

F. S. INGOLDSBY.
DUMP CAR.

APPLICATION FILED MAR. 18, 1901.

1,046,191.

Patented Dec. 3, 1912.

6 SHEETS-SHEET 1.

Fig. 1,

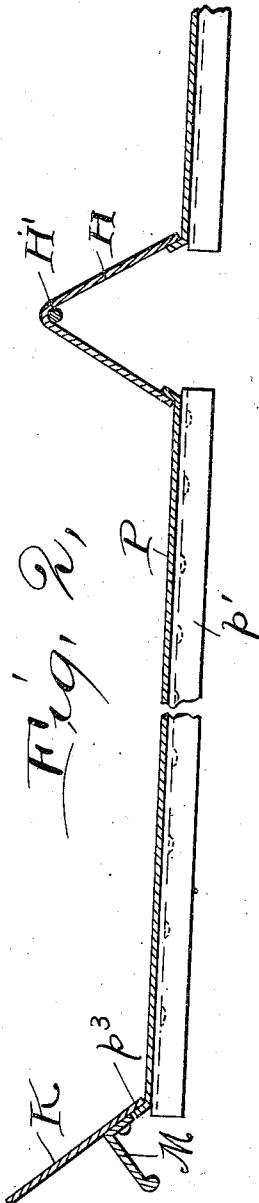
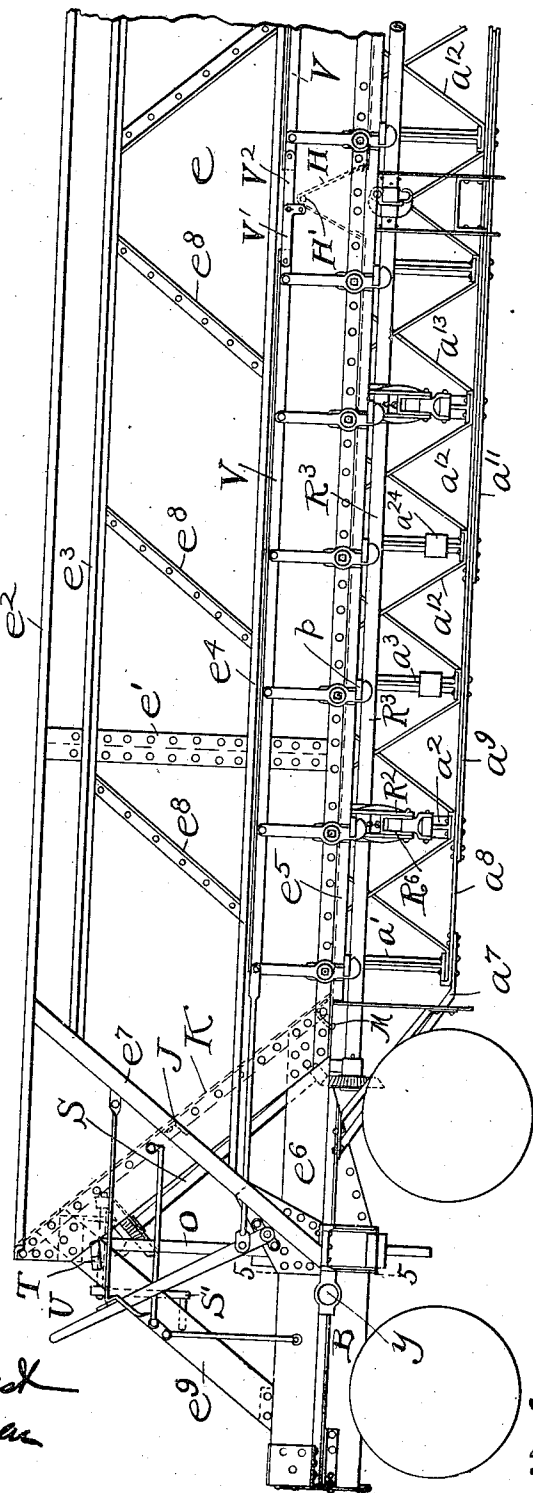


Fig. 2,

Witnesses.
E. B. Gluck
F. D. Amman

Inventor:
Frank A. Ingoldby
By his Attorneys,
Shannon & Bates

F. S. INGOLDSBY.

DUMP CAR.

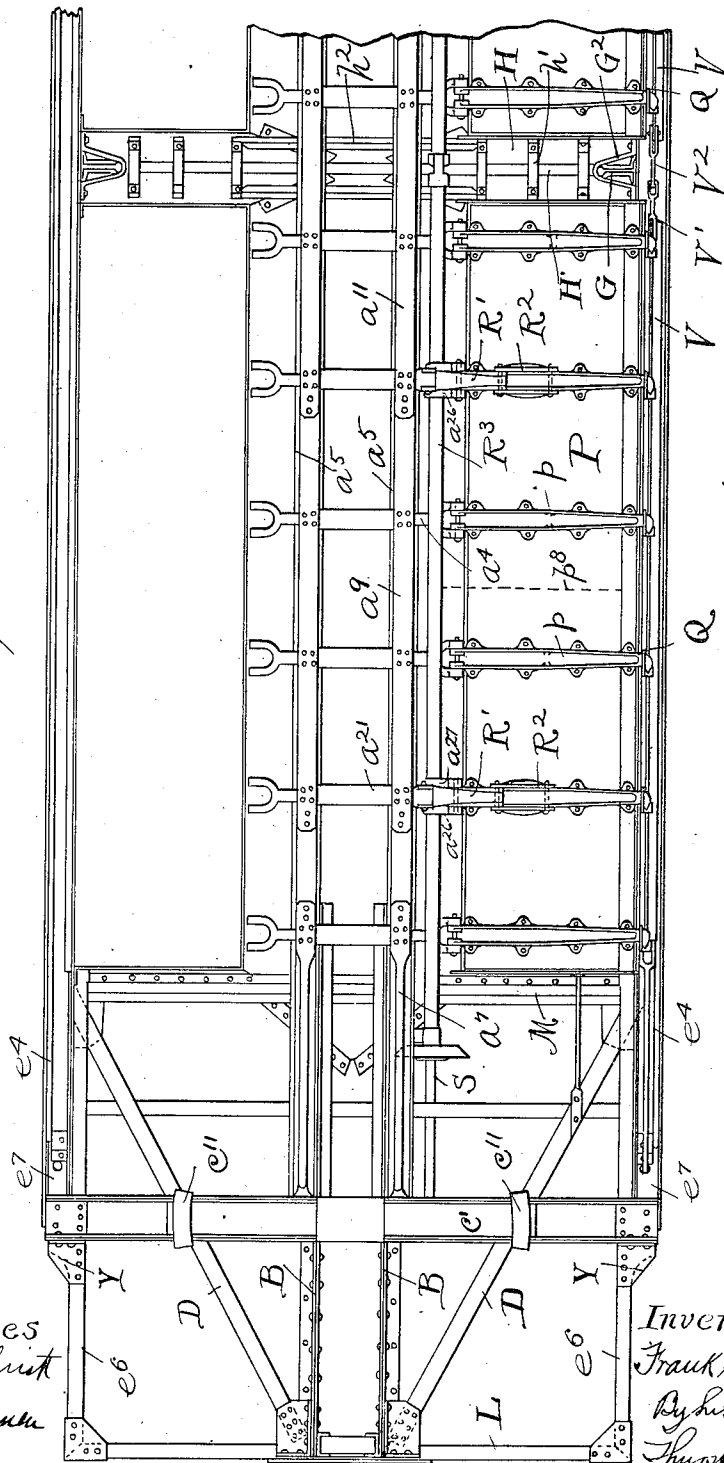
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6 SHEETS—SHEET 2.

Fig. 3,



Witnesses
E. B. Gilchrist
H. D. Ammen

Inventor,
Frank S. Ingolsby,
By his Attorney,
Thurston & Bates

F. S. INGOLDSBY.

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6 SHEETS—SHEET 3.

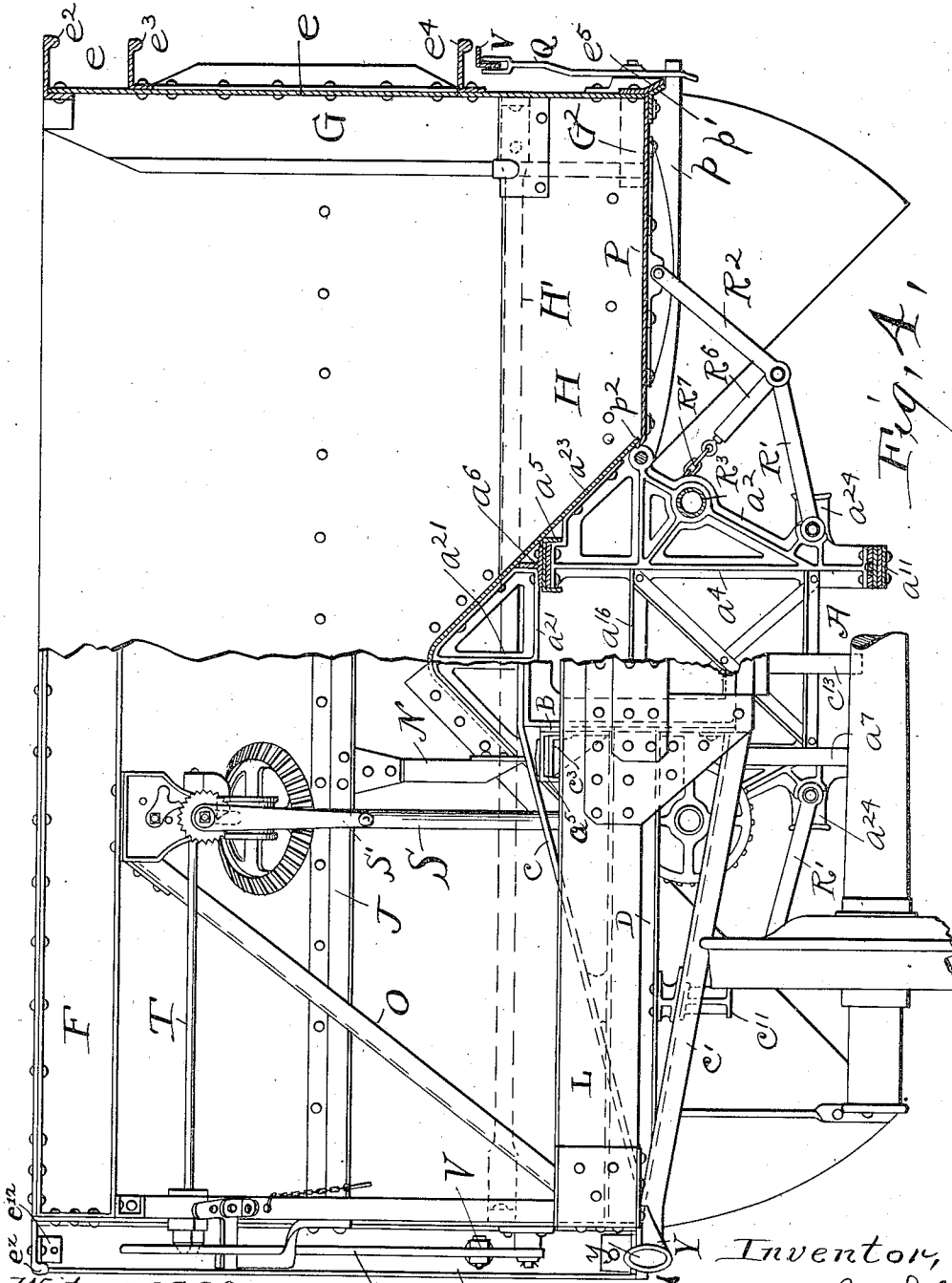


Fig. A,

Witnesses.
E. B. Gilchrist
F. D. Ammen

Inventor,
Frank S. Ingoldby,
By his Attorneys,
Thurston & Bates

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6 SHEETS—SHEET 4.

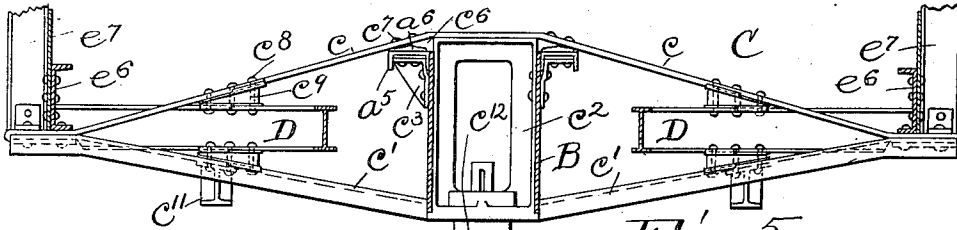


Fig. 5,

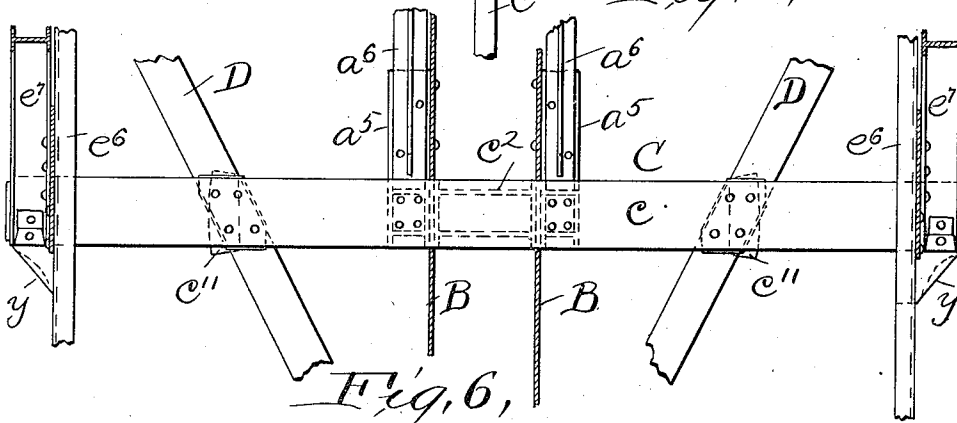


Fig. 6,

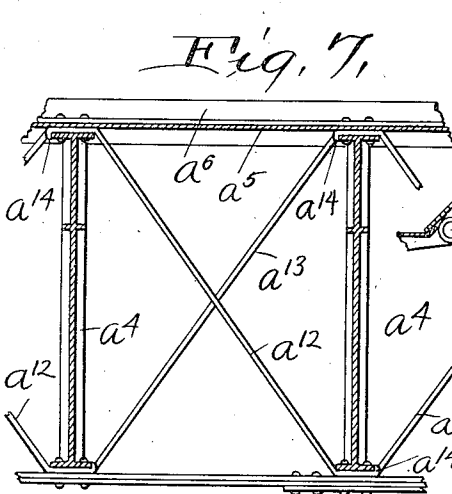


Fig. 7,

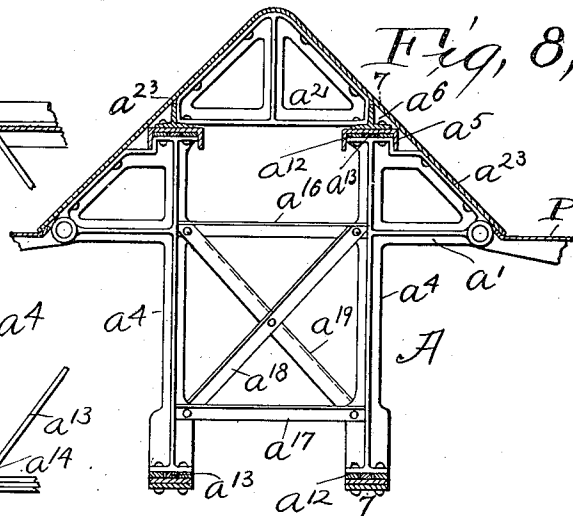


Fig. 8,

Witnesses.
E. B. Gilchrist
L. D. Ammen

Inventor,
Frank S. Ingoldsky,
By his Attorneys,
Thurston & Bates

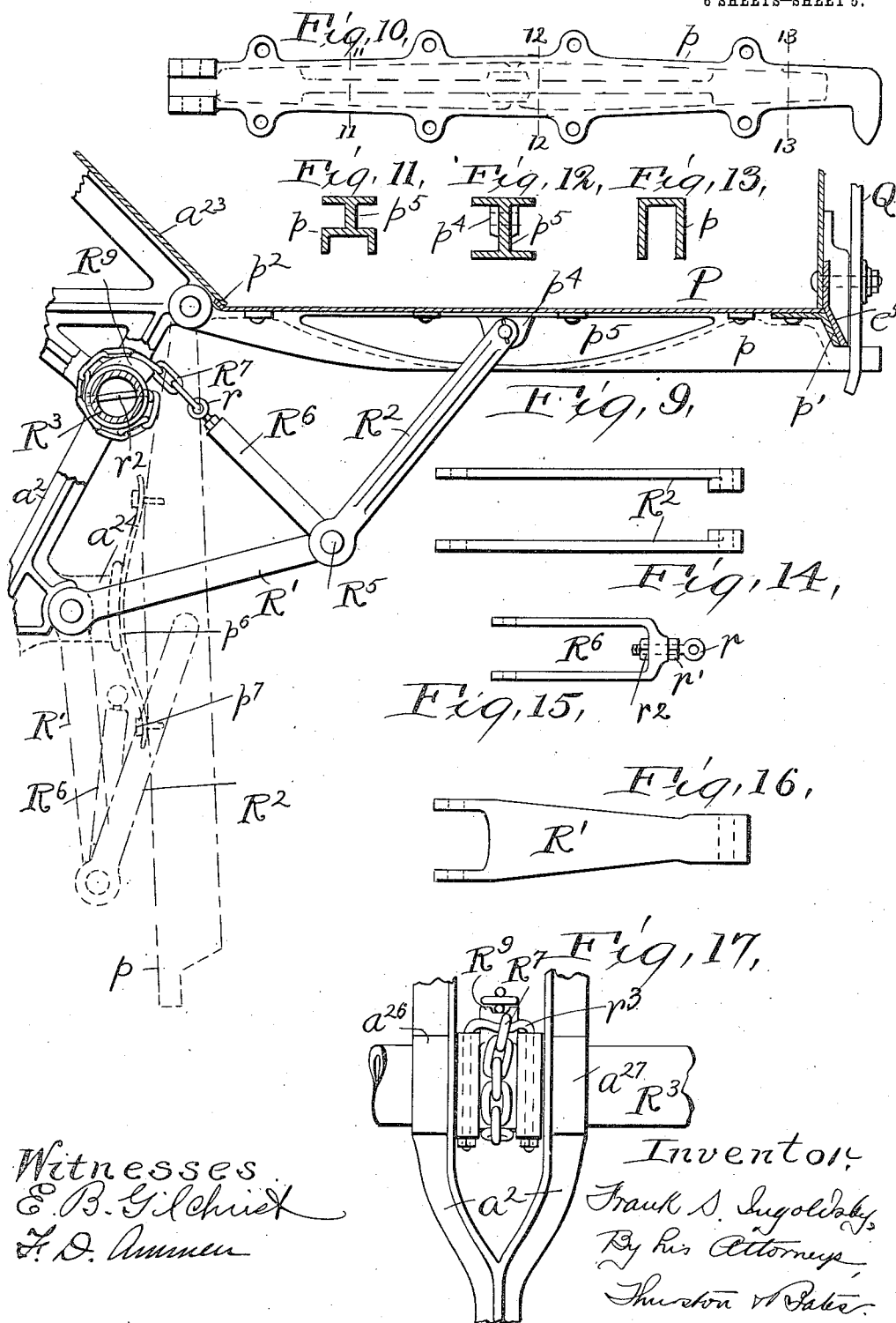
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6 SHEETS—SHEET 5.



Witnesses
E. B. Gilchrist
J. D. Ammen

Inventor,
Frank S. Ingoldsky,
By his Attorneys,
Thurston & Bates.

F. S. INGOLDSBY.

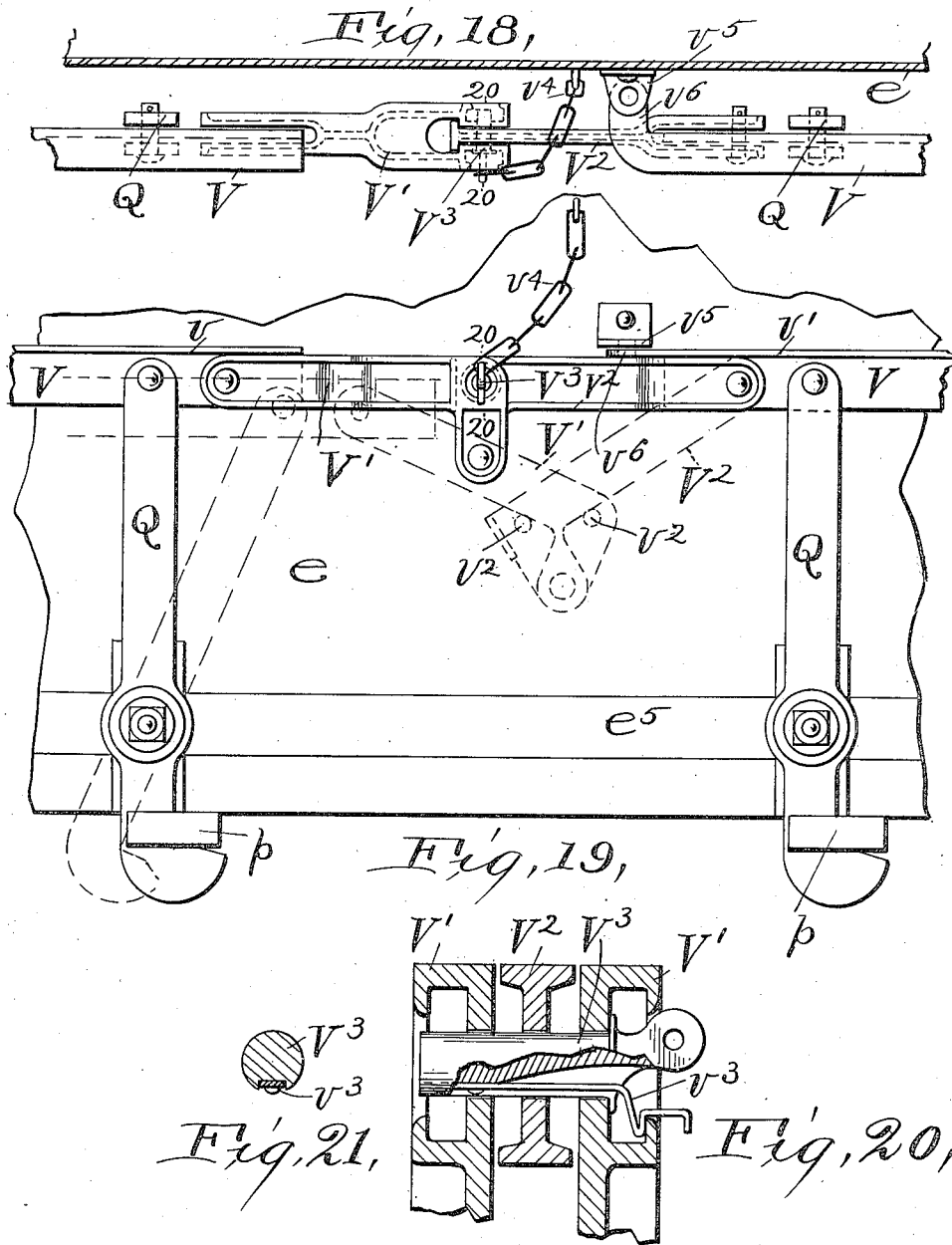
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6 SHEETS—SHEET 6.



Witnesses
E. B. Gilchrist
F. D. Ammen

Inventor:
Frank S. Ingolsby,
By his Attorneys,
Thurston & Bates.

UNITED STATES PATENT OFFICE.

FRANK S. INGOLDSBY, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE INGOLDSBY
AUTOMATIC CAR COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF WEST
VIRGINIA.

DUMP-CAR.

1,046,191.

Specification of Letters Patent.

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Application filed March 18, 1901. Serial No. 51,656.

To all whom it may concern:

Be it known that I, FRANK S. INGOLDSBY, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented a certain new and useful improvement in Dump-Cars, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

10 The object of the present invention is primarily to provide a metallic dump car, made largely of sheet steel and rolled forms, embodying the dumping principles of my prior patents numbered 551,319, 613,279, and 15 632,650, granted to me respectively December 10, 1895, November 1, 1898, and September 5, 1899. In making such embodiment I have devised many new features which contribute to the efficiency of the car and some 20 of which are adaptable to cars of wooden construction as well as metallic cars. There is therefore no intention in the present case to limit the invention to metallic cars, except in those claims where it is so specified 25 or necessarily implied. The type of car illustrated in the patents referred to may be described briefly as having in its preferable form, inclined end floors, a central longitudinal beam, dumping doors between the 30 central beam and sides hinged at the central beam and swinging downward to discharge the load, and interlocking hooks carried by the sides of the car and engaging with the hooks projecting from the doors to hold the 35 latter in place, a hand or power operated lever to move the hooks to disengage the doors, and suitable mechanism to elevate the doors after they are dropped.

The present invention is concerned, besides the general design and arrangement of the car, with the following features, namely: the trussed sides and center beam of the car; the body bolster and the floor bracing coöperating therewith; the cross bracing; 45 the arrangements of the push pocket to bear on the bolster and protect it; the tight joints at the edges of the doors; the door raising mechanism; and mechanism whereby doors on the same side of the car may be dropped 50 successively or independently instead of simultaneously. It has been my object to endow these features with cheapness and lightness of construction and efficiency in operation increasing the capabilities of the

car and its effectiveness, and reducing its 55 weight.

In the drawings, which clearly illustrate the present invention, Figure 1 is a side elevation of slightly more than half of a car embodying the same; Fig. 2 is a vertical 60 longitudinal section through the floor of the car showing the tight joints at the ends of the dumping doors. Fig. 3 is a bottom plan of the car; Fig. 4 is an end view of such car, the right hand half being in vertical 65 section; Fig. 5 is an end view of the body bolster, being a section on the line 5—5 of Fig. 1; Fig. 6 is a plan of such bolster; Fig. 7 is a vertical longitudinal section through one of the trusses of the central beam, as indicated by the line 7—7 of Fig. 8. Fig. 8 70 is a transverse section of the center beam; Fig. 9 is a transverse section showing the toggle mechanism for raising the dumping doors, the door being shown in its extreme 75 dumped position in dotted lines. Fig. 10 is a plan of the floor beam; Figs. 11, 12 and 13 are cross sections thereof, being taken on the correspondingly numbered lines of said figure; Figs. 14, 15 and 16 are views of mem- 80 bers of the toggle arrangement, Fig. 14 showing the links which are pivoted to the floor beam, Fig. 15 showing the clevis which connects the knuckle of the toggle with the operating chain, and Fig. 16 showing the 85 link connecting with the strut. Fig. 17 is a front elevation of the power equalizing drum of the raising mechanism. Fig. 18 is a plan of the link for throwing the locking levers, showing its breaking joint which allows one 90 door to be dropped without the other on the same side of the car. Fig. 19 is a side elevation of a portion of the car showing this breaking joint; Fig. 20 is an enlarged section through the locking pin of such joint 95 being on the line 20—20 of Figs. 18 and 19. Fig. 21 is a transverse section of the pin.

Center truss.—The central longitudinal beam is really the back-bone of my car, supporting half the load. Its construction is 100 one of the important features of the present invention, as it solves the problem of a simple, light and strong beam. This beam consists of a pair of parallel Pratt trusses braced to each other by suitable bridging and carry- 105 ing a V-shaped sheathing which constitutes the upper surface of the beam and carrying also the pivots of the dumping doors and

the raising mechanism. This I will now describe, referring particularly to Figs. 1, 4, 7 and 8. Each of the Pratt trusses A of the central beam consists of a series of vertical castings a' a^2 or a^3 , (differing according to the specific requirements of them) but all having at their inner edge the vertical ribbed strut a^4 . The upper chord consists of an inverted channel beam a^5 above this strut surmounted by the inverted T-beam a^6 . The lower chord which is in tension consists of the tie member a^7 and the flat tie bands a^8 a^9 a^{11} . The main obliques a^{12} consists of two flat members which pass across the ends of the struts a^4 and leave a space between them through which the counters a^{13} may also pass in the diagonally opposite direction across the ends of the adjacent strut, this arrangement being used both at the top and bottom of the truss. All these various members are riveted together, the rivets passing through the ends of the strut a^4 and through the main obliques and through the top and bottom chords of the truss fastening all securely together. The obliques and the counters lie between the ends of the strut a^4 and the upper and lower chord respectively and at each end are formed with a gib a^{14} by which they hook over the edge of the strut a^4 . This gibbing of the counter is sufficient to hold it in place without a specific rivet for it; the obliques need not be gibbed but preferably are.

On their inner sides the struts a^4 have webs to which are riveted the cross bridging consisting of the angle bars a^{16} a^{17} a^{18} a^{19} . Supported on the T-beams a^6 at intervals throughout the length of the trusses are the cross castings a^{21} having their two upper sides coming substantially to an angle at the center of the car. A longitudinal sheet steel sheathing a^{23} covers the upper portions of these Pratt trusses, and riveted to the casting a^{21} and to the castings a' a^2 a^3 , and extends through the inclined ends, being flanged upwardly and riveted thereto, as shown in Figs. 3 and 4. This makes a very light and at the same time strong central beam. I utilize the vertical struts of these Pratt trusses for carrying the hinges of the dumping doors and for carrying the raising mechanism, which will be hereinafter explained in detail, it being sufficient at this point to state that where simply the doors are hinged to the beam the castings may be of the form indicated by a' in Fig. 8; where the raising toggles are located the castings are of the form indicated as a^2 in Fig. 4, operating to support the raising shaft. Intermediately, where the floor beams occur but not the toggle mechanism, as at a^3 , the bumper block a^{24} is provided for receiving the impact of the floor beam, and to reduce the effect of this impact I put springs on the engaging floor beams. This is indi-

cated in Fig. 9. The bumper a^{24} and springs p^8 there shown in dotted lines are beyond the floor beam which appears, cooperating with the succeeding beam. The leaf spring p^8 is secured to the floor beam p by screws p^7 taking through slots in the spring.

At each end of the Pratt trusses, I attach by suitable rivets the plates B, which are one continuous piece from substantially the point where the inclined floor joins the main floor to the end of the car. The double object of these plates is to present an easy method of attaching the draft rigging of the cars and to take and distribute the shocks and strains due to coupling and uncoupling or pulling the train, and also to help support the center trusses. The draft plates and the members a^5 , a^6 together constitute continuous draft beams extending from end to end of the car. These plates are securely riveted to the bolster which I will now proceed to describe.

Body bolster.—As shown most clearly in Figs. 5 and 6, the body bolster C consists of a flat tie plate c , two channel struts c' , and a center casting c^2 , these parts being secured together and the tie plate taking over the top of the casting c^2 while the struts c' abut and are riveted to its sides at their lower ends. At their outer ends the tie plate c is hooked over the web of the channel struts and riveted thereto. The casting c^2 is of the box-like form shown, having a pair of parallel sides which are riveted to the two vertical plates B. The outer sides of these castings are also riveted to the brackets c^3 which support and are riveted to the upper chord a^5 a^6 of the central trusses. The T-web of the beam a^6 is removed where it passes under the tie plate c and the space is filled by a filling block c^8 , and rivets c^7 secure the tie plate, the filling block, the beams a^5 a^6 , and the bracket c^3 all rigidly together. By the construction just described the central beam of the car is secured to the bolsters.

Passing from the end of the car on the outer sides of the plates B, to which and to the end of the frame they are secured by suitably flanged plates, are the diagonal braces D which are in the form of I-beams and pass through the space between the tie plate c and the strut c' of the bolster, being secured to the car sides by suitably flanged riveted plates at substantially the lower edge of the inclined floor. These beams D serve to distribute the strains from the draft rigging to the sides of the car. Where they pass through the bolster they are secured to the plates c' and the channel members c^2 by means of rivets c^8 passing through suitable distance blocks c^9 . Thus the diagonal beam and the castings c^9 make a rigid strut between the upper and lower members of the bolster. This, so far as I know, is a new

feature and serves a double purpose; first, by making this beam a part of the necessary strut tie between the plate c and the strut c' I do away with the necessity of having a separate and independent strut-tie in the bolster at this point, and this saves so much weight in material in the car; second, this member D being thus tied at its middle is practically speaking twice as stiff and strong as it would be if it were not so tied. Additional parts of the bolster are the side bearings c^{11} , which are conveniently so placed that they are carried by the same rivets which secure the channels c' to the I-beams D , and the center bearing c^{12} carried by the casting c^2 as a fundamental part of it. The king bolt c^{13} passes through the center of this bearing. The design of this bolster is such that it combines great strength and lightness.

By providing the heavy diagonal beams D , I decrease the liability of the car to become crippled in a wreck, for in the event of an end to end collision the corners of the car could be smashed in or even broken off without putting the car out of service, while in such wreck these corner beams would serve to protect the diagonal beams, and the latter in turn would form horizontal inclined fenders protecting the bolster. Likewise the car-body is fendered vertically by the inclined members a' of the Pratt trusses, which, in the event of a wreck loosening the body bolster from the truck, would ride up on the truck instead of plowing through it. These are important features.

The center truss arrangement and the bolster which I have described and which the drawings show as embodied in a steel car are adapted to be applied to wooden cars without substantial alteration, the bolster being simply made a little shorter in length so as not to project beyond the wooden sides of the car. I can thus with my construction build a car which is part steel and part wood, that is, the under framing being of steel and the superstructure of wood. For certain kinds of service, such class of car is a valuable one, and the present invention is designed with it in mind as well as for all steel cars.

Side trusses.—I will now describe the trussed car-side, the two being just alike. This side truss E as shown consists of sheet metal plates e which may be either one piece from end to end of the car or in several pieces riveted together. The latter is the form shown, the pieces being joined by a double butt joint e' . The top chord of this truss consists of the members e^2 e^3 , and the bottom chord the members e^4 e^5 e^6 . There are also a pair of main struts e^7 , intermediate struts e^8 , and end struts e^9 . The members e^2 e^3 and e^4 are angle sections, preferably "bulb-angles" as shown, the member e^5

is an obtuse angle section, the members e^6 and e^9 are channel sections, the member e^7 is an I-beam section and e^8 are angle sections. This car side acts as a Howe truss, the top being in compression, the bottom in tension, the main load passing down the strut e^7 to the bolster and down the diagonal struts e^8 to the lower chord and the plate e acting both as ties and counters. I have so designed the side however that it will resist the strains due to the outward pressure of the load in the car without the necessity of putting chains or other tie members across the top of the car. This is an important feature and is accomplished in the following manner: The main strut e^7 is fastened securely at or about its center to a cross tie J of angle section which extends across the car from side to side just beneath the sloping end floor, and is fastened to the main strut on the other side of the car. Now the foot of the main strut being securely fastened to the bolster it is well heeled at that point, hence that part of the main strut which is between the bolster and the tie J is rigidly held in place and therefore the remaining part of the strut e^7 acts as a beam fixed at one end and presents a strong resistance to any lateral pressure coming upon it. Thus this main strut e^7 , besides acting as a strut to carry the load to the bolster, also acts as a cantaliver to resist the outward pressure of the load. Now the other members of the side truss which are the main ones to resist this outward pressure of the load are the bulb angle beams e^2 e^3 , the span of which is materially reduced owing to the fact that the strut e^7 is inclined toward the transverse center of the car and therefore the beams e^2 e^3 need only span such distance as is between the upper ends of these struts, wherefore they are better able to resist the strain. Moreover, I extend e^2 beyond the strut e^7 and rigidly secure it to the strut e^7 by the angle clip e^{12} riveted to the strut and the beam e^2 , and at the end of the car to the cross channel beam F . This makes the beam e^2 fixed at its ends, wherefore, according to a well known principle of mechanics, it is between the struts e^7 much stronger and stiffer than if it were simply supported at its ends, its weak point being due to a shearing strain coming at the strut e^7 . The beam e^3 however is simply supported at its end and its weakest point is at the middle, wherefore a more uniform resistance to the pressure due to the outward bulge of the load is obtained. The member e^4 also acts as a beam supported at each end and does its part toward resisting the outward bulge of the load, and besides performing this function it in connection with the main strut e^7 forms a guard for the protection of the locking mechanism beneath it which holds the doors in place. This last feature is a

very important one as it sometimes happens that cars in transit come in contact with obstructions, such as the open door of a box car on a siding or projecting planks on a lumber car, which might damage the locking mechanism or even break it, so that the car would be dumped and the contents scattered or lost. With the overhanging beam e^4 however protecting this mechanism, such possibility is reduced to a minimum.

To resist the tension which is along the bottom of the car side, I provide the channel member e^6 extending from the end of the car and securely rivet it to the plate e , and overlapping both is the member e^5 securely riveted to both the plate e and the channel member e^6 . The member e^5 which is an obtuse angle section not only helps the plate e to resist the tension but its lower part acts as a bevel against which the corresponding bevel of the doors engage, as hereinafter explained.

From another point of view it is evident that the side of the car composed of the plate or web e bounded by the members e^2 , e^5 , e^6 and e^9 may be considered as a girder having applied thereto a truss composed of the members e^3 , e^4 and e^7 . Of the girder, the members e^5 and e^6 constitute the tension chord and the members e^2 and e^9 the compression chord; of the truss, the member e^4 constitutes the tension chord, the members e^3 and e^7 the compression chord, the members e^6 the struts or braces, and the plate e the ties between said struts or braces.

Cross tying of the car.—Now, from what has already been said it will be obvious that if the beams e^7 , e^8 , e^2 , e^3 and e^4 are made strong enough and properly fastened at the points indicated, they will in themselves be sufficient to resist the outward pressure of the load throughout the length of the car; but in order to make them perform this service satisfactorily it would be necessary to add more weight to these members than is otherwise essential. To avoid this I aid these members in resisting this outward pressure by introducing in the center of the car a gusset member G which I prefer to make of a deck beam section. This member or post G is made to act as a cantaliver by having secured to it the tie rod H' which extends entirely across the car and is secured in a like manner to the opposite post G . This post G is heeled at its lower end by the strap G^2 which in turn is securely fastened to the side of the car. To further strengthen and stiffen this heeling of the post G and to cover and protect the tie rod H' and at the same time to form a sloping cross beam at the transverse center of the car, I introduce the inverted V-shaped plate H which I securely fasten both to the longitudinal center member of the car and to the sides, and I further strengthen this plate H

by the ties h' crosswise of the plate and secured to it and the ties h^2 lengthwise of the plate and extending across the central beam.

The two sides and the center member of the car are tied together across the car at the ends by the following members: on the top by the beam F which is preferably of a channel section and is fastened to the upper end of the sloping ends K of the car. The sloping ends are secured to the central beam by having the sheet covering of that beam riveted to the sloping end floor, all rivets being countersunk in their upper surface where they are exposed to the load, and the laps or joints being on the under side of the sloping floor.

The car sides are tied together at the bottom first by the end sill L of the car; next by the bolster; next at the lower edge of the sloping floor K , by the cross beam M (which I prefer to make of a bulb angle section), and finally the sides are tied together at the center of the car by the plates H and the ties h^2 and the tie rod H' as already explained. It will thus be seen that the central longitudinal beam is secured to the central cross beam, the ends of which cross beam are connected to the sides, and to the bolsters, which in turn are secured to the car sides.

The tie beam J across the car not only acts as a tie to hold the main struts e^7 together, but also acts as an intermediate support for the sloping floor, and in order to help the tie J to act as such floor support I introduce the posts N as braces to stiffen said tie-beam J . In addition to the lateral stiffening afforded by the sloping ends K , I provide the diagonal strut-ties O leading from the beam F diagonally downward to the ends of the bolster.

Push post pocket.—It will be observed that the bolster C extends beyond the channel members e^8 which form the extreme end of the car sides, this arrangement being so that the main strut e^7 may rest on the end of the bolster. Now this provides an offset which might be struck and damaged by something in running, wherefore I provide on this offset the bracket Y which is formed as shown having strengthening webs and a hollow dish-shaped cavity y . This casting from its sloping exterior surface acts as a fender to protect the projecting end of the bolster and by its cavity it makes a convenient pocket in which to place the end of the push post used in moving cars on one track by the train or engine moving along the adjacent track.

Tight door joint.—The dumping doors are indicated by P . They may be of wood, or of sheet steel as shown in the drawing. In either event they are supported by suitable floor beams p which are hinged at their inner ends to the castings a' , a^2 or a^3 of the central trusses, and at their outer ends in-

terlock with locking levers Q pivoted to the sides of the car. Along the outer edge of the floor plate I rivet the obtuse angle iron p' which makes a bevel cooperating with the obtuse angle member e^5 hereinbefore referred to.

The hinge of the door is located behind and within the sheathing a^{23} of the central beam, the result of which is that a wider door may be employed and hence more effective dumping obtained. In order to secure a perfectly tight joint along this inner edge, the floor plate P is turned up on a bevel p^2 adapted to substantially contact with the inner side of the sheathing plate a^{23} . The upper edge of this bevel is near enough to the horizontal plane through the axis of the pivot so that the upper edge does not swing materially outward when the door drops, and hence may be caused to preserve a very snug fit against the inner edge of the sheathing plate when the door is in its elevated position. The ends of the door are similarly turned up on bevels p^3 (Fig. 2) which take behind the extreme edges of the inclined floor or the cross beam H.

The above arrangement makes a very tight joint,—no material is allowed to escape or leak out when the doors are closed, and when the doors drop to dump there is no ledge along the hinged edges of the door for the lodgment of material, the inner edge of the door being always beneath and thus protected by the lower edge of the sheathing a^{23} .

Door raising mechanism.—The door raising mechanism is best shown in Figs. 4, and 10 to 17 inclusive. It consists in its general characteristics of a toggle provided by links R' and R^2 , the former of which is pivoted to one of the struts a' , a^2 or a^3 , and the latter of which is pivoted to a door beam p , the clevis R^0 , and a rotatable shaft R^3 and a chain adapted to be wound up by such rotation and tend to straighten out the toggle. Describing it more specifically, the link R' is formed as shown in Fig. 16. The links R^2 consist of a pair of rods which take outside of the link R' being connected by the pivot bolt R^5 . The floor beam is preferably of the form shown in Figs. 10 to 13. Near its ends it is of channel section and at its center of an I-beam section while immediately it is a composite section. The bars R^2 take around the lower web of the I-beam part and have bosses which extend above the same and bear against suitable bosses p^4 which are carried by the floor beam on the sides of the web p^5 . The chain R^7 is connected with the knuckle pin R^5 by the clevis member R^6 pivoted on that pin and to which the chain is adjustably secured by a screw-threaded eye r locked by nuts r' r^2 , as appears in Fig. 15.

The operating shaft R^3 is journaled in the

struts a^2 and carries the drums R^9 to which the ends of the chains R^7 are secured and upon which they are wound by the rotation of that shaft. It is desirable that the power of the toggle device should be regulated so as to get the best distribution of force throughout the entire movement of the door from the vertical to the horizontal position, and to provide for this I have devised the power equalizer R^9 which is simply the drum made in the form of a cam-shape. By properly forming the curve of this cam I equalize the power required to rotate the shaft, the cam operating with the greatest leverage when the toggle joint has the least, and vice versa. This cam drum also acts as a stop or collar keeping the shaft R^3 in place by being located between the bearings a^{26} a^{27} which support that shaft; it is secured to the shaft by the U-bolt r^3 which also secures the chain.

The shaft R^3 is shown as hollow though it may be made otherwise. It is shown as operated by the diagonal shaft S geared with it and rotated by the crank S' suitably geared to it. This crank is disengaged by the push rod T when the operating lever U is thrown, this lever through the link V swinging the hooks W as explained in my prior patents referred to.

By making a flexible connection between the operating shaft and the mechanism for raising each door, as by the chain R^7 , I allow any door to be dropped independently of the others, whereby when four doors are employed a quarter of the total load may be discharged singly if desired; or by cutting the door in two in the middle this toggle arrangement would allow me to drop one half of the door at each time, thus discharging one-eighth of the total load in the car; the dotted line p^8 across the door in Fig. 3 indicates this possible severance of the door. This feature is very useful where bins into which the cars are to dump have small openings. For instance, a bin might have an opening only six feet long, whereas the total opening in the bottom of the car may be over twenty feet. Thus if the whole side dumped at once it would be impossible to discharge properly into that small bin, while by letting down the floor five or six feet at a time for example, and then bringing up the succeeding section the bin could be properly filled. Moreover, small quantities of material could be deposited along the track where needed for some light repair work without the necessity of discharging half of the load. This arrangement also permits the car being pocketed inside if desired. Irrespective of these advantages the toggle has advantages of its own in that it gives more power, puts the point of application of the power farther out on the door, renders the erection or maintenance of the

cars easy and simple and does away with the necessity of cutting up into the center member of the car.

There is another advantage in my toggle raising mechanism in that it is high up underneath the car and is protected by the Pratt trusses. For example, in the event of a wreck breaking the truck from the body bolster, the inclined ends a' of the Pratt trusses act as deflecting fenders and cause the trusses to ride over the loosened truck preserving the toggle mechanism from injury. This is an important feature as it renders the liability of damage to the raising mechanism in such case much less than it otherwise would be.

Breaking joint of releasing link.—It is obvious that in order to drop one door, or one half of one door, independently, it is necessary to provide means whereby the locking lever U may release but one of said doors or parts of a door. To conveniently accomplish this I make the link V in as many sections as there are doors or separated half doors, as the case may be, and provide means for connecting and disconnecting these. This is clearly illustrated in Figs. 18 and 19.

The link V consists of two or more alined angle irons v v' as shown; the locking levers Q being pivoted to them. Now between the locking levers which are at the adjacent ends of the doors these links are separated but are connected in service by the bell crank arms V' and V^2 which are pivoted to the links and pivoted to each other near the extremity of their bell crank arms. A pair of holes v^2 are made at the bend in these bell cranks which aline when the long arms are parallel with the links, and a pin V^3 is inserted through these alined holes, thus rigidly coupling the links v v' together. This pin V^3 is prevented from displacement by the detent spring v^3 which it carries and which is adapted to engage a suitable shoulder on the outer bell crank arm V^2 ; a chain v^4 prevents the pin becoming lost. This is the normal position of the parts and the links v v' operate as if one continuous member. When it is desired however to dump only the first quarter or first eighth of the load in the car, as the case may be, the spring detent v^3 is forced by the finger toward the pin and the pin withdrawn from the holes v^2 and is placed in the alined holes of the bracket v^5 carried by the side of the car and the intumed end v^6 of the link v' . With the parts in this position the link v' is securely held against displacement, while if the lever U is thrown the arms V' V^2 simply buckle allowing the link v to move but not the link v' , wherefore the parts assume the position shown in dotted lines in Fig. 19, and only the door or doors at the left of that figure are dropped. Thus it is possible to

conveniently dump the car in sections as desired.

Having described my invention, I claim:

1. In a dump car, a beam comprising a pair of trusses, the upper edges of the trusses presenting an incline, filling blocks continuing said incline, and a sheet metal sheathing of an inverted V-shape supported by said filling blocks, substantially as described. 70

2. In a dump car, an interior longitudinal beam including a truss with vertical struts combined with a dumping door hinged to the vertical struts of said truss, substantially as described. 75

3. In a dumping car, a truss comprising a longitudinal beam and having vertical struts combined with a dumping door hinged to said struts, substantially as described. 80

4. In a dump car, a beam including a truss having vertical struts, a pivoted dumping door, and means for raising the door which is carried by the vertical struts of said truss, substantially as described. 85

5. In a dumping car, a truss having vertical struts, a pivoted dumping door and means for raising the door carried by the vertical struts of said truss, substantially as described. 90

6. In a dump car, a beam comprising a pair of trusses having vertical struts rigidly braced together, and a sheathing carried thereby, combined with dumping doors hinged to the vertical struts of said trusses, substantially as described. 95

7. In a dump car, a pair of trusses having vertical struts the upper edge of the struts being inclined, combined with an inclined sheathing carried by said edge, and dumping doors hinged to said struts, substantially as described. 100

8. In a dumping car, a pair of trusses having vertical struts, the upper edge of the struts being inclined, combined with an inclined sheathing carried by said edge, substantially as described. 105

9. In a dump car, a beam comprising a pair of trusses rigidly braced together, the trusses having vertical struts, a portion of which is a vertical post and a portion laterally projecting, and a dumping door pivoted to said projecting portion, substantially as described. 110

10. In a dump car, the combination of a beam comprising a pair of trusses which include vertical struts, obliques hooking over the ends of said struts, and an upper and a lower chord each riveted to the obliques and the struts, substantially as described. 120

11. In a dump car, a central longitudinal beam comprising a pair of trusses and a sheathing carried by the struts of said trusses, said struts including a vertical post and an inclined upper surface in which said sheathing is secured and lateral portions by which raising mechanism is carried, com- 125 130

bined with pivoted dumping doors and such raising mechanism, substantially as described.

12. In a dump car, a metallic beam including a truss with upper and lower chords and struts all riveted together, said lower chord comprising flat bands placed upon each other and increasing in number toward the center of the beam, substantially as described.

13. In a dump car, a beam including a truss which has a longitudinally flanged member for its upper chord, vertical castings for its struts, and flat bands for its lower chord, said flat bands being riveted upon each other and increasing in number toward the center of the car, substantially as described.

14. In a dump car, a car side having an upper chord consisting of a through beam fixed at its ends, and a short beam supported at its ends, combined with a lower chord and struts, substantially as described.

15. A car side having a pair of main struts inclining toward the transverse center of the car from the bolster, a double upper chord, one member of which terminates at said strut, and the other member of which continues beyond said strut and is there secured, substantially as described.

16. In a dump car, the combination with the side of the car, and door releasing mechanism carried by said side near its lower edge, of a projecting beam secured to the car side above such mechanism, substantially as described.

17. In a dump car, the combination with the side of the car, an angle plate extending along the car side at its lower edge, a dumping door adapted to engage said plate, a door-releasing mechanism carried by said side near its lower edge, and a beam secured to the side and projecting outwardly beyond said angle plate and said door-releasing mechanism, substantially as described.

18. In a dump car, the combination with the side of the car, of an angle plate secured to the lower edge of the side and having an outwardly projecting flange, a pivoted dumping door, the free edge of which is adapted to extend outwardly beneath the said flange, and means for forcing said door snugly against said flange, substantially as described.

19. In a dump car, the combination with the side of the car, of an angle plate secured to the lower edge of the side and having an outwardly projecting flange, a pivoted dumping door, the free edge of which is adapted to extend outwardly beneath the said flange, and a beam secured to the side above said angle plate and projecting outwardly beyond the same.

20. In a dump car, in combination, the bolster, a strut at the side footing on said

bolster, a longitudinal beam on the outer side of the car secured to said strut, and dumping mechanism on the side of the car near and protected by said beam, substantially as described.

21. In a dump car having a trussed metallic side, a lower chord for said side consisting of an obtuse angle plate extending along the car at its lower edge, combined with a dumping door adapted to engage said plate, substantially as described.

22. A dumping car having a trussed metallic side provided with a lower chord consisting of an angle plate extending along the car at its lower edge, combined with a dumping door adapted to engage said plate, substantially as described.

23. In a dump car, a body bolster having a central frame and compression and tension members secured thereto, combined with a longitudinal beam having a truss the upper chord of which passes through the bolster in proximity to the outer side of the central frame and the under side of the tension member and is secured to each of said members, substantially as described.

24. In a dump car, a body bolster having a central frame, and tension members secured thereto, combined with a longitudinal beam having a truss, a bracket carried by the outer side of said central frame, the upper chord of the truss being secured to said bracket, substantially as described.

25. In a dump car, a body bolster having a lower compression member and an upper tension member, combined with a diagonal beam extending from the end of the car to the side and passing between said members of the bolster and there secured, substantially as described.

26. In a dump car, a body bolster having a central frame and compression and tension members carried thereby, a pair of plates leading from the central frame to the end of the car, a pair of diagonal braces secured at the end of the car on opposite sides of said plates, said braces leading to the sides of the car and there secured and immediately passing between the tension and compression members of the bolster and there secured to them, substantially as described.

27. In a dumping car, a body bolster having an upper and a lower member, combined with a pair of diagonal brace beams extending from the end to the sides of the car and passing between said members, and filling means secured to said diagonal braces and to said members to fill the distance between said members, substantially as described.

28. In a dumping car, a body bolster comprising a truss having a lower compression member and an upper tension member, combined with a diagonal brace beam extending

from the end to the side of the car and passing through the bolster between said members, filling blocks on the upper and under side of the diagonal brace and rivets or bolts for securing the filling blocks and the diagonal beam and the tension and compression members of the bolster together, substantially as described.

29. In a dump car, a body bolster having a lower channel-shaped compression member, and an upper tension member, combined with a diagonal brace beam extending from the end to the side of the car and passing through the bolster between said members, filling blocks on the upper and under side of the diagonal brace to fill the distance between said members, and rivets or bolts for securing the filling blocks and the diagonal beam and the tension and compression members of the bolster together, substantially as described.

30. In a dump car, in combination, trussed sides, a central longitudinal beam, a central cross-beam, a gusset member on the inner side of the car secured to such sides and to such central beam, substantially as described.

31. In a car, in combination with the sides of said car, a cross beam uniting said sides, a gusset member consisting of a beam secured to one side of the car and projecting transversely therefrom, and a strap secured to such side and embracing the heel of said member, substantially as described.

32. In a dumping car, the combination of the side of said car, a gusset member attached to said side and having its heel secured to the lower portion thereof, and a tie rod secured at one end to said gusset member above the heel and at the other end to the opposite side of said car, substantially as described.

33. In a dump car, the combination of the sides of said car, gusset members attached thereto, a cross beam secured to said gusset members, and a tie rod extending through said cross beam and secured to the gusset members, substantially as described.

34. In a dump car, a beam consisting of an inverted V-shaped plate, and a tie rod beneath said plate at the angle thereof, substantially as described.

35. In a dump car, a cross-beam including an inverted V-shaped plate secured to the car side, and straps securing together the lower edges of said plate, substantially as described.

36. In a dump car, in combination, a central longitudinal beam, a cross beam intercepted thereby, said cross-beam having a tie rod passing through the longitudinal beam, and inverted V-shaped plates passing over the tie rod on opposite sides of the longitudinal beam and secured to it, substantially as described.

37. In a dump car, the combination with floor framing, of a bolster extending beyond the framing, and a push pocket secured to the framing and the bolster at such point, substantially as described.

38. In a dump car, side trusses having struts on their outer sides, a body bolster on which said struts seat, beams continuing the lower chords of the side trusses beyond said bolster, which beams are secured on the inner sides of said struts, combined with deflecting members located in the angle between said beams and the bolster and carrying push pockets, substantially as described.

39. In a dump car, the combination with a beam having a downward projecting sheath, of a dumping door hinged to said beam and having an upturned edge taking behind said sheath, substantially as described.

40. In a dumping car, a hollow metallic beam having a downwardly inclined sheath and strut members for supporting it, combined with a door pivoted to such strut members beneath said sheath, substantially as described.

41. In a dump car, a hollow metallic beam having a downwardly inclined sheath and strut members for supporting it, combined with a floor beam pivoted to one of said strut members beneath said sheath, and a floor carried by said floor beam and having an edge adapted to lie behind said sheath, substantially as described.

42. In a dump car, a beam having a downwardly inclined sheath, and strut members for supporting it, combined with a floor beam pivoted to such strut member beneath said sheath, and a floor carried by said floor beam and having an upwardly inclined edge adapted to lie behind said sheath, substantially as described.

43. In a dump car, a dumping door having a sheet metal floor plate, an obtuse angle strip secured thereto at the free edge thereof, combined with a car side and a cooperating metallic obtuse angle strip carried by it, substantially as described.

44. In a dump car, a side having secured at the lower portion thereof a beam of obtuse angle section, locking levers pivoted to the said beam, combined with a dumping door having at its free edge an obtuse angle cooperating with said beam, substantially as described.

45. In a dump car, a trussed metallic side whose lower chord includes a tie of obtuse angle section riveted to the side and projecting below it, locking levers pivoted to the car side on the outer side of said tie, combined with a hinged dumping door having at its free edge an obtuse angle cooperating with said tie, and projections carried by said door with which said levers may engage, substantially as described.

46. The combination of a beam, a door pivoted thereto, a pair of toggle links jointed together, a shaft longitudinal of the beam, a flexible connection between the shaft and the joint of the toggle, one of the free ends of the toggle being connected with the floor, and members on the under side of said beam carrying said shaft and having the other free end of said toggle connected to them, substantially as described.

47. In a dump car, the combination of a beam, a vertical strut member carried therewith, a pivoted door, a pair of toggle links connected together by a knuckle joint and pivoted at their opposite ends one to the strut casting, and the other to the door, a shaft and a flexible connection between it and the toggle, substantially as described.

48. In a dump car, the combination of a beam, a strut carried thereby, a closure for the bottom of said car, a toggle lever, one end of which is pivoted to the strut and the other to the closure, and means for operating said toggle lever, substantially as described.

49. In a dump car, the combination of a longitudinal beam including a truss having vertical struts, a door pivoted to a vertical strut of said beam, a pair of connected toggle links pivoted one to the door and the other to the strut, a shaft carried by said strut, and a connection between it and the knuckle of the toggle, substantially as described.

50. The combination with a vertical strut carrying an upper sheath, a dumping door pivoted to said strut and cooperating with said sheathing, a pair of toggle links connected together and pivoted at opposite ends to the door and the strut respectively, a shaft journaled in said strut, a chain secured to said shaft and connected to the knuckle of the toggle, substantially as described.

51. In a dump car, in combination, a beam carrying a strut, a floor beam hinged thereto, said floor beam having vertical webs, a toggle connecting said strut and floor beam, the upper member of said toggle consisting of two links taking on to opposite sides of a web of the floor beam, and means for straightening out said toggle, substantially as described.

52. In a dump car, in combination, a beam, a dumping door hinged thereto and adapted to be closed when substantially horizontal, a toggle for raising the door and including two joined members, one secured to the under side of the door and the other to a depending part of said beam, a shaft carried by the beam, and a chain secured to the shaft and connected with the knuckle of the toggle, substantially as described.

53. In a dump car, in combination, a

dumping door, a toggle for operating the same consisting of a pair of members, a pin connection between the members, a clevis connected with the pin, and means for straightening the toggle, said means being adjustably connected with said clevis, substantially as described. 70

54. In a dump car, the combination of a door, a toggle for operating the same, a shaft having thereon an eccentric drum, and means connecting said drum and the toggle, the arrangement of the parts being such that the maximum power of the drum is exerted when the power exerted by the toggle is at the minimum and the minimum power of the drum is exerted when the power exerted by the toggle is at the maximum, substantially as described. 80

55. In a dump car, the combination of a door, a toggle for closing the same, a shaft for operating the toggle, a longitudinal beam having a strut pivoting the fixed end of the toggle and the shaft, and a connection between said shaft and the toggle, substantially as described. 90

56. In a dump car, in combination, a dumping door, a toggle for raising the dumping door consisting of an inner link and a pair of outer links connected therewith by a knuckle pin, one of said links being connected with the door and the other with a stationary part, and a clevis connected with the knuckle pin between the inner link and the two outer links, a chain for straightening said toggle, said chain being adjustably connected by a screw threaded eye with said clevis, and means for drawing in the chain, substantially as described. 100

57. In a dump car, the combination of a beam carrying a vertical strut, a shaft journaled therein, a door hinged to said beam, a toggle connected to the door and the strut, an eccentric drum on the shaft, and a chain leading from said drum to the toggle, substantially as described. 110

58. In a dump car, the combination of a beam carrying a vertical strut, a shaft journaled therein, a drum on said shaft between bearings on the strut whereby the drum operates also as a set collar, the periphery of said drum being eccentric or cam-like, a toggle mechanism for raising the door, and a flexible connection between its knuckle and the periphery of the drum, substantially as described. 115

59. In a dump car, in combination, a pivoted dumping door, a toggle for raising the same, a shaft for operating the toggle, a drum on said shaft, a chain leading from said drum to the toggle, and a bolt securing at once the chain to the drum and the drum to the shaft, substantially as described. 125

60. In a dump car, in combination, dumping doors, locking mechanism therefor, means for throwing said locking mechanism 130

simultaneously for consecutive doors, and means for interrupting the throwing mechanism, whereby one door may be released without the release of the other adjacent thereto, substantially as described.

61. In a dump car, in combination, dumping doors, locking levers therefor, a link for throwing the locking levers, and a breaking joint in said link between the consecutive doors, substantially as described.

62. In a dump car, in combination, dumping doors, locking members, a link for throwing them, said link being broken between the dumping doors, a pair of bell crank arms pivoted at opposite ends to the consecutive parts of the links, and pivoted together, and means for holding said arms substantially in alinement or allowing them to buckle, substantially as described.

63. In a dump car, in combination, dumping doors, means for holding the same closed, means for throwing said door-closing means comprising a sectional link and a disconnecting means between the sections of said link whereby less than the whole number of doors may be operated by said links, substantially as described.

64. In a dump car, in combination, dumping doors, locking levers for holding the same elevated, a link for throwing said levers, said link being in sections connected by a broken joint between consecutive doors, means for connecting said broken joint, and means for supporting the farther section of the link when the joint is broken, substantially as described.

65. In a dump car, a combination with dumping doors, pivoted locking levers therefor, a link for throwing said levers which link is made in sections, a pin for locking said sections together, and a stationary bracket with which the far section of said link may be locked by said pin when the joint is broken, substantially as described.

66. In a dump car, in combination, dumping doors, levers for locking the same, a link for throwing said levers which link is made in sections, a pin for connecting said sections, and a spring detent carried by said pin for retaining it in locked position, substantially as described.

67. In a dump car, the combination of dumping doors, bumpers for receiving the impact thereof, and springs for resisting such impact, substantially as described.

68. In a dump car, the combination of a hinged floor beam, a leaf spring carried thereby in its under side, and a rigid bumper with which said spring may engage when the floor beam swings downward, substantially as described.

69. In a dump car, a longitudinal beam having a truss, dumping doors hinged to said beam, toggle raising mechanism for

said door which raising mechanism is carried by the door and truss, and when the door is raised, is entirely above the lower edge of the truss and is protected thereby, substantially as described.

70. In a dump car, a longitudinal beam composed of trusses, the lower chords of which incline upward at their ends, combined with toggle raising mechanism carried by the struts of the trusses above the lower chords, substantially as described.

71. In a car, a side supporting structure composed of a plate-girder having a compression flange, an additional horizontal compression member secured to the side plate of the girder below said flange, and an inclined member secured to the car side and leading from the end of said horizontal member diagonally downward to the lower edge of the side.

72. In a car, a side supporting structure composed of a plate-girder having a tension flange, and an additional tension chord secured to the outer side of said side independent of said flange.

73. In a car, a side composed of a plate-girder having tension and compression flanges and a reinforcing structure having tension and compression chords independent of the flanges of said plate-girder.

74. In a steel car, a girder side having a plate with a compression chord extending along its upper edge, a strengthening member extending along the side of the car near its upper edge for a distance intermediate of the ends of the car, diagonal strengthening members secured to the car sides and extending from the ends of such strengthening member downward substantially to the lower edge of the side.

75. In a steel car, a plate-girder side having compression and tension chords along its upper and lower edges, an additional compression chord near the upper edge, an additional tension chord near the lower edge and a diagonal brace riveted to the car side between said additional chords.

76. In a steel car, a plate-girder side having top and bottom chords, a pair of strengthening members secured to the side, one near the upper chord and the other near the lower chord, and diagonal strengthening members secured to the car side and connecting the ends of said two additional strengthening members.

77. The combination, in a steel car, of a plate-girder side having upper and lower chords, an additional strengthening structure secured to the outer side of the girder and including a compression chord leading diagonally upward near the ends of the car and extending horizontally at the center portion of the car and a tension chord extending horizontally throughout its length, and an inclined brace riveted to the side of

the car between the horizontal portions of the additional chords.

78. In a dump car having inclined end floors, the combination of bolsters beneath said end floors, longitudinal members extending from bolster to bolster through the inclined floor, a longitudinal plate secured to the tops of said members intermediate of their ends and having its end portions extending through openings in the inclined end floors and secured to the under side thereof.

79. In a steel car body, the combination with the side plates, of angle plates or bars running along and riveted to the bottom of said plates, a leg of the angle being inclined downwardly, substantially as described.

80. In a dump car, the combination with a side of the car, of an angle plate extending along the lower edge of said side, a central longitudinal beam, and a door extending between said beam and the lower portion of the car side, said door being provided at its free edge with an angle plate, substantially as described.

81. In a dump car, a dumping door having an angle plate secured thereto at its free edge, combined with a car side having an angle plate carried at its lower edge, against which the free edge of said door is adapted to close, substantially as described.

82. In a dump car, the combination with a side of the car of an angle plate extending along the lower edge of said side, a central longitudinal beam, a door extending between said beam and the lower portion of the car side, said door being provided at its free edge with an angle plate, and means for forcing said door closed with its free edge in contact with the angle plate on the side, substantially as described.

83. In a car, a pair of longitudinal members having each a vertical flange and an inwardly directed horizontal flange, a ridge plate thereabove, and transverse members carried by said longitudinal members and supporting said ridge plate, said transverse members having horizontal portions engaging the horizontal flanges of the longitudinal members and vertical portions engaging the vertical flanges of said members.

84. In a car, a pair of longitudinal members, each comprising an inverted T-beam, a ridge plate thereabove and transverse members resting on the inwardly directed flanges of said T-beams, said transverse members having at each end a vertical portion engaging the vertical flange of the T-beam, the upper surface of each of said members intermediate said vertical portions being shaped to engage said ridge plate.

85. In a dump car, the combination of a pair of longitudinal members, transverse members extending above and connecting the upper portions of said longitudinal mem-

bers, lateral members projecting from said longitudinal members, a ridge plate supported by said transverse members, and doors hinged to said lateral members, substantially as described.

86. In a car, the combination, with the sides, of a longitudinal ridge, a transverse ridge extending from each side to the longitudinal ridge and there suitably secured, and tie members connecting the inner ends of said transverse ridge and extending across the plane of said longitudinal ridge.

87. In a car, the combination, with the sides, of a longitudinal member, a transverse member extending from each side to the longitudinal member and there suitably secured, and a tie connecting the inner ends of said transverse member and extending across the plane of said longitudinal member.

88. In a car, the combination of sides, a ridge shaped hollow member extending transversely of said car and between the sides thereof, and a transverse tie rod for said sides located in and protected by said hollow member.

89. In a dump car, a door-way having at the edge thereof a flange making with the plane of the door-way an obtuse angle, combined with a door having at its free edge a cooperating flange making an obtuse angle with the plane of the door.

90. A dump car, having in its bottom a door-way provided at an edge thereof with a flange making an obtuse angle with the plane of the door-way, combined with a door hinged to the edge of said door-way opposite said flange and provided at its free edge with a corresponding flange making an obtuse angle with the plane of the door.

91. In a car, the combination of end sills, body bolsters, longitudinal center members having an inverted V-shaped hood and connected to said bolsters, and draft members extending from said end sills to said bolsters and connected with said bolsters and end sills.

92. In a car, the combination of a plate-girder side having a flanged strengthening member at the upper edge thereof, a flanged strengthening member at the lower edge thereof, a pair of inclined struts extending from the lower portion of said side to the upper strengthening member, and an additional strengthening member parallel with and near said upper strengthening member and bounded by said struts.

93. In a metallic car, in combination, a plate-girder side comprising a plate with flanged upper and lower chords, struts held against said side and terminating at their upper and lower ends at said upper and lower chords respectively, and an additional strengthening member near said upper chord and parallel with it and terminating

at said struts and intermediately held against the car side.

94. In a steel car, a girder side having a plate with a compression chord extending along its upper edge, an additional strengthening member extending along the side of the car near its upper edge for a distance intermediate of the ends of the car, and strengthening members extending downward from said additional member to the ends of the bolsters.

95. In a metallic car, in combination with a pair of bolsters, of a plate-girder side, struts held thereto and terminating at their lower ends adjacent to the bolsters and at their upper ends adjacent to the upper chord of the girder, and a strengthening member in addition to the upper chord of the girder held to the side of the car between said struts adjacent to such upper chord.

96. A steel car, having a plate-girder side and a plurality of strengthening members extending along the same near its upper edge, the upper one of said strengthening members continuing to the end of the car, bolsters, struts rising from the ends of the bolsters to the upper strengthening member, the lower one of said strengthening members terminating at said struts.

97. In a steel car, a girder side comprising a plate and strengthening members along the upper and lower edges thereof, and end struts adjacent to the upper ends of which said upper members are secured, combined with intermediate struts secured to said plate and extending to the upper member and secured to it, and an additional strengthening member parallel with and near said upper member and in compression and secured at its ends to said intermediate struts, whereby the upper member is anchored at four points, and the additional member at two points, thus differently apportioning the strains.

98. A steel car, having a plate-girder side including upper and lower chords, a bolster, a strut rising from the end of the bolster, and an additional compression member extending between said struts parallel with the compression chord.

99. A steel car having a plate-girder side, a strengthening member secured to and extending along the top of said side from one end of the car to the other, a shorter strengthening member secured to the side below the member mentioned, and a member secured to the car side and leading downward from said shorter member to the bolster.

100. A steel car having a plate-girder side, a plurality of strengthening members secured to and extending along the top of said side, one beneath the other, the upper member extending to the end of the car and the

lower member terminating short thereof, and struts on the outer side leading upward from the bolsters to the upper chord past the ends of said additional strengthening member.

101. In a metallic car, a bolster having tension and compression members and an intermediate strut frame with vertical sides combined with a pair of draft plates passing through the bolster and riveted to the flat side of said frame and longitudinal central members secured to said plates on the inner side of the bolster and passing into the bolster beneath its tension member and secured to such tension member.

102. In a car, the combination of a pair of bolsters, a longitudinal central member extending between said bolsters, said member comprising upper and lower chords of commercially rolled shapes, the lower chord being reinforced, and means for securing the ends of the lower chord to the upper chord and for securing both the upper chord and the lower chord to the bolsters.

103. In a car, the combination of a pair of bolsters, a central longitudinal truss, the upper member of which extends between the bolsters on a level therewith and the lower member of which extends diagonally downwardly at its ends from said bolsters and is parallel with said upper member intermediate of such diagonal portions, and struts spacing said members apart.

104. In a car, the combination of a pair of bolsters, a pair of central longitudinal members extending between said bolsters, said members comprising upper and lower commercially rolled shapes, struts spacing said upper and lower shapes, and means connecting the ends of the lower shapes to the bolsters and to the upper shapes.

105. In a car, the combination of a pair of bolsters, a central longitudinal truss extending between said bolsters, said truss comprising an upper metallic chord, a lower metallic chord, struts between said chords, the ends of said chords being brought together and passing jointly into the bolster, and rivets connecting both chords with the bolster.

106. In a car, the combination of sides, a hollow member extending transversely of said car and between the sides and a tie rod extending through such hollow member and connected with the sides.

107. In a car, the combination of sides, a transverse ridge-shaped member secured to car side, and a tie rod beneath such ridge.

108. In a steel car, the combination with bolsters having central frames and tension straps surmounting them, of a longitudinal member extending from the central frame of one bolster to the central frame of the other, said member comprising an upper chord, a lower chord, and struts, the lower

chord extending beneath the tension strap and being there secured to the bolster.

109. In a steel car having inclined end floors, the combination with bolsters beneath such floors,—draft members between the bolsters, a hood-sheet carried thereby and extending longitudinally between the end floors and passing through such floors and flanged onto the under surface of the same.

110. The combination with a side wall of a car, of a lower side sill including in its construction three structural shapes, the intermediate shape being secured to the outer face of the side wall and located only at such portion of the car and the other two shapes being secured to the inner face of the side wall and located only at the end portions.

111. The combination with a side wall of a car, of a side sill including in its construction two oppositely disposed structural shapes, one being secured to the inner face of the side wall and the other to the outer face thereof, one of said shapes being located at an intermediate portion only and the other adjacent to the end portion only.

112. A car body having a plate-girder side whose lower chord is on the inner side of the girder near the ends of the car and on the outer side of the girder at an intermediate portion of the car.

113. In a dump car, the combination of a plate-girder side whose lower chord near the ends of the side is secured to the inner side of the plate and intermediately of the ends secured to the outer side of the plate, and a dumping door adapted to abut the intermediate portion of the chord.

114. A car side having a flanged side sill riveted to the lower edge of said side, said side sill being partly on the inner side of the side and partly on the outer side.

115. A car side having an upper angular flange and a flanged side sill riveted to the lower edge of said side, said side sill near its ends consisting of channeled shaped members, and intermediately of an angle member, and a dumping door cooperating with such angle member.

116. In a dump car, the combination of a beam, dumping doors hinged at the opposite sides thereof and adapted when horizontal to close against the sides of the car, toggle mechanism carried by said beam on its under side and connected with the under sides of the doors, and means for straightening the toggles.

117. In a dump car, the combination of a longitudinal central member having a trussed under-structure, dumping doors hinged thereto and adapted when closed to extend horizontally therefrom to the sides of the car, toggle links connecting said doors with said member, and means for straightening such toggle.

118. In a dump car, the combination of a central longitudinal ridge, members depending therefrom, doors pivoted at the sides of said ridge, toggle links pivoted at their upper ends to said doors and at their lower ends to such depending members, and mechanism located beneath the ridge and connected with said toggle links for straightening them and thereby raising the doors.

119. In a dump car, the combination of a beam, a dumping door hinged thereto and adapted to be closed when substantially horizontal, a toggle for raising the door and including two jointed members, one secured to the underside of the door and the other to a depending part of said beam, and means for straightening the toggle.

120. In a dump car, the combination of a central beam including a ridge plate and members secured to the under side thereof, dumping doors pivoted to some of said members, toggle links connected together and connected at their free ends respectively with the door and one of such members, and mechanism beneath the ridge connected with the knuckle of said toggle for straightening it.

121. In a dump car, the combination of a central longitudinal ridge, under-bracing therefor, dumping doors pivoted to the under-bracing, means beneath the ridge and doors for raising them, and bumpers carried by the under-bracing for receiving the impact of the doors.

122. In a dump car, the combination of a longitudinal member having struts with a tension chord beneath them, of a dumping door carried by said member, and bumpers for said door formed on said struts.

123. In a car, a side supporting structure composed of a plate girder having a compression member extending along the top of the girder from one end of the car to the other, and strengthening means secured to the car side beneath said member and having a horizontal portion located intermediately and downwardly inclined portions at the ends of the horizontal portion.

124. In a steel car, a girder side having a plate with the compression chord extending along its upper edge and strengthening means extending along the side of the car near its upper edge for a distance intermediate of the ends of the car and diagonally downward substantially to the lower edge of the side.

125. In a steel car, a plate girder side having top and bottom chords, and additional strengthening means secured to the side of the car and including a flanged member parallel with the upper chord, and a flanged member parallel with the lower chord and diagonal connections between said members.

126. In a car, a plate girder side having

- top and bottom chords and strengthening means in addition to said chords including diagonal and horizontal members.
127. In a car, a plate girder side having
 5 top and bottom chords and strengthening means in addition to said chords leading diagonally upward from points adjacent to the bottom chord and extending immediately parallel with the top chord.
128. In a car, a plate girder side having
 10 top and bottom chords and strengthening means in addition to said chords leading diagonally upward from points adjacent to the bottom chord and extending immediately parallel with the top chord, combined
 15 with an additional tension member extending horizontally from one diagonal to the other.
129. A steel car having a plate girder
 20 side, a strengthening member secured to and extending along the top of said side from one end of the car to the other and strengthening means secured to the car side and extending in part parallel with said member
 25 and in part diagonally downward.
130. In a car, the combination of a bolster, a car side resting on the bolster and an extension sill resting on the bolster and secured to the car side and extending to the
 30 end of the car.
131. The combination of a bolster, a car side resting on the bolster, a main strut footing on the bolster, secured to the car side and a longitudinal member resting on
 35 the bolster and secured to said main strut, and a longitudinal strengthening member secured to the car side and abutting an intermediate portion of said main strut.
132. A car having bolsters and struts
 40 footing on them and a plate-girder at its side extending beyond said struts, and a plurality of strengthening members secured to and extending along the top of said plate structure, one of said members terminating
 45 adjacent to the bolsters, and the other being of different length and both being anchored adjacent to said struts, and both of said members extending in parallelism throughout their length, substantially as described.
133. A car having bolsters and struts
 50 footing on them and a plate-girder at its side extending beyond said struts, and a strengthening member secured to and extending along the top portion of said plate structure, said member extending substantially parallel with the floor-frame throughout its length, and another strengthening
 55 member secured to and extending for a different distance along the top portion of said plate structure, one of said strengthening members terminating at said struts and the other at the end of the car side, substantially as described.
134. A car having bolsters and struts
 65 footing on them and a plate-girder at its side extending beyond said struts, and a flanged strengthening member secured to and extending along the top portion of said plate structure, said member extending substantially parallel with the floor-frame throughout its length, and another flanged strengthening member secured to and extending for a different distance along the top portion of said plate structure, one of said strengthening members terminating at said struts and the other at the end of the car side, substantially as described.
135. A car having bolsters and struts footing on them and a plate-girder at its side extending beyond said struts, said
 80 girder having a flanged member at its top extending substantially throughout the car-body, and a shorter flanged strengthening member secured near the top of the plate-girder, one of said members extending between and terminating adjacent to the bolsters; substantially as described.
136. A car having a plate-girder side, the lower chord of which extends beyond the
 90 bolsters, an angle riveted to the upper edge of the side and extending from end to end, and another angle riveted along the upper part of the side and terminating adjacent to the bolsters, both members extending substantially parallel throughout their length,
 95 substantially as described.
137. A car having a plate-girder at its side, the lower chord of which extends beyond the bolsters, and provided in its upper
 100 portions with two angular flanges, one of said flanges extending from end to end and the other extending between and terminating adjacent to the bolsters, both flanges being substantially parallel throughout their length; substantially as described.
138. A car having a side formed at least in part of a plate structure extending beyond struts rising from the bolsters, two
 105 angles riveted along the upper edge of the plate structure, the flanges of both angles projecting outwardly from the top edge of their vertical legs, the angles being parallel to the upper edge of the side throughout their length, and at least one of said flanges covering the top edge of the plate structure,
 110 one of said angles extending to the end of the car and the other terminating at said struts; substantially as described.
139. A car having a side formed at least in part of a plate-structure extending beyond struts rising from the bolsters, two
 115 angles riveted along the upper edge of the plate structure, the flanges of both angles projecting outwardly from the top edge of their vertical legs, and at least one of said flanges covering the top edge of the plate structure, one of said angles extending between and terminating adjacent to said struts and the other extending beyond said
 120 struts; substantially as described.

140. A car having a plate-girder at its side with two angles riveted along its upper portion, the horizontal flanges of both angles projecting in the same direction, one of the angles extending throughout the body and beyond struts rising from the bolsters and the other terminating adjacent to the struts, said angles being substantially parallel throughout their length; substantially as described.

141. A car having a plate-girder at its side with two angles riveted along its upper portion, the horizontal flanges of both angles projecting in the same direction, one of the angles extending throughout the body and beyond struts rising from the bolsters and the other terminating adjacent to the struts, said angles being substantially parallel throughout their length, and at least one of the angles covering the edge of the side; substantially as described.

142. A car having a load-inclosing side with a lower chord extending beyond the bolsters partly within and partly without the plane of the side plate, a plate structure forming at least a part of such side throughout its length, said plate structure having a plurality of strengthening members secured to and extending along its top, one of said members terminating adjacent to the bolsters and the other being of different length, and both of said members extending in parallelism throughout their length; substantially as described.

143. A car having an inclined end floor, a load-inclosing side with a lower chord extending beyond the bolsters, said lower chord beneath the end floor being inside the plane of the side plate and between the end floors being outside such plane, a plate structure forming at least a part of such side throughout its length, said plate structure having a plurality of strengthening members secured to and extending along its top, one of said members terminating adjacent to the bolsters, and the other member terminating at a different point and in parallelism to the other member; substantially as described.

144. A car having bolsters and struts footing on them and a plate-girder at its side and extending beyond the bolsters, said girder having stiffening members at separated points in its length, and a plurality of strengthening members secured to and extending longitudinally along the top of the girder, one of said members terminating adjacent to the bolsters and the other terminating at a different point and parallel with the other strengthening member; substantially as described.

145. A car having a plate-girder at its side, bolsters, struts rising therefrom, said girder extending beyond the struts and having stiffening members at separated points

in its length, and a strengthening member secured to and extending along the top of the girder, said member terminating adjacent to the bolsters and extending substantially parallel with the floor throughout its length and another stiffening member terminating at said struts; substantially as described.

146. The combination with a car side of an upwardly extending strut secured thereto, and two angle-beams extending along the side, one of such beams being shorter than the other and terminating at the strut, and the other continuing beyond the strut and anchored on the far side thereof.

147. In a car, a plate girder side having two longitudinal angle beams near the upper edge thereof and two longitudinal angle beams near the lower edge thereof the free flanges of such angles all projecting outwardly.

148. In a railway car, the combination with the car-side and the stiffening members or stakes thereof, of a flanged bar or top guard angle secured to the upper edge of said car-side and stakes aforesaid, and provided with a bulb or reinforcement integral with its outstanding edge.

149. In a car side, the combination with a strut footed on the bolster, of an upper chord having strengthening members near the top of the side, one terminating at the strut, and one extending beyond it.

150. In a car, the combination of a plate girder side having a strut rising from the bolster, and a pair of longitudinal members adjacent to the top portion of the side, the upper one of said members extending across the top of the strut, and the lower one of said members abutting the inner face of the strut.

151. A car having its sides terminating over the bolsters, inclined struts rising from the bolsters, and inclined end floors leading from intermediate portions of the car to a position over the bolsters, said end floors crossing said struts, and braces for the upper portion of the car end.

152. In a dump car, the combination with a dumping door and supporting mechanism therefor carried by the car side, of a longitudinal member constituting at once a stiffening member for the car side and a protection for the supporting mechanism.

153. In a dump car, the combination with a plurality of doors in the same side of the car, dumping mechanism therefor, and means whereby such dumping mechanism may release either one door or a plurality of doors as desired.

154. In a dump car, the combination of a central longitudinal shedding structure, dumping doors hinged to opposite sides thereof and adapted to close against the car side, toggle raising mechanism connected

with the central structure and the under sides of the doors, and means for operating such toggle raising mechanism.

155. In a dump car, the combination of a longitudinal central member, dumping doors carried thereby, a plurality on each side, toggle raising mechanism for the doors, hooks carried by the side of the car for holding the doors when raised, means for releasing one door independently of the other.

156. In a dump car, the combination of a plurality of dumping doors on the same side of the car, means for releasing the doors together or releasing one independently, and common raising mechanism for a plurality of doors.

157. The combination in a dump car, of a

plurality of dumping doors on the same side of the car, common raising mechanism therefor, means for releasing both doors together or one independently, the raising mechanism allowing a single door to go down without interfering with the door held elevated.

158. In a dump car, the combination of plate girder sides, pivoted hooks carried by the sides and protected by longitudinal stiffening members, dumping doors adapted to be held elevated by said hooks, and toggle raising mechanism for said doors.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

FRANK S. INGOLDSBY.

Witnesses:

ALFRED E. DAVIS,

EDITH E. RAYMOND.