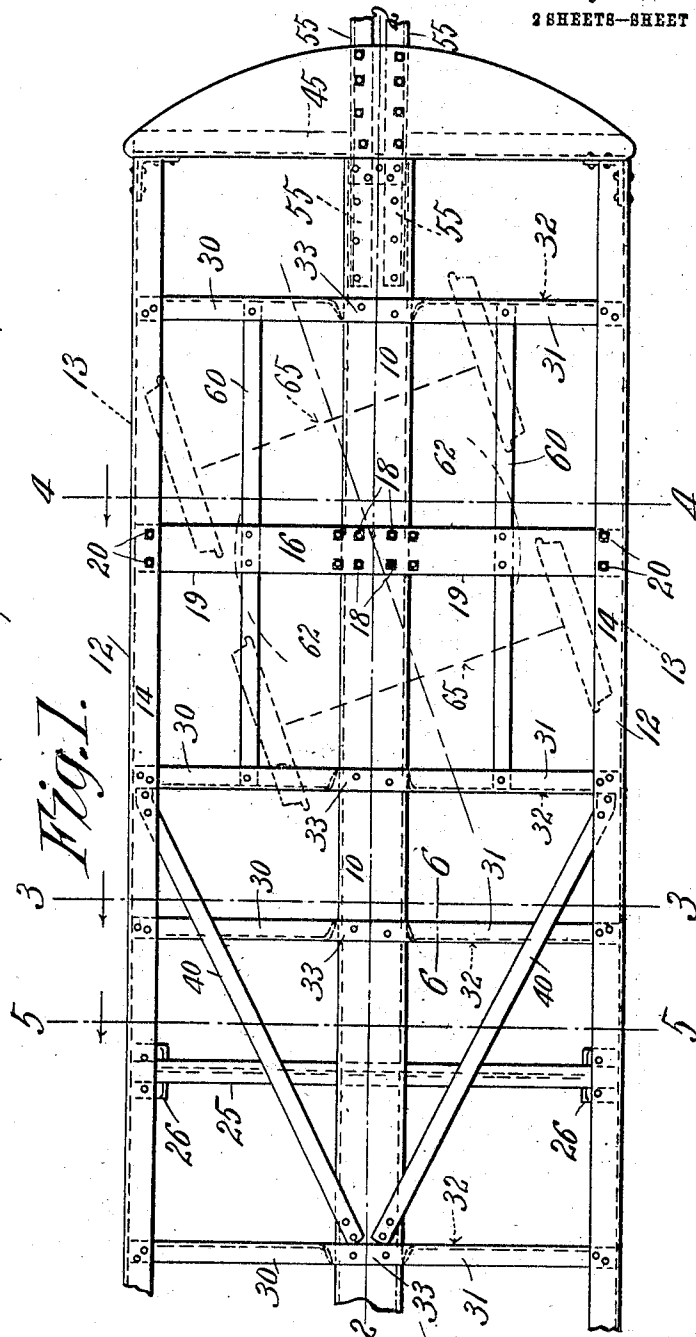
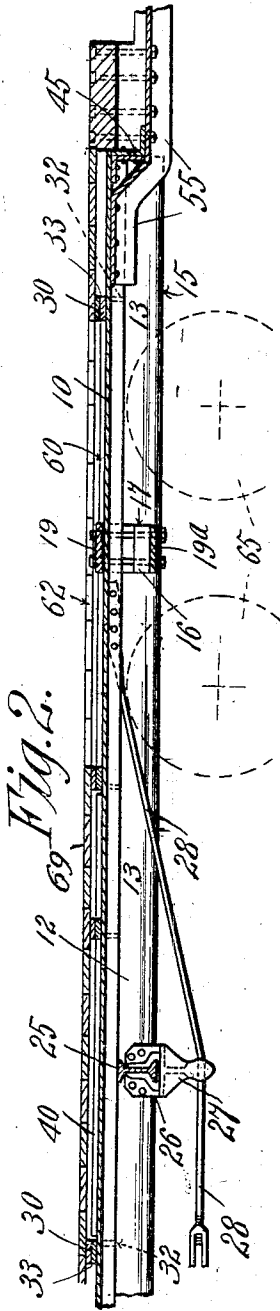


C. F. RICE.
 UNDERFRAME FOR RAILWAY CARS.
 APPLICATION FILED FEB. 9, 1909.

Patented July 27, 1909.

2 SHEETS—SHEET 1.

929,630.



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28 SHEETS—SHEET 2.

Fig. 3.

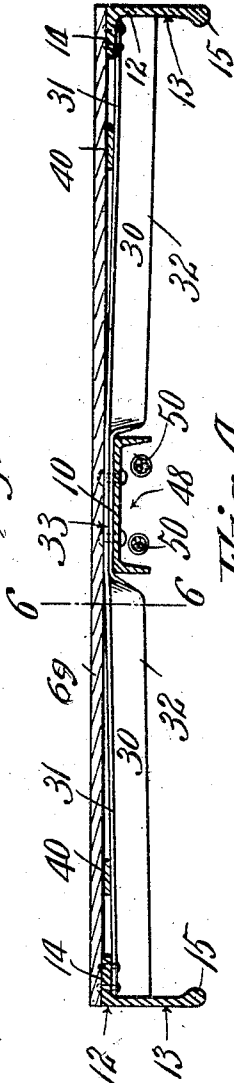


Fig. 4.

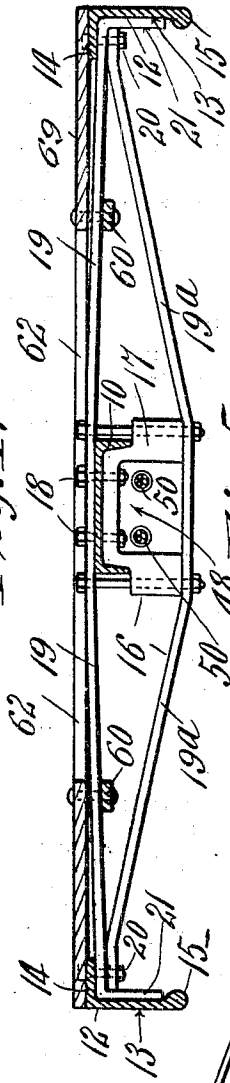


Fig. 5.

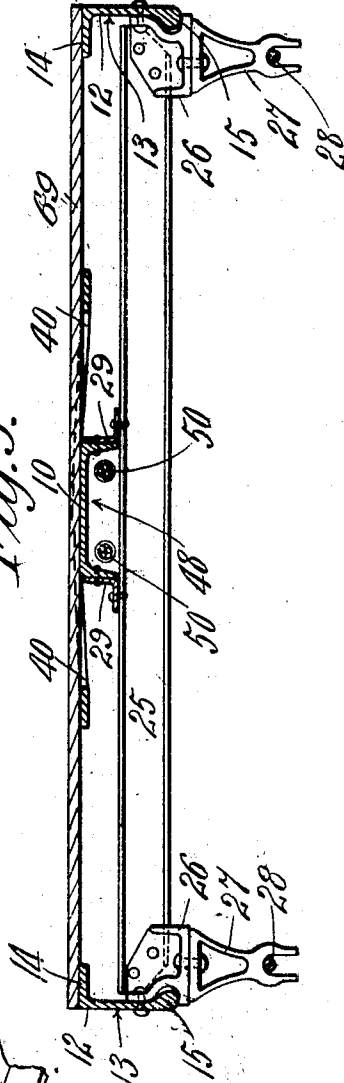
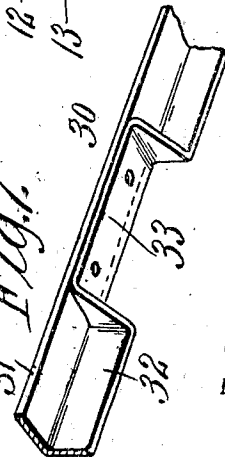


Fig. 6.



Fig. 7.



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UNITED STATES PATENT OFFICE.

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UNDERFRAME FOR RAILWAY-CARS.

No. 929,630.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed February 9, 1909. Serial No. 476,978.

To all whom it may concern:

Be it known that I, CLIFFORD F. RICE, a citizen of the United States of America, and resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Underframes for Railway-Cars, of which the following is a full, clear, and exact description.

10 This invention relates to improvements in an underframe for a railway car, more especially a street railway car.

An object of the invention is to provide by the use of structural steel of shapes easily obtainable, and the employment of new forms of connections of the parts, a car body underframe which, while unusually light, is of great strength and rigidity; and which requires, by the absence of castings or forgings not only greatly lessened expense in manufacture as occasioned by the materials employed but also greatly lessened cost for labor because of the facility with which the parts may be fitted together and united for the making of the underframe.

Another object of the invention is to provide an underframe in which very little transverse space is occupied by the side sills for the greater portion of the height of the latter whereby even although the underframe is but slightly above the top of the car wheels such wheels in running around curves may have capabilities for greater swinging movements than is ordinarily the case where side sills of the usually wide and deep constructions are employed.

Other objects of the invention are attained in and by the constructions, combinations and arrangements of parts which constitute this invention and which are hereinafter fully and particularly described in conjunction with the accompanying drawings and set forth in the claims.

In the drawings:—Figure 1 is a top plan view of one end portion of my improved steel underframe for street-cars; Fig. 2 is a central longitudinal section of the same on line 2—2, Fig. 1; Fig. 3 is a cross sectional view taken on line 3—3, Fig. 1; Fig. 4 is a cross sectional view taken on line 4—4, Fig. 1, and Fig. 5 is a similar cross section, but taken on line 5—5, Fig. 1; Fig. 6 is a sectional end-view of one of the transverse floor-beams as taken on lines 6—6, Figs. 1 and 3;

Fig. 7 is a perspective view of the middle portion of one of the transverse floor-beams.

In the drawings, 10 indicates the longitudinally extending center-sill of the car body underframe, which extends from end to end thereof, and is formed in one integral part from a steel channel-beam of the cross-sectional shape shown in Figs. 3 to 5.

12, 12, designate the side-walls which are formed from steel bulb-angle irons or beams, the depending vertical flanges 13 of which are about double the width of the horizontal flanges 14 thereof. The lower edge portions of the flanges 13 are rounded and reinforced by the bulb-edges 15 formed thereon, and which give increased lateral strength to the said flange, which combined with the before-mentioned extra width of the same produces a side-sill which is capable of resisting the vertical strain of heavy loads.

The center-sill 10 and side sills 12 of the underframe are united by the body bolster 16. The bolster, as I prefer to construct it, includes a central channel block 17 disposed below the channel shaped center sill, having a centralized upper portion thereof of reduced size which fits snugly within the inverted channel of the center sill, see Fig. 4.

Secured by through-bolts 18 to the center-sill 10 and to the top and bottom faces of the block 17 are the upper and lower members 19, 19^a of the bolster truss. These truss members are formed of flat steel bars of a width equal to the longitudinal dimension of the bolster-block 17 and extend unbroken from side to side of the underframe. The opposite end portions of the truss members 19 and 19^a are united and secured to the under side of the side-sill flanges 14 by the bolts 20. The ends of the upper truss member 19 are bent downward at right angles and abut against the inside faces of the flanges 13 of the side sills 12, thereby imparting increased lateral strength as well as load sustaining strength to the underframe at such place.

The underframe toward a central part thereof and longitudinally inwardly from the bolster 16, is provided with, preferably, two transverse I-beams or transoms 25, (one thereof being shown in Figs. 1, 2 and 5), and which extend unbroken from one side-sill to the other. The end portions of the transoms 25 are united to the side sills 12 by the saddle blocks 26, to which the end portions

of the transoms are riveted and which in turn are riveted to the vertical flanges 13 of the side-sills. The under-side faces of the saddle-blocks 26 have riveted thereto the struts 27 which form a part of the side-sill truss 28. The transoms 25 pass under the center sill 10 (see Fig. 5) and are secured thereto by the rivet-united angle-plates 29. The underframe is further strengthened laterally by the transverse steel floor beams 30, which also extend, unbroken, from one side-sill 12 to the other. These floor-beams 30 (8 or 10 in number in the length of a car) are provided at uniformly spaced distances apart throughout the underframe, and are formed of steel angle irons arranged with the upper members horizontally, and their lower members vertically. The ends of the transverse floor beams 30 abut against the vertical flanges 13 of the side-sills 12, and the end portions of the top flanges 31 of the said floor beams 30 are riveted to the undersides of the top-flanges 14 of the side-sills, such floor beams between their middle center sill-engaging portions and the side sills having slight downward deflections as clearly shown in Fig. 3. The central portion of the vertical flanges 32 of each floor beam 30 is for a distance equal to the width of the center-sill 10 bent upward to a horizontal position and into close contact with the under-side of the floor beam flange 31, as shown at 33 in Figs. 3, 6 and 7, and is secured in this position to the top face of the center-sill 10 by rivets. The underframe is further braced and supported against lateral strains by the pairs of flat steel braces 40 which, as seen in Fig. 1, extend from a point on the center-sill 10 centrally of the underframe diagonally to each side-sill 10.

The ends of the center and side-sills of the underframe are united and braced by the usual end sill 45.

The downwardly open space 48 under the inverted trough shaped channel-beam forming the center-sill 10 extends in one unbroken length from one end sill 45 at one end of the underframe to the other, and provides a convenient and safe storage space or conduit for the electric wires 50 leading to and from the motors provided in electrically propelled street-cars. It is generally preferred to maintain and carry the several wires 50 within the space 48 under the center sill in cable form as shown in Figs. 3 to 5. The inverted channel-beam center-sill 10 also provides at each end of the underframe a strong and efficient means for securing thereto the draft-sills 55 which are riveted to the center-sill 10, as shown in Figs. 1 and 2.

The two floor beams 30 adjacent, and at either side of the bolster 16 are connected together by longitudinally arranged flat bars 60, which extend parallel to the center sill

12, see Fig. 1. The space 62 between the bars 60 and between the floor beams 30 to which their ends are riveted is not covered by the flooring of the car, but by a separate cover or trap door, whereby convenient access to the motor of the car is assured.

One important object attained by the use of the bulb-angle side-sills 12, before described, is that, in addition to their strength and power to resist vertical and lateral strains, not possessed by ordinary steel angle beams, such bulb-angle side-sills having the positions and relations shown in the cross sectional views of the drawings, and by dotted line indications in the plan view, Fig. 1, afford increased space between the opposite sills whereby the car trucks 65 beneath the underframe may turn on curves of shorter radius than would be the case if the underframe comprised the wider and more bulky side-sills as heretofore ordinarily used.

It is to be noted in the construction of the underframe as particularly represented in Fig. 3, that the tops of the horizontal inwardly extending flanges comprised in the side sills are slightly higher than the horizontal top or back of the center-sill so that when the series of transverse floor beams 30 are connected with the center-sill and with the horizontal flanges of the side-sills, the tops of the central portions of the floor beams and the tops of the side-sill center flanges constitute supports all at one level both at the median line and at the opposite sides of the underframe for the flooring 69.

I claim:—

1. In an underframe of a railway car a longitudinal center-sill constituted by an inverted channel iron, opposite longitudinal side sills constituted by angle irons comprising vertical outwardly disposed side flanges and horizontal flanges inwardly extended from the upper portions of the vertical flanges, transverse metallic floor beams centrally crossing in contact on the top of the center-sill, having their portions at opposite sides of the latter slightly downwardly inclined and having their extremities engaged under the inwardly extended horizontal members of angle irons constituting the side-sill and rivets, or like fastenings, for uniting the floor beams centrally to the center-sill and at their extremities to the side sills.

2. In an underframe of a railway car a longitudinal center-sill constituted by an inverted channel iron, opposite longitudinal side sills constituted by angle irons comprising vertical outwardly disposed side flanges and horizontal flanges inwardly extended from the upper portions of the vertical flanges, having their tops slightly higher than the top of the center sill, transverse metallic floor beams centrally crossing in contact on the top of the center-sill, having

their portions at opposite sides of the latter slightly downwardly inclined and having their extremities engaged under the inwardly extended horizontal members of angle irons constituting the side sills whereby the tops of the side-sill horizontal flanges, and of the middle portions of the floor beams constitute a level support for the car flooring, and rivets, or like fastenings, for uniting the floor beams centrally to the center-sill and at their extremities to the side sills.

3. In an underframe of a railway car, a longitudinal center-sill constituted by an inverted channel iron, opposite longitudinal side sills constituted by angle irons comprising vertical side flanges having each a longitudinally continuous bulb-like enlargement at its lower edge and horizontal flanges inwardly extended from the upper portions of the vertical flanges, transverse floor beams consisting of angle irons centrally crossing on and in contact with the top of the center-sill and having their portions at opposite sides thereof slightly downwardly inclined and having their extremities engaged under the horizontal flange members of the side-sills and vertically applied rivets uniting the floor beams centrally to the top member of the center-sill and at their extremities to the side sills.

4. In an underframe of a railway car a longitudinal center-sill constituted by an inverted channel iron, opposite longitudinal side sills constituted by angle irons comprising vertical side flanges and horizontal flanges inwardly extended from the upper portions of the vertical flanges, transverse floor beams centrally crossing on and in contact with the top of the center-sill and having their extremities engaged in contact against the horizontal members of the side-sills, said floor beams being constituted by angle irons having the vertical members thereof at their central portions bent toward, and folded in facewise contact under the horizontal members, and rivets for uniting the floor beams centrally through the superposed portions thereof to the back of the center-sill, and at its extremities to the side sills.

5. In an underframe of a railway car, a center-sill composed of a longitudinally continuous inverted channel iron, opposite side sills constituted by angle irons comprising vertical outwardly disposed side flanges and horizontal flanges inwardly extended from the upper portions of the vertical flanges, a bolster comprising a block having a narrowed upper portion thereof engaged and fitted under and within the center-sill constituting channel iron and transversely arranged upper and lower truss members, the upper one engaging over the top of the center sill and having its extremities engaged under the horizontal flanges of the side sills

and the lower truss member having its intermediate portion engaged under said block and having its portions at opposite sides thereof upwardly and outwardly inclined and having its extremities engaged under the end portions of the upper truss under said side sill horizontal flanges, means for uniting, at the center of the structure the center-sill, the said block and intermediate portions of said truss members, and rivets connecting the extremities of said bolster truss members with each other and with the side-sill flanges.

6. In a railway car underframe, a longitudinal continuous inverted channel iron constituting a center-sill, opposite side sills constituted by angle irons having outwardly disposed vertical flanges provided at their lower edges with longitudinal continuous bulb enlargements, and horizontal flanges inwardly extended from the upper portions of the vertical flanges, a bolster comprising an inverted U-shaped block having its upper portion narrowed, and of step-shape, engaged and fitted in the center sill inverted channel iron, a transverse upper truss member crossing over and in contact with the top of the center sill and having its portions near its end engaged under the horizontal flanges of the side sills and having its extremities downturned in engagement with the inner vertical faces of the side sill flanges and having its ends in engagement with said bulb enlargements, a lower truss member having opposing portions upwardly and outwardly extended and having its extremities in facewise contact against the portions of the upper truss member which underlie said side sill horizontal flanges, means for uniting the extremities of the truss members to each other and to the side sills, and means for uniting at the center of the structure the center-sill, said block and the intermediate portions of said truss members.

7. In a railway car underframe, a longitudinal center sill constituted by an inverted channel iron, opposite longitudinal side sills constituted by angle irons having their vertical members outwardly disposed and their horizontal flanges inwardly extended from the tops of said vertical members, transverse metallic floor beams centrally crossing in contact on the top of the center sill and united thereto and having their extremities connected with the horizontal flanges of the side sills, a bolster comprising a block, the upper portion of which is engaged within the inverted trough-shaped center sill, and upper and lower truss members, one crossing over the center sill and the other under said block and having their extremities converged and connected to the side sills, means for uniting, at the center of the structure, the said block, the bolster truss members and center sill, and one or more transversely ar-

5 ranged transom beams under and centrally connected to the center sill and saddle blocks secured to the vertical flanges of the side sills and to which the extremities of the transom bars are connected.

10 8. In a railway car underframe a longitudinally continuous inverted channel iron constituting a center sill and opposite angle irons arranged as described and constituting
15 side sills, metallic transverse floor beams crossing by the middle portions on the top of the center-sill and united thereto and having their extremities connected under the horizontal flanges of the side sills, saddle blocks
connected to the lower portions of the side
sill flanges, transom bars transversely ex-

tending from one side sill to the other, endwise supported on and connected to said saddle blocks and intermediately connected to the center-sill below which it is disposed, 20 truss rods connected to the side sills and extending below the saddle blocks and struts connected with and depending below the saddle blocks and with which said truss rods are engaged. 25

Signed by me at Springfield, Mass., in presence of two subscribing witnesses.

CLIFFORD F. RICE.

Witnesses:

G. R. DRISCOLL,
WM. S. BELLÖWS.