

No. 688,019.

Patented Dec. 3, 1901.

G. I. KING.
HOPPER BOTTOM CAR.

(Application filed June 10, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

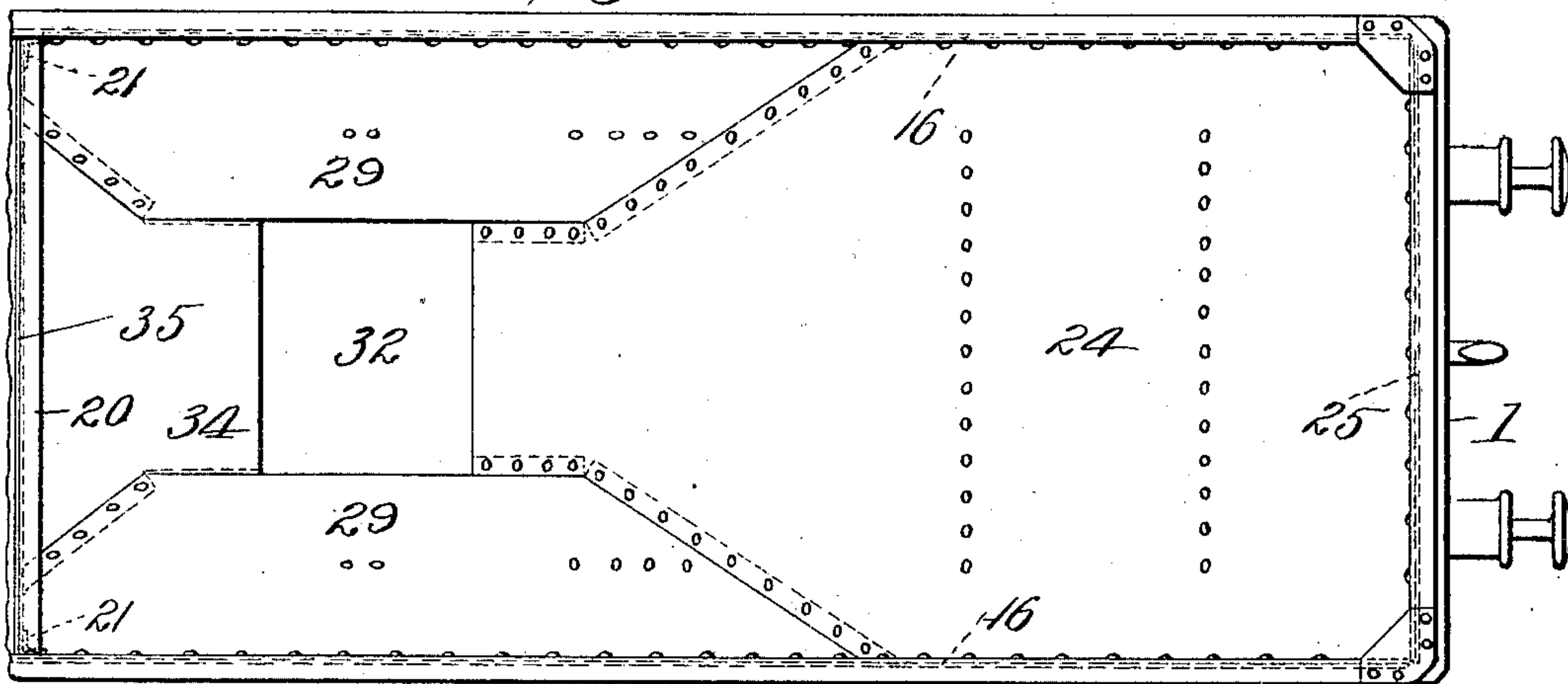


Fig. 2.

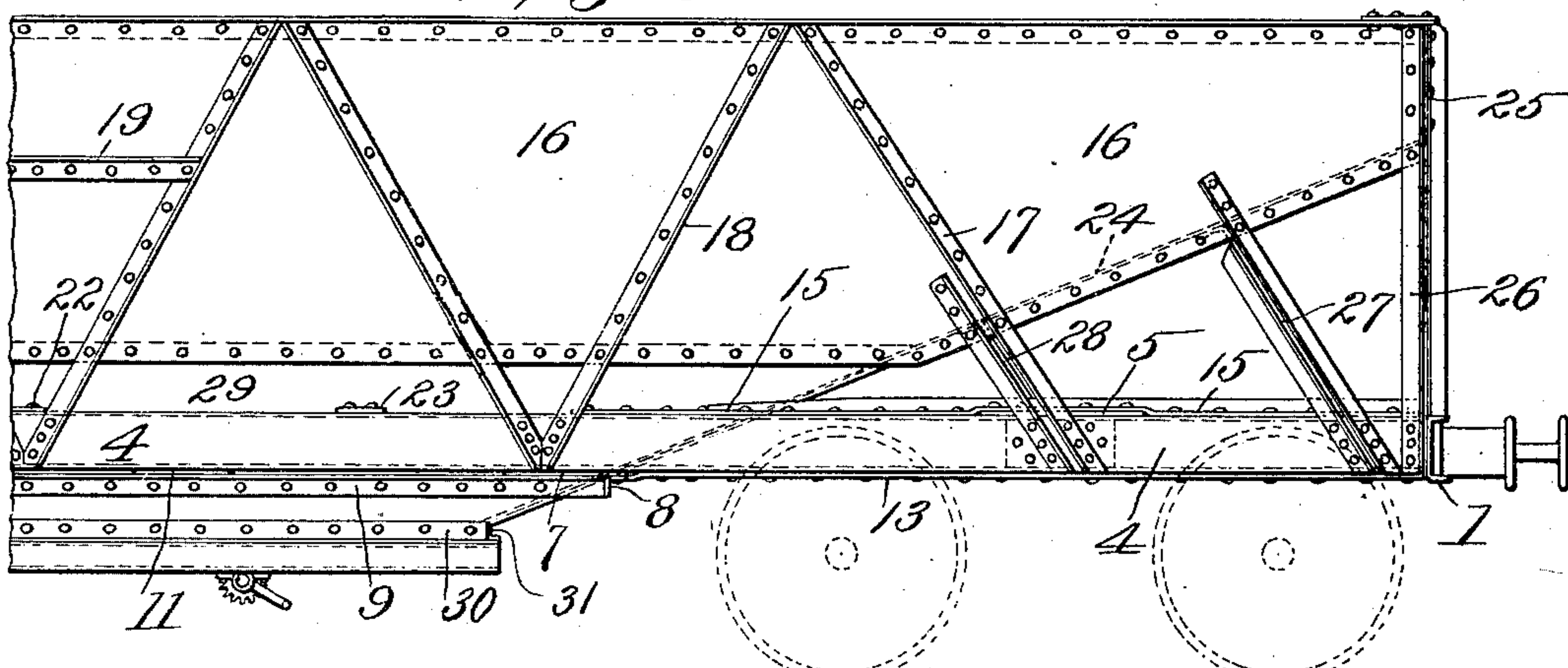
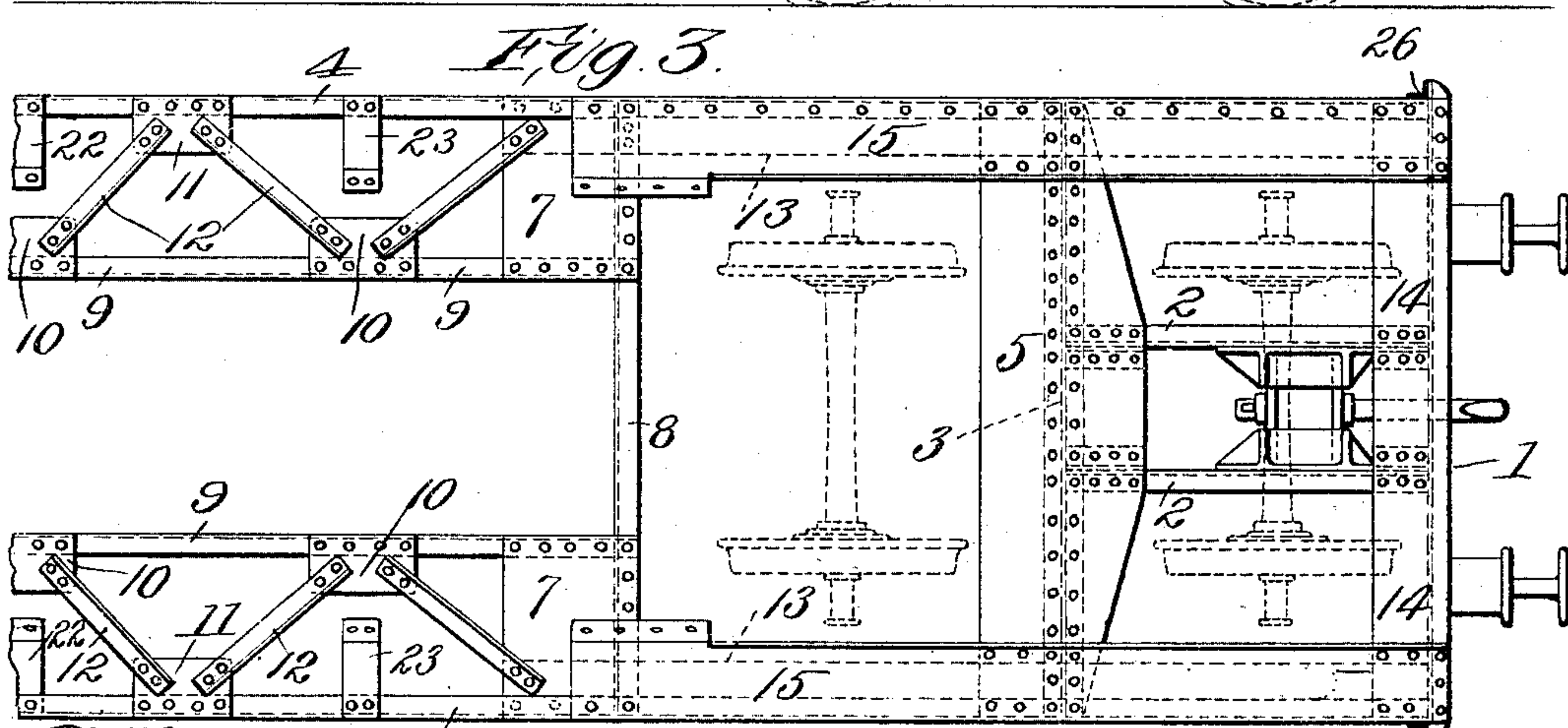


Fig. 3.



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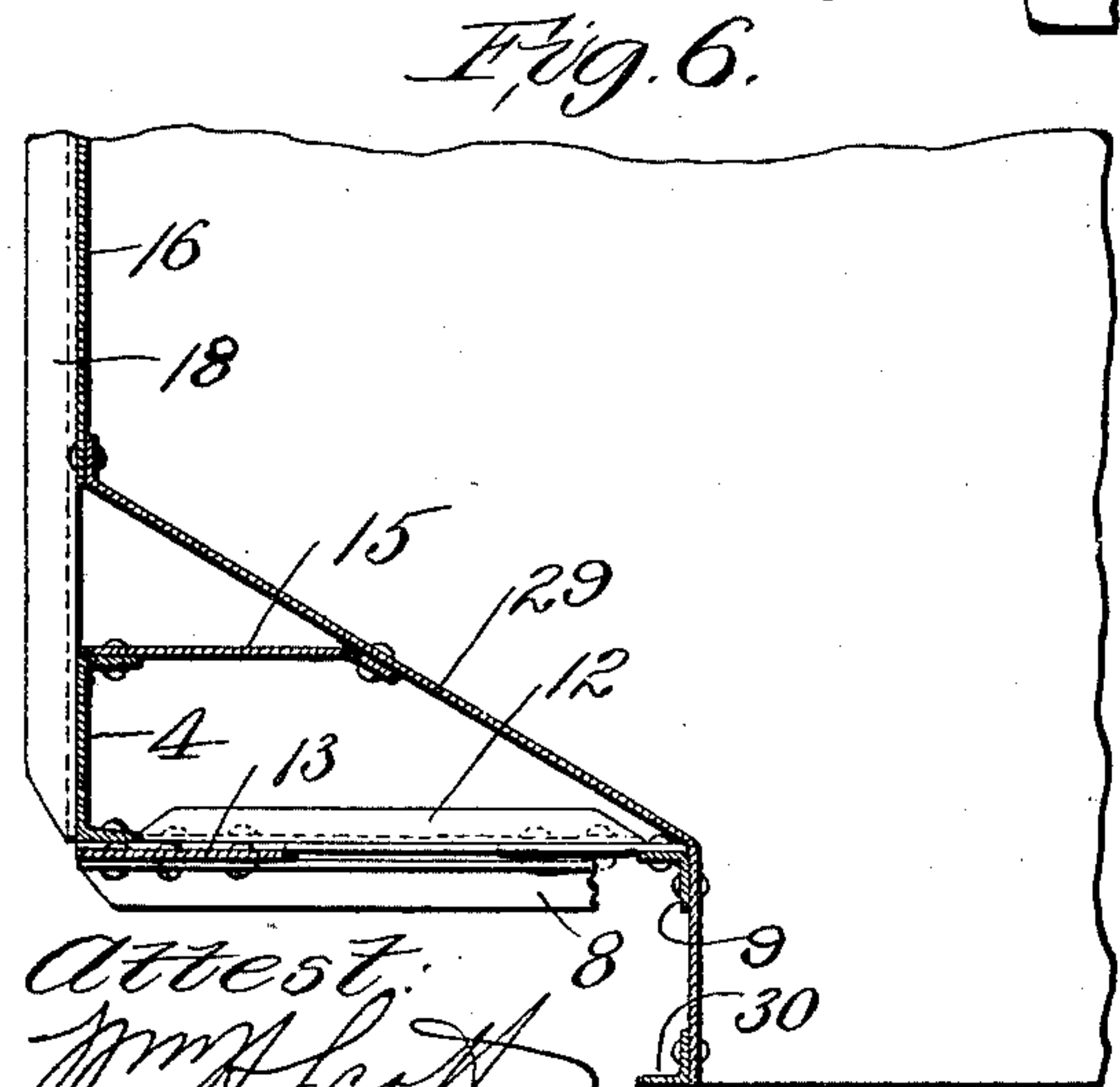
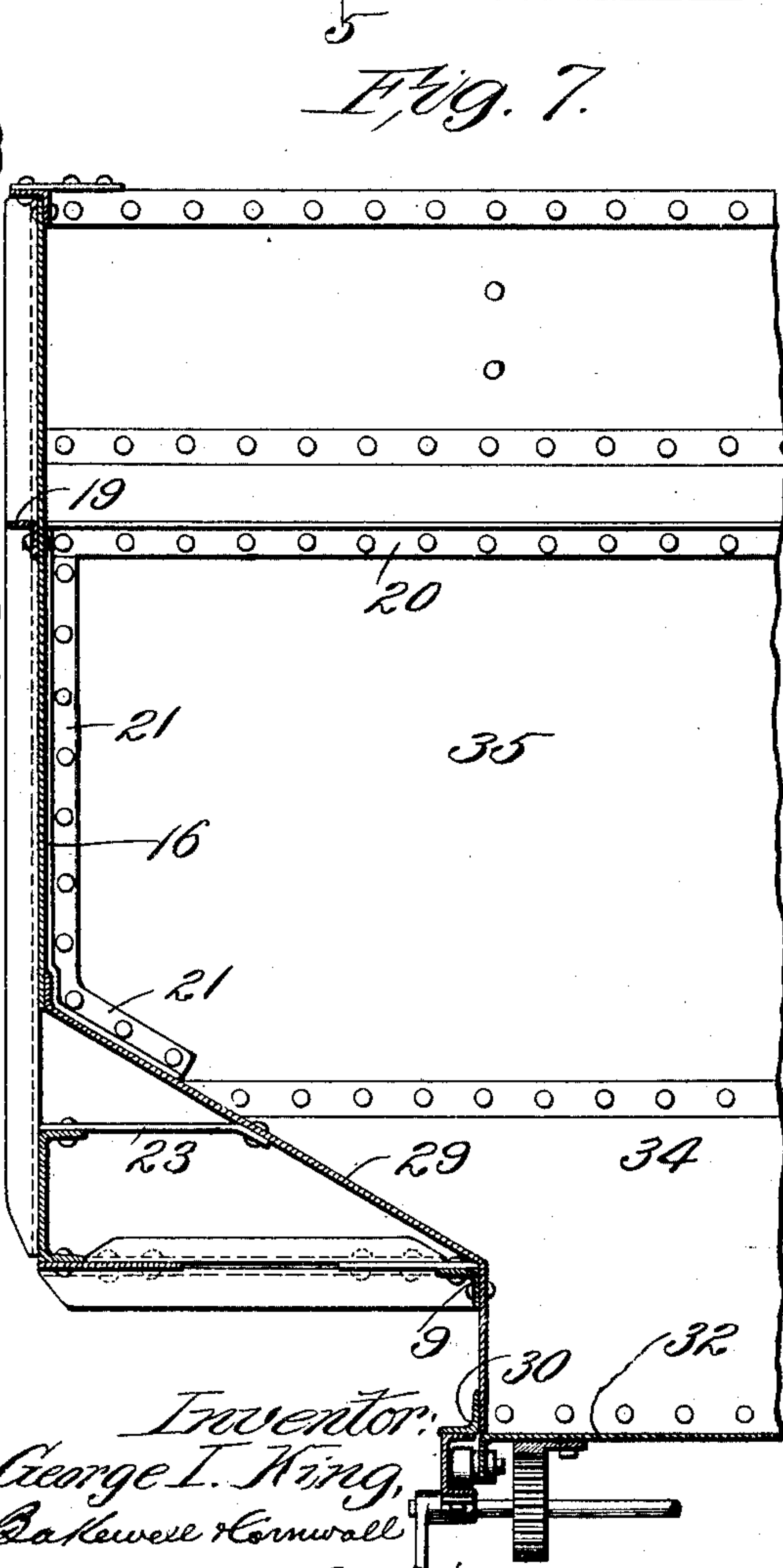
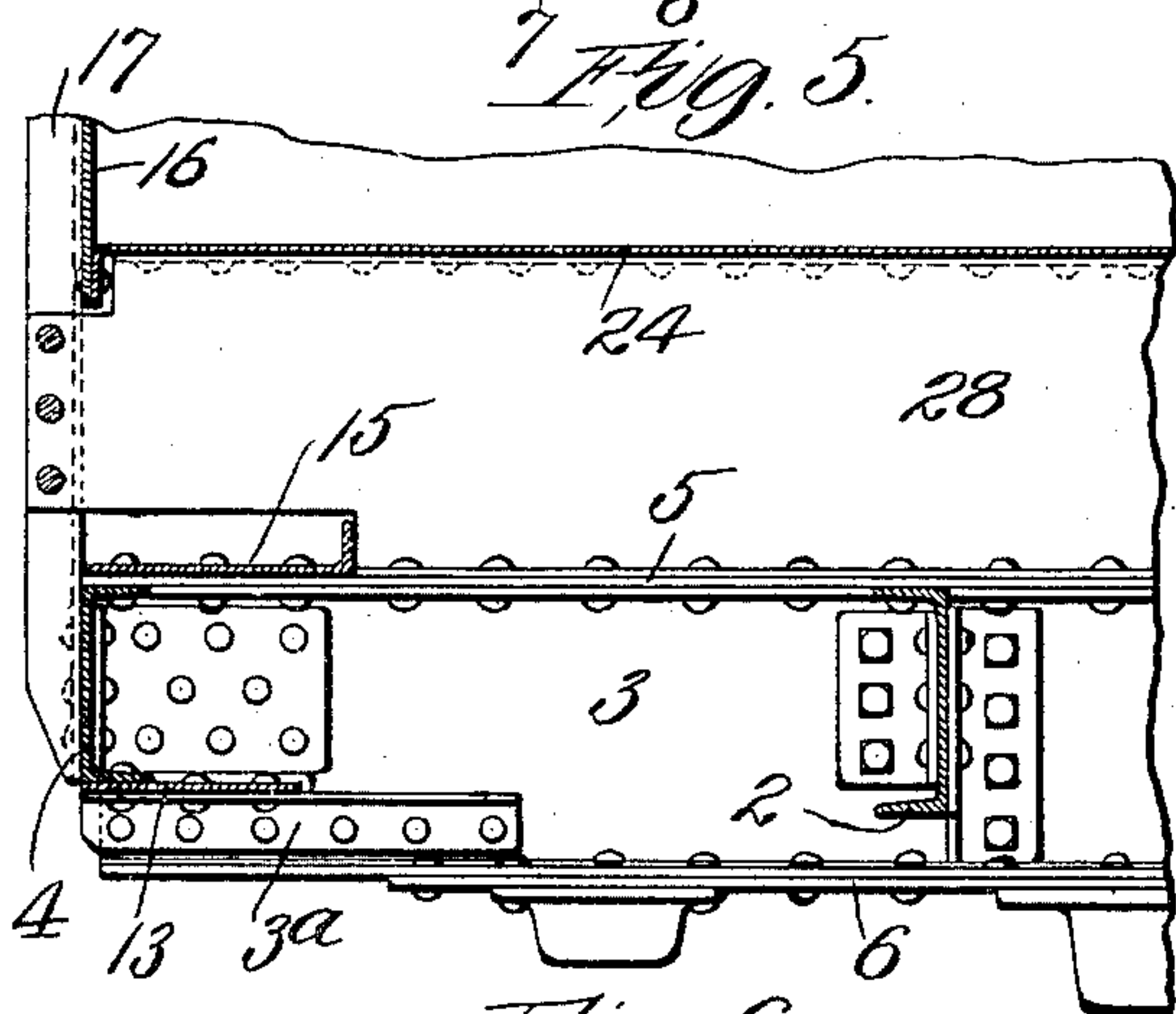
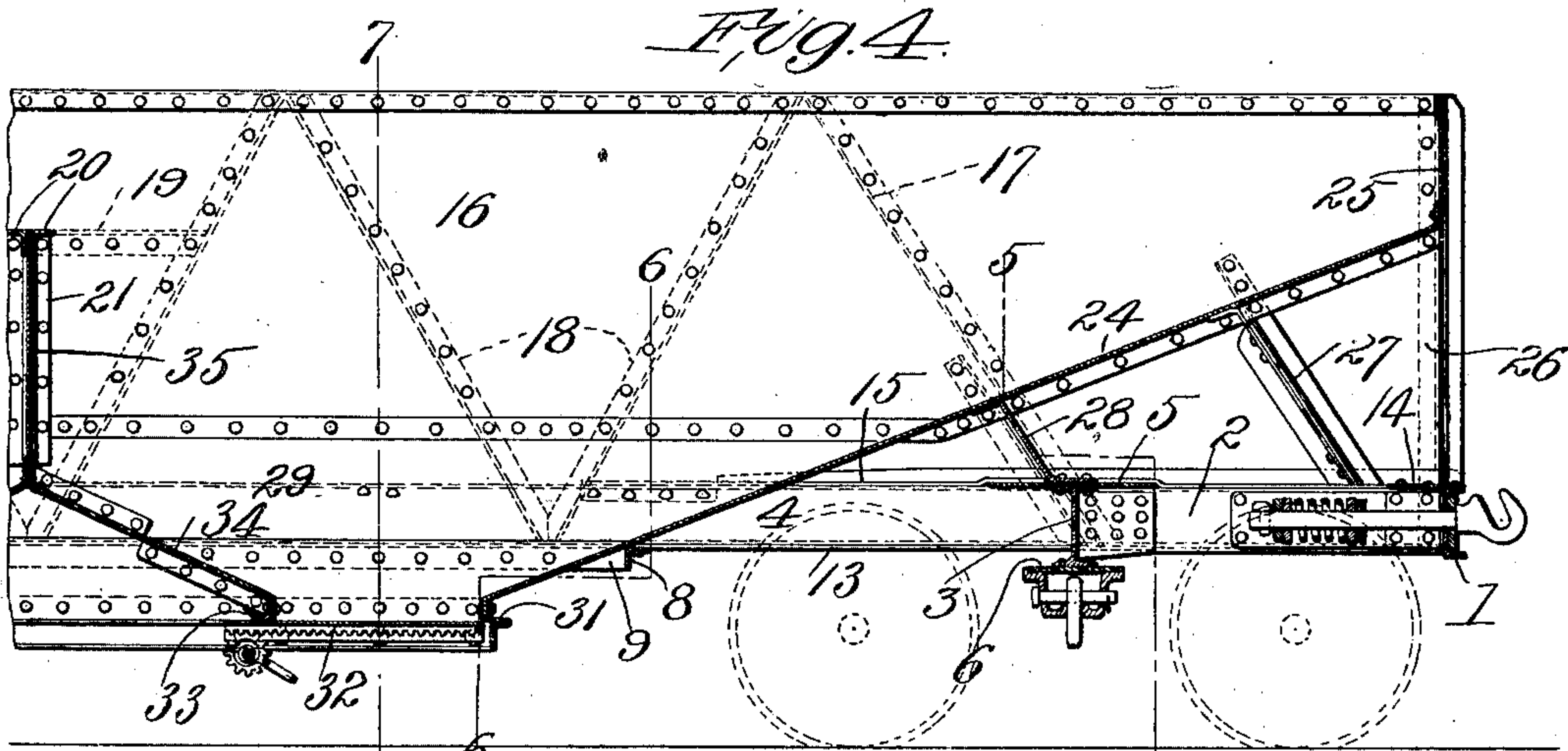
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G. I. KING.
HOPPER BOTTOM CAR.

(Application filed June 10, 1901.)

(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

GEORGE I. KING, OF DETROIT, MICHIGAN, ASSIGNOR TO AMERICAN CAR & FOUNDRY COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF NEW JERSEY.

HOPPER-BOTTOM CAR.

SPECIFICATION forming part of Letters Patent No. 688,019, dated December 3, 1901.

Application filed June 10, 1901. Serial No. 63,904. (No model.)

To all whom it may concern:

Be it known that I, GEORGE I. KING, a citizen of the United States, residing at the city of Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Hopper-Bottom Cars, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a partial top plan view of my improved hopper-bottom car. Fig. 2 is a side elevational view of one end of the car. Fig. 3 is a top plan view of the underframing for one end of the car. Fig. 4 is a vertical sectional view through one end of the car. Fig. 5 is an enlarged detail view on line 5 5, Fig. 4. Fig. 6 is an enlarged detail sectional view on line 6 6, Fig. 4. Fig. 7 is an enlarged detail sectional view on line 7 7, Fig. 4.

This invention relates to a new and useful improvement in hopper-bottom cars designed especially for use in hauling loose loads or material in granular form, the object being to provide a car with a bottom made up of inclined sheets to accelerate the discharge of the load, the exit-openings for the load being controlled by suitable doors.

Another object is to construct a car of the character described of structural or pressed steel, and in order to obtain maximum strength and rigidity with the least amount of dead-weight with respect to the carrying capacity of the car I utilize the side walls as plate-girders, which plate-girders also help form what might be termed the "top chords of side trusses," the bottom chords of said trusses being preferably in the form of horizontally-arranged latticed girders supported at their ends by the body-bolsters of the car.

Another object is to take advantage of the arrangement and disposition of the hopper-floor sheets by utilizing said sheets to add strength and rigidity to the structure.

With these objects in view the invention consists in the construction, arrangement, and combination of the several parts, all as

will hereinafter be described, and afterward pointed out in the claims.

In the drawings, 1 indicates the end sills of the car, and 2 the draft-sills, which draft-sills preferably extend only to the body-bolsters.

3 indicates the body-bolsters, which are preferably continuous from side sill to side sill and I-shaped in section.

4 indicates the side sills, which are preferably in the form of channels with their flanges presented inwardly, said channels being riveted to the ends of the body-bolsters.

5 and 6 are top and bottom cover-plates for the body-bolsters.

7 indicates connection-plates secured to the bottom flanges of the side sills, and under the outer edges of these connection-plates is arranged a transversely-disposed angle 8.

9 indicates angles preferably parallel to each other and to the side sills, which angles are arranged under the inner edges of the plates 7, and consequently these angles are on a lower plane than the bottom flanges of the side sills. These angles 9 carry connection-plates 10, and the side sills carry connection-plates 11, said connection-plates being diagonally arranged with respect to each other for the attachment of lattice-bars 12.

13 indicates plates extending from the end sills back to and under the plates 7. These plates 13 are riveted throughout their length to the bottom flanges of the side sills. By preference the angle 8 is arranged under the plate 13, filling-pieces being employed where required. Plates 13 are preferably bent up at the edges of the plates 7, so as to lie against the bottom flanges of the side sills.

As shown in Fig. 5, the web of the body-bolster is cut away to enable this plate to extend continuously without interruption from the end sill to the connection-plate 7. To secure the lower portion of the body-bolster to the plate and the bottom flange of the side sill, I arrange an angle 3^a thereunder, whose vertical leg is riveted to the web of the body-bolster. The side sill is secured to the end of the body-bolster by a corner connection-plate, the bottom flange of the side sill being

received in the opening formed in the web of the body-bolster. The above construction is necessary where the body-bolster is deeper than the side sills. Of course where the bolster and side sills are of the same depth the plates 13 would be secured to the bottom flanges of each.

The center-plate and side bearings are preferably castings riveted to the bottom cover-plate of the bolster, and as it is desirable to preserve the continuity of the bolster, especially at the central portion thereof, I do not remove any part of the bottom flanges or web for the reception of the king-pin, but make the center-bearing deep enough to enable the king-pin to be introduced therein from the bottom and a cross-key inserted, which cross-key serves to hold the king-pin in its designed position. This cross-key passes through openings in the center bearings and a registering opening in the upper end of the king-pin, being headed at one end, and a cotter or split ring being introduced through the other to prevent its getting out of position.

14 indicates a transversely-arranged plate riveted to the side and draft sills in proximity to the end sills. 15 indicates plates riveted to the top flanges of the side sills and to the ends of the plates which they intersect, said plates 15 being preferably bent so as to pass over the transverse plate 14 and the top cover-plate of the bolster and to lie close against the top flange of the side sill, if required. These plates 15 are provided with upwardly-extending marginal flanges practically throughout their entire length for the purpose of adding strength thereto. These marginal flanges at the inner ends of the plates 15 are preferably turned downwardly and riveted to the floor-sheet of the car-body.

The structure above described forms a very strong but light underframing of such character that the inner truck-wheels may project upwardly into the space between the body-bolster and the angles 8 without detracting from the rigidity of the frame. The type of car to which this underframing is peculiarly adapted is that wherein the body of the car is "low set." Consequently the underframing must be correspondingly positioned, and it is necessary in doing this to accommodate the trucks without sacrificing the strength of the underframe. The car shown in the accompanying drawings is designed to meet conditions of service and standards at present extant in Queensland, and therefore the standard draft-rigging in vogue on Queensland railways is here shown.

The side sills 4, angles 9, and lattice-bars 12, before referred to, form horizontally-arranged latticed girders which, in addition to resisting buffing and pulling stresses, are also placed in tension by forming the bottom chords of the side truss-frames.

16 indicates the side walls of the car in the form of plate-girders which are supported

over the body-bolsters by inclined stiffening-braces 17. The lower edges of the side sheets are above the side sills, as shown, and said side sheets have angles 18 riveted thereto, which angles are oppositely inclined or arranged zigzag between the inclined stiffening-braces 17. These angles and inclined stiffening-braces form a series of triangles or A-frames connected together at their upper ends by the side sheets and at their lower ends by the side sill member of the horizontal girders. This structure possesses great strength besides being extremely light. It has the elements of a trussed framing in that part of the top chord or compression member is in the form of a deep vertical web, which also forms the side wall of the car. The latticed girder acts as the bottom chord and under load is placed in tension, while the inclined braces 18 take the place of the usual vertical posts and diagonals commonly found in trussed frames.

Referring to Fig. 2, it will be noticed that the two inclined braces 18 nearest the body-bolster are connected to the side sill approximately in the transverse plane of the angle 8, and, further, that the angle 8 referred to serves as a transverse floor-beam by supporting the lower end of the inclined end floor-sheets.

In the design shown in the accompanying drawings there are six angles 18 on each side of the car between the inclined stiffening-braces 17, and the middle two of this set of angles are connected practically to a common point at their lower ends to the side sill. To brace the center of the car, I arrange an angle 19 exteriorly the side sheet, as shown in Fig. 2, and secure between the side walls, in the plane of the angles 19, a tie-bar 20 in the form of two oppositely-arranged angles.

21 indicates angles riveted to the inner face of the side sheets and extending downwardly from a point opposite the angles 19 inwardly to the apex of the cross-ridge.

22 indicates a tie-plate riveted to the top flange of the side sill and extending inwardly to the side floor-sheet, to which it is also riveted. This tie-plate 22 is preferably opposite the central cross-ridge. 23 indicates a similar tie-plate for tying the top flange of the side sill and the side floor-sheet at a point intermediate the center of the car and the connection between the end of the side floor-sheet and the top flange of the side sill through the instrumentality of the inner end of the plate 15.

24 indicates the sloping end floor-sheet, which is provided with downturned flanges at the sides of its upper portion, which are riveted to the lower inclined edges of the side floor-sheets.

25 indicates the end sheet of the car.

Corner-posts 26 connect the side and end sheets and the side and end sills. The floor of the car-body adjacent the corner-posts is

partially supported by a frame 27, composed of members so arranged as, in addition to partially supporting the floor of the car, to resist lateral swaying of what might be termed the

5 "overhanging" body portion.

28 indicates a floor-support extending transversely the underframe to which it is secured, the ends of said floor-support projecting outwardly beyond the car-body and being secured
10 to the inclined stiffening-braces. As shown, I prefer to form this floor-support of a sheet of metal appropriately bent or flanged, the bottom flange being riveted to the top cover-plate of the bolster, while the upper flange
15 thereof is riveted to the floor-sheet.

29 indicates the sloping side floor-sheet, sometimes designated as the "side hopper-sheet." This sheet 29 has its upper edge riveted to the lower edge of the side sheet 16 and
20 extends inwardly and downwardly over the angle 9, to whose vertical leg it is riveted. The vertical portion of this sheet 29 forms a vertical wall of the exit-opening for the load, it being further strengthened by an angle 30.
25 The lower inner end of the end floor-sheet is flanged downwardly and reinforced by an angle 31. To the angles 30 are secured the guides for the horizontally-movable doors 32, said doors being provided with racks on their under
30 sides, with which engage pinions secured to an operating-shaft, which shaft is provided with a crank-handle at its extremity or extremities.

33 indicates transversely-extending angles
35 secured to the lower edges of the vertical portions of the side floor-sheets 29.

34 indicates a ridge-sheet which is flanged over the angle 33 and riveted thereto, said ridge-sheet between the vertical portions of
40 the side sheets 29 being flanged downwardly and riveted thereto through the medium of such flanges, while above the vertical portions or throughout the inclined portions of the sheets 29, traversed by the ridge-sheet, said
45 ridge-sheet is flanged upwardly, and through the medium of such flange is riveted to the inclined portions of the sheet 29. The upper edge of the ridge-sheet is flanged vertically, through which flange it is riveted to its com-
50 panion.

35 indicates a partition-plate extending across the car in the transverse plane of the apex of the cross-ridge. This partition-plate is secured in position by being introduced be-
55 tween the vertical flanges at the upper edges of the cross-ridge between the angles 21 and between the angles or tie-rods 20. It is obvious that this partition can be extended up above the top of the side walls of the car for
60 the purpose of enabling the car to carry a mixed load, keeping said mixed load separated, whereby the contents of one end of the car may be discharged through the hopper-opening without affecting the load at the other
65 end of the car. Constructed as shown in the drawings this partition-sheet not only adds

strength to the side walls, but ties said side walls together, preventing lateral bulging thereof, and combined with the ridge-sheets forms an effective and rigid support therefor
70 and for the center of the car.

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

1. In an underframing for cars, the combi-
75 nation with the end sills, of body-bolsters, draft-sills extending between said end sills and body-bolsters, side sills, and plates riveted to the top and bottom flanges of said side sills and extending inwardly beyond the body
80 bolsters; substantially as described.

2. The combination with the end sills, of body-bolsters, draft-sills arranged therebetween, side sills, and plates 13 and 15 riveted to the bottom and top flanges of the side sills,
85 plates 15 being provided with marginal flanges along their inside edges; substantially as described.

3. The combination with a body-bolster, of a side sill riveted thereto, said side sill being
90 of less depth than the body-bolster, and a plate 13 riveted to the bottom flange of the side sill and being received by an opening in the web of the body-bolster; substantially as described.
95

4. The combination with side sills, of a body-bolster continuous from side sill to side sill and deeper than said side sill, plates 13 riveted to the bottom flanges of the side sills and received in openings in the web of the body-
100 bolster, and angles 3^a riveted to the web of the body-bolster and to said plates; substantially as described.

5. The combination with end and side sills, of a body-bolster, plates 13, attached to the bot-
105 tom flanges of the side sills, plates 14 extending transversely the framing and attached to the top flanges at the ends of the side sills, and plates 15 attached to the top flanges of the side sills, substantially as described.
110

6. The combination with end and side sills, of a body-bolster, the plates 13 and 15 attached to the bottom and top flanges, respectively, of the side sills, and extending some distance in-
115 wardly from the ends of said side sills, and a transversely-arranged angle 8 tying the side sills together at the inner extremities of the plates 13 and 15; substantially as described.

7. The combination with side sills, of connection-plates 7, attached to the side sills, an
120 angle 8 attached to the connection-plates and extending transversely the framing, said angle 8 being distanced from the body-bolster, and longitudinally-disposed angles 9 attached to the inner edges of the connection-plates;
125 substantially as described.

8. The combination with side sills, of connection-plates 7 attached to the side sills, an angle 8 attached to the connection-plates, said angle 8 being distanced from the body-bolster,
130 angles 9 attached to the inner edges of the connection-plates, and being arranged paral-

lel to the side sills, and lattice-bars connecting the angles 9 and the side sills; substantially as described.

9. In a hopper-bottom car, the combination with the side walls, of the inclined side floor-sheets, side sills, and plates 15 riveted to the side sills and having one end secured to the side floor-sheets; substantially as described.

10. In a hopper-bottom car, the combination with the side walls, of side sills whose middle portions form members of horizontally-arranged girders, strengthening-plates riveted to the ends of the side sills, vertical side walls, inclined side floor-sheets riveted to the side walls and passing inwardly and downwardly over the inner edges of the horizontally-arranged girders, and bars riveted to the side sills and the side walls; substantially as described.

11. In a car, the combination with an underframing comprising horizontally-arranged girders located about the middle of the car, one member of which is in the form of a side sill extending to the ends of the car, reinforcing-plates riveted to the projecting ends of the side sill, a transverse tie-bar at the ends of the horizontally-arranged girders, and a car-body composed of vertical side walls, sloping end sheets, and inclined side floor-sheets, which are attached to and supported by said underframing; substantially as described.

12. In a car, the combination with an underframing comprising the side and end sills, body-bolsters, draft-sills extending from said bolsters to the end sills, reinforcing-plates attached to the ends of the side sills and extending inwardly beyond the body-bolsters, transverse tie-bars at the inner extremities of said reinforcing-plates, horizontally-arranged latticed girders in the middle of the car between said transverse tie-bars, and a car-body comprising side walls whose lower edges terminate above the side sills, inclined side and end sheets, supports between the ends of the car-body and the underframing, and inclined bars attached to the side walls and the side sills; substantially as described.

13. In a car, the combination with side sills, of end sills, body-bolsters, draft-sills extending from said bolsters to the end sills, reinforcing-plates attached to the ends of the side sills and extending inwardly beyond the body-bolsters, transverse tie-bars at the inner extremities of said reinforcing-plates, and horizontally-arranged girders in the middle of the car between said transverse tie-bars; substantially as described.

14. In a car, the combination with the underframing, of a car-body comprising side walls,

inclined stiffening-braces 17, and bars 18 for supporting the side walls, and a centrally-located partition extending transversely the car and attached to the side walls; substantially as described.

15. In a car, the combination with the side walls, of a cross-ridge, a partition attached to the apex of the cross-ridge and to the side walls, and bars 19 attached to the side walls and extending on each side of the point of attachment of said partition; substantially as described.

16. In a car, the combination with the side walls, of side sills arranged under the lower edges of the side walls oppositely-inclined bars 18 arranged in the center of the car and attached to the side walls and to the side sills, bars 19 riveted to the outer faces of the side walls between and near the upper ends of the bars 18, transversely-arranged tie-bars 20, and a partition attached to said tie-bars and to the side walls of the car; substantially as described.

17. In a car, the combination with horizontally-arranged girders, of the side walls located thereabove, inclined side floor-sheets attached to the lower edges of the side walls and to the inner edges of the girders, the inner edges of said inclined side floor-sheets being vertically disposed to form the walls of the exit-opening for the load, and cross-ridge sheets which are flanged downwardly for attachment to the vertical portions of the side floor-sheets and upwardly for attachment to the inclined portions of said side floor-sheets, the upper edges of said ridge-sheets being flanged vertically for attachment to each other; substantially as described.

18. In a hopper-bottom car, the combination with vertical walls around the exit-opening for the load, a door for closing the exit-opening for the load, and channel-irons attached to the lower edges of said walls for forming guideways for the door; substantially as described.

19. The combination with the walls forming the exit-opening for the load, of angle-irons attached thereto, channel-irons attached to said angle-irons, and a door mounted to slide in the ways provided by said channel-irons; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 6th day of June, 1901.

GEORGE I. KING.

Witnesses:

N. CURTIS LAMMOND,
F. R. CORNWALL.