No. 676,530. Patented June 18, 1901.

C. M. CARNAHAN.

METALLIC CAR CONSTRUCTION.

(Application filed Feb. 19, 1900.)

(No Model.) 3 Sheets—Sheet 1.

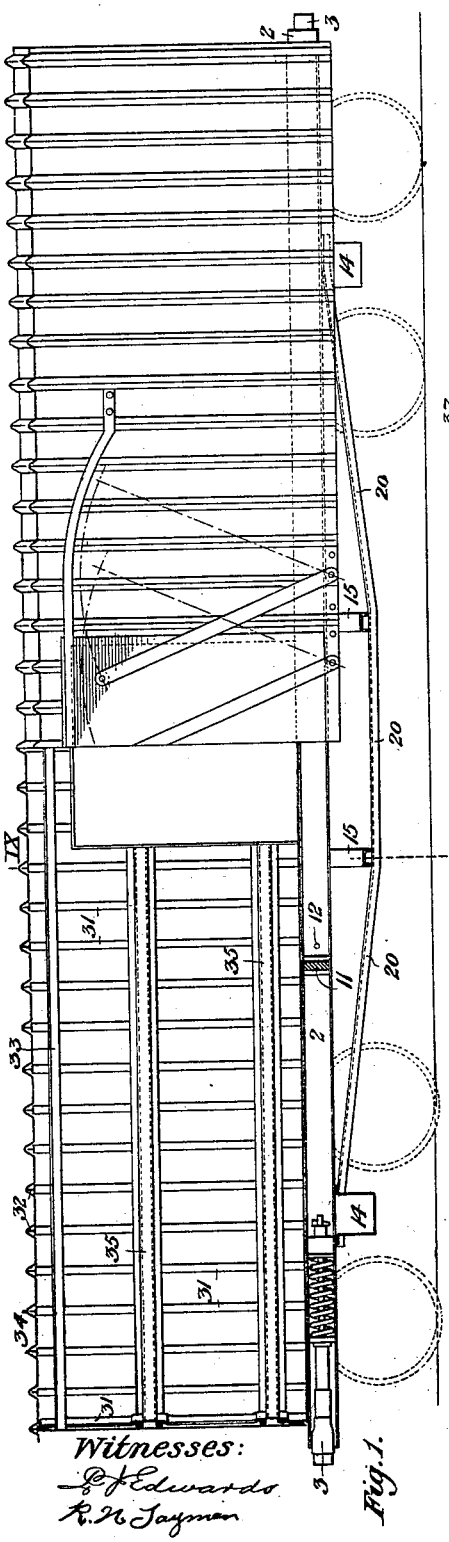

Fig. 1.

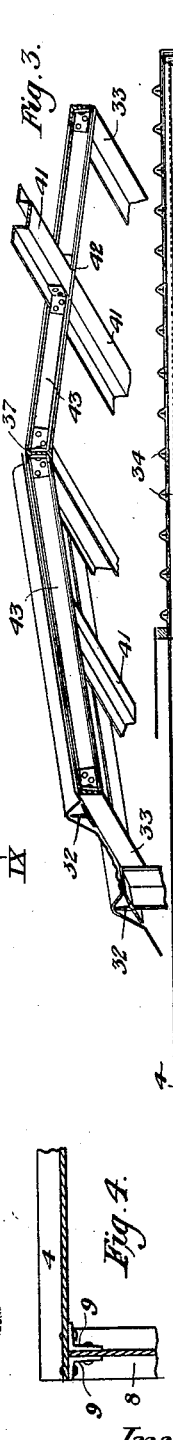

Fig. 3.

Fig. 4.

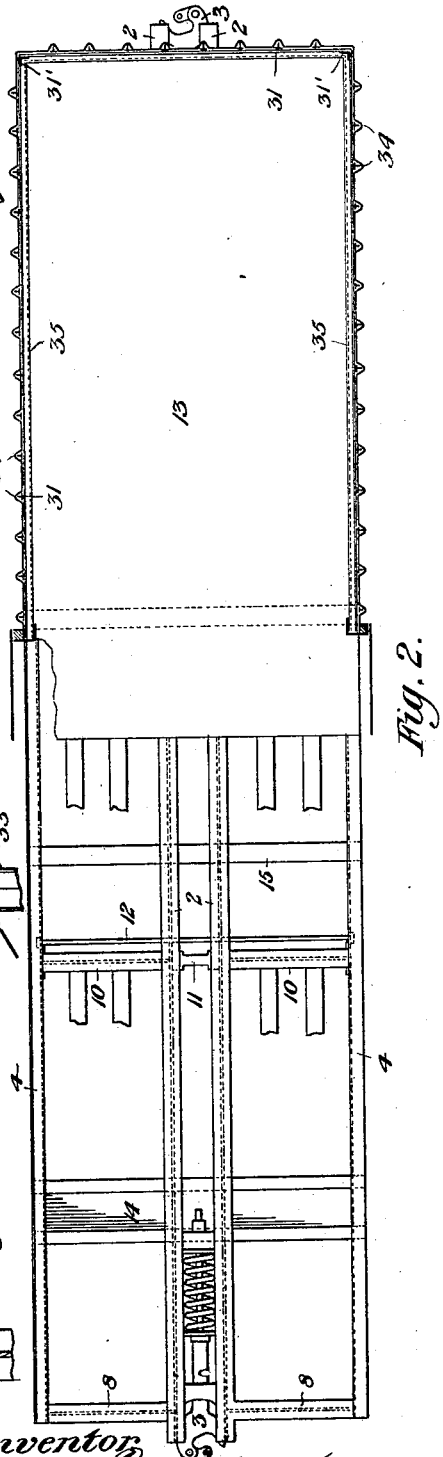

Fig. 2.

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(Application filed Feb. 19, 1900.)

(No Model.) 3 Sheets—Sheet 2.

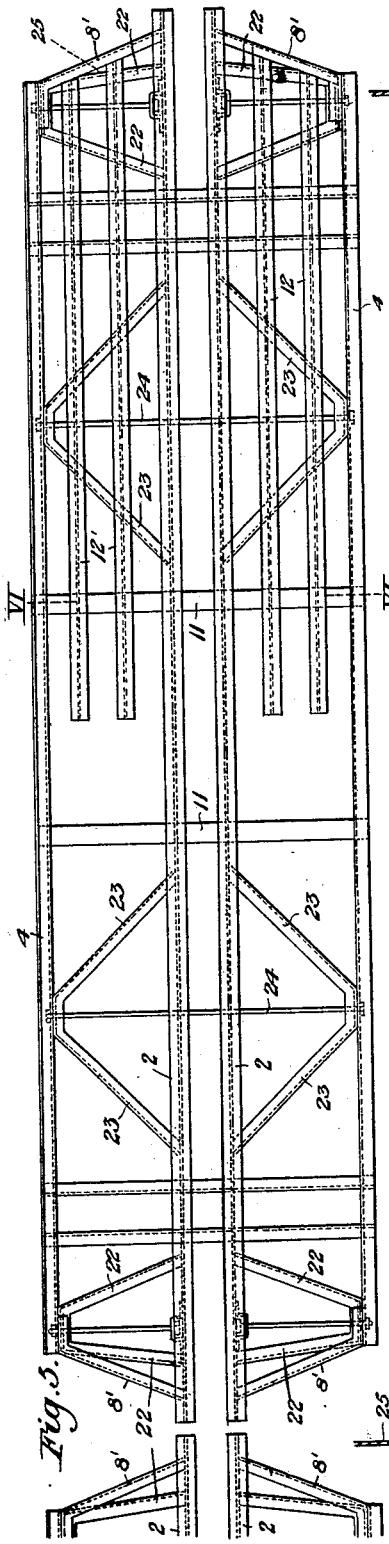

Fig. 5.

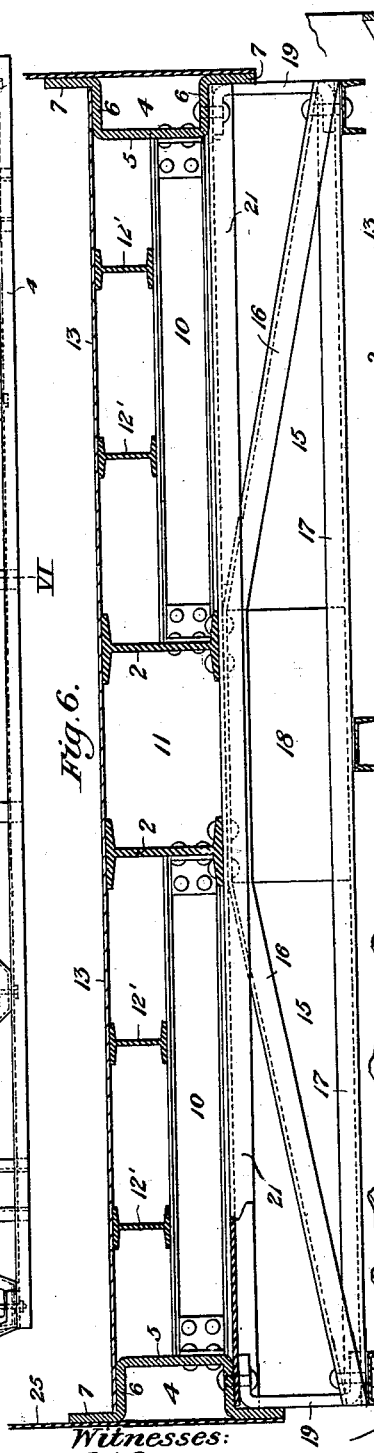

Fig. 6.

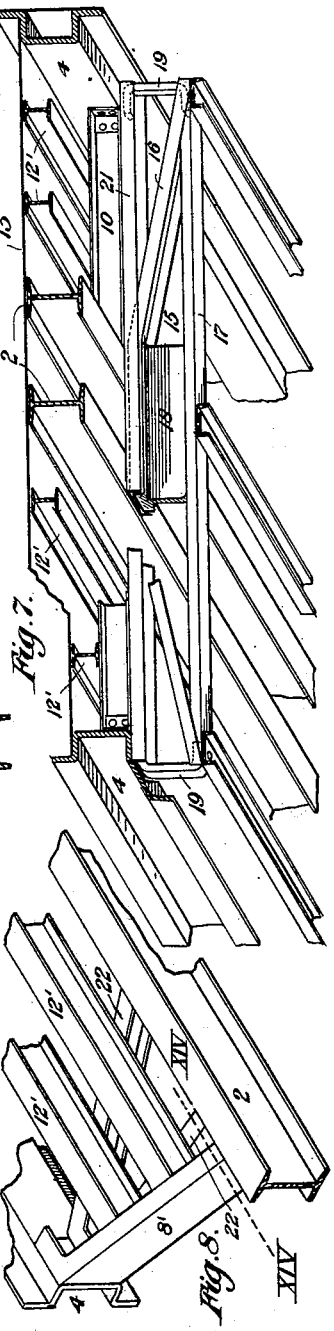

Fig. 7.

Fig. 8.

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METALLIC CAR CONSTRUCTION.

(Application filed Feb. 19, 1900.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 9.

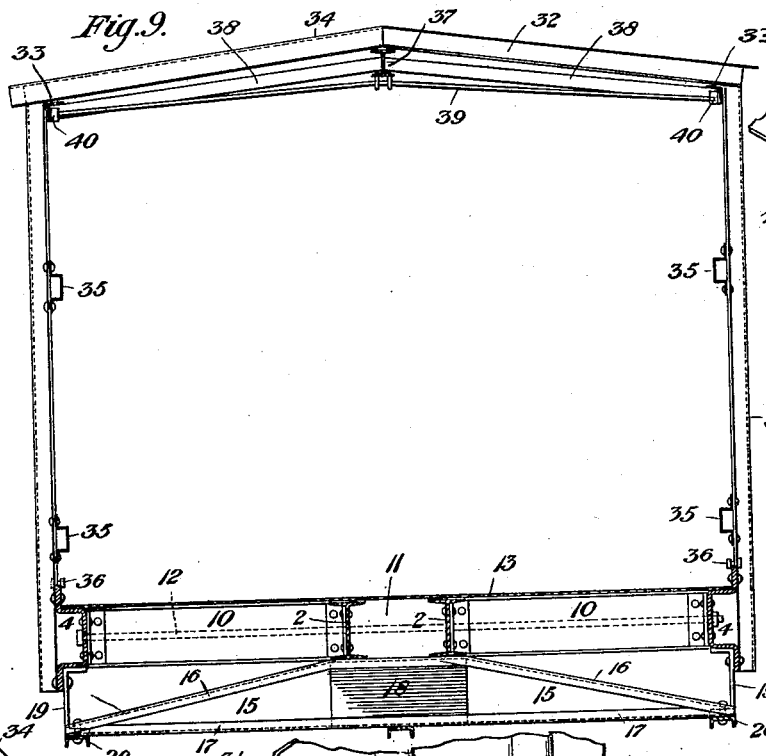

Fig. 10.

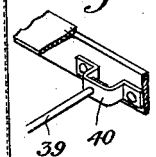

Fig. 15.

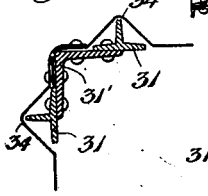

Fig. 12.

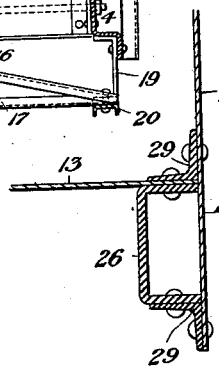

Fig. 11.

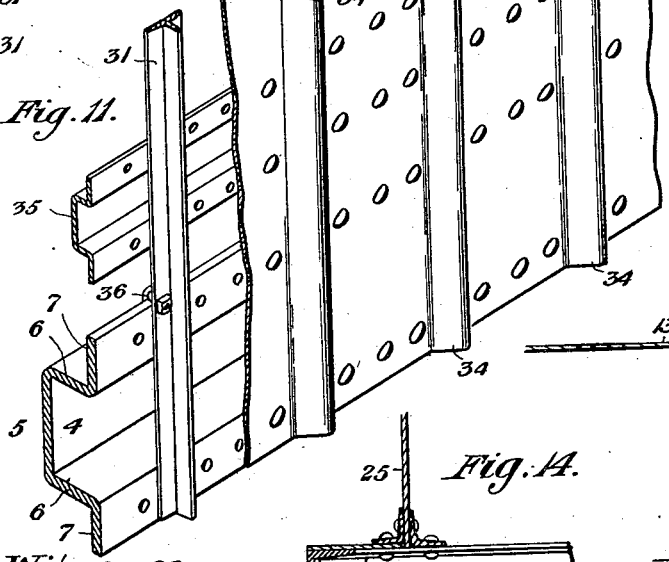

Fig. 13.

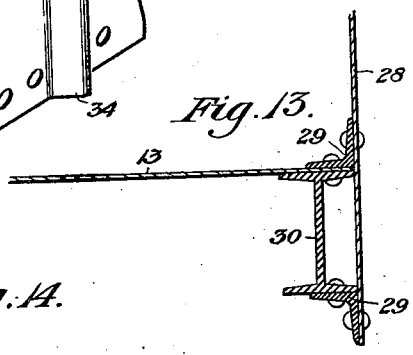

Fig. 14.

Witnesses:

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UNITED STATES PATENT OFFICE.

CYRUS M. CARNAHAN, OF ALLEGHENY, PENNSYLVANIA.

METALLIC CAR CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 676,530, dated June 18, 1901.

Application filed February 19, 1900. Serial No. 5,704. (No model.)

To all whom it may concern:

Be it known that I, CYRUS M. CARNAHAN, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Metallic Car Construction, of which the following is a specification, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a view in side elevation, partly in section, of my improved car. Fig. 2 is a sectional plan view. Fig. 3 is a perspective detail view showing the construction of a portion of the roof-framing. Fig. 4 is a detail view illustrating a corner-joint connection of the floor members. Fig. 5 is a plan view illustrating the floor-framing and certain modified construction of the end members. Fig. 6 is a cross-section on the line VI VI of Fig. 5. Fig. 7 is a cross-sectional perspective detail view further illustrating the same construction. Fig. 8 is a perspective detail view illustrating the floor-framing at one corner. Fig. 9 is a cross-section through the car on the line IX IX of Fig. 1. Fig. 10 is a detail view illustrating the connection of the rod with the corner-angle. Fig. 11 is a perspective detail view illustrating the side framing and sheathing. Fig. 12 is a sectional detail view showing a modified construction at the lower side corner of the car, employing a channel. Fig. 13 is a similar view illustrating the substitution of an I-beam for the box-girder. Fig. 14 is a longitudinal sectional detail view through the floor-framing, indicated by the line XIV XIV of Fig. 8. Fig. 15 is a cross-sectional detail view illustrating the manner of bracing the corner and connecting the sheathing.

My invention relates to the construction of railroad and other cars or vehicles for the transportation of freight, passengers, &c.; and it consists in the features of construction, as shown in the drawings and as hereinafter described.

The invention has in view the cheapening and simplifying in construction of what are at present known as "steel cars," with the accompanying advantage incident to the various features and modifications which I have employed.

Referring to the drawings, 2 2 are center sills made of structural I-beams located midway of the main framework running longitudinally for the full length of the car, assembled in close relation to each other and with sufficient intervening space to receive the draw-heads 3 at each end, with their accompanying draft-gear. On each outer side, on corresponding levels with the I-beams, are mounted the side sills 4 4, composed of a box-truss member preferably consisting of a rolled plate having an inwardly-extending web body portion 5, top and bottom portions 6 6, and vertical flanges 7 7. This construction is of great strength, forming, in effect, when the sheathing of the car is in place, a box-girder and providing ample interior space for bolt-heads and nuts and offering convenient faces for attachment of the other parts. These side sills are strongly incorporated with the center sills at the ends by end sills 8 8, consisting of structural members, I-beams or channels connected to the center and side sills by angle-plates 9, riveted to each member. At intermediate equally-spaced positions are similar cross-sills 10, connected in like manner, and between the center is placed a metal filler-block 11, similarly connected and forming with the sills 10 a rigid cross-framing. The various parts are also held together at these points by the bolts 12, extending from side to side, passing through the web portions of the center and side sills and drawn up tight. It will be noted that the filler-blocks and tie-bolts are omitted at the ends for the purpose of providing clearance for the draw-head and rigging.

On the same level with the center and side sills, extending longitudinally of the car and framed in against the end and cross sills by riveted angle-plates, are the intermediate sills 12′, upon which the floor 13, preferably of sheet metal, is laid and riveted.

Underneath the main floor-framing, at each end, in position for truck-bearings extending across from side to side and riveted to the longitudinal members, is the body-bolster 14, formed of sheet metal in the form of a three-sided box with lateral flanges similar in shape to the side sill 4. These bolsters serve to strengthen and brace the framework laterally and to centralize the strain upon the trucks. Underneath in similar transverse

position are the usual needle-beams 15, (shown to advantage in Figs. 6 and 9,) composed of an upper channel 16, constituting an arched member bearing up under the center sills and tapering downwardly and resting at the ends on a lower horizontal channel member 17, with an intervening filler-block 18. At the outer end these channels, which constitute the needle-beams, are rigidly connected with the side sills by rigid strut members 19.

The body truss-rods 20 are made of channels or any convenient shape, passing underneath and supporting the needle-beams and upwardly beyond toward each end of the car, being connected to the under side of the side sills.

As shown in Fig. 6, I have employed a supplemental channel 21 as an additional member of the needle-beam, which channel lies up under the cross-sills for the full width of the car and is incorporated with the side sills and strut members by rivets passing through all. Immediately below, it will be noted, all the lower members are connected and incorporated with the body truss-rod in a similar manner, by rivets or bolts passing through from top to bottom. In this construction (shown in Fig. 6) it will be seen also that the cross-sills 10 and the intermediate sills 12′ are made of but half the depth of the center and side sills, permitting the intermediate sills to lie on top of the cross-sills, and thereby obviating the necessity of short lengths and necessary framing. In the modified construction shown in Figs. 7 and 8 this arrangement of half-depth beams is also utilized, and I have employed end sills 8′, made of channels riveted to the side and center sills, against which end-sill channels abut the intermediate sills 12′, riveted thereto by the usual angle-plates. Underneath the intermediate sills are supplemental cross-sills 22, of half-depth, made in one piece, connected at the inner ends to the center sills by riveting through angle-plates and bent at the middle outwardly and connected by riveting to the side sills. It will be observed that the end sills in this construction are disposed at an angle to the center sills, tapering backwardly and leaving considerable space, so that when the ends of two cars are brought into coupling position, as shown in Fig. 5, ample room will be left for coupling operations without sacrificing any material car-space. Supplemental lateral braces 23 of channels are located, as shown, arranged at angles extending across from the side to the center sills, the various members being rigidly held together by bolts 24. These end and intermediate diagonal braces serve to greatly stiffen the entire framework, and the end sills 8′ are floored over, the part projecting beyond the end wall 25 of the car being sufficient for an end platform. While I have shown in some of the views cross-sills for the full depth of the center and side sills, I prefer the half-depth construction, for the reason that it allows of continuous intermediate sills, while the intervening space, being unobstructed lengthwise of the car, admits of placing brake-pipes, rods, &c., to good advantage.

In Figs. 12 and 13 I have shown modified constructions of the side sill employing a channel 26, incorporated with the floor 13 and side sheathing 28 by means of angles 29, riveted as shown, or by using an I-beam 30, to which the floor and side are connected in the same way. Both constructions approximate the one already described and provide the open outer side for bolt-heads, &c.

The framing for the sides consists of studding 31, of structural-steel shape, preferably T's, extending from the lower side of the side sill 4 up to the roof-purlins 32, also made of T's, an angle 33 being used to form a corner brace and joint. It is not designed that the side and top framework shall be rigidly connected together or to the main frame; but they shall be held together by sheets of metal corrugated, as shown at 34, to fit over and around the T, the plates being riveted to the side sills, as shown in Fig. 9, and to the angle 33 at the corners. The side and roof members 31 and 32 may, however, be made in one piece. Longitudinal interior box-braces 35 similar in construction to the side sills are located at suitable heights to provide proper strength and extend for the full length of the car except at the doors, where suitable framing is provided. These braces 35 are also riveted to the plates, as shown, through the upper and lower flanges. The studding-posts 31 are detachably placed in position resting on the top flange 7 of the side sills by means of a short bolt 36, so that in case one or more sections of the sheathing are to be removed or renewed the posts may be shifted at will, while the sheathing when in position firmly embraces the posts and binds all the parts rigidly together. At each corner I employ upright angle members 31′, framed in with the floor-framing and box-girders and firmly incorporated with the adjacent studding and sheathing by rivets, as clearly shown in Fig. 15. It will be noted that the overlapping ends of the sheathing are conveniently connected together and to the corner-angles in the same manner.

The ridge-poles of the car consist of an I-beam 37 or other suitable shape, forming the hip of the roof and upon which the T's 32 rest. This beam extends the full length of the car and is suitably framed with the end, while cross-braces 38 connect it with the corner-angles 33 at the center of the car. Tie-rods 39, engaging straps 40, secured on the inner side of the corner-angles 33 at intervals throughout the length of the car, further serve to brace and tie the sides firmly together.

A modified construction which for certain types of car is preferable is shown in Fig. 3, wherein I employ longitudinal roof-box

braces 41, connected at 42 to cross-beams 43, located midway of the length of the roof and securely riveted to the ridge-pole I-beam 37 and to the corner-angles 33. This construction provides stiffness for the roof over the doors and also serves as an additional support for the roof-purlins 32.

As thus constructed my car is extremely strong, durable, serviceable, and light. Very little machine-work is required in constructing and erecting it, and the use of structural shapes throughout reduces the labor to a minimum.

What I claim is—

1. In a car construction, the combination of longitudinal I-beam center sills, box-girder side sills and structural end sills all of uniform depth, supplemental cross-sills of less depth forming cross-braces, and intermediate longitudinal sills of structural beams, resting on the cross-sills, abutting against the end sills and flush with the top of the center, side and end sills respectively, transverse structural needle-beams bearing under the center sills, and truss-rods passing underneath the needle-beams, and connected at their ends to the car-framing, substantially as set forth.

2. In a car construction, the combination of longitudinal I-beam center sills, box-girder side sills and structural end sills sloping backwardly and outwardly to the side sills, all of uniform depth, supplemental cross-sills of less depth forming cross-braces, and intermediate longitudinal sills of structural beams, resting on the cross-sills, abutting against the end sills and flush with the top of the center, side and end sills respectively, transverse structural needle-beams bearing under the center sills, and truss-rods passing underneath the needle-beams, and connected at their ends to the car-framing, substantially as set forth.

3. In car construction, the combination of longitudinal I-beam center sills, box-girder side sills and structural end sills, all of uniform depth, supplemental cross-sills of less depth forming cross-braces, intermediate longitudinal sills of structural beams resting on the cross-sills, abutting against the end sills and flush with the top of the center, side and end sills respectively, and transverse rectangular body-bolsters formed of bent plate provided with lateral securing-flanges connected with the center and side sills respectively, transverse needle-beams with truss-rods connected at each end to the framing, substantially as set forth.

4. In a car construction, longitudinal I-beam center sills, box-girder side sills and structural end sills of uniform depth, intervening cross-sills of less depth, intermediate sills flush with the top of the center, side and end sills, and transverse needle-beams consisting of an arched channel member, a lower straight channel member, an intervening filler-block and end connections, substantially as shown and described.

5. In a car construction, longitudinal I-beam center sills, box-girder side sills and structural end sills of uniform depth, intervening cross-sills of less depth, intermediate sills flush with the top of the center, side and end sills, transverse needle-beams consisting of an arched channel member, a lower straight channel member, an intervening filler-block and end connections, with supporting body truss-rods, substantially as shown and described.

6. In a car construction, in combination with side and end sills, a wall-framework consisting of vertical structural studding supported on the sills, longitudinal interior box-braces, and exterior wall-sheathing riveted to the sills and such box-braces and embracing the vertical studding, substantially as shown and described.

7. In a car construction, in combination with side and end sills, a wall-framework consisting of vertical T's supported on the sills, longitudinal interior box-braces, and exterior wall-sheathing corrugated to fit around the T's and riveted to the sills and box-braces, substantially as shown and described.

8. In a car construction, the combination with side and end sills, of vertical T-studding supported on the sills, longitudinal interior box-braces, T roof-purlins forming continuations of the vertical studding, and wall and roof sheathing exterior to the studding and purlins and connected therewith, substantially as shown and described.

9. In a car construction, the combination with side and end sills, of vertical T-studding supported on the sills, longitudinal interior box-braces, T roof-purlins supported on the vertical studding, and corrugated wall and roof sheathing fitting around and exterior to the studding and purlins and connected therewith, substantially as shown and described.

10. In a car construction, a wall and roof construction consisting of vertical T-studding, longitudinal interior box-braces, T roof-purlins supported on the vertical studding, angles forming a joint connection, a ridge-pole formed of an I-beam, and corrugated wall and roof sheathing fitting around and exterior to the studding and purlins and connected therewith, substantially as shown and described.

11. In a car construction, a wall and roof construction consisting of vertical T-studding, longitudinal interior box-braces, T-roof purlins supported on the vertical studding, angles forming a joint connection, a ridge-pole formed of an I-beam, transverse roof-braces connecting the I-beam with the angles, and corrugated wall and roof sheathing fitting around and exterior to the studding and purlins and connected therewith, substantially as shown and described.

12. In a car construction, a wall and roof construction consisting of vertical T-stud-