

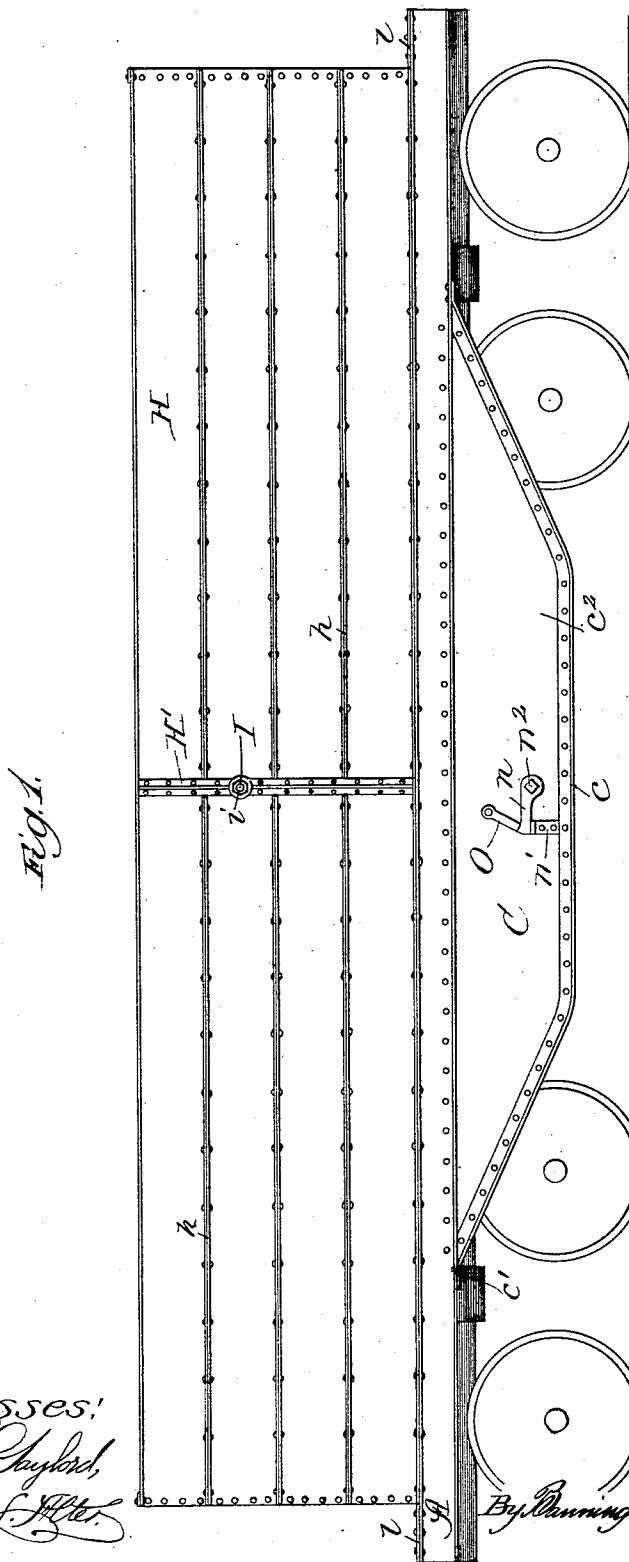
(No Model.)

7 Sheets—Sheet 1.

W. PENNOCK.
METALLIC CAR.

No. 571,883.

Patented Nov. 24, 1896.



Witnesses:

Chas. F. Chubbard,
Supt. J. M. R.

Inventor:

Willard Pennock,
D. Cunningham Shelden,
Atys.

(No Model.)

7 Sheets—Sheet 2.

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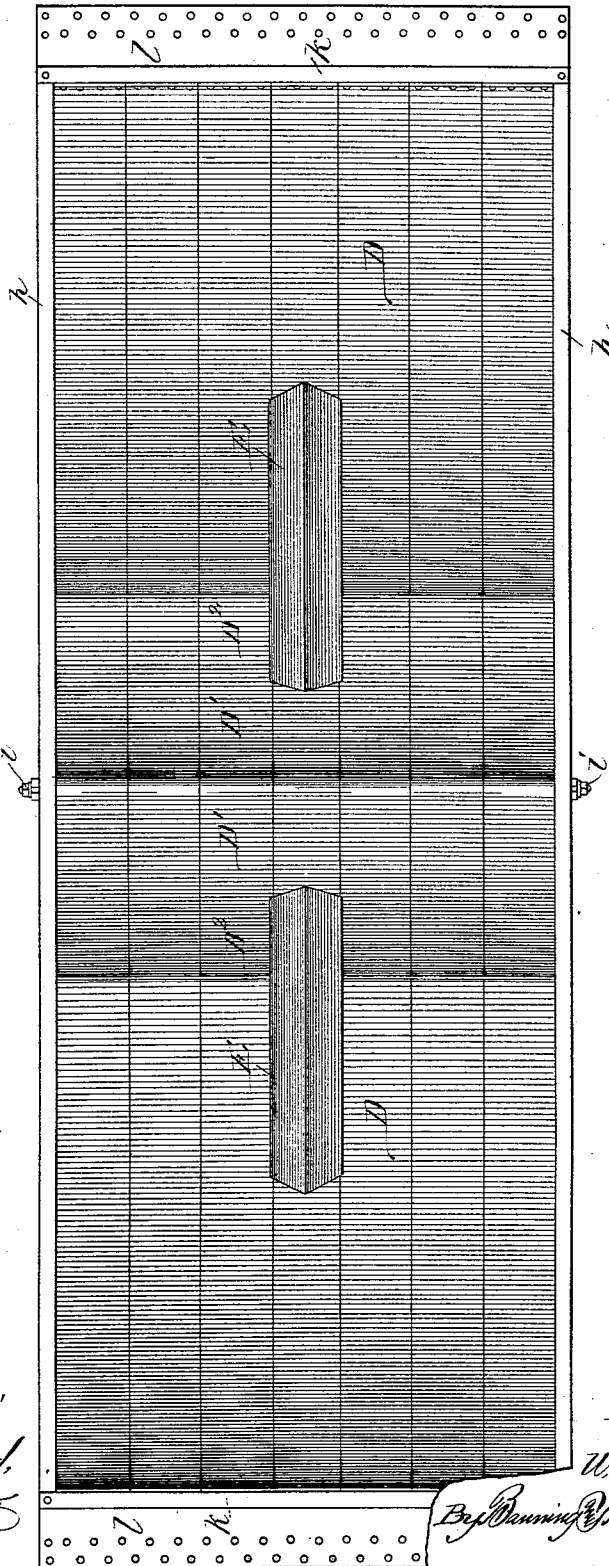


Fig. 2.

Witnesses:
E. S. Claydon,
L. J. Miller.

Inventor:
Willard Pennock,
By Pennington, Pennington & Sheridan,
Attys.

(No Model.)

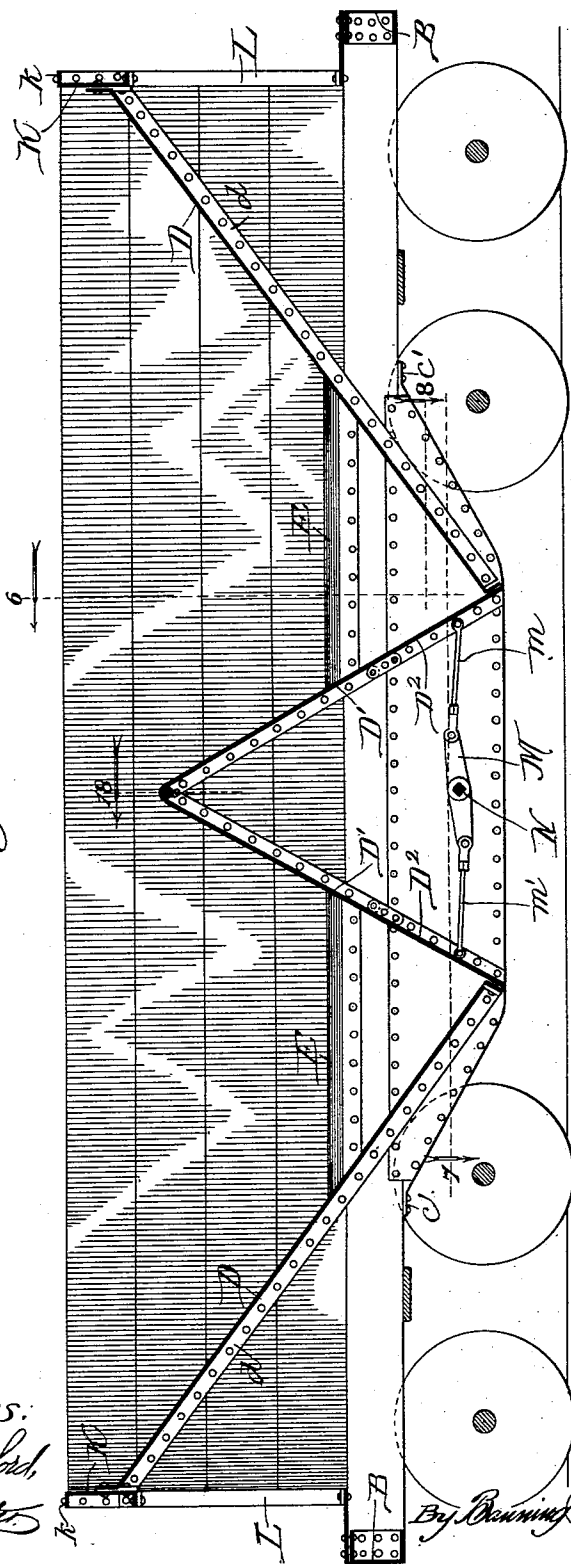
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Patented Nov. 24, 1896.

Fig. 3.



Witnesses:
Chas. P. Chylant,
John S. [unclear]

Inventor:
Willard Pennock,
By *Banning & Banning*
Attys.

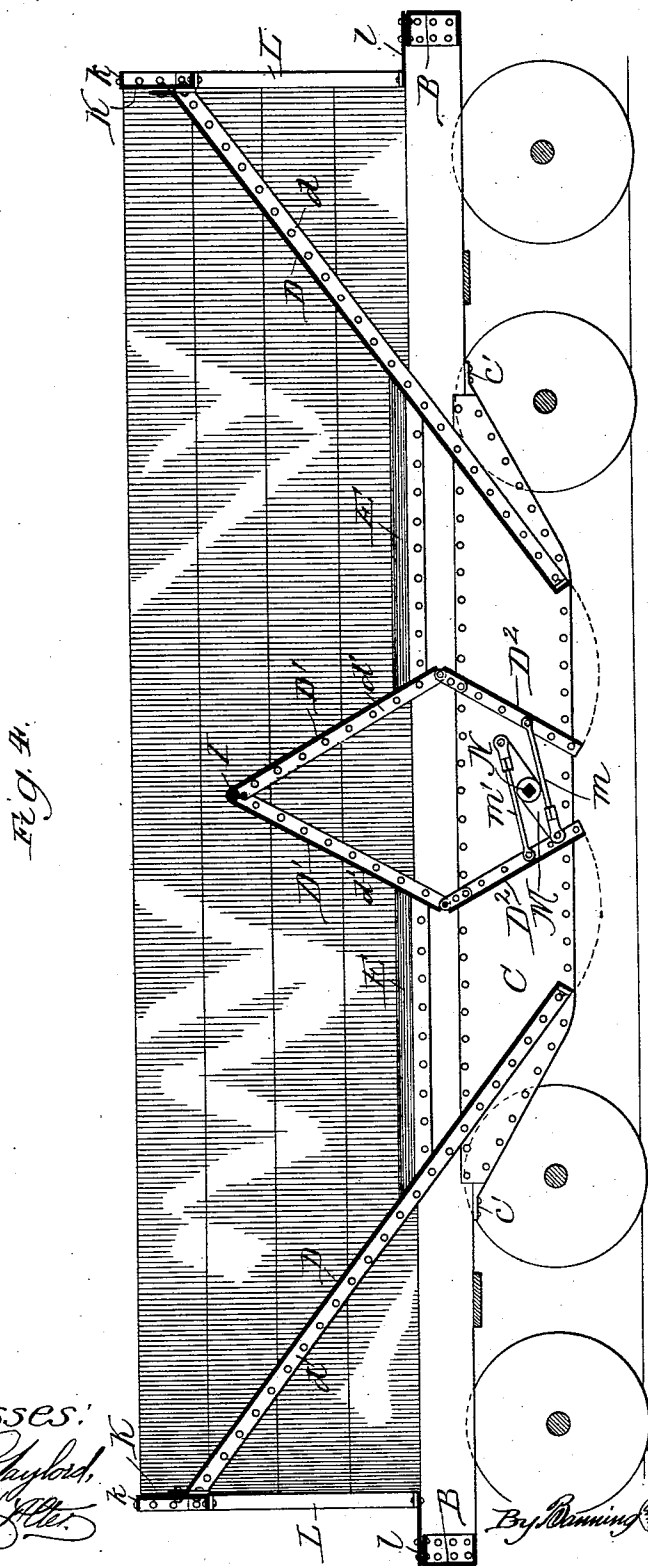
(No Model.)

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W. PENNOCK.
METALLIC CAR.

No. 571,883.

Patented Nov. 24, 1896.



Witnesses:
Edw. Chyford,
John J. Little.

Inventor:
Willard Pennock,
By *Benjamin W. Pennock* & *Benjamin W. Pennock*
Attys.

(No Model.)

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W. PENNOCK.
METALLIC CAR.

No. 571,883.

Patented Nov. 24, 1896.

Fig. 5.

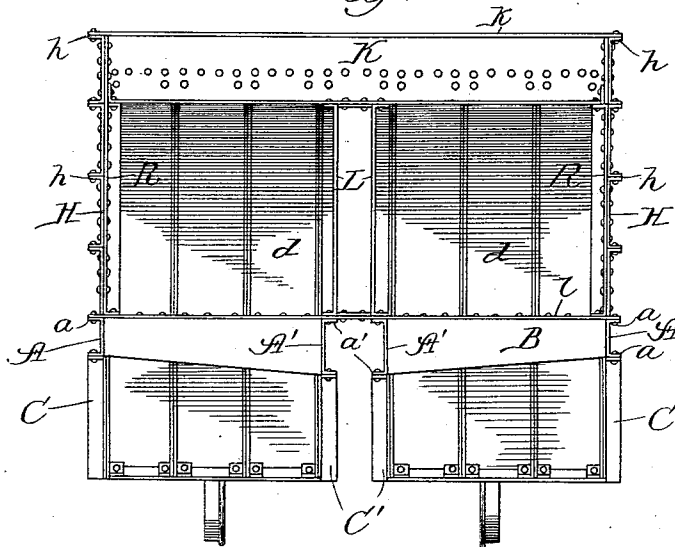
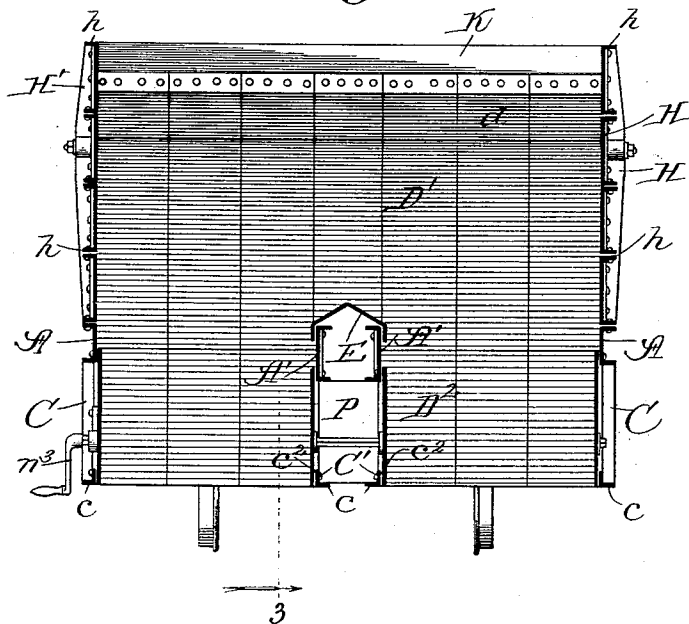


Fig. 6.



Witnesses:

Chas. E. Gaylord,
Lute J. Alter

Inventor:

Willard Pennock,
By Manning & Manning, Attys.

(No Model.)

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No. 571,883.

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Fig. 7.

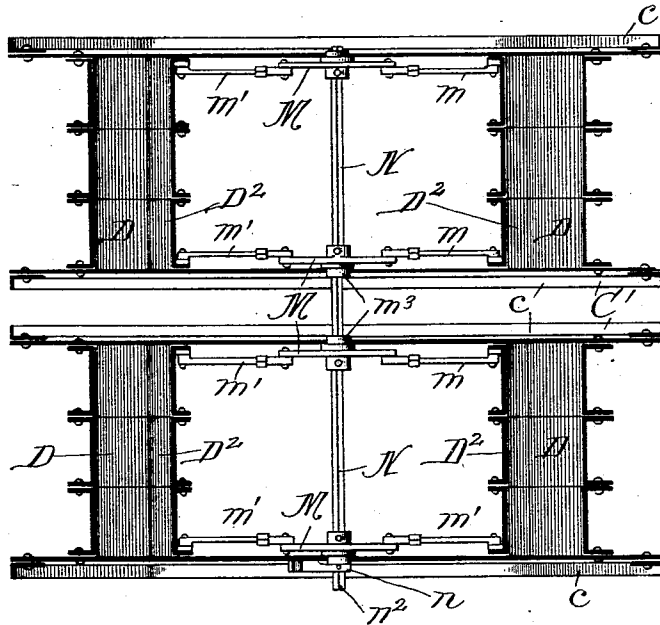


Fig. 8.

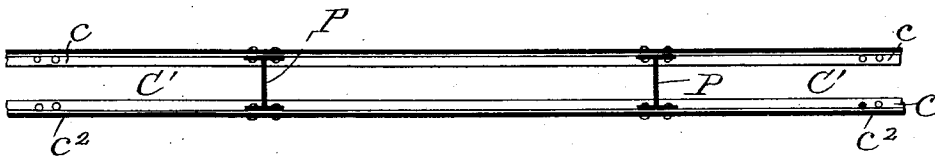


Fig. 9.

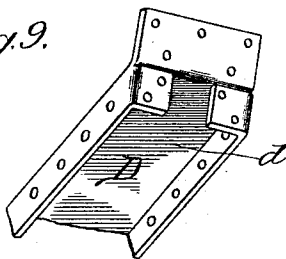
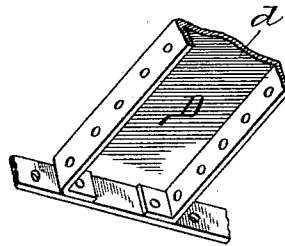


Fig. 10.



Witnesses:

*Wm. L. Gaylord,
Lute S. Allen.*

Inventor:

*Willard Pennock
By Penning & Penning Attorneys*

(No Model.)

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W. PENNOCK.
METALLIC CAR.

No. 571,883.

Patented Nov. 24, 1896.

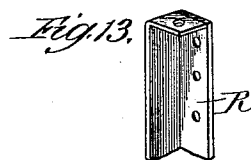
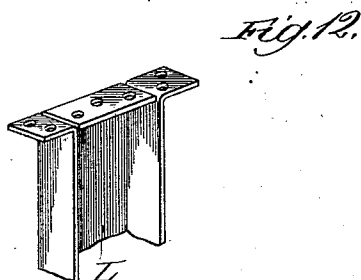
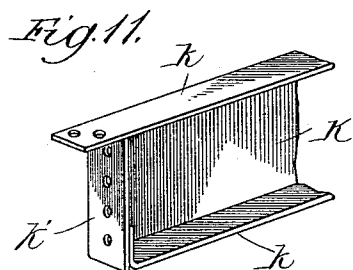


Fig. 14.

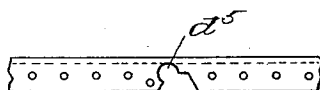


Fig. 15.

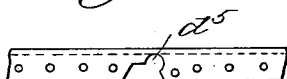


Fig. 16.

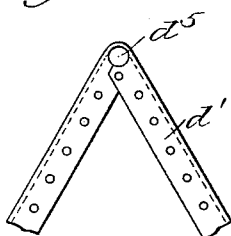


Fig. 17.

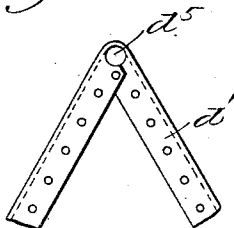
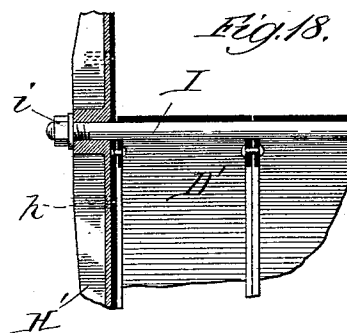


Fig. 18.



Witnesses:
C. E. Gaylord,
L. E. J. M.

Inventor:
Willard Pennock,
By *Wm. D. Pennington* & *Wm. D. Sheridan*,
ATTY'S

UNITED STATES PATENT OFFICE.

WILLARD PENNOCK, OF MINERVA, OHIO.

METALLIC CAR.

SPECIFICATION forming part of Letters Patent No. 571,883, dated November 24, 1896.

Application filed April 14, 1896. Serial No. 587,452. (No model.)

To all whom it may concern:

Be it known that I, WILLARD PENNOCK, a citizen of the United States, residing at Minerva, Stark county, Ohio, have invented certain new and useful Improvements in Metallic Cars, of which the following is a specification.

My invention relates to railway-cars, both passenger and freight, and particularly to that class of freight-cars known as "hopper-cars."

The object of my invention is to provide a simple, economical, and efficient metallic railway-car; and the invention consists principally in providing a car of this type with a bottom portion formed of metallic channel-beams extending lengthwise of the car with their legs extending downwardly, so as to provide a smooth upper floor-surface, metallic beams longitudinally and centrally disposed and arranged under the central channel beam or beams, metallic angular beams arranged one at each side of the car and bent to form the compression member of a truss, and a filling of metal interposed between the compression member and the metallic side sills of the car and secured to the same to stiffen the structure and assist in distributing the load.

The invention consists, further, in providing a car with a substantially centrally-located A-shaped bottom portion, swinging doors on each of the depending legs of the A-shaped portion, a set of compound levers interposed between such doors and arranged to open or close the same, and a rock-shaft for operating the levers.

The invention consists, further, in providing a car of the class described herein with a bottom or floor portion and side portions formed of metallic channel-beams arranged longitudinally with respect to the length of the car and with their legs or flanges extending outwardly to resist internal pressure, and at the same time present a substantially smooth interior surface for the load.

The invention consists, further and finally, in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a freight-car of the hopper type fitted with my improvement; Fig. 2, a plan view of the same, looking at it from the

top; Fig. 3, a longitudinal vertical sectional elevation taken on line 3 of Fig. 6, showing the doors at the bottom portion of the hopper in their closed position; Fig. 4, a similar view of the structure shown in Fig. 3, with the doors at the bottom of the hopper in their open position. Fig. 5 is an end view of the car; Fig. 6, a transverse section taken on the line 6 of Fig. 3; Fig. 7, a horizontal sectional view taken on the line 7 of Fig. 3; Fig. 8, a horizontal sectional view taken on the line 8 of Fig. 3, looking in the direction of the arrow and showing the center truss-beam with interposing truss; Fig. 9, a perspective view of the upper end of one of the channel-beams that form the end floor portion, illustrating the method of bending and perforating the same before it is secured to the end portion of the car; Fig. 10, a similar view of the lower end of one of the same beams, showing the manner of securing it to the cross-bar; Fig. 11, a perspective view of a portion of a channel-beam that forms the end portions of the car; Fig. 12, a perspective view of a portion of the supporting-post that is interposed between the end channel beam or board and the end sill to support the same; Fig. 13, a perspective view of one of the vertical angle-irons that is used to secure and support the ends of the side portion of the car-frame. Figs. 14, 15, 16, and 17 are detailed views of the channel-beams that form the central A-shaped portion of the car-floor before and after bending; and Fig. 18, a transverse section of a portion of the central A-shaped bottom portion, taken on the line 18 of Fig. 3.

In the art to which this invention relates it is usual to form metallic cars by merely providing metal pieces and arranging them substantially in the same relation to each other as the old wooden members have been arranged—in other words, merely replacing the old wooden members by metallic members. There are many objections in this method, the principal one being that it generally increases the weight of the car without giving desired results—viz., to obtain the greatest strength and rigidity with the least amount of material. The principal object of my invention, therefore, is to obviate these objections and provide a car formed entirely of metal or substantially so, and so construct

and arrange the metal portions in relation to each other that the whole structure is stiffened, many of the usual and ordinary parts dispensed with, and a car of the greatest strength adapted to carry the maximum load with the least amount of metal or weight of material is provided.

In illustrating and describing my improvements I will only illustrate and describe that part which I consider to be new in connection with so much of that which is old in the art that it is necessary to disclose my invention and enable those skilled in the art to practice the same, leaving out that which is old and well understood by those skilled in the art and which I deem it unnecessary herein to describe in order to avoid confusion and prolixity. I prefer for convenience to show and describe my improvements in connection with a hopper-bottom car; but I do not desire to be limited strictly to this kind of car, as the improvements are capable of being embodied in all classes of railway-cars by making mere mechanical changes to suit different circumstances and conditions and which need not necessarily involve a departure from the spirit of my invention.

In constructing a car fitted with my improvements I make the platform of the desired size, shape, and strength by using side sills A A and center sills A' A', formed, preferably, of metal channel-beams, the side sills having their legs *a* turned outwardly and the center sills or channel-beams having their leg portion *a'* turned in a reverse direction or inwardly. These sills are connected together by means of end sills B B. (See Fig. 3.) In order to stiffen or brace these sill portions that support the superstructure and flooring, I provide truss-beams C C' C' C', the trusses C' being used particularly when my improvements are fitted to a hopper-bottom car. These trusses are formed by taking an angle iron or beam *c* of the desired size, shape, and length, bending it in substantially the form shown in Fig. 1, and securing the end portions at *c'* to the legs or flanges of the sills, preferably by riveting. I interpose between this angle-beam or compression member and the sills a metallic filling *c''*, in this instance consisting of a web of sheet metal of the desired thickness, and rivet the same to the side sills or channel-beams and the angle-beam *c*, that forms the compression member of the truss. A description of one of these truss-beams is an exact description of the others, but it will be noticed, however, that the center sills are a little wider and extend down to a plane lower than those on the side. Otherwise they are substantially the same.

The flooring of the car, as shown in the drawings, Figs. 2, 3, and 4, should be made of a double incline, so as to form a hopper-car. The end portions D D are arranged at a suitable incline and are formed of several channel-beams of metal *d*, arranged lengthwise of the car with their leg portions extend-

ing downwardly. These leg portions are riveted together and are arranged so that they resist the pressure of the load on the inside of the car. A central A-shaped bottom portion D' is provided and is formed of several channel-beams arranged lengthwise of the car and preferably constructed of continuous channel-beams with a central cut or opening, (shown in Figs. 14 and 15,) so that when bent into the shape shown in Figs. 16 and 17 they provide a central aperture at the apex, for the purpose hereinafter described, smooth side surfaces of practically "right" and "left" construction, so that when they are riveted together they form a perfectly-rigid bottom well adapted to resist interior pressure. Their leg portions are extended downwardly, so that the upper portion of the channel-beams present a smooth interior surface for the load. The lower portions of the inclined floor and the central A-shaped portion of the floor are bifurcated so as to straddle the center sills, as shown in Figs. 5 and 6, and form hopper-pockets between the center and side truss-beams. To deflect the material comprising the load into these pockets, the center sills are provided with an angular cap portion E, arranged with its apex projecting upward, as shown particularly in Figs. 3, 4, and 6. This effectually prevents the material from falling between the tracks and assists in the discharge of the load, as hereinafter described. Each of the lower depending legs of the central A-shaped portion is provided with a swinging door D²—four in all. As shown in Fig. 3, when the doors are in their closed position they form a portion of and a continuation of the A-shaped hopper-bottom portion and are preferably formed of channel-beams similar in shape, size, and cross-section to those forming the upper part of the A-shaped portion. The floor, or its different parts, is preferably formed of seven of these channel-beams securely riveted together and arranged so that one channel-beam occupies substantially a central position, as is clearly shown in Fig. 6 of the drawings.

The side boards or portions of the car are formed of channel-beams H, of the desired shape, size, and strength, extending longitudinally or lengthwise of the car and with their leg portions *h* extending outward, so as to present a smooth inner surface for the load and resist internal pressure. These channel-beams are securely riveted together and the lower one has its lower leg securely riveted to the upper leg of the side channel beam or sill. The vertical center portion of these side boards is preferably provided with a metallic brace H', having a central perforation arranged in line with the perforation *d'* in the apex of the A-shaped floor portion, through which is passed a tie-rod I with threaded ends and having nuts *i*, which act to securely tie the side beams together. (See Fig. 18.)

The side boards are tied together at their

end portions by means of the channel-beams K, which form end boards and which are arranged transversely across the car with their legs or flange portions k extending outwardly. The web portions of these end boards K are bent outwardly, as at k' , Fig. 11, practically at right angles to the web, so as to provide what might be termed a "flange," by which they are riveted to the side boards.

The upper legs of these end boards are cut so as to extend out and overlap the side board, to which they are securely riveted. By this method it will be seen that the side boards are effectually tied together and that the side and end boards present a continuous beam of substantially the same cross-section entirely around the car, each tying the other against internal pressure and dispensing with the use of the ordinary stakes.

The upper ends of the inclined floor portion D are preferably secured to these end boards by cutting the legs, as shown in Fig. 9, and bending them inwardly substantially at right angles to the longitudinal portion, and at the same time bending the web portion inwardly and upwardly, perforating the same and securely riveting such portions to the end boards, as shown in Figs. 3 and 4. The end boards are further provided with center supporting-posts L, formed, preferably, of channel-beams, as shown particularly in Figs. 5 and 12, with the leg portions bent outwardly and the web portion bent into the channel, the upper end of which is securely riveted to the end board and the lower end to the platform l of the car.

Describing now the mechanism by which the swinging doors of the hopper portion of the car are operated and held in their different positions: Interposed between the swinging doors is a set of compound levers composed of a central vibrating lever M and two end levers $m m'$, pivoted thereto and to the door portions. The central vibrating lever is mounted upon a rock-shaft N, which has its bearing portions in the web of the side and central truss-beam. This rock-shaft is provided at its outer end with a stop-lever n , arranged to contact a stop n' and limit the vibratory motion of the central lever. This stop-lever is so arranged with relation to the movement of the rock-shaft and central lever that it carries the pivotal fulcrum-point of the end levers beyond the straight line, so that the tendency of the load is to prevent unlocking. The stop-lever and stop, however, act to hold these compound toggle-levers in such a position (see Fig. 3) that they are substantially in a straight line, so that the pressure of the load on one door is transmitted directly through these levers to the other door and act to keep it closed, the rock-shaft having very little work to perform other than the unlocking of the levers. The rock-shaft is preferably formed of a square bar with a projecting square end n^2 , on which a wrench or key n^3 (see Fig. 6) may be placed for the purpose

of vibrating or operating the same. All that is necessary to unlock the car is simply to vibrate the central lever a little past the line of centers, when the load will assist in the further opening of the door.

In Fig. 7 it will be noticed that the hub portion m^3 of the central levers form the bearings on which the rock-shaft is vibrated. By this structure it will be seen that the doors are effectually kept in their closed or locked position and so tight at the point where they contact the opposite inclined portion of the bottom as to prevent leakage or spilling of fine ores, sand, or other material, which is very objectionable in that where a load is spilled on the track or between the tracks it is apt to derail following cars. A gravity-latch O is used (see Fig. 1) to hold the stop-lever n , and through it the doors, in their closed or locked position.

To hold the hopper portions the desired distance apart to prevent bulging inward and at the same time to act as ties and struts, I provide two I-beams P (see Fig. 8) and interpose them between the central truss members. These I-beams are preferably arranged in vertical position and have their leg portions securely riveted to the webbing or metallic filling of the central truss member. To further strengthen the ends of the side boards, I provide angle-irons R (see Figs. 5 and 13) and secure one flange of the angle to the web portions of the channel-beams adjacent to their ends by means of rivets, thus stiffening such end portions more effectually against stress and strains.

While I have described my invention more or less minutely with regard to details and as being embodied in certain precise forms, I do not desire to be limited thereto unduly, no more than is pointed out in the claims. On the contrary, I contemplate all proper changes in form, construction, and arrangement, the omission of immaterial parts and the substitution of equivalents, as circumstances may suggest or render expedient.

I claim—

1. A car of the class described, having a bottom portion provided with a substantially centrally-located A-shaped portion, swinging doors—one on each depending leg of the A-shaped portion, a set of compound levers formed of at least three links interposed between such doors and arranged to open or close the same, and a rock-shaft substantially centrally arranged between the swinging doors and carrying the central link of the compound levers for holding the compound lever in a substantially straight line when the doors are closed for transmitting the strain or load from one door to the other and for operating the levers or links, substantially as described.

2. A car of the class described having a bottom provided with a substantially centrally-located A-shaped portion, swinging doors one on each of the lower depending legs of the A-shaped portion, a set of compound

toggle-levers interposed between such doors the central lever of which is arranged to carry the pivotal fulcrum-points of the end levers beyond a central line to lock the same, and
 5 hold the compound levers in substantially a straight line when the doors are closed to transmit the strains direct from one door to the other, and a rock-shaft upon which said central lever is mounted for operating the
 10 parts, substantially as described.

3. A car of the class described having a bottom provided with a centrally-located A-shaped portion, swinging doors one on the lower end of each depending leg of the A-
 15 shaped portion, a set of compound toggle-levers interposed between such doors the central lever of which is arranged to carry the pivotal fulcrum-points of the end levers beyond a central line to lock and hold the com-
 20 pound levers in substantially a straight line when the doors are closed to transmit the strain or load from one door to the other and cause the load to assist in locking the same, a rock-shaft upon which the central lever is
 25 mounted and operated, and means for limiting the motion of the rock-shaft in one direction, substantially as described.

4. A car of the class described having a bottom provided with a centrally-located
 30 A-shaped portion, swinging doors one on the lower end of each depending leg, a set of compound toggle-levers interposed between such doors the central lever of which is arranged to carry the fulcrum pivotal points of
 35 the end levers beyond a central line to hold the compound levers in substantially a straight line when the doors are closed to assist in locking the doors and transmit the strain or load from one door directly to the
 40 other, a rock-shaft upon which the central lever is mounted and operated, and means for locking the rock-shaft at one limit of its motion to hold the parts in their closed position, substantially as described.

5. A car of the class described having a
 45 bottom or floor portion and side portions formed of channel-beams arranged longitudinally with respect to the length of the car and with their legs or flanges extending out-
 50 wardly to present a smooth or substantially smooth interior surface, substantially as described.

6. A car of the class described having a bottom or floor portion and side portions
 55 formed of channel-beams arranged longitudinally with respect to the length of the car and end portions formed of channel-irons arranged transversely the length of the car all
 60 of such channel-beams having their legs or flanges extending outwardly to reinforce the structure and present a smooth interior surface, substantially as described.

7. A car of the class described having an inclined bottom or floor portion provided with
 65 a substantially centrally-located A-shaped portion, and side portions formed of channel-beams all arranged longitudinally with respect to the length of the car and having their
 70 leg or flange portions extending outwardly to reinforce the structure against interior pressure and present a smooth or substantially smooth interior surface, and means for tying
 the side portions together at the ends and central portion, substantially as described.

8. A car of the class described, having a
 75 bottom portion formed of metallic beams extending longitudinally or lengthwise of the car, metal beams one arranged at each side of the car to form the compression member of a
 80 truss and a filling of metal interposed between the metal compression-beam and the outer side channel-beams and secured to the same to stiffen the structure and assist in distributing the load, substantially as described.

WILLARD PENNOCK.

Witnesses:

W. CLAYTON LLOYD,
 THOMAS F. SHERIDAN.