(No Model.) 4 Sheets—Sheet 1.

W. ROBINSON.

RAILWAY CAR.

No. 355,720. Patented Jan. 11, 1887.

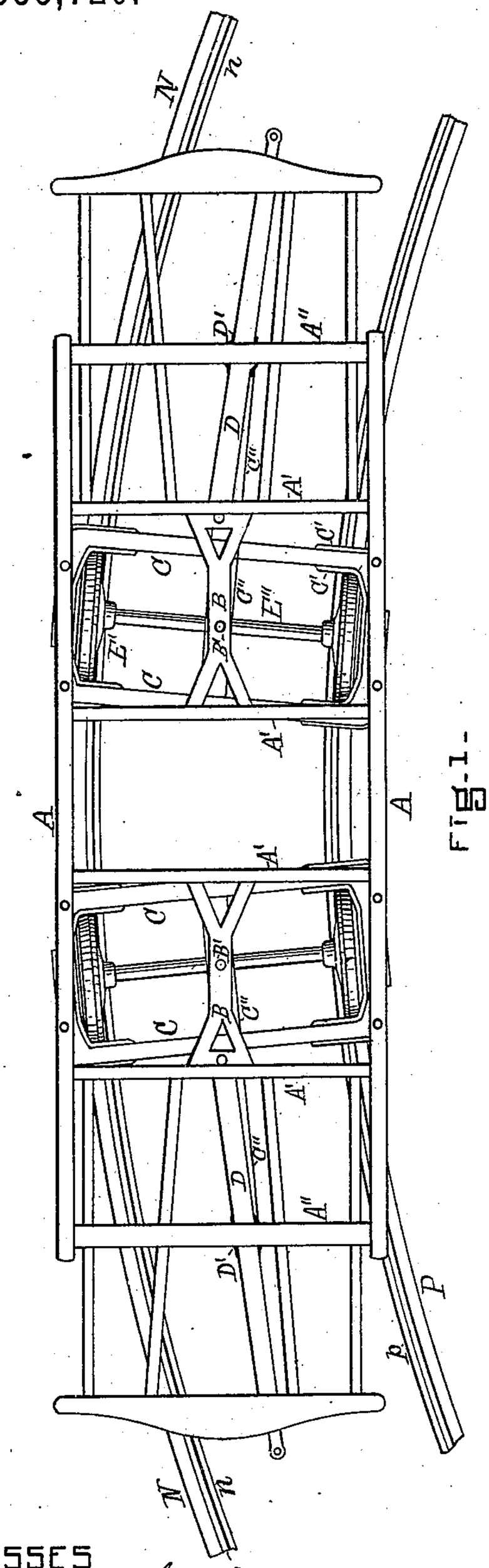

Fig. 1.

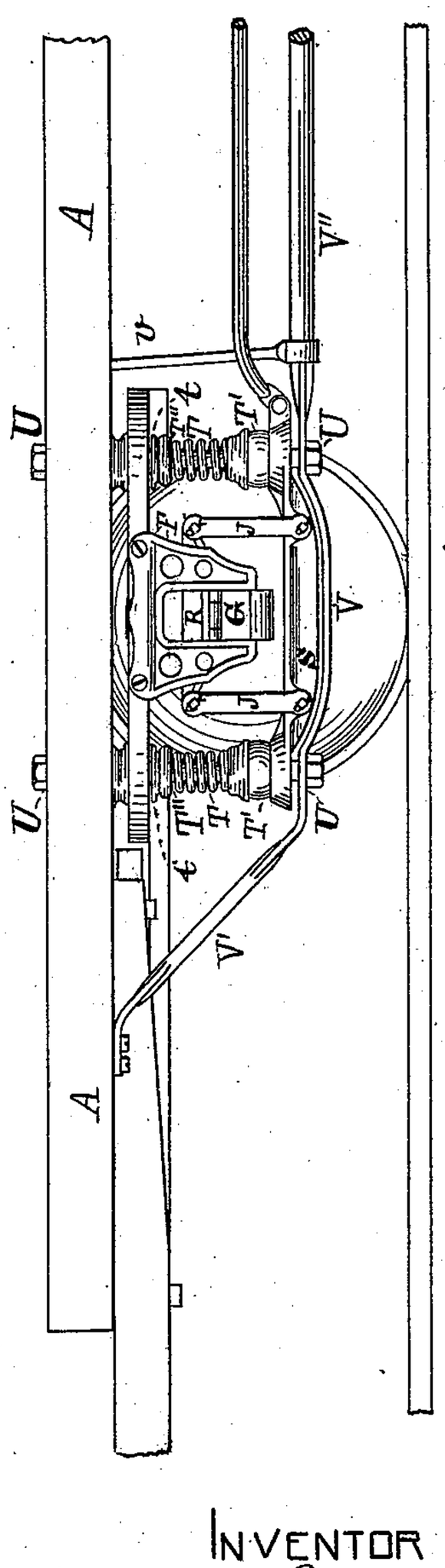

Fig. 6.

WITNESSES

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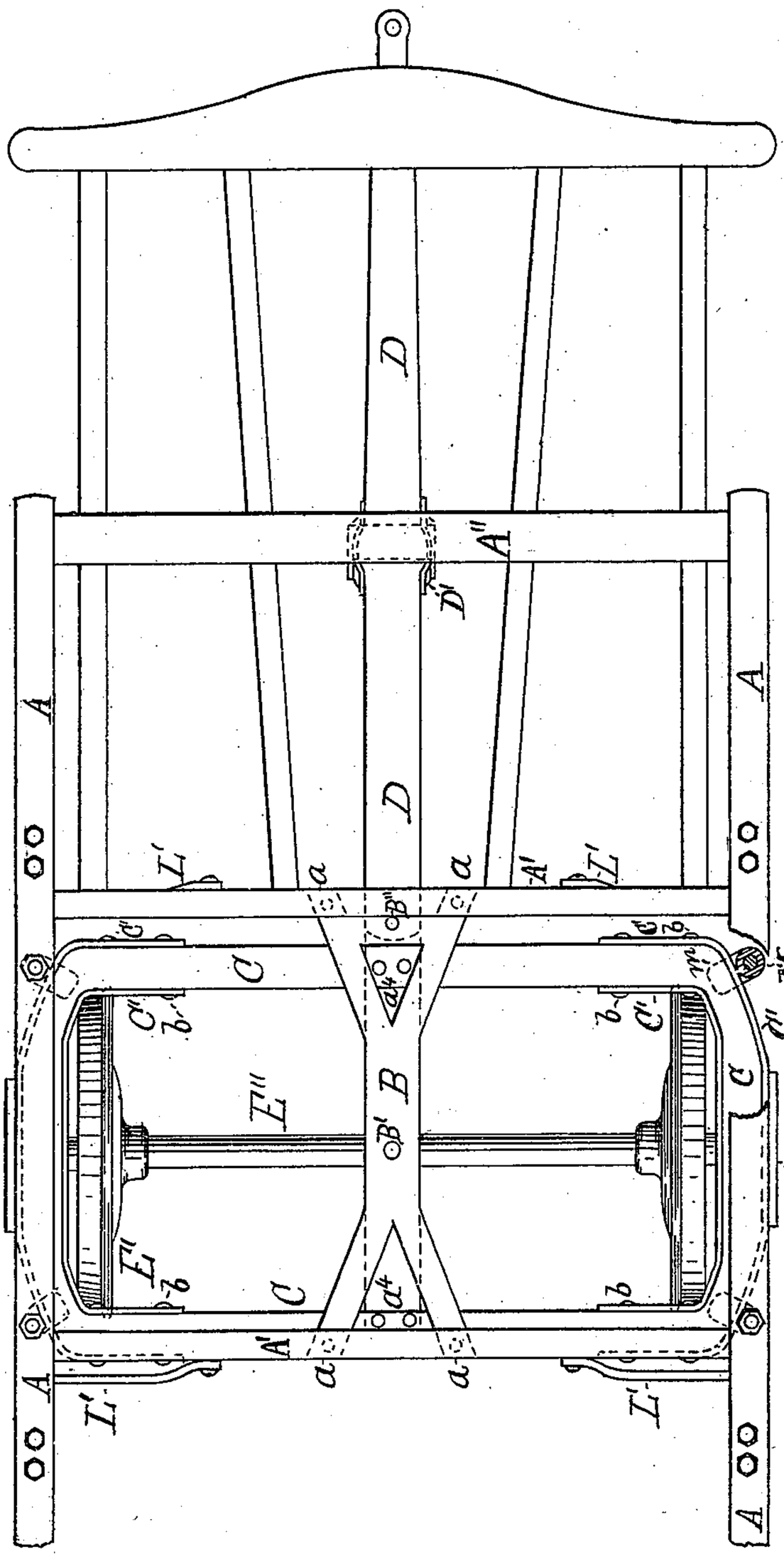

FIG. 2.

WITNESSES

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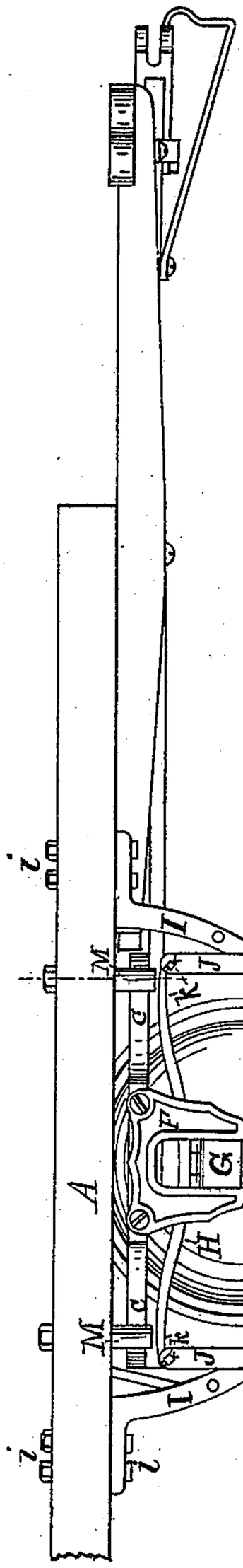

FIG. 5.

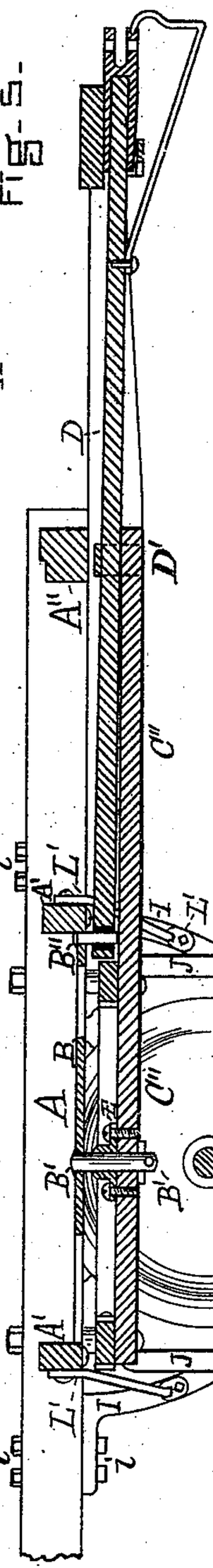

FIG. 2.

FIG. 3.

FIG. 1.

FIG. 7.

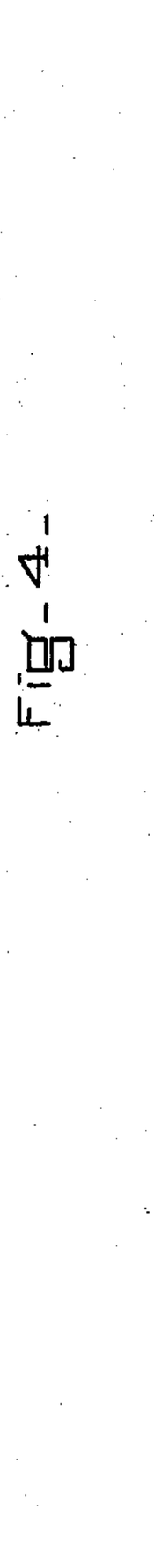

FIG. 4.

WITNESSES

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(No Model.) 4 Sheets—Sheet 4.

W. ROBINSON.

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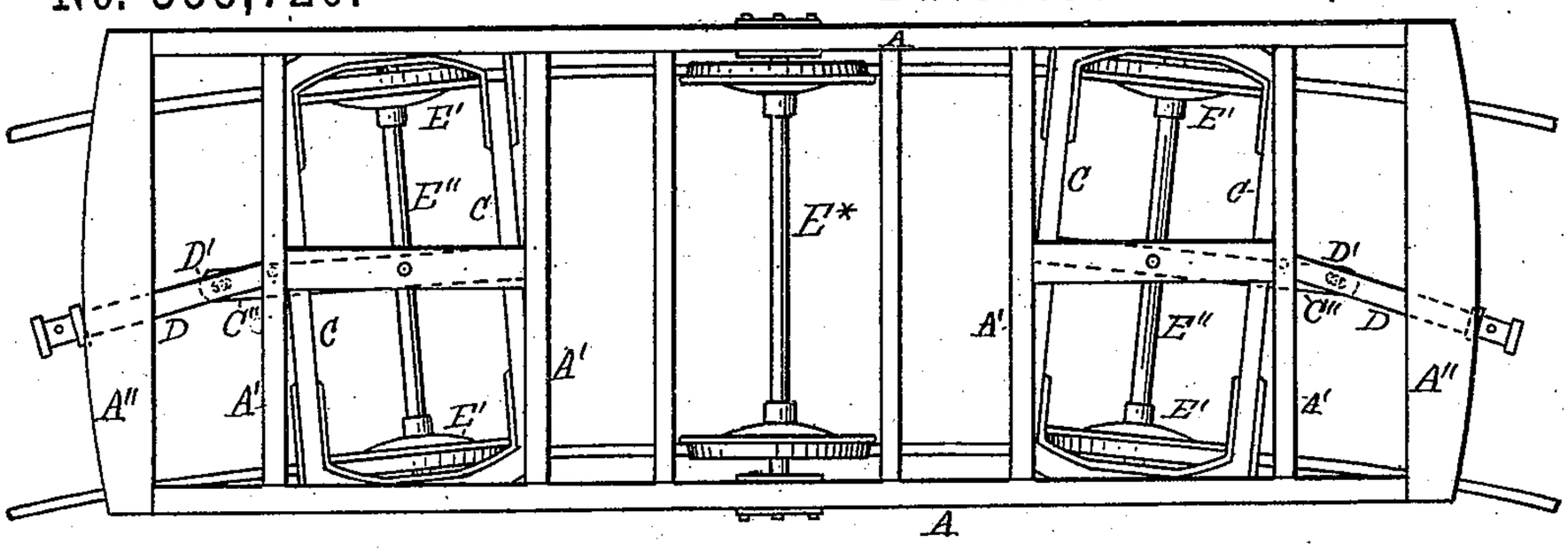

Fig. 8.

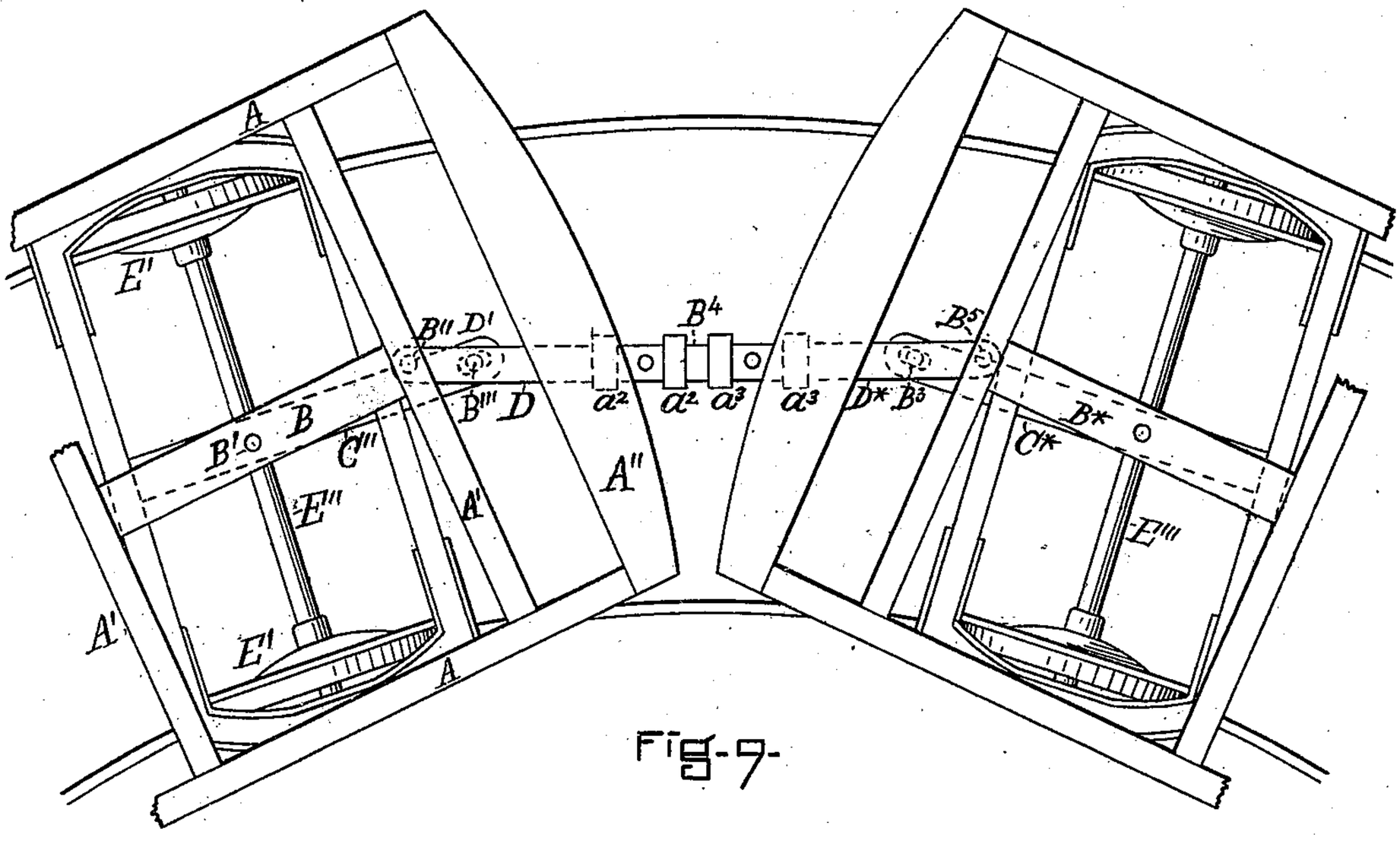

Fig. 9.

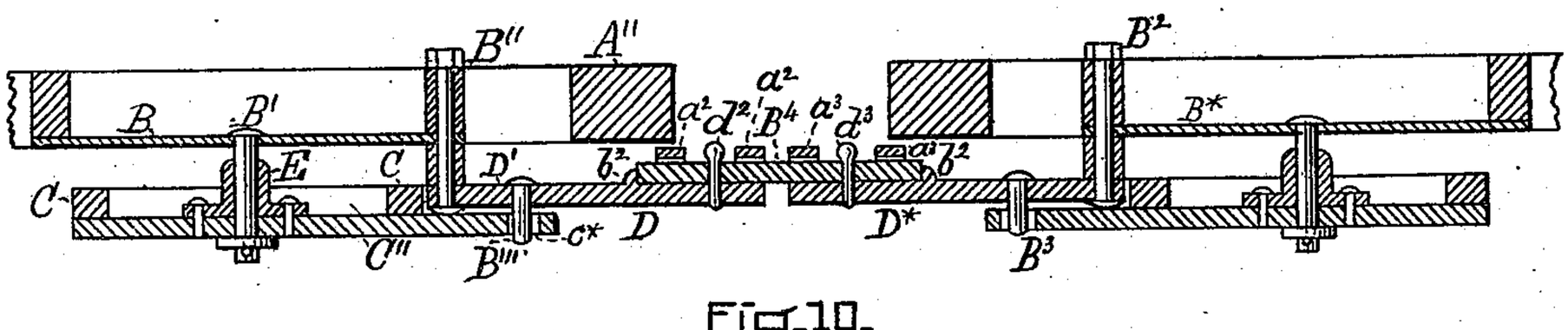

Fig. 10.

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UNITED STATES PATENT OFFICE.

WILLIAM ROBINSON, OF BOSTON, MASSACHUSETTS.

RAILWAY-CAR.

SPECIFICATION forming part of Letters Patent No. 355,720, dated January 11, 1887.

Application filed May 19, 1884. Serial No. 131,953. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ROBINSON, a citizen of the United States, residing in Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Railway-Cars, of which the following is a specification.

My invention relates to the radiation on curves of the axles of four or six wheeled cars, more especially of four-wheeled street-cars.

In the accompanying drawings, Figure 1 is a plan of a radial street-car, on a curved track, involving my improvements. Fig. 2 is a plan view of half the car on an enlarged scale, showing the position of parts on a straight track, and having a portion of the frame broken away to show the mode of constructing and supporting the corner of the truck. Fig. 3 is a side elevation, and Fig. 4 a central longitudinal vertical section, of the same. Fig. 5 is a perspective view of one of the springs. Fig. 6 is an elevation of a modification of the invention. Fig. 7 is a vertical section, on an enlarged scale, of one of the corner supports of the truck. Fig. 8 is a plan of a six-wheeled car embodying my invention. Fig. 9 shows two cars coupled in a train on a curve, and Fig. 10 is a central vertical longitudinal section of the same on a straight line.

C C are two single trucks or wheel-frames, centrally pivoted to the car-frame A at B'. Said trucks are not connected together in any manner, and operate with entire independence of each other.

E' are the wheels, and E'' the axles.

The forked metal plate B, provided with the central bolt, B', on which the truck swivels, and the bolt B'', on which the draw-bar D swivels, is securely bolted at *a a* to the cross-bars A' of the car-frame.

The truck-frame C is preferably composed of wood for the sake of lightness, and has its corners and ends securely bound inside and out with thin bands of metal, C', placed edge up for the sake of strength. Bolts or rivets *b*, passing through the metal bands and the wood, hold the same securely together. It will be sufficient in many cases to secure the corners alone by metal plates, and not the ends, thus reducing the weight somewhat—a desideratum in a car drawn by horses. The corners of the truck are curved, as shown, on a line struck from the center B', for convenience of support in swiveling the truck. The truck-transom C'', secured to the center of the truck-frame C at a^4, extends forward toward the end transom, A'', of the car-frame, and engages adjustably at D' with the draw-bar D, which is pivoted by the bolt D'' to the metal plate B; or it may be pivoted directly to the car-frame.

A metal block, E, Figs. 4 and 10, is bolted to the truck-transom C'', and the truck king-bolt B' passes through this block and the wooden transom, whereby a metallic wearing-surface is secured between the king-bolt and said truck-transom.

The pedestal F, secured to the truck, embraces the sides of the axle-box G, and the semi-elliptic spring H, (see Figs. 3 and 5,) preferably made of a single leaf of hammered steel, rests adjustably on said box G. Brackets I, secured to the car-frame A by the bolts *i*, project downward and engage pivotally with the lower ends of the links J at *k*, the upper ends of said links being pivotally connected to the ends of spring H by bolts *k'*.

L is a tie-rod securing together the two brackets I at opposite ends of the spring H, and L' are diagonal rods bracing the brackets I to the cross-bar A' of the car-frame. The spring H is provided with lugs H', to keep it from slipping off the box. Either these lugs are rounded on the inside, to permit relative rotary motion between the spring and box, or the box is rounded somewhat where it comes in contact with the lugs of the spring, in which case said lugs are flat on the inside. This arrangement answers the same purpose as the other. I prefer, however, to have a single round lug projecting from the center of the bottom of the spring and fitting loosely into a round hole in the top of the box. The ends of the spring are provided with tightly-fitting metal thimbles H'', to prevent the bolts *k'* wearing directly on the spring. These thimbles, when unduly worn on one side, are easily turned partly around to present a new wearing-surface, or knocked out and replaced by new thimbles.

It will be observed that the weight of the car is supported, through the brackets I and links J, on the ends of the springs H, the springs resting on the boxes, as already described. Furthermore, the weight of the car-

depending from the lower ends of the links J keeps said links in a perpendicular position, and consequently the axles of the independent trucks in a normally parallel position—a position which they maintain until radiated in the manner hereinafter described.

The truck and pedestal sustain no weight, their office being simply to hold the wheels and axles in proper position, and to guide and control the same. The truck itself depends from and is supported by the car-frame. It is necessary, therefore, to provide corner supports for the trucks. These are shown in Figs. 2, 3, and 7.

The bolt M, provided with the hook or projection *m*, on which the corner of the truck C rests adjustably, passes through the car sill or frame A, and is rigidly secured thereto, the shoulder *m'* limiting the entrance of said bolt into said sill. The bolt M passes outside of the curved corner of the truck, the hook *m* projecting under the corner and supporting the same adjustably. By this means of support the corner of the truck can be made solid and rigid, and at the same time light.

The rails of that portion of a street-railway passing around street-corners are usually constructed with elevated flanges on the inside, as indicated in Fig. 1.

The operation of my invention, as used on a street-railway, is as follows: When the horses attached to the draw-bar D reach and follow a curved track, they swing said draw-bar horizontally to one side of the center of the car, and thus bring the forward truck or wheel-frame with its axle into a position radial to the curve. (See Fig. 1.) The inside of the rear outer wheel, coming in contact with the inside flange, *n*, of the outer rail, N, meets with a resistance which retards the forward motion of said wheel, causing the wheel-frame to swivel, and bringing the axle into a position radial to the curve, as shown. Thus the two trucks or wheel-frames, with their axles, are radiated with entire independence of each other—one by the horses or motive power, the other by the flange or guard of the outer rail. It will be observed in this case that the forward truck radiates its axle, while the rear axle radiates its truck.

In a car with a six-foot wheel-base, in passing around a curve with a thirty-foot radius, each axle-box is thrown three inches to one side of its normal position, in order that the axles may become radial to the curve—that is, the links J (see Figs. 3 and 6) are inclined three inches from the perpendicular. As soon, therefore, as the force or resistance which radiates the axles and trucks is removed, the weight of the car depending from said inclined links tends to straighten the same, and thus to bring the axles into their normal parallel position. In practice I find this to be the result, for as soon as a straight track is reached the weight of the car instantly straightens the links J and brings the axles into a true parallel position at right angles to the longitudinal axis of the car-body. When the axle becomes radial, the spring H is carried with the box G backward or forward of its normal position, but the end connections hold said spring substantially parallel to the car-frame under all circumstances; hence it is necessary that the spring should rest loosely—that is, adjustably—on said box, thus being adapted to allow the latter to make a swiveling motion under said spring.

The truck-transom C″ may be extended to the end of the car, and become itself both draw-bar and transom. This gives very satisfactory results; but I prefer to apply the draft to the car-body rather than directly to the truck; hence I use the independent draw-bar, as shown.

Referring to the modification shown in Fig. 6, a rigid saddle, R, is placed adjustably on the box G, the upper ends of the links J being pivotally attached to said saddle, as shown, while the lower ends of said links are pivotally attached to and sustain the short equalizer S. Spiral or rubber springs, or a combination of the two, T T′, as shown, rest on the equalizer S, while the car-body rests on the upper ends of said springs. The upper spring-seats, T″, are provided with flanges *t*, which support the corners of the truck adjustably, while the bolts U, secured to the car sill or frame and passing through the spring-seats, springs, equalizer, and slots in the truck corners, hold the various parts in proper relative position. The brace V secures the lower ends of one pair of bolts U together, the outer end, V′, of said brace being secured to the sill A of the car-frame, while the inner end, V″, extends to the other pair of spring-bolts on the same side of the car. The diagonal brace *v*, secured to one of the cross-bars of the car-frame, holds the brace-rod V″ rigidly in position. In this case, also, the radiation of the truck brings the links J to an inclined position in the same manner described in connection with the other figures. The operation of the trucks in this case is satisfactory; but the method first described is somewhat easier, and in cars drawn by horses is to be preferred, because it is lighter.

A four-wheeled car operating on the principle described, with the trucks acting independently of and entirely disconnected from each other, becomes radial on curves much more freely, easily, and promptly than when the trucks are connected and depending one upon the other for radiation.

In the six-wheeled car shown in Fig. 8 the end trucks are swiveled in the manner already described; but the central axle, E*, does not swivel, as it is necessarily radial to any curve on which the car may be. Said axle E* is connected, by means of its pedestals, directly to the car-frame A, and has a little more end-play in its boxes than the other axles, whereby it is allowed to adapt itself to a straight track or to a curve, as shown.

In Figs. 9 and 10 two cars are shown coupled

together in a train. The bolt or pin B‴ is secured in the draw-bar D, and engages in the slot *c** of the truck-transom C″, whereby the side movement of said draw-bar produces radiation in the axle by thrusting said transom C″ to one side, thus causing the truck to swivel. The pin B‴ might of course be fixed in the truck-transom C″ and engage in a slot in the draw-bar D, simply reversing the position of the pin without altering the result.

When two cars are to be coupled, the location of the pin B‴, where the truck-transom C″ engages adjustably with the draw-bar D, must be in such relative position that when the draw-bars D and D* of the adjacent cars are in a straight line with each other while said cars are on a curved track the truck-transom C″ will be turned to one side from its normal position just sufficient to bring the truck, with its axle E″, into a position radial to the curve. This point, at B‴, is found to be nearer to the pivotal point B″ of the draw-bar than to the outer end of the same, as will be seen by inspection of Fig. 9.

In drawing the train it is not material whether the draw-bars D D* are rigidly secured together or not; but in order to prevent any possible false movement in backing I prefer to secure said draw-bars rigidly together. To this end they are provided with the bands a^2 a^3, through which the coupling-bar B^4 is passed, fitting the same closely. The coupling-pins d^2 d^3 are passed through the coupling and draw bars, thus making the draw-bars D and D* practically one continuous bar. The lugs b^2 on the draw-bars prevent the coupling-bar from entering too far. The draw-bars are or may be provided with suitable springs (not necessary to be shown here) to give them suitable elasticity.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the car-frame provided with depending unyielding brackets, of the truck or axle-frame, the axle yieldingly supported within said frame, the box guides or pedestals attached to said axle-frame, the springs supported by the axle-boxes, and the swinging links forming connection between said springs and said brackets, substantially as described.

2. The combination of the car-frame A, provided with the rigid depending brackets I, the truck or axle-frame C, the pedestal F, attached thereto, the axle-box G, yieldingly supported within said pedestal, the spring H, supported by said box, and the links J, forming swinging connection between said spring and said brackets, substantially as set forth.

3. A semi-elliptic spring so constructed as to adapt it to be held adjustably in place on the axle-box, while the latter is permitted to swivel under said spring, the spring remaining parallel to the car-frame, substantially as described.

4. The combination, with the axle-box G, of the spring H, resting adjustably thereon, said spring being provided with one or more vertical lugs adapted to hold the same in proper position on said box, while permitting a vertical swiveling motion of said spring on said box, substantially as described.

5. The spring H and axle-box G, in combination with each other and adapted to swivel one upon the other, substantially as described.

6. In combination, the truck C, spring H, axle-box G, links J, brackets I, braces L′, and tie-rod L, substantially as and for the purpose described.

7. The combination, with the car-frame provided with a swiveling truck or axle-frame, of a draw-bar pivoted to said car-frame independently of said truck and forming no part thereof, said draw-bar being adjustably connected to said truck, whereby horizontal movement of said draw-bar will cause a swiveling movement in said truck, substantially as described.

8. In combination, the truck C and the independently-pivoted draw-bar D, said draw-bar engaging said truck adjustably at a point nearer to the pivotal point B″ of said draw-bar than to the outer end of the same, the whole adapted to produce radiation of the axles on curves when two cars are coupled together, substantially as described.

9. In combination, the draw-bar D, the truck C, and the pin B‴, or equivalent mechanical device, making adjustable connection between said draw-bar and truck, whereby horizontal movement of said draw-bar will cause a swiveling movement of said truck, substantially as described.

10. The metal plate B, provided with bifurcated expanded ends secured to the cross-bars A′, and provided with the king-bolt B′, adapted to form a swiveling bearing-point for the truck C, substantially as set forth.

11. The bolt M, secured to the car-frame and provided with a hook or projection, *m*, adapted to extend under a portion of the truck C, for the purpose of supporting the same, substantially as described.

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Witnesses:
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JOSEPH L. STEVENS.