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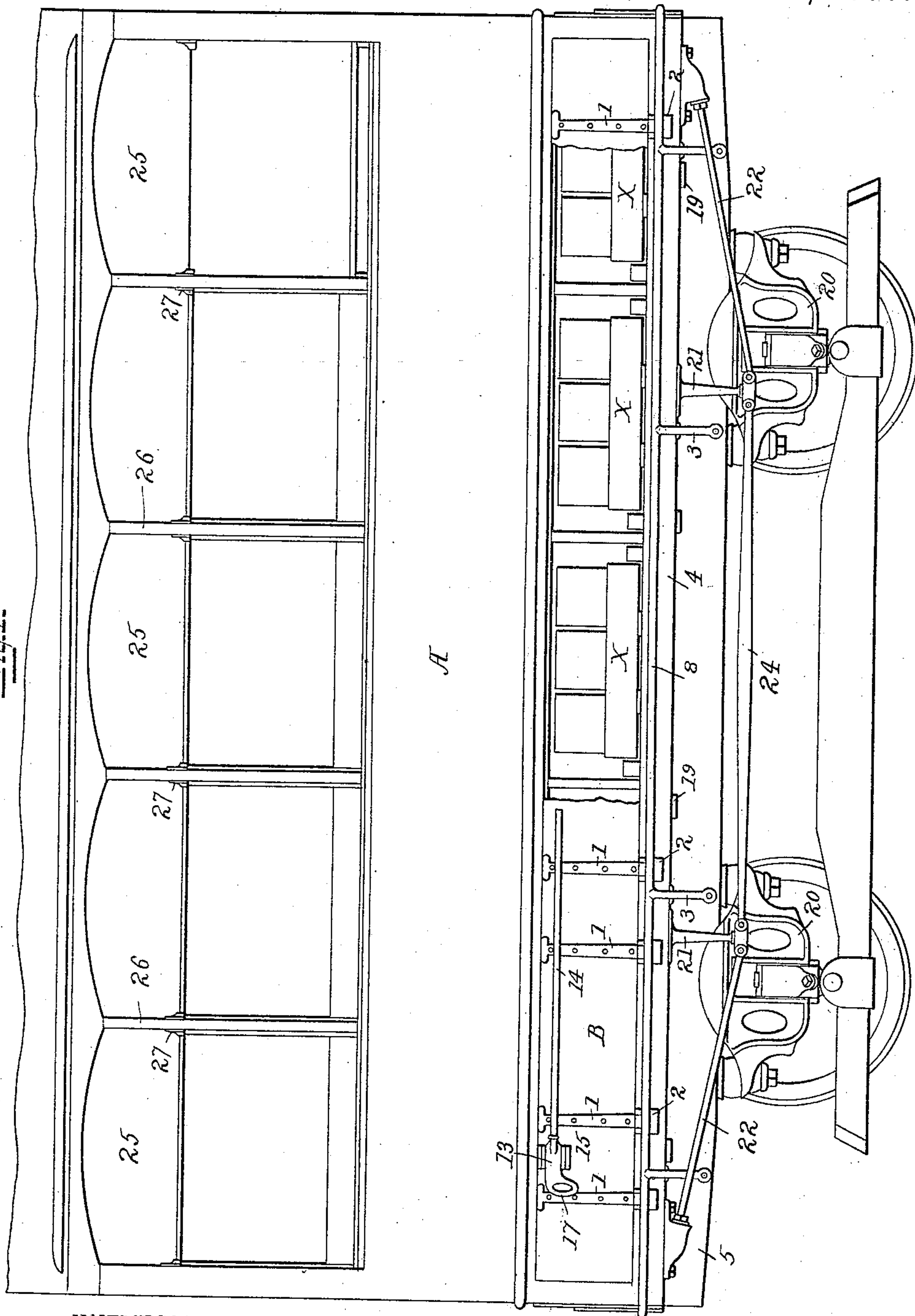
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J. STEPHENSON.  
STORAGE BATTERY ELECTRIC CAR.

No. 442,744.

Patented Dec. 16, 1890.

Fig. 1.



WITNESSES

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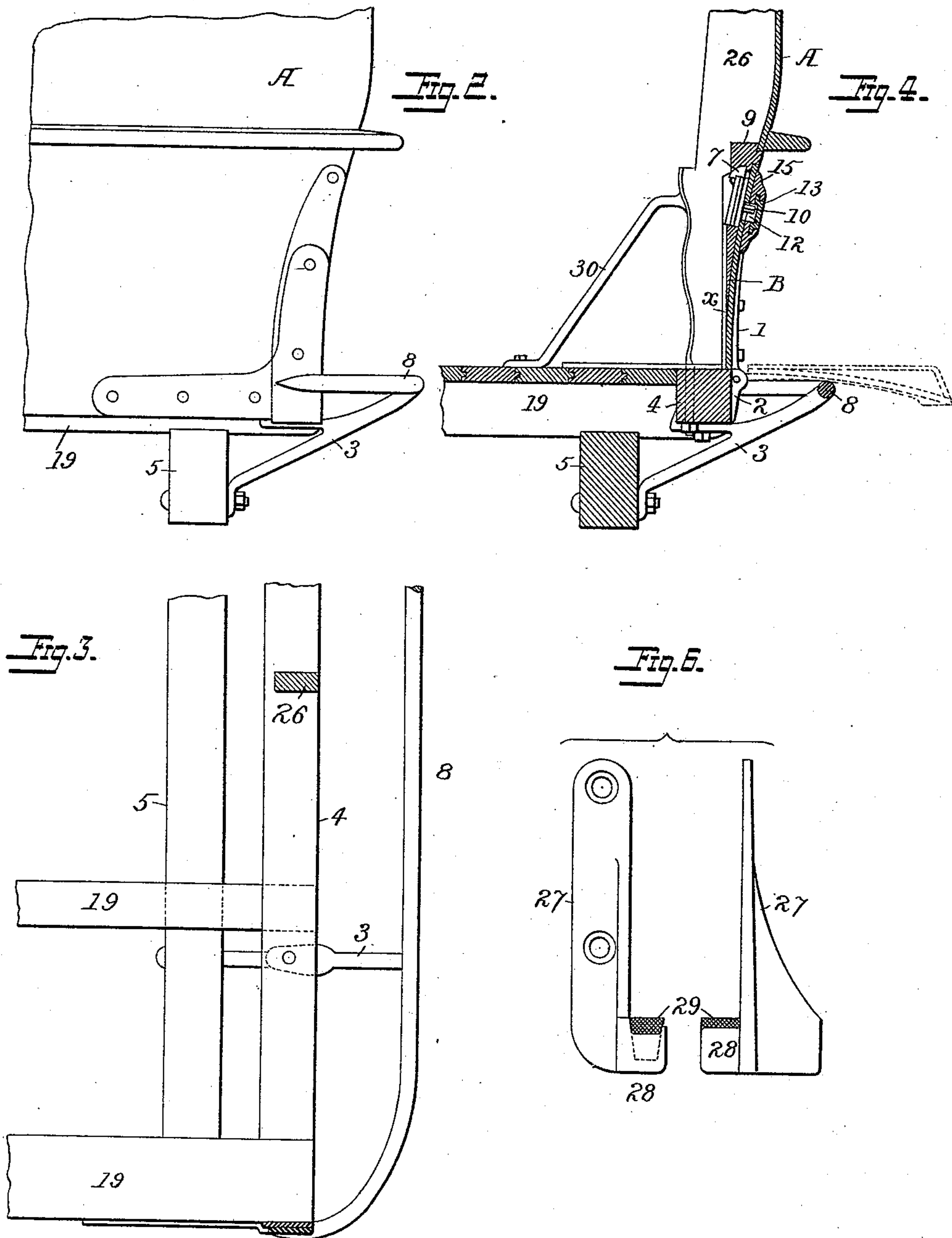
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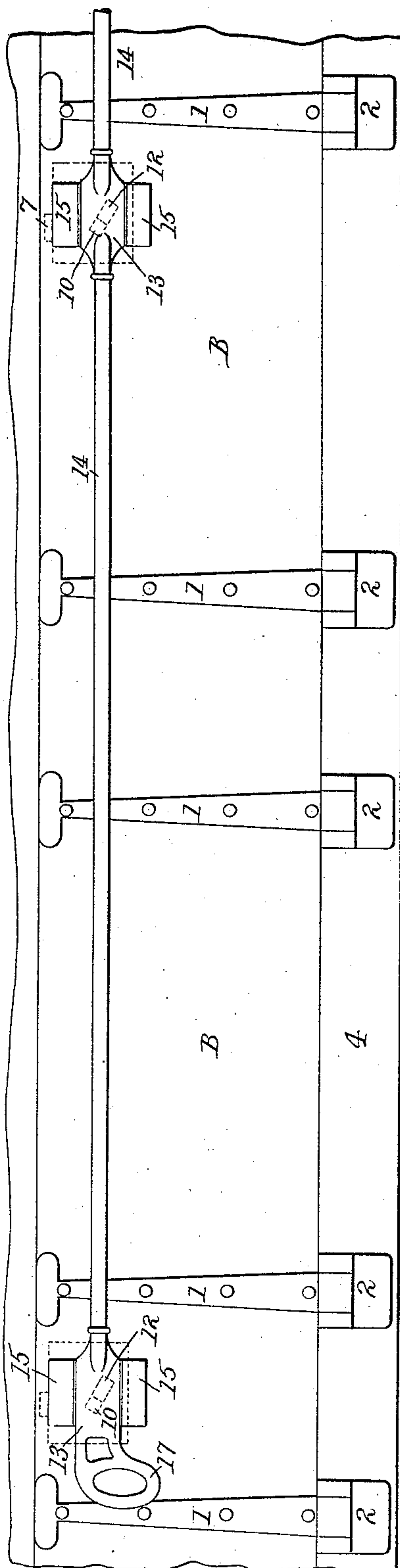
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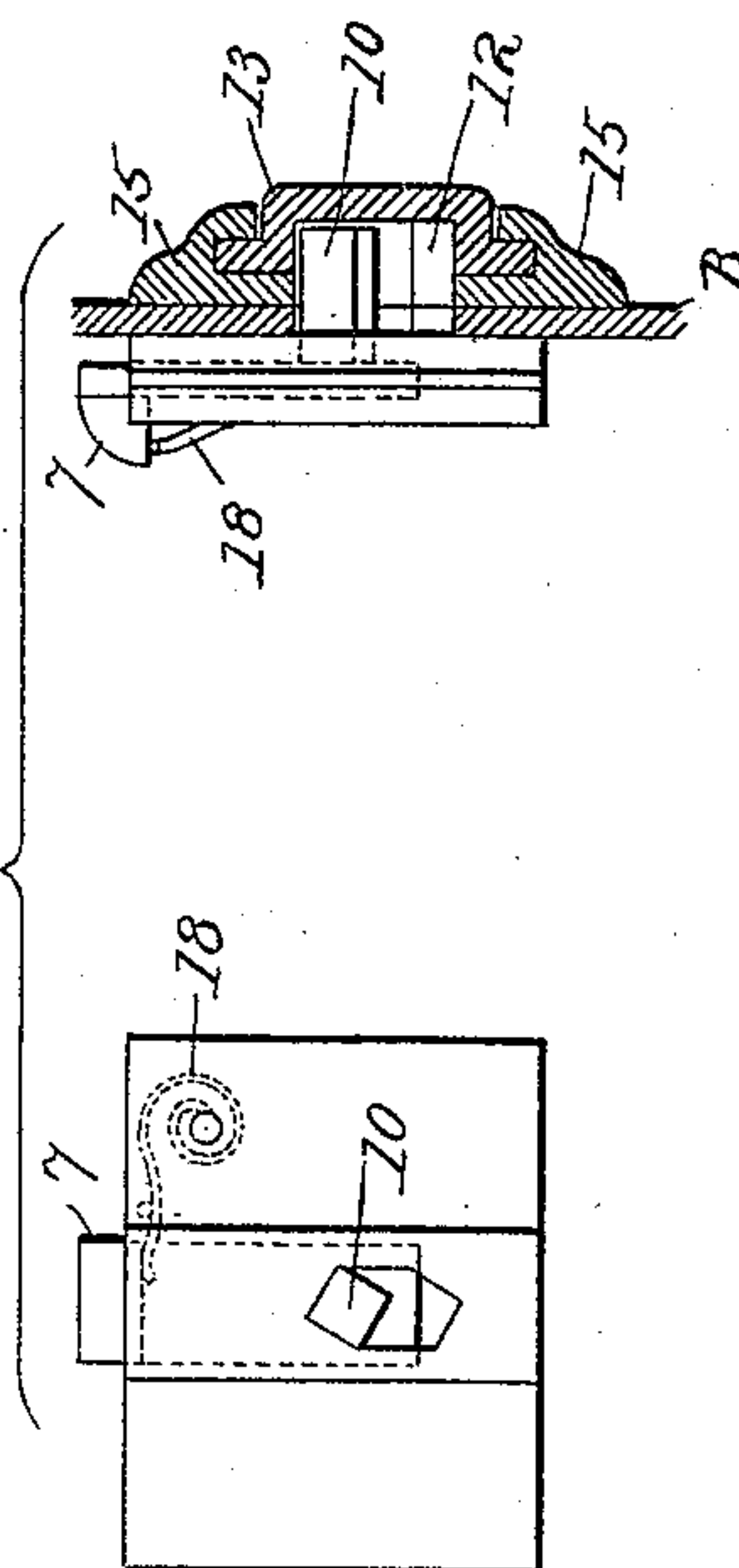
Fig. 5.



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Fig. 7.



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# UNITED STATES PATENT OFFICE.

JOHN STEPHENSON, OF NEW YORK, N. Y.

## STORAGE-BATTERY ELECTRIC CAR.

SPECIFICATION forming part of Letters Patent No. 442,744, dated December 16, 1890.

Application filed August 2, 1890. Serial No. 360,763. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN STEPHENSON, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Storage-Battery Electric Cars, of which the following is a specification.

Among the various plans of propelling cars by electricity devised in consequence of the public desire to avoid overhead wires in the street special importance has been given to the system embracing cars each of which carries the means for storing electrical energy required to propel it. The cells in which the electricity is stored as yet constructed are capable of supplying the motive power for a few hours only at a time, necessitating frequent renewals, and the object of my invention is a car adapted to the storage of electricity and to facilitate the renewals or removal and replacement of the cells; and to this end my invention consists in constructing a car as fully set forth hereinafter, and as illustrated in the accompanying drawings, in which—

Figure 1 is an elevation in part section of sufficient of a tram-car to illustrate my improvement. Fig. 2 is a part end view; Fig. 3, a part plan of the base-frame. Fig. 4, a part sectional elevation; Fig. 5, an external view showing part of one side. Fig. 6 is a view showing in front and side elevation the hanger for the frameless glass plates above the sashes. Fig. 7 is a view in face and section showing the lock for the foot-panel.

A represents the side of the car-body, in which near the lower portion is an opening, to which is fitted the foot-panel B. I construct this foot-panel in a special manner and with appliances sufficient, when the panel is open, to support the same in a horizontal position, that it may act as a shelf or bridge on which the trays, with their cells, may temporarily rest, the panel, with its hinges and appurtenances, being so adjusted that a person at either end may raise or lower the panel, or it may lock or unlock, when in its vertical position. The hinges 1 conform to the curve of the panel and extend entirely across the outer face, the hinge-knuckles 2 being placed below the level of the car-floor to such an extent that the metal-faced ribs  $\alpha$ , extend-

ing across the inner faces of the panel, will be on a straight line with the floor of the car when the panel is in its open position, as shown in Fig. 4. These straight lines of ribs along the car-side form ways on which to slide the trays of the storage-batteries, the panel constituting temporarily a shelf or bridge for the support of such trays. These ribs are preferably of metal fastened by rivets or bolts passing through the panel and the hinges, and thereby strengthening the panel. To support the panel in its horizontal position, the car is provided with a guard-rail 8 at a proper elevation, extending along the side of the car-body, with limbs or brackets 3 secured to the sill 4 of the car-body and also to the pedestal-timber 5. The guard-rail 8 is further strengthened by bending its ends inward and connecting each to the outer side of the adjacent end sill, as shown in Figs. 3 and 4.

The foot-panel is provided with a series of locks or bolts 7, each adapted to engage a keeper or recess in a side bar 9, above the opening for the panel. From each bolt extends a lug 10, which enters a diagonal slot 12 in a plate 13, which is connected to a lock-operating slide-bar 14. Each plate 13 is confined to slide between guides 15 15, and the end plates are provided with handles 17. A spring 18 operates each bolt, so that it will spring to place independently of the others; but when the operator seizes the handle at either end and slides the various plates 13 longitudinally, all of the bolts are withdrawn by a single pull and the panel is released, so that it can be turned down to a horizontal position, and by then seizing either handle and raising the panel to a vertical position it is at once automatically locked.

Close-body tram-cars usually have their bodies strengthened by truss-work under the car-seats; but in electric cars with accumulators stored under the car-seat and with foot-panels to admit the trays there is no possibility of such strengthening, although in such case bracing is more needful because of the added weight of the cells and because of the loss of strength by detaching the foot-panels from their usual pillar-fastenings. For these reasons, and also to give more room for storage, the frame of the car-floor is made wider



than usual, and the pedestal sills or timbers 5 are placed under the floor-beams 19 and are there secured. The car-body sills 4 must thus be outside, beyond and above the pedestals 20, affording room for trussing the sills beyond the faces of the pedestals, which is done by placing before each pedestal a straining-post 21, with its head secured under and to the body-sill, and its lower end upon the truss 10 consisting of three sections 22 22 24, the two end sections 22 22 being struts forced upward by nuts on the straining-post, the outer ends of the struts being securely lodged to the corners of the car-body.

15 As the space beneath the seats is occupied by the cells, there is not the usual place for the glass frames of the side windows to run down. This, together with the necessity of having windows of the extreme height, renders a change from the usual construction 20 necessary, and I therefore shorten the side window-sashes and fill the space above the sashes with frameless glass of unusual thickness, the edges of each glass 25 being beveled and lodged in the side pillars 26 in grooves thereof, and to hold these thick glasses in place I use at each lower corner of each glass a metal hanger 27, secured to each side pillar with a lug 28, supporting a cushion 29, of rubber, on which the lower corner of the fixed 30 glass rests. The frameless glass, in connection with the metal sashes below, leaves a nearly unobstructed view through the window-openings.

35 As the side pillars of the car-body are deprived of the support usually afforded by the foot-panel and its ribs, I brace each pillar with a stay 30, one end secured to the car-floor and the other to the pillar above the floor, as 40 shown in Fig. 4.

Without limiting myself to the precise construction and arrangement of parts shown and described, I claim—

1. A car with foot-panel hinged at its lower 45 verge and with a guard-rail arranged to support the panel in a horizontal position with supports from the car-body sill, substantially as and for the purpose described.

2. A car with its foot-panel hinged at its 50 lower verge, and a series of locks at the opposite verge of the panel, the bolts of each lock connected with a lock opening sliding bar, substantially as described.

3. A car with a hinged foot-panel having 55 a lock operating sliding bar with diagonal slots or grooves, and lock-bolts with pins entering the slots, said bar having a free longitudinal motion, substantially as described.

4. A car with its foot-panel hinged at one 60 edge and provided near its other edge with locking mechanism connecting a series of locks, and devices for moving the bolts thereof from either end of the car, substantially as described.

5. A car with its foot-panel hinged at one

edge to be opened or locked shut by a series of locks with vertical bolts, each bolt having a post or pin projecting through the box-shell and fitting into a diagonal groove in a lock opening sliding bar, which bar when moved 70 endwise is adapted to operate all the lock-bolts at that side of the car, substantially as described.

6. A car with its foot-panel hinged at its 75 bottom verge, with ribs fitting on the inner side of the panel and the hinges placed on its opposite side, with the hinges, panel, and ribs secured together, substantially as described.

7. An electric car with its body provided 80 with receptacles for storage-batteries under the car-seats, and with the foot-panel of the car-body made to open for admission of the storage-cells, and with the body of the car strengthened by a truss under the sills, sub- 85 stantially as described.

8. A car with the space below the car-seats prepared for holding the cells and with the side-window sashes when down occupying a position above the cells, the spaces above the 90 tops of the window-sashes when up filled with thick frameless glass, substantially as and for the purpose described.

9. A car with its spaces below the car-seats prepared for holding the electric cells and 95 with the window-sashes when down stopping at a point above the cells, the spaces above the tops of the sashes when up filled with thick frameless glass, with their lower corners held by metal hangers secured to the car- 100 pillars, substantially as described.

10. A car with its spaces below the car-seats prepared for holding electric cells and with the window-sashes when down stopping at a point above the cells, the spaces above the 105 tops of the sashes when up filled with thick frameless glass, with their lower corners held by metal hangers secured to the car-pillars, the foot or shoe of each hanger fitted with a cushion on which the corners of the glass 110 rest, substantially as described.

11. A tram-car with its foot-panel hinged to open outward and the side pillars braced by stays having their lower ends secured to the car-floor and their upper ends secured to the 115 side pillars above the floor, substantially as described.

12. A car having a side opening, with a foot-panel adapted thereto hinged at its bottom verge, with ribs on the inner side of the panel 120 and plates on the opposite side, the hinges, panel, ribs, and plates secured together, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of 125 two subscribing witnesses.

JOHN STEPHENSON.

Witnesses:

F. E. BARNES,  
S. C. SHERWOOD.