

Nov. 29, 1932.

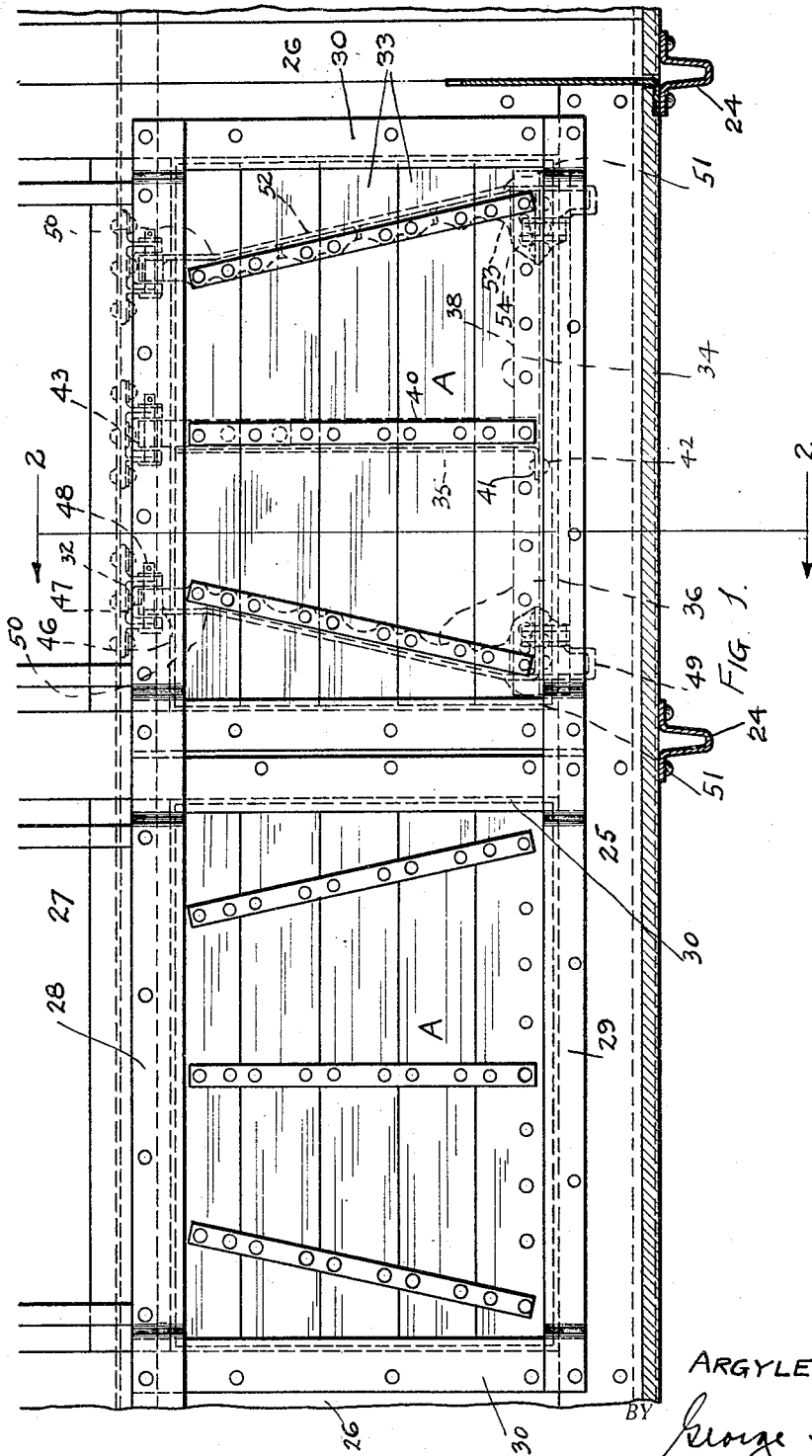
A. CAMPBELL

1,889,171

LOAD DISCHARGING CAR

Filed Oct. 26, 1931

6 Sheets-Sheet 1



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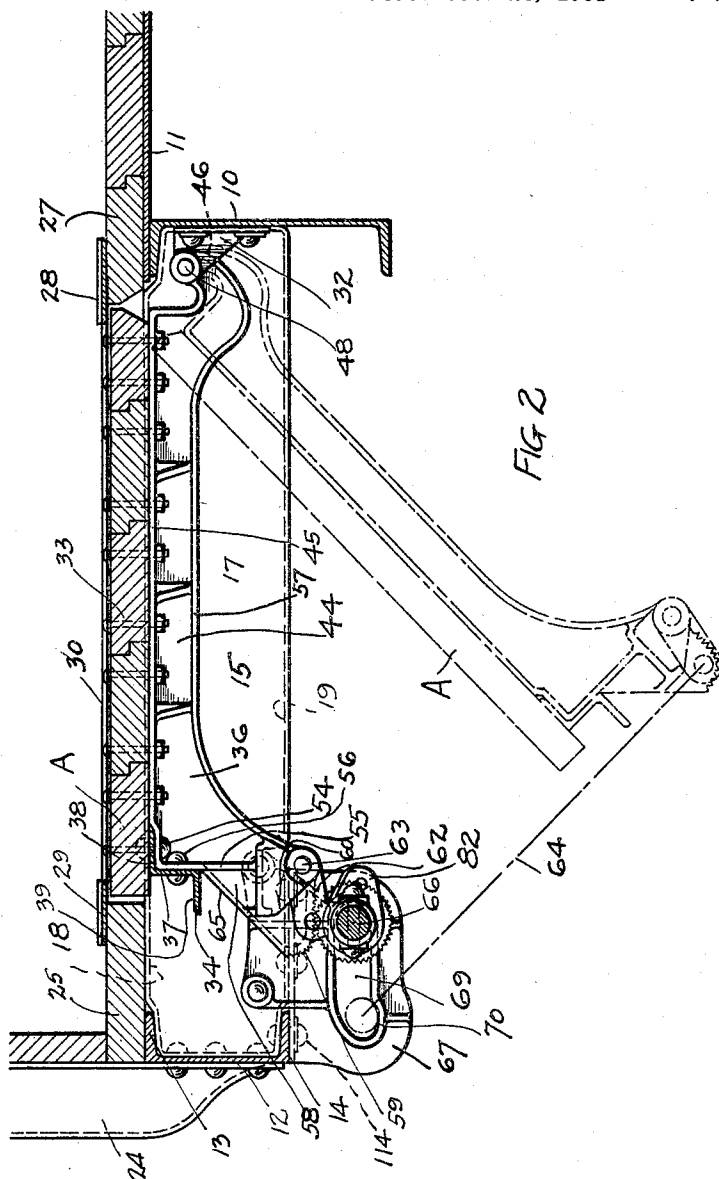
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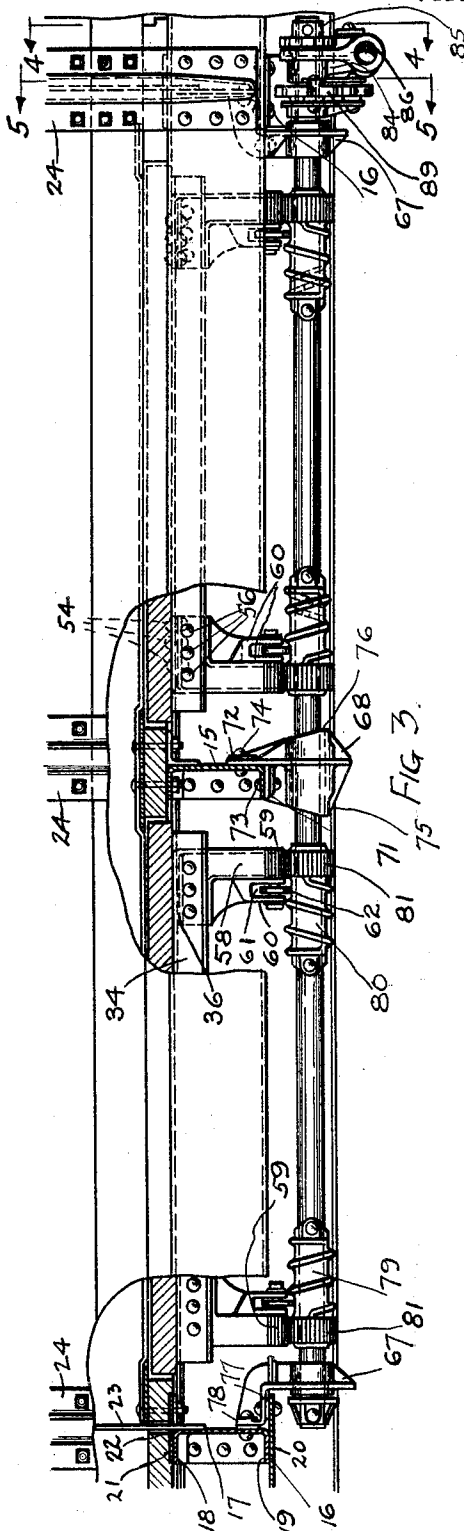
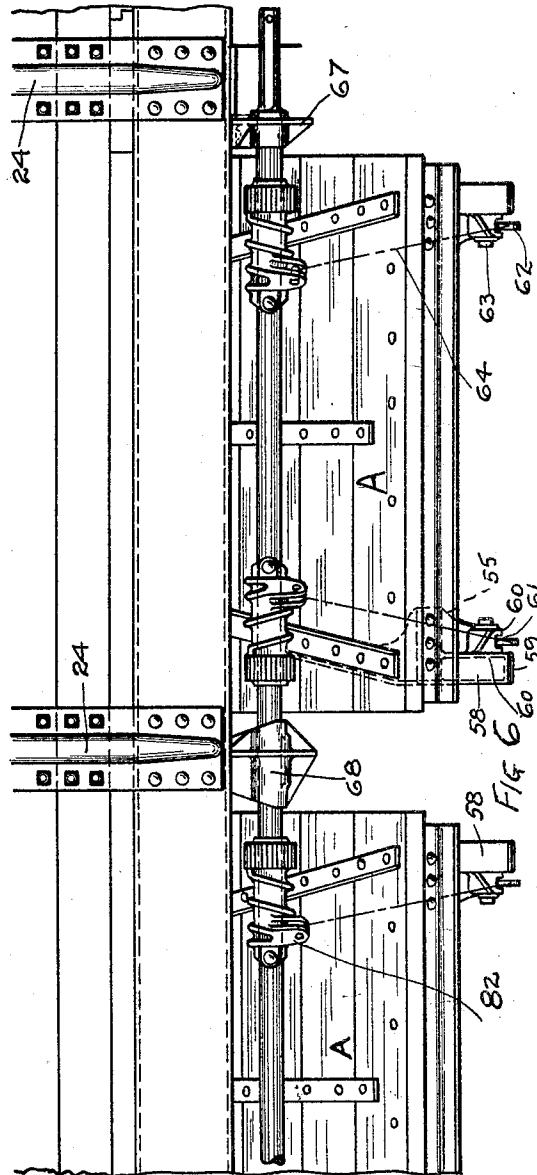
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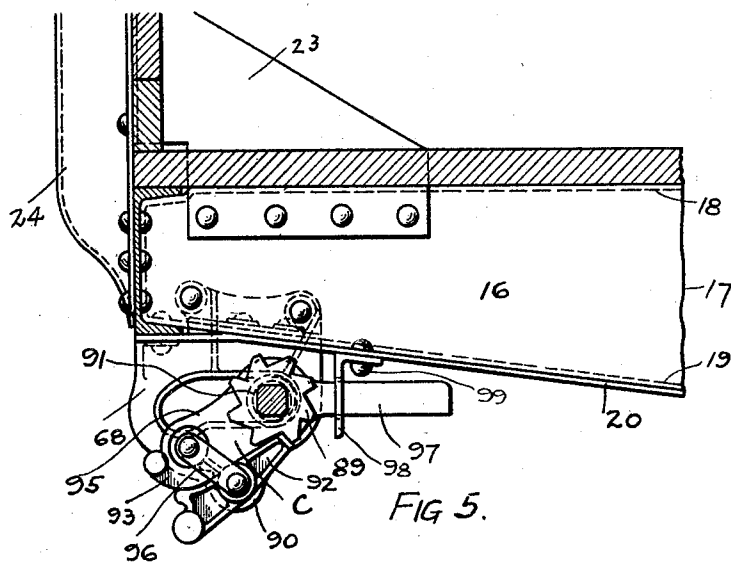
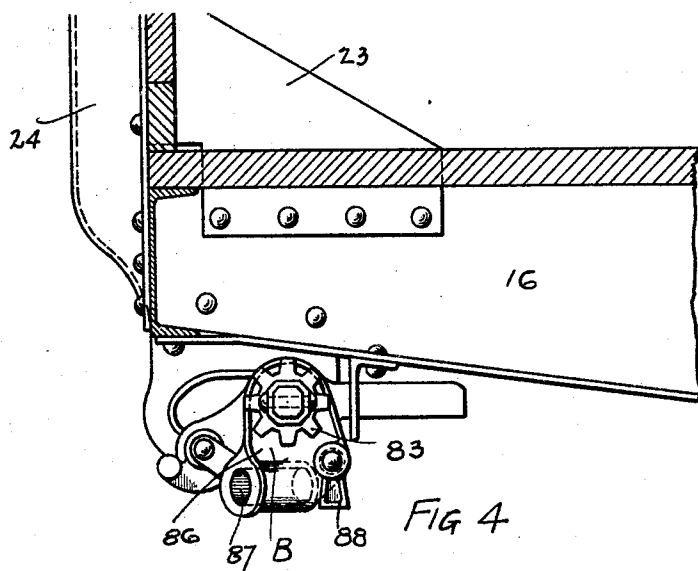
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6 Sheets-Sheet 4



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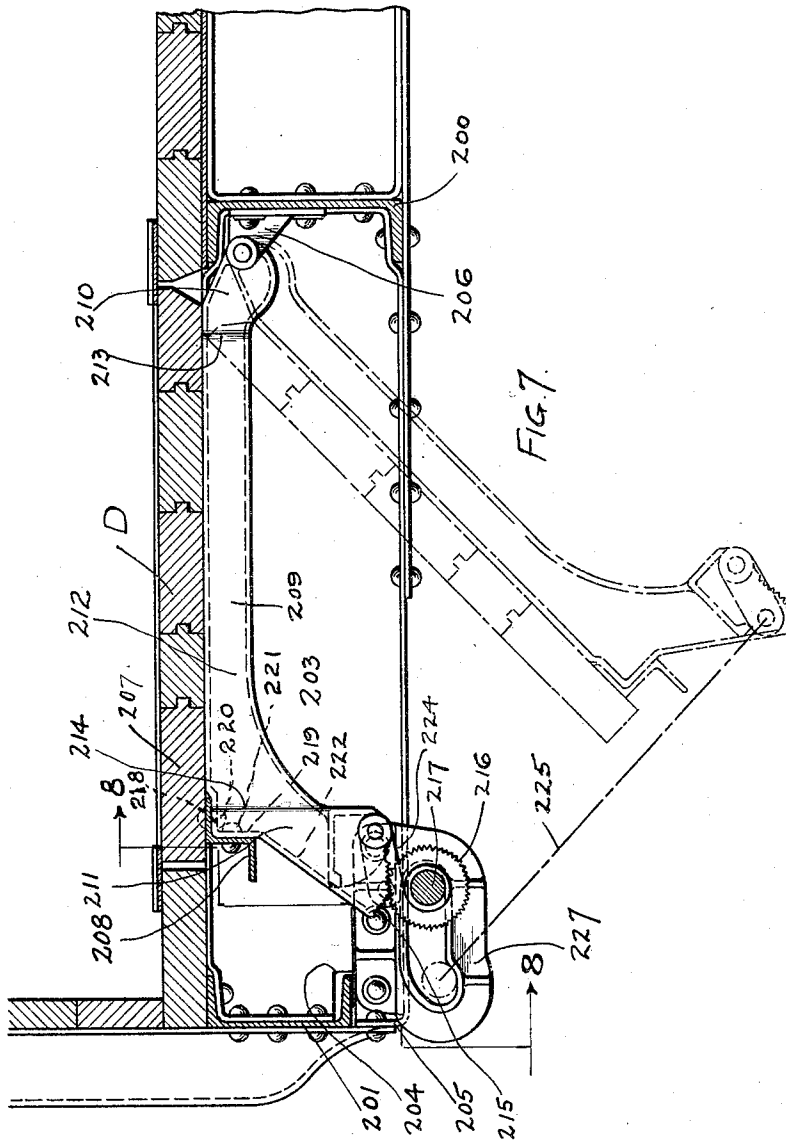
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6 Sheets-Sheet 5



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6 Sheets-Sheet 6

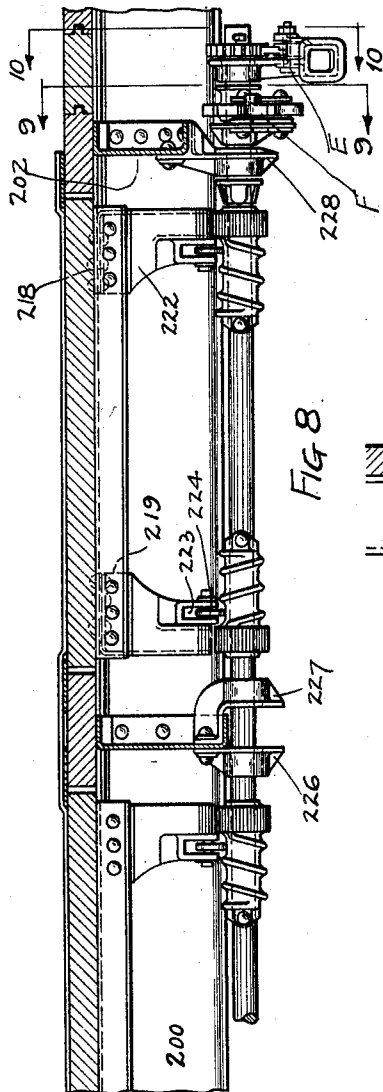


Fig. 8.

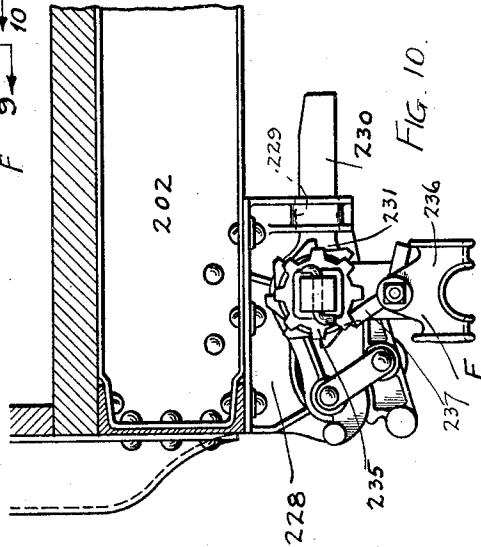


Fig. 10.

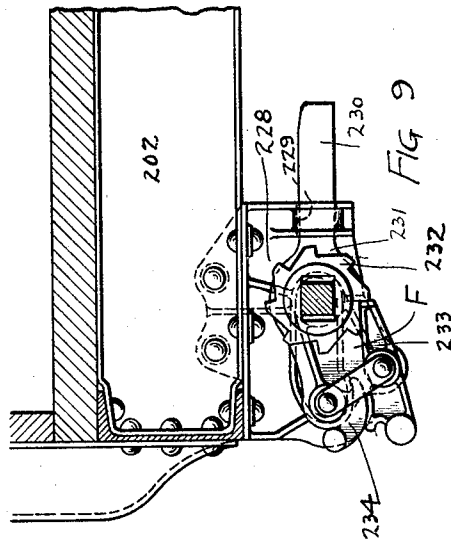


Fig. 9.

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UNITED STATES PATENT OFFICE

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LOAD DISCHARGING CAR

Application filed October 26, 1931. Serial No. 571,083.

My invention relates to improvements in load discharging cars.

An object of the invention is to provide an improved door and cooperating raising and supporting mechanism particularly adapted for gondola cars of the type having a side sill or other obstruction depending below the floor of the car.

Another object of the invention is to provide an improved door operating mechanism of the type having a bodily movable shaft adapted to move beneath the door for support of the same and movable outwardly beyond the free edge of the door for releasing the doors and discharging the load.

Still another object of the invention is to provide improved door supporting means in combination with an improved door bracing structure such as will operate to minimize strains on the door and door operating mechanism with the door either in its open or closed position.

A still further object of the invention is to so dispose all parts of the door operating mechanism as to prevent interference or weakening of the structural parts of the car and render said operating means visible and accessible to permit ease of operation.

A more specific object of my invention is to provide integral door beams such as will operate to bridge the space intermediate the hinge supports and door supporting mechanism in a manner to provide adequate reinforcement for the door, and also for supporting the door in a manner such as will relieve the door supporting means of undue strain.

My invention also contemplates the application of doors, door operating mechanism and parts to a car of standard construction with all parts disposed outwardly of the car framing in such a manner as to avoid weakening of the structural elements of the car, and to provide for transferring loads from the door to the door operating mechanism and thence to the side sill of the car.

My invention further resides in certain detail of parts such as will be fully pointed out hereinafter and claimed.

For further comprehension of my invention, reference may be had to the accompany-

ing drawings wherein my improved construction is shown as applied to a so-called gondola car having drop doors hinged adjacent the longitudinal center of car and opening outwardly for discharging the load to the side of the track.

In said drawings:

Fig. 1 is a plan view of a portion of a car showing a pair of doors together with the associated car construction, said view illustrating approximately one-half the width of the car.

Fig. 2 is a vertical sectional transverse view taken substantially on a line 2—2 of Fig. 1, the door indicated in closed position by full lines and in open position by conventional dotted lines.

Fig. 3 is a longitudinal vertical elevational view of that portion of the car illustrated in Fig. 1, certain parts of the side sill being broken away to more fully illustrate the door operating mechanism parts.

Fig. 4 is a fractional transverse vertical sectional view taken through the car and on a line 4—4 of Fig. 3, said view illustrating only the portion of the car adjacent the side sill and showing the door operating shaft rotating means.

Fig. 5 is a fractional vertical transverse sectional view taken adjacent the side sill of the car and on a line 5—5 of Fig. 3, said view illustrating the creeper arrangement for maintaining the shaft against reverse rotation and for locking the said shaft in the final closed position beneath the doors.

Fig. 6 is a longitudinal vertical elevational view of a portion of Fig. 3 illustrating the doors in the open position.

Fig. 7 is a vertical transverse sectional view of a portion of a car showing a modified form of construction wherein a cross beam member is extended an appreciable distance below the side sill and a modified door brace is employed.

Fig. 8 is a longitudinal vertical elevational view taken through that portion of the car shown in Fig. 7 and on a line 8—8 of Fig. 7.

Fig. 9 is a fractional transverse sectional view taken on a line 9—9 of Fig. 8 and illustrating the shaft locking means.

And Fig. 10 is a fractional transverse sectional view taken on a line 10—10 of Fig. 8 and illustrating the shaft rotating means.

In said drawings, the car framing structure is shown as including a longitudinal centersill formed of a pair of vertical channel members 10 (one of which only is shown), said members being united by a top cover plate 11. At the side of the car there is a side sill member 12 also of channel shape construction and having its upper and lower flanges 13 and 14 inwardly disposed, the top flange 13 lying substantially in alignment with the top of the centersill structure. Extending transversely of the car between said centersill and side sills are a plurality of cross members indicated at 15 and 16, the former corresponding in depth to the side sill. The cross beam member 16 inclines from the lower portion of the centersill to the lower portion of the side sill, and both of said cross beams include vertical web sections 17 and upper and lower outstanding flanges 18 and 19, respectively. The members 16 on the opposite sides of the centersill are tied transversely across the lower portion of the centersill by a bottom cover plate 20 which extends continuously between the side sills. Certain of the cross beams are further tied across the plane of the centersill by top cover plates 21, said top plates adjacent the sides of the car being coped at 22 to accommodate vertical inside gussets 23. In alignment with each of the cross beams there is provided side stakes 24 which are riveted to the side sill and extend upwardly above the floor for cooperation with the inside gussets 23.

The floor of the car includes fixed floor sections 25, 26 and 27 extending adjacent the sides of the car, along the top of the cross beams, and above the centersills, respectively, the edges of said floor sections serving to define discharge openings which are adapted to be closed by the pivotally mounted bottom doors A. Around the sides of the discharge openings there are provided longitudinal and transverse edge plates 28, 29 and 30, respectively, said edge plates being carried by the fixed floor sections and bolted thereto and having edge portions projecting into overlapping relation with the associated discharge doors.

Inasmuch as the construction of each dumping door A is of similar construction, the description herein will be confined to only one of said doors.

Each door A is pivotally mounted at 31 on hinge brackets 32, there being preferably three hinge supports per door. The door, which may be of any suitable construction, is shown in this embodiment as including a plurality of boards 33 bolted or otherwise secured to a frame structure composed of longitudinal and transverse bracing members,

the former being indicated at 34 and the latter at 35 and 36, respectively, the members 36 being extended outwardly beyond the swinging edge of the door for cooperation with door supporting means hereinafter described. The reinforcement 34 which extends adjacent to and along the free edge of the door is preferably in the form of a Z-shaped section having the web 37 extending substantially normal to the main plane of the door and having one flange 38 underlying the door boards and the opposite flange 39 spaced from the underside of the door boards. The central hinge brace 35, which is preferably of angle shape with one flange 40 underlying the door boards, is bent at its outer end to present a flange 41 secured to the front beam member at 42, and adjacent the hinged end of the door said brace 35 is provided with a hinge strap 43.

The members 36, of which there are two per door, are each preferably formed of a one-piece integral construction of cast metal and include a main weblike portion 44 which is generally disposed at an angle normal to the main plane of the door and secured to the main body of the door by an underlying flange portion 45. Adjacent the hinge end of the door each beam member 36 is formed with an integral portion 46 having a hinge eye 47 whereby mounting is effected on the associated hingebutt bracket 32 by means of a pivot 48. The portion 46 extends at an angle substantially at right angles to the hinge axis of the door and is spaced an appreciable distance from the adjacent side edge of the door.

Adjacent the outer or swinging edge of the door, each said member 36 is provided with another portion 49 which also generally extends in a plane substantially at right angles to the hinge axis of the door, said portion 49 however being disposed relatively closer to the adjacent side edge of the door than the hinge portion 46, and, as will be observed by reference to the plan view, Fig. 1, the beam 36 is formed with offsets 50 and 51 therein, thereby disposing the intermediate connecting portions 52 at an angle between said respective portions 46 and 49.

Adjacent the front beam member 34, the underlying flange 45 is enlarged and extended lengthwise of the front beam to present a triangular shaped construction 53 which in effect provides a gusset connection between the front beam upper flange 38 through the medium of a plurality of rivets 54. The depending web-like portion adjacent the outer edge of the door is extended downwardly and braced relatively to the web 37 of the front beam member by an integral triangular shaped wall 55 which is extended lengthwise adjacent to the wall 53 and is secured to the web 37 by three rivets 56. The walls 53 and 55 in cooperation with the main web portion 44 provide a three wall box-like integral con-

struction which fits into the angle defined by the body of the door and the depending web 37 of the front beam member 34 and thus operates to strongly brace the door frame and effectively brace the door hinge beams against vertical, horizontal and torsional displacement. The lower margin of the beam 36 is reinforced by an outstanding flange 57 which, in cooperation with the upper flange 45, provides a channel-shaped construction, and which in further cooperation with the end wall 55, there is provided a strong pan-shaped construction for the door hinge beam.

Each beam 36 is provided with a downwardly and forwardly projecting extension 58 which extends to a position below the side sills and cross beams and is there formed with a rounded serrated surface 59. Adjacent said surface 59 there is provided spaced walls 60—60 which provide an opening 61 within which a link 62 is pivotally mounted at 63. The link constitutes the terminal member of a flexible connection 64 which extends between the door and shaft 66 in a manner to be described hereinafter.

From the lower portion of the depending flange 37 to the outer extremity of the serrated surface, the projecting portion of the beam 36 presents an upper inclined wall 65 which serves to brace the door seat relatively to the front beam. The operating shaft 66 is mounted in slotted bearings 67 and 68. Each bearing is provided with an elongated slot 69 formed adjacent its outer end with a depressed portion 70. This depressed portion 70 is for the purpose of retaining the shaft in its outermost position beyond the path of movement of the free edge of the door brace, thereby permitting the extremity of the door brace to pass the shaft and associated parts during the movement of the door from the open to closed position or vice versa. Each bearing bracket is extended beneath the side sill member 12 and secured at 114 to the lower flange 14 thereof.

The intermediate bearing bracket 68 is provided with horizontal and vertical flanges 71 and 72, respectively, and is thereby united with the cross beam by rivets 73 and 74. The lower bearing portion of said bracket is extended lengthwise of the shaft for an appreciable distance beyond the said securing flanges as indicated at 75 and 76 in order to bring the said bearing in near proximity to the door brace and thereby reduce the bending strain on the shaft.

The respective bearings 67 are formed of substantially Z-shape with one wall 77 extending horizontally and the other wall 78 extending in a vertical direction and overlying the vertical web 17 of the cross beam. It will be noted that this construction provides for a direct support of the bearing by means of the lower cross beam cover plate 17 and also for the support of the bearing in two distinct

planes—that is, both in horizontal and vertical planes.

Cooperable with the serrated bearing portions 59 of the door brace are winding sheaves 79 rigidly secured to the shaft 66. Each said winding sheave is formed with spiral guide-way 80 and includes at one end the serrated wheel 81. The serrated wheel 81 is disposed in alignment with the serrated portion 59 on the door and the respective serrated portions on the door and shaft being adapted to register and interengage when the shaft is in operative supporting relation with the door.

The flexible connections 64 which extend between the door and shaft operate to raise the door by rotation of the shaft and thereafter bring the shaft to a supporting position beneath the door, said connections 64 being attached at one end to the door by means of the terminal link 62 and to the winding sheave 79 by means of jaws 82—82, the latter being disposed on the end of the winding sheave opposite to the serrated wheel 81.

At one end the operating shaft is provided with door rotating means indicated at B, Figs. 2, 4 and 5, and shaft retaining means indicated at C, both of said devices being preferably located beneath one of the cross beam members and immediately adjacent one of the bearings. The operating shaft 66 is extended through the end bearing 67 and beyond the same for the purpose of receiving said devices.

The shaft rotating means B includes a ratchet wheel 83 rigidly secured to the end of the shaft and having hub portions 84 and 85, respectively, disposed on opposite sides thereof. Mounted on hub 84 is a loosely mounted lever element 86 having a socket portion 87 formed integrally therewith. Pivotaly mounted on said lever is an operating pawl 88, said pawl being adapted to have engagement with the ratchet wheel 83 for engagement with the teeth of the ratchet wheel to rotate the shaft in either direction.

The shaft rotating and locking mechanism C is to prevent the shaft from rotation in a reverse direction either during the closing of the door or after the doors have been placed in closed position. This locking means includes a toothed ratchet wheel 89 secured to the shaft, a creeper 90 loosely mounted on a hub 91 formed integrally with the ratchet wheel 89, a pawl 92 pivotally mounted on the creeper, and a locking dog 93 adapted to lock the pawl 92 relatively to the ratchet wheel. The pawl 92 and dog 93 are mounted on lugs formed integrally with an outwardly projecting arm 95 on the creeper. A tie plate 96 overlies both the dog and the pawl and serves to retain these members in fixed relation to each other. Opposite to the arm 95 there is an inwardly extending arm 97 with which a slotted bracket 98 is adapted to cooperate to prevent turning movement of the creeper

relatively to the axis of the shaft. The bracket 98 is preferably formed of angular section and is riveted or otherwise secured to the associated cross beam bottom cover plate, as indicated at 99. The disposition of the shaft rotating and locking mechanisms beneath the cross beam adjacent the side sill not only economizes space, but also protects the mechanisms against the discharging load.

With the doors in closed position, as indicated in Fig. 3, it will be observed that the outwardly deflected door beams provide for the disposition of the shaft engaging portion of the door beam to lie comparatively close to the shaft supporting bearings on the car structure, and therefore the bending tendency on the shaft is materially reduced. With the doors in the open position and supported as indicated in Fig. 6, the chains form the support for the door to limit opening movement thereof, and it will be observed that the chains spread outwardly towards the lower portion of the door thereby providing for a generous spacing between the chains adjacent the main body of the door, thus allowing for free discharge of the load over the free edge of the doors. The normal tendency with the chains in such position would be to cause overturning of the door beams in the direction of the chains, but inasmuch as said beams are braced in different directions by the gusset portions on the hinge beams, and the door beams are inclined towards the hinge brackets, such twisting movement of the beams is prevented.

In the modification shown in Figs. 7 to 10, inclusive, my improved construction is shown as applied to a car having somewhat smaller doors and in which certain of the cross beams of the car are extended outwardly beneath the side sill. In this embodiment, the center sill construction is indicated at 200, the side sill at 201, and the transverse cross beams at 202 and 203, the latter being coped out at 204 and extended below the side sill, as indicated at 205.

The discharge doors D are pivotally mounted on hinge brackets 206 carried by the center sill, each door consisting of a plurality of boards 207 braced on the underside by longitudinal and transverse bracing beams, as indicated at 208 and 209, respectively, the former being preferably of Z-shape and the latter consisting of a pair of integral cast metal hinge beams. Each of said beams 209 have portions 210 and 211 disposed in a plane at right angles to the axis of the door and spaced lengthwise of the door from each other and integrally united by an angularly disposed portion 212, the various bends being indicated at 213 and 214. The beam adjacent the free edge of the door slopes downwardly beneath and beyond the front door beam and is formed on its under surface with a rounded serrated seat 215 adapted to have support-

ing cooperation with a correspondingly serrated surface 216 carried by operating shaft 217. The hinge beams 209 adjacent the free edge of the door are formed with extended surfaces 218 and 219, which, respectively, extend horizontally and vertically lengthwise of the front beam member 208 and are secured to said member by a plurality of rivets as 220 and 221. The wall 219 is deflected below the front beam, as indicated at 222, and conforms in shape to the projecting portion of the beam. Adjacent the serrated seat on the door the beam is provided with an opening 223 adapted to receive the terminal link 224 of a flexible connection 225 connecting the shaft and door. The shaft is mounted in the slotted bearing brackets 226, 227 and 228, respectively, and is adapted to move into supporting relation with the door. The shaft-rotating and shaft-locking means indicated at E and F, respectively, are located on the end of the shaft adjacent the bearing 228, the latter being provided with an integrally formed guiding recess 229 through which the projecting portion 230 of a creeper 231 is adapted to extend, said creeper 231 having associated therewith ratchet wheel 232 and pawl and dog means, as indicated at 233 and 234, respectively to maintain the shaft against rotation.

The shaft rotating means E includes a ratchet wheel 235 fixed to the shaft, and a socketed lever and pawl means indicated at 236 and 237, respectively.

I claim:

1. In a railway car, the combination with a hinged door; of bracing means for the underside of the door, including a pair of braces extending from the hinge edge of the door towards the swinging edge thereof, said braces adjacent the hinged edge of the door being spaced an appreciable distance from the side edges of the door and diverging outwardly from each other towards the free edge of the door; and a bodily movable shaft adapted to engage the said braces near the free edge of the door, said engaging portion of each brace extending substantially at right angles to the longitudinal axis of the shaft.

2. In a car door of the character described, adapted to be pivotally hinged adjacent one edge and movably supported adjacent the free edge, the combination of means for reinforcing the underside of the door, including integral braces extending from the hinged edge of the door and diverging outwardly toward the free edge of the door whereby said beams at the rear edge of the door are spaced relatively close to each other and at the front edge of the door are spaced outwardly to provide means adjacent the immediate corners of the door for cooperation with the door operating mechanism.

3. As an article of manufacture an integral hinge door brace construction for discharge

doors for railway cars adapted to span the distance intermediate the hinged edge of the door near the rear edge thereof, and door supporting means disposed adjacent the swinging edge of the door, said brace having projecting portions extending beyond the door at the rear and front edges of the door and generally in a plane substantially at right angles to the hinged axis of the door, and being spaced from each other lengthwise of the door whereby said beam at the rear edge of the door is spaced a greater distance from the side edge of the door than at the front edge thereof, and a connecting portion underlying the door and secured thereto, said portion extending at an angle to said respective projecting portions and integrally uniting the same.

4. In a railway car door, the combination with the body thereof; of a depending marginal reinforcement flange adjacent the free edge of the door forming with the body of the door an angularly related construction; a combined integral hinge and bracing member adapted to fit in the angle defined by the said depending flange and the body of the door, said bracing member having a depending web section extending at an angle to the main direction of the said marginal reinforcement and having angularly related walls formed integrally with the said depending web and respectively overlying the body of the door and the depending marginal flange of the door to provide a three-wall box-shaped section, said walls which overlie the marginal flange being extended lengthwise of the said flange and secured thereto by a plurality of securing means whereby an extended connection is provided between the said marginal flange and the hinge beam to prevent overturning of the said hinge beam under torsional strains.

5. In a railway car door of the character described adapted to be pivotally supported adjacent one edge thereof and adapted to be movably supported adjacent the free edge thereof by movable door supporting means; the combination of a reinforcing beam member extending adjacent to and parallel with the free edge of the door, said beam member being formed with a flange underlying the main body of the door and having a flange depending from the body of the door, a pair of integral hinge beam members adapted to span the distance intermediate the said door supports at the respective edges of the door, said hinge beam members being of generally pan-shaped form and fitting into the angle defined by the main body of the door and the depending flange of the front beam member, each said pan-shape member adjacent the front door beam being of extended depth in the general direction of the front door beam and said extended portion of the beam being secured to said front door beam whereby a

bracing connection is obtained between the front door beam and the door brace; and a projecting portion formed integrally with each hinge beam and extending beyond the front door beam, said last named extension having formed integrally therewith a seat for supporting cooperation with the movable door supporting means.

6. In a railway car door, the combination with the body thereof; of under-bracing for the said door, including a continuous marginal reinforcing flange adjacent the front edge of the door, a beam member adapted to extend in a direction at an angle to the marginal flange and having a portion projecting beyond and beneath the same, said beam including a three-wall integral box-like section disposed in the angle defined by said marginal reinforcing flange and the body of the door, said projecting portion of the beam having a door supporting seat and a housing formed integrally therewith, said housing being adapted to receive the terminal link of a door raising connection.

7. In a railway car door of the type adapted to be pivotally mounted upon the car structure, the combination with the body of the door; of a beam extending lengthwise adjacent the front margin of the door and having one flange underlying the body of the door and secured thereto and having a depending web; an integral hinge member extending at an angle to the said front beam member and having a flange underlying the body of the door and the underlying flange of the front beam member and secured to said respective members, and an integral wall connecting said flange and depending web of the hinge member and extending parallel to and overlying the web of the front beam member, said last named wall in cooperation with the underlying flange and depending web of the hinged brace member providing a three wall box-shaped construction adapted to form a bracing connection between the front beam member and the hinged member to prevent vertical, horizontal and torsional displacement between said respective members; and an extension formed integrally with said box-shaped section and including spaced walls adapted to receive the terminal link of a door connection and also incorporating an integral serrated seat for cooperation with door supporting means.

8. In a railway car, as an article of manufacture, a door brace for reinforcing the under surface of a hinged door and adapted to cooperate with a beam extending lengthwise of the door adjacent the free edge thereof, said beam having adjacent one end thereof integral means for hingedly supporting the door and having at the opposite end thereof a box-like structure having walls extending respectively in the general direction of the beam and secured thereto and also in

the direction of movement of the door in both horizontal and vertical planes, said three walls being integrally formed to present a box-like section of greater depth than the remainder of the said beam.

9. As an article of manufacture for a pivotally hinged door, a door brace adapted to be positioned beneath the door and extend as a unitary structure from the hinged edge of the door to the free edge thereof for supporting cooperation with door supporting means, said brace at the rear and front edges of the door being provided with projecting portions spaced from each other lengthwise of the door; and an angularly related portion extending between said respective projecting portions, said beam adjacent the outer edge of the door being provided with a box-like portion presenting walls extending in three different planes, one of said walls lying substantially normal to the main plane of the door and in the direction of movement of the door and the other two walls extending in a direction lengthwise of the door and integrally united with said first named wall, said last named two walls being of greater depth than the remaining portions of the beam and presenting gusset-like portions for bracing the door beam against torsional displacement.

10. In a railway car door construction a door of the type adapted to be pivotally hinged adjacent one edge thereof and supported adjacent the free edge thereof by means of movable door supporting means, a pair of integral braces disposed adjacent the respective side edges of the door and extending from the hinge end of the door to said door supporting means, said hinge braces at the rear edge of the door being spaced an appreciable distance from the side edges of the door and diverging away from each other as the free edge of the door is approached whereby said beams adjacent the front edge of the door lie immediately adjacent the corners of the door, a reinforcing marginal flange extending lengthwise of the door adjacent the free edge thereof and intersecting the respective hinge beams and secured thereto, each said hinge beam having enlarged gusset-shaped integral flanged portions extending in the direction of and into overlying relation with said front marginal beam and secured thereto.

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