, which border the floor. These angle-plates are arranged between the ribs. The diagonal strips of ceiling are also fastened in like manner to the ribs P, and the uppermost of them are fastened at their upper ends to horizontal strips of ceiling S^2, which line the curve where the side of the car joins the roof.

I make the axles T of the car largest in the bearing, the journal T′ projecting from the body of the axle in a form whose cross-section is a circle, and whose longitudinal section is a curve which varies rapidly from the longitudinal direction of the axle for a short distance at each end, and thence very slowly to the middle, as shown in Fig. 14 of the drawings. The precise curvature which I find best is one whose abscisses (or co-ordinates parallel with the longer axis) vary as the squares of their successive numerals 1 2 3, &c., while its ordinates vary as the alternate numerals 1 3 5, &c.—*i. e.*, arithmetically by a common difference of 2. Of course, I do not limit myself to these precise increments, as they may be varied within the limits of the general principle which I have stated, and still produce substantially the same result. This form of journal gives a long and nearly level bearing-surface, which has at the same time sufficient curvature to counteract completely any tendency to shifting lengthwise of the axle, while by means of the comparatively abrupt projection at the ends the brass T^2 is firmly locked in its place. The brass has a convex enlargement, t^2, directly over the axis of revolution, substantially as shown in my application No. 63,912, already referred to.

The journal T′ may be formed in one piece with the axle, in which case the wheels would of course have to be arranged outside of the bearings. I prefer, however, to form the journals separate from the axle, and then case-harden them and force them onto the body of the axle. They may be thus forced on either before or after the wheels have been attached, and may consequently be arranged either between the wheels or outside of them. The form of journal which I have described gives over fifty per cent. more bearing-surface than the ordinary journal, and with the same load is subjected to less then two-thirds the same pressure per square inch.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a railway-car, the longitudinal girder A, in combination with the transverse floor-joists B and the truss-bars B′, the floor-joists B having their ends sprung down to a deflection within a safe limit of elasticity before being fastened to the ends of the truss-bars B′, to prevent vibration of the joists while the car is moving empty, and when the car is loaded so as to take a portion of each joist's load directly to the top flange of the girder A by means of the stiffness of the joist, and the other portion of each joist's load down the truss-bar to the bottom flange of the girder A, substantially as described and shown.

2. In a railway-car, the V-shaped bolster C, rigidly secured to the main floor-beams at its ends, and pivotally suspended from the cross-beams in the middle, and composed of two parallel pairs of downwardly-convergent bars rigidly connected at their convergent ends, the bars of each pair being also connected by cross-braces, substantially as and for the purpose described.

3. The two-part channel or angle-arch bar E, in combination with the two-part angle truss-bar E′, and vertical braces E^2, provided with heads at each end firmly clamped between the component parts of both the arch-bars and truss-bars, substantially as and for the purposes set forth.

4. In a railway-car, the arch-bar E, the truss-bar E′, the connecting-bar G′, longitudinal girder A, V-shaped bolster C, and pivotal suspension-hanger D, in combination with I-

beam transoms G, of the minimum depth, to permit the car-floor to be as low as possible, substantially as described.

5. In a railway-car, the arch-bars E and truss-bars E′, constituting the truss spanning the distance between the two axle-boxes on each side of the truck, in combination with the transoms G, the brace-bars E^2, and the lateral brace-bars E^3, fastened to the transoms G at one end, and at the other to the brace-bars E^2 near the outer quarter of the bars E and E′, substantially as and for the purposes set forth.

6. The combination of the arch-bars E, the truss-bars E′, and the horn-plates F′, all constructed and arranged substantially as and for the purpose described.

7. The vibration-springs H^3, in combination with the car-body and the truck cross-beams, whereby the car-body is tied down to the ends of the truck cross-beams, substantially as and for the purpose set forth.

8. The transverse floor-joists, in combination with the longitudinal floor-plank and the channel-beams O, fastened to the end of the joists, and also to the edges of the floor-plank, substantially as and for the purposes set forth.

9. The axle-box, in combination with the rods L, the triangular bell-crank M, and the arms K′, arranged and operating substantially as and for the purposes set forth.

10. In a railway-car, an angle-bar, P, in combination with a sheet-metal strip or strips bent or flanged at the edges to meet the sides of the angle-bar, and a U-shaped strip, R′, inclosing and clamping together the angle-bar and edges of the sheet, substantially as and for the purposes set forth.

11. A car-axle, in combination with an independent tubular bearing of oval shape and hardened metal shrunk on the axle, substantially as and for the purposes set forth.

12. In combination with the running-board, the casting Q′, bent at the ends to inclose the board, and having one of the bent ends prolonged to form a support, q', for a hand-rail.

EDWARD B. MEATYARD.

Witnesses:

THOMAS H. PEASE,

W. C. CORLIES.