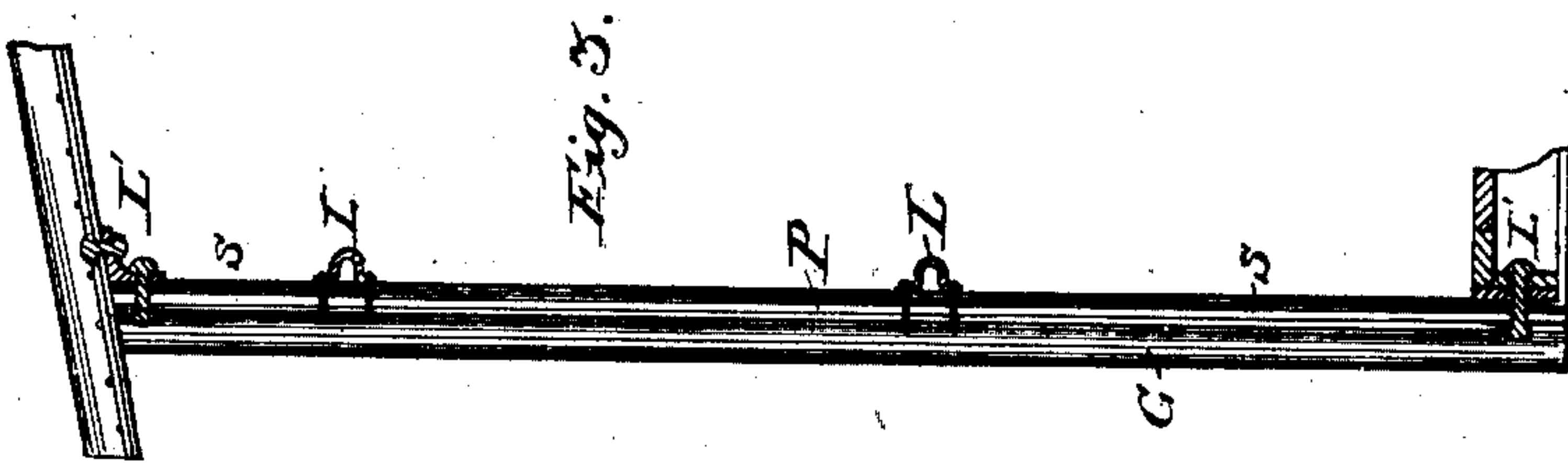
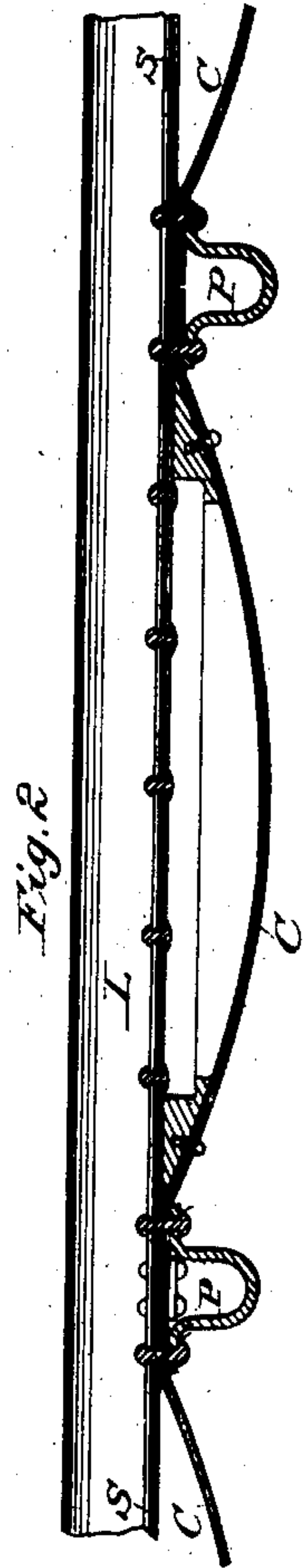
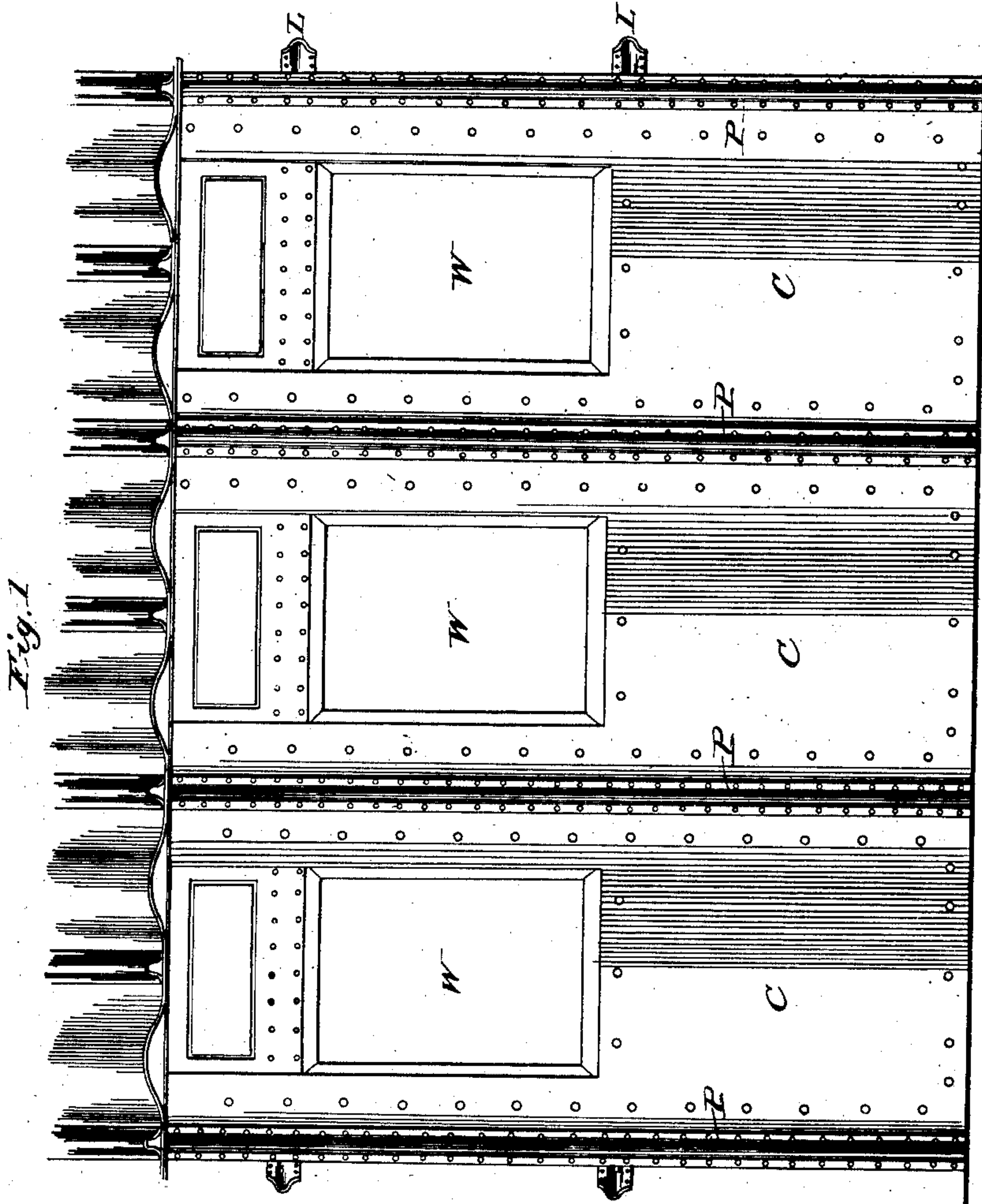


No. 30,426.

PATENTED OCT. 16, 1860.

J. A. ROEBLING.
RAILROAD CAR.



Witnesses:

*John A. Roebling
Charles Swanwick*

Inventor:

John A. Roebling

UNITED STATES PATENT OFFICE.

JOHN A. ROEBLING, OF TRENTON, NEW JERSEY.

IMPROVEMENT IN METALLIC RAILROAD-CARS.

Specification forming part of Letters Patent No. 30,426, dated October 16, 1860.

To all whom it may concern:

Be it known that I, JOHN AUGUSTUS ROEBLING, civil engineer, of Trenton, in the county of Mercer, in the State of New Jersey, have invented certain new and useful Improvements in the Construction of Iron Railroad-Cars, of which the following is a full and exact description, reference being had to the accompanying drawings, which make a part of this specification, and in which—

Figure 1 represents an elevation of the outside of a portion of the body of an iron passenger railroad-car made upon my improved plan. Fig. 2 represents a horizontal section of the same, taken through the lower part of it, showing the curved and plain panels and the space between them on an enlarged scale. Fig. 3 shows the vertical section of the side of a car.

The construction of railroad-cars in such manner that they shall be wholly or in great part formed of iron or other suitable metal has for a long time been considered as a very desirable end to be attained and various plans have been proposed; but to obtain the requisite strength without too great increase of weight and at a moderate cost has proved to be a difficult matter. The mere framing of an iron or metallic car does not accomplish all that is desired, although by itself it may be a great improvement. If wooden panels are inclosed in such a frame, they add but little to the strength by acting as braces unless they are made of such thickness as to add materially to the weight. Wood, being exposed to shrinkage, should, for this reason alone, never form an essential part of an iron car. Railroad-cars are constantly subjected to side strains and blows, and these, especially in cases of accidents, will in a great measure have to be resisted by the paneling, which, if made of wood, must be very heavy, and even then may, when broken into splinters, become a great source of danger to the passengers.

A panel of flat sheet metal has been proposed as a substitute for one of wood, and this has the further advantage of acting, when properly secured, as a brace to the framing, the tensile strength of the sheet resisting the elongation of the diagonals of the frame. Such a panel, adding strength to the structure, will in so far be an advantage. Its

resistance to lateral blows, however, will not be materially greater than that of a wooden panel, unless its weight is much increased, as a single flat sheet is not the most advantageous form for resisting blows directed perpendicularly against it; but a single panel of sheet metal is open to another objection. The great conducting-power of metal would offer but little protection against outside extremes of temperature. In addition to this, to form a recess or cavity for lowering the window-sash would require additional inside work. A mode of construction has been proposed, which in part meets these objections, but is open to another of a serious character. This plan consists in fastening two sets of plates—one on the inside, the other on the outside—to a heavy metal frame. I am not aware that this plan has ever been carried out, for its adoption involves a large expenditure of material and labor, which even then does not give all the advantages required.

To meet the difficulties above cited, I have made my invention, which I will now proceed to describe, as applied to the construction of the sides of a railroad-car as well as of its roof.

The frame of the car consists of uprights P and longitudinal pieces L, which may be of the **U I L L** or any other suitable shape of section placed at right angles, so as to leave open rectangular spaces to be filled by panels, windows, or ventilators. Between the uprights and the longitudinal pieces flat sheets S, of iron, are to be placed, forming flat panels, covering the whole of the sides, with the exception of the window and door openings. Sheets may be used as long as they can be rolled. This same flat sheet is to be continued over the car to form its inner roof or ceiling. Between the window-openings in the sides narrow plates may be used, running up and down and riveted to the long plates which run lengthwise of the car below the window-openings. Between the uprights curved panels C are to be arranged, so that their concavity is toward the flat panel, and their edges extending far enough under the uprights may be secured to them and to the flat panels by rivets. The relative position of the various parts being such as has been described, it is evident that if punched at proper intervals each single rivet will at once secure the flange

of the U-iron, the flat and the curved panel. At the intersection of the uprights and of the longitudinal pieces a single rivet will unite them both with the intervening curved and flat panels. In this way all the important parts of the structure are united in the most economical and most effective manner.

The curvature of the panels may be varied to suit the requirements of each particular case. While their vertical edges are so bent as to fit against the flat panel, I prefer to retain and secure the curve of the horizontal edges by introducing corresponding strips of wood inside, to which the curved sheet is fastened by wood-screws or rivets. To increase still more the stiffness of the curved panels and also their resistance, in case of an upsetting or rolling of the car, I further propose to introduce another horizontal wooden strip in the center of the sheet, and also a vertical one secured by wood-screws.

Where windows and ventilators are to be made, corresponding openings are to be left in both the flat and curved panels. I prefer the employment of a drop-window with curtains and without shutters. A recess or receptacle is then to be formed within the lower part of the curved panel by cutting out the wooden strips, so that the sash may slide freely between. Where less strength is wanted, the curved panel may be omitted in the upper part of the car—that is, from the lower end of the window upward, being employed only below the window.

As is plainly exhibited by Fig. 1, which represents a partial elevation of a car, curved plates may also be employed to the best advantage in the construction of the roof; but for this purpose I prefer to use curved plates of only half the width as those in the sides, and I double the number of ribs. The latter may have the cross-section of a Ω , or be of any other suitable shape.

Fig. 3 shows how the roof and the side of a car may be united by an angle-iron in a simple and effective manner. The width of the

curved panels in the roof being reduced, no wooden strips are needed inside, except at the eaves or edges of the roof, where the intervening space between the flat and curved sheets should be closed by a board closely fitting in and secured by wood-screws.

By the combination of parts as above described, and which constitutes my invention, the great end is accomplished of increasing immensely the resistance, spring, and elasticity of the car. Each curved panel in the sides as well as in the roof forms a spring, and by its elastic power will greatly diminish the danger of collisions, while its arched form vastly increases its strength to resist the effect of blows. In case of an upsetting or rolling down embankments and rocky slopes the curved panels will receive all the blows, and will thus protect the lives of the passengers inside. In addition to these important advantages there are those already mentioned—namely, the formation of hollow walls and of a hollow roof filled with air, which serves as a non-conductor of heat and cold, the better protection against sparks and fire from the outside, and also the great facility of making receptacles for drop-windows without additional material or work.

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

The combination of the longitudinal pieces, ribs, or uprights, straps and plates, which constitute the frame-work of the sides and roof of a metallic railroad-car with curved and flat panels in such manner as to leave a partial space between the panels, and thus forming a non-conducting wall and affording a receptacle for window-sashes when required, while the curved and flat panels may be united with any part of the framing with which they come in contact by one single rivet.

JOHN A. ROEBLING.

Witnesses:

WASH. A. ROEBLING,
CHARLES SWAN.