Aug. 13, 1935. A. CAMPBELL 2,011,470

RAILWAY CAR DOOR CONSTRUCTION AND THE LIKE

Filed June 25, 1934 6 Sheets-Sheet 1

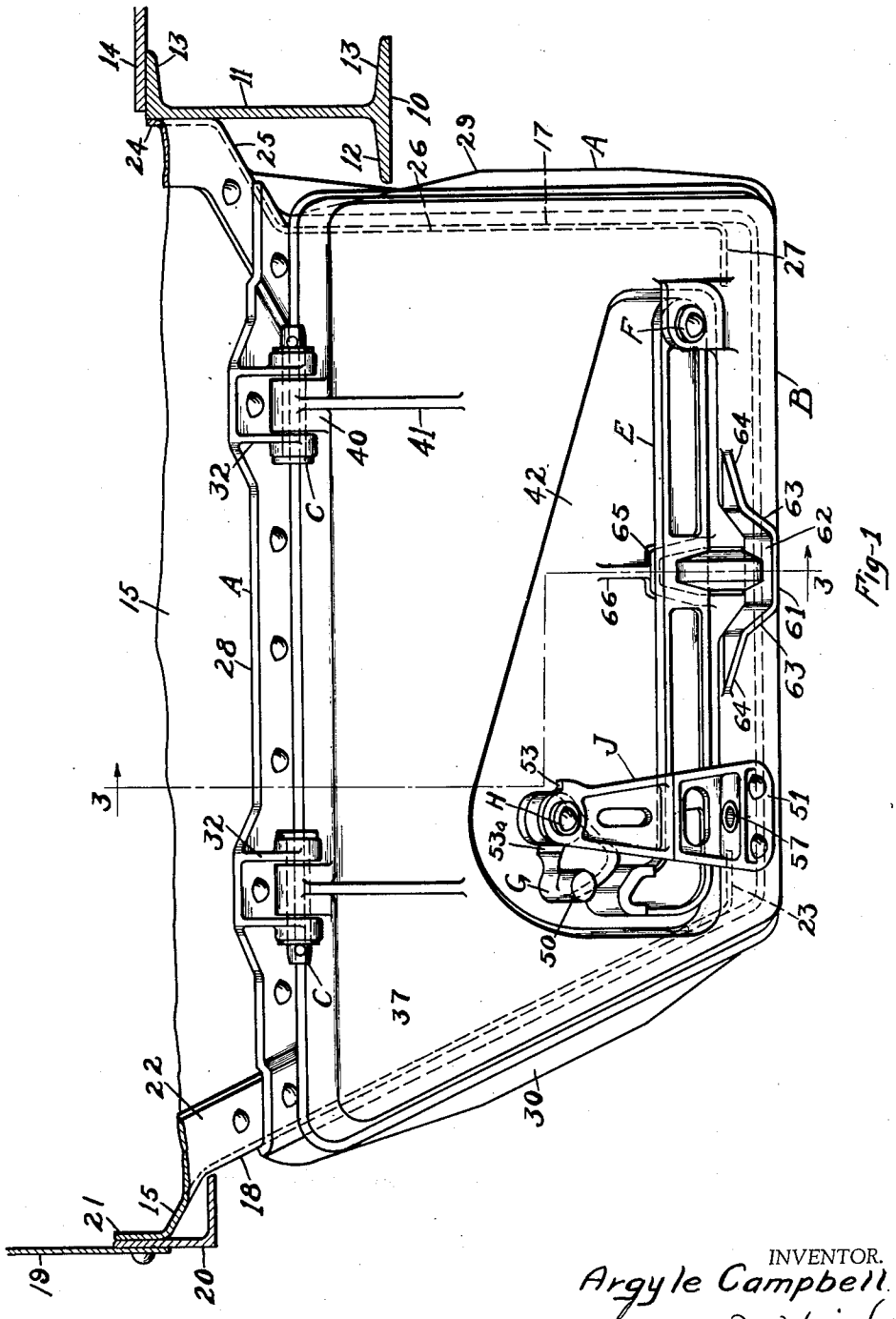


Fig-1

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RAILWAY CAR DOOR CONSTRUCTION AND THE LIKE

Filed June 25, 1934 6 Sheets-Sheet 2

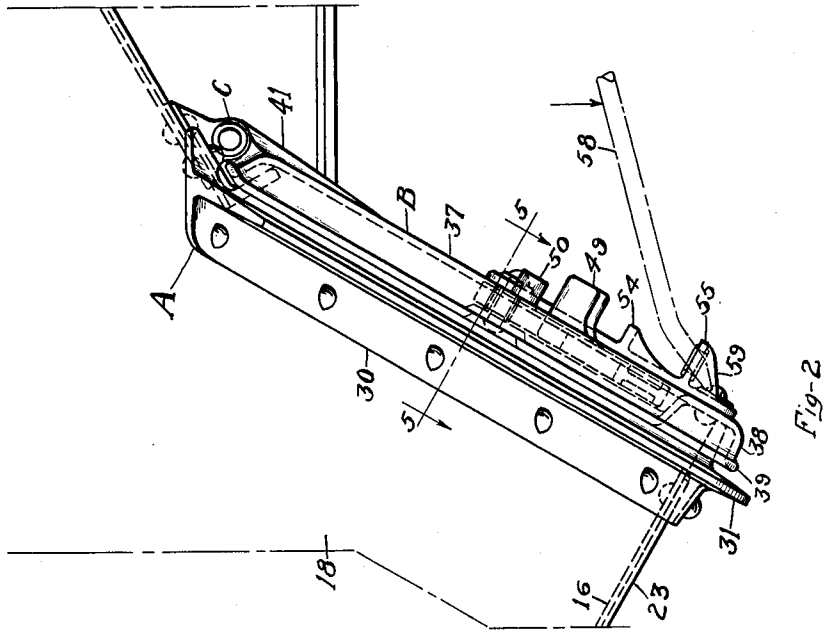


Fig-2

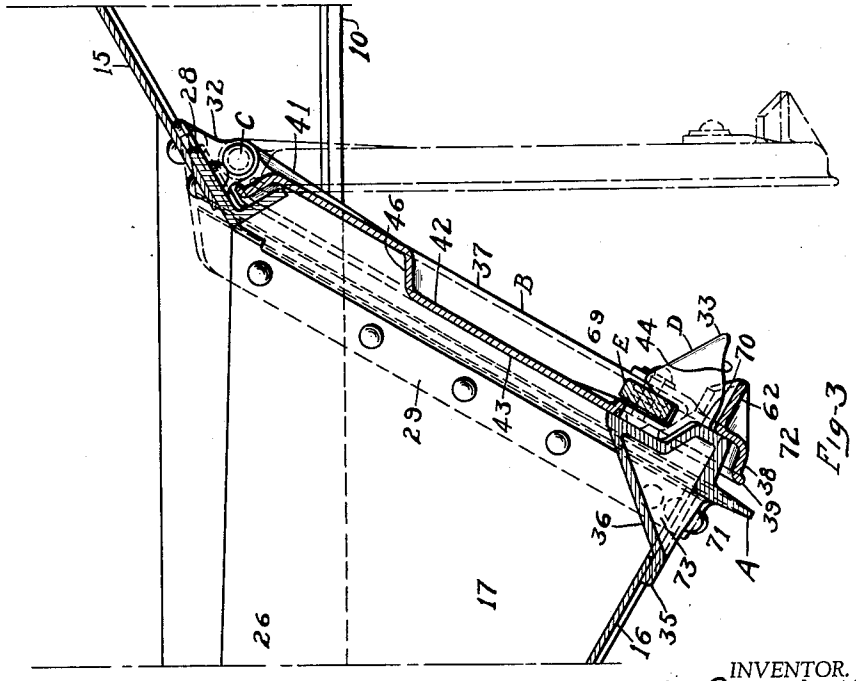


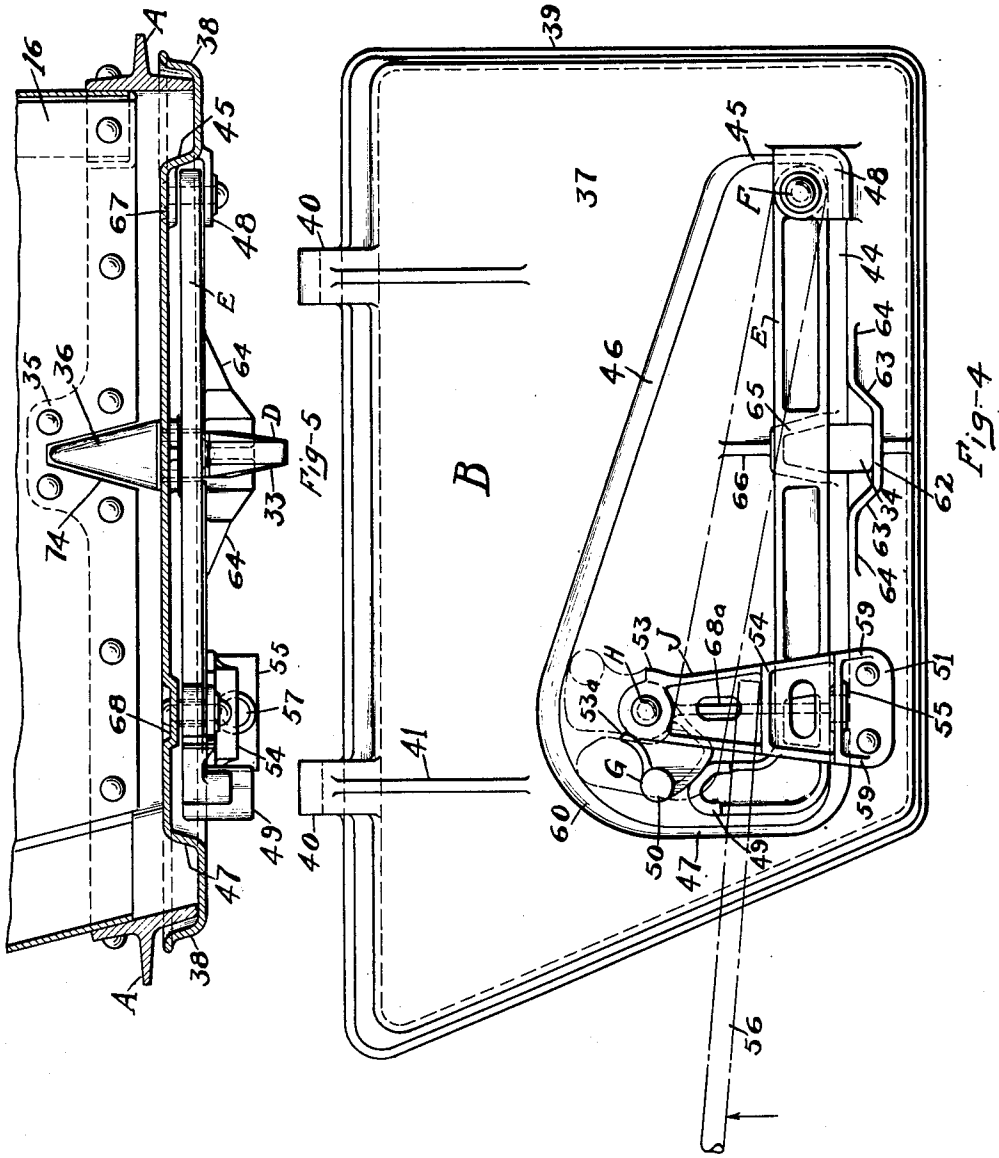
Fig-3

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RAILWAY CAR DOOR CONSTRUCTION AND THE LIKE

Filed June 25, 1934 6 Sheets-Sheet 3



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RAILWAY CAR DOOR CONSTRUCTION AND THE LIKE

Filed June 25, 1934 6 Sheets-Sheet 4

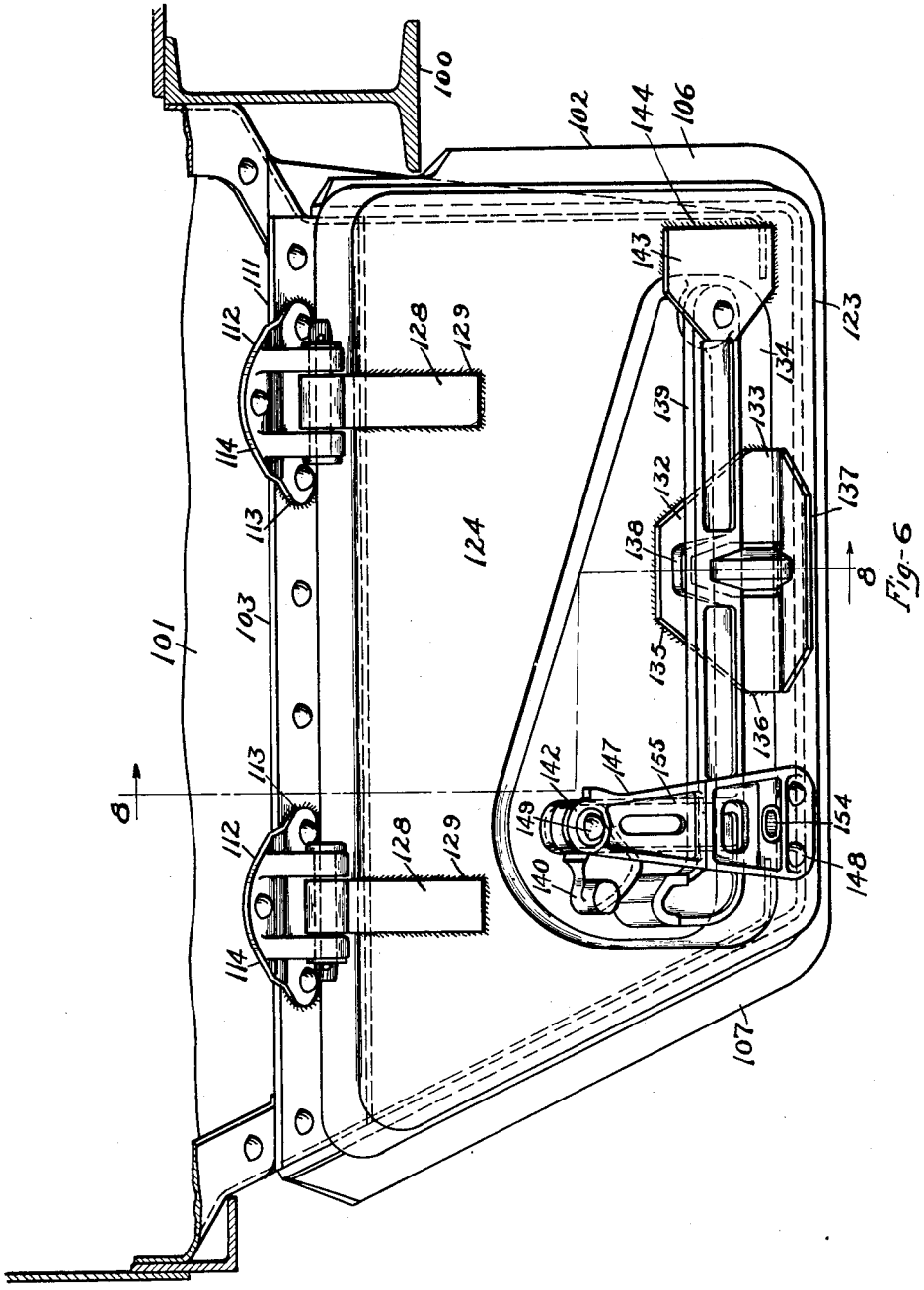


Fig-6

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RAILWAY CAR DOOR CONSTRUCTION AND THE LIKE

Filed June 25, 1934 6 Sheets-Sheet 5

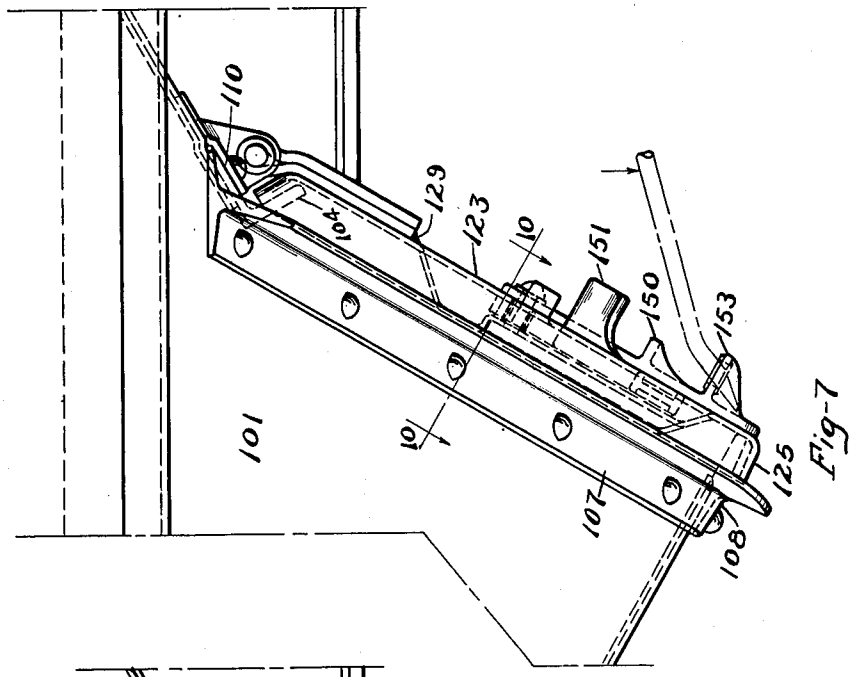


Fig-7

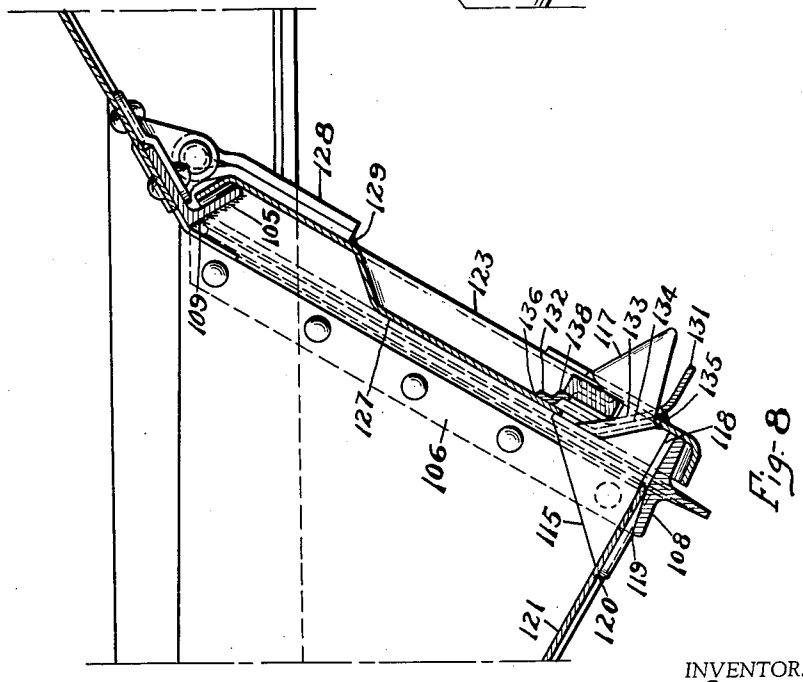


Fig-8

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RAILWAY CAR DOOR CONSTRUCTION AND THE LIKE

Filed June 25, 1934 6 Sheets-Sheet 6

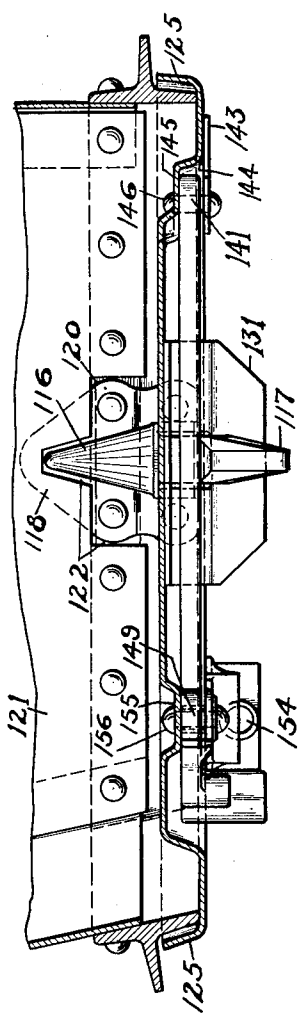


Fig-10

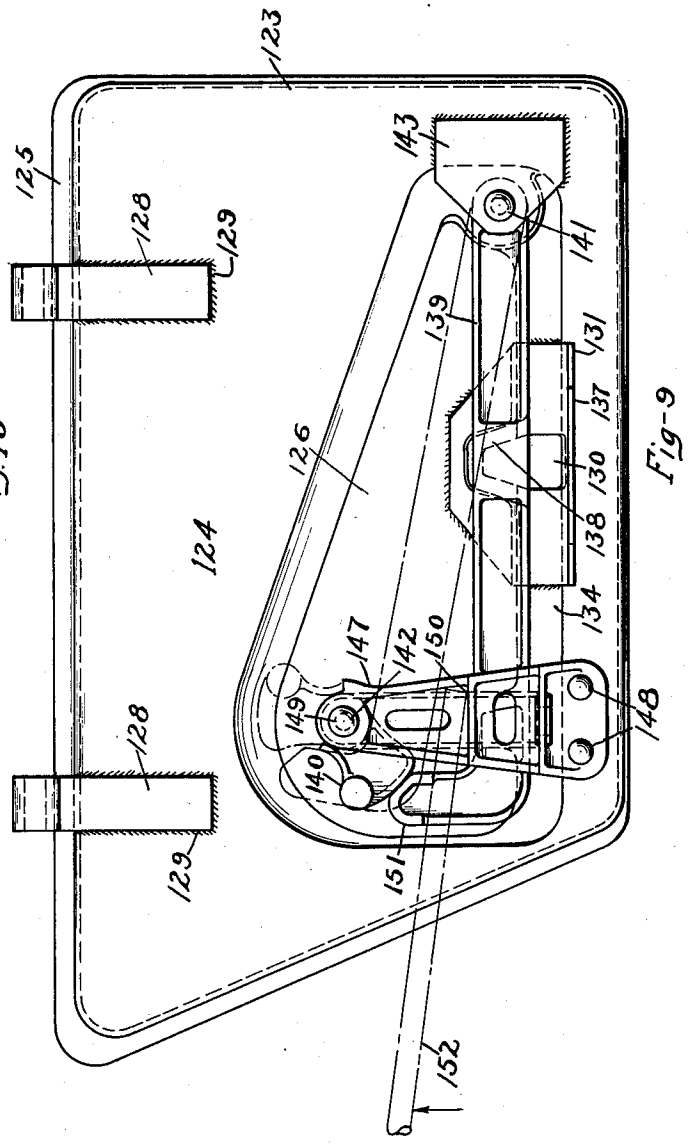


Fig-9

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Patented Aug. 13, 1935 2,011,470

UNITED STATES PATENT OFFICE

2,011,470

RAILWAY CAR DOOR CONSTRUCTION AND THE LIKE

Argyle Campbell, Chicago, Ill., assignor to Enterprise Railway Equipment Company, Chicago, Ill., a corporation of Illinois

Application June 25, 1934, Serial No. 732,233

6 Claims. (Cl. 105—308)

My invention relates to railway car door construction and the like, and more particularly to the door construction and related discharge door framing identified therewith.

One of the objects of the invention is to provide a discharge door having a rigidifying embossment adapted to reinforce the door in various directions and of such a formation as to permit the placement of door latching means within the said embossment.

Another object of the invention is to provide an improved discharge door suitably constructed to cooperate with door latching means in such a manner as to form a door with a rigidifying embossment acting to strengthen the door in various directions and at the same time accommodate door latching means.

Still another object of my invention is to provide an improved door which will cooperate with a door framing structure in such a manner as to enable the combining of the entire parts entering into the door supporting means and latching means in an assembled unit which may be applied to the car structure as a self contained unit.

A still further object of the invention is to provide a door having pivoted latching means and to so offset the body of the door in different planes that the latch will lie between the said respective planes.

My invention further resides in certain other details of construction as hereinafter will be apparent from the following description in conjunction with the accompanying drawings which illustrate embodiments of my invention.

Referring to these drawings,

Fig. 1 is a transverse vertical sectional view of the lower portion of a hopper car showing the car construction on one side of the centersill;

Fig. 2 is a longitudinal vertical side elevational view of that part of the car illustrated in Fig. 1, illustrating the hopper door in closed position in relation to the hopper door framing;

Fig. 3 is a longitudinal vertical sectional view taken substantially on a line 3—3 of Fig. 1, illustrating the hopper door in closed position in relation to the door frame;

Fig. 4 is a front elevational view of the door assembly as shown detached from the car structure;

Fig. 5 is a horizontal sectional view taken on the line 5—5 of Fig. 2;

Fig. 6 is a transverse vertical sectional view of the lower portion of a hopper car showing an alternate construction wherein welded joints are used to obtain integral construction;

Fig. 7 is a longitudinal vertical side elevational view of a portion of the car illustrated in Fig. 6;

Fig. 8 is a longitudinal vertical sectional view taken on a line 8—8 of Fig. 6;

Fig. 9 is a front elevational view of the door assembly as shown detached from the car structure; and

Fig. 10 is a horizontal sectional view taken on a line 10—10 of Fig. 7.

My invention is illustrated as being embodied in a hopper car of the W-type in which the hoppers extend below the centersills and are arranged with the hoppers on each side of the centersill in transversely aligned pairs and each hopper is provided with a discharge opening and individual doors for said respective openings. The doors of each pair are transversely aligned and in the present embodiment of my invention are operated independently of each other.

Since the hopper structures on both sides of the centersill are of similar construction, the drawings illustrate the details of the structure on one side of the centersills, and only sufficient of the car structure is shown to illustrate the relation of the parts. Referring first to the construction illustrated in Figs. 1 to 5 inclusive, the centersill structure is illustrated by one of the beam members 10 of the centersills and is of the type having a vertical web section 11 and lower outstanding marginal flange sections 12 and 13. The upper portion of each member includes an inturned flange 13, the beam members on the opposite side of the centersills being united by a main cover plate 14.

The hopper on each side of the centersills is defined by upper and lower longitudinal sloping walls 15 and 16 respectively, and by inner and outer side walls 17 and 18 respectively. The side walls are spaced transversely of the car from each other and united with the upper and lower sloping walls 15 and 16, all of which are arranged to provide a discharge opening disposed in a plane at an approximate right angle to the sloping floor sheet 16. The side wall of the car includes a vertical sheet 19 and the lower marginal reinforcing member 20. The outer hopper wall 18 has a flanged portion 21 riveted to the side wall of the car and is further formed with a flange portion 22 extending inwardly towards the centersill of the car to form a support for the upper sloping floor sheet 15. The wall 18 is further provided with an inwardly directed flange 23 extending beneath the lower sloping sheet 16.

The inner hopper sheet 17 at its upper edge is provided with a flange portion 24 which is ver-

tically disposed in a plane parallel to the centersill web 11 and riveted thereto. The main body portion of the hopper sheet 17 is deflected downwardly at an angle as indicated at 25 where it crosses the outwardly extended flange of the centersill and thence continues vertically downwardly, thereby presenting the main body portion of the hopper plate as indicated at 26, and joins with the sloping bottom sheet 16 by being flanged under the same as indicated at 27. Said downwardly extended wall 26 of the hopper wall portion 17, adjacent the hopper opening, is spaced from the lower marginal flange 12 of the centersill a sufficient distance to accommodate a hopper frame structure hereinafter more fully described.

The outer hopper sheet 18 extends downwardly and inwardly towards the centersill thereby cooperating to form a trapezoidal shaped opening providing for a discharge opening of greater length adjacent the upper portion of the door as compared with the lower portion of the door opening. The hopper discharge opening is defined by the marginal edges of the hopper plates 15, 16, 17, and 18 and is adapted to be closed by the door and frame assembly constituting the main feature of my invention.

The assembly of door and frame, as shown in Figs. 1 to 5 inclusive, is preferably formed of cast steel parts and consists of a door frame A, which extends completely around the door opening, and a discharge door B pivotally mounted on the door frame by hinge pins C. The frame A, adjacent the lower portion and centrally thereof, is formed with an integral keeper D adapted to cooperate with a latch bar E, the latter being pivotally mounted on the door by means of a pivot F. Adjacent its swinging end the bar is extended upwardly, and a pivoted locking dog G cooperates with said extension to lock the bar in place, said dog being mounted on the door structure at H. Overlying the latch bar E and the locking dog G is a guiding wall element J.

The reinforcing frame A includes an upper beam portion 28 which underlies the upper sloping wall 15 and a lower portion of stirrup-like formation extending around the sides and bottom of the hopper. The stirrup portion includes vertical leg members 29 and 30 and a lower horizontally disposed portion 31. The elements 29, 30 and 31 are preferably of T-shaped section, and the upper portion 28 is preferably of angle section and is formed with a pair of integral depending hinge lugs 32—32 for the purpose of accommodating the door pivotal mountings C.

The integral keeper D is formed with a hook shaped portion 33 which projects through an opening 34 (Fig. 4) in the door B and engages with the bar E for locking the door in closed position. The underlying portion of the lower beam 31 of the frame A adjacent the said keeper is enlarged as indicated at 35, and upstanding from said enlargement the keeper is formed with an integrally formed triangular shaped bracket portion 36 which is arranged to abut the door and rearwardly of its abutting face is formed to shed lading from the hopper and prevent material from pocketing around said keeper.

The door B, which may be formed of cast metal, is preferably of trapezoidal form to correspond to the shape of the discharge opening and is pan-shaped to enclose one edge of the frame A. The door comprises a body portion 37 presenting a substantially flat single surface adapted to contact with the four edges of the door frame. Extending upwardly from said body portion 37 the door is provided with the integral flange 38 which gives the door its pan shape. The flange is continuous around the edges of the door and is reinforced adjacent its upper edge with an integral beading 39. Formed integrally with the body portion 37 and the upper adjacent flange 38 of the door are hinges 40 adapted to cooperate with the hingebutt portion 32 of the frame A. Each hinge 40 is reinforced by means of a rib 41.

The body portion 37 of the door, commencing at a short distance beyond the swinging edge thereof, is formed with an upwardly extending box-like portion which constitutes an offset or embossment 42 raised above the main plane of the door 37 and lying in the plane of the frame. The embossment includes a raised panel surface 43 united with the remaining portions of the door by means of connecting walls 44, 45, 46, and 47, which are preferably formed on a slope to prevent lodging of material. The depth of the offset 42 is preferably made to correspond with the depth of the pan-shaped door, said depth being of sufficient extent to accommodate therein, between the plane of the respective walls representing the main body of the door 37 and the panel 43, the body portion of the latching bar E, also the body portion of the dog G.

The latch bar E adjacent its pivotal mounting is retained in position by means of an overlying wall 48 which is integrally united with the door body adjacent the lower horizontal offset wall 44 and the inner vertical offset wall 45. This wall 48 in combination with the panel wall 43 and the said offset walls 44 and 45, define a pocket, within which the pivotal end of the latch bar is received and guided. The overlying wall 48 is preferably disposed in substantially the same plane as the main body portion 37. The wall 48 in combination with the wall 43, forms carrying means for the pivotal mounting F of the latch bar.

Adjacent the swinging edge of the latch bar E there is provided laterally projecting portions 49 and 50, respectively disposed on the latch E and the dog G; said lateral projections extend outwardly beyond the indented portion of the door, thereby forming convenient means for operation of said latch members. The guide member J which overlies the latch and dog, is provided with a plate portion 51 which lies against the main body of the door and is riveted thereto adjacent the lower margin of the door by means of rivets. The member J is also secured to the door by means of the rivet of the pivot H. The inner surface of said member J constitutes guiding means for the latch bar and the latch dog. On one side of said member there is provided a lug 53 adapted to engage with a corresponding lug 53a on the dog G for the purpose of limiting the swing of the latter in an unlocking direction. On the outer side of the member J there are provided lateral projections 54 and 55, the former constituting a ledge on which a removable bar, indicated in conventional dotted lines at 56, is adapted to bear for cooperation with the lateral lug 49 of the latch bar. The projecting ledge 55, which is preferably disposed adjacent the lower margin of the door, is provided with an opening 57 whereby a pinch bar or other suitable tool, indicated in conventional dotted lines 58 (Fig. 2), may be inserted therein. By bearing down on the outer end of the bar, the operator may conveniently close the door. The ledge 55 is braced relatively to the adjacent door portions by a pair of braces 59.

The embossment 42 is of such a shape as to accommodate the latch E and dog G in any of their positions of swing, and for this purpose said embossment, adjacent the swinging end of the latch, is formed of an arcuate portion 60 and is of greater width than the opposite end where the embossment is formed of only sufficient width to accommodate the latch bar E, it being noted that the width of the embossment is approximately twice that of the bar, thus permitting of the easy removal or insertion of said latch member in the pocket provided in the corner of the offset by wall 48.

In a door arrangement of the type illustrated in the embodiment shown herein, the lower connecting wall 44 extends contiguously with the swinging edge of the door, and the walls 45 and 47 extend in a direction substantially at right angles to the swinging edge of the door and merge into the upper wall 46, the latter being united to wall 47 by the arcuate portion 60 and converging downwardly from said arcuate portion towards the pivoted end of the latch. The wall 46 extends diagonally across the trapezoidal shaped door between the corners of the door having the greatest span therebetween. The connecting walls 44 and 46 are inclined in the direction of flow of the load and are preferably disposed at a greater inclination to the main body of the door than the side connecting walls 45 and 47, and thus the tendency for the pocketing of material is minimized. It will be noted that the walls 44 and 46 of the embossment provide reinforcement between the side edges of the door.

Continuity of reinforcement of the wall 44 is interrupted adjacent the free edge of the door by the opening 34, and in order to compensate for such break in continuity there is provided on the outer side of the door an outstanding flange 61 which extends for an appreciable distance on each side of the opening and is of such shape as to extend beneath the hook as indicated at 62 and upwardly at each side thereof as indicated at 63—63 and thereafter contiguously to the swinging edge of the door by portions 64 lying substantially in the plane of the portion 44 of the embossment. Around the upper portion of the opening 34 there is provided a beading 65 which forms a runway or guide for the latch bar during its movement, said beading merging into an integral rib 66 at the center portion of the door.

At each of the pivots F and H there are provided depressed portions in the raised panel plate of the embossment, as indicated at 67 and 68 respectively, for the accommodation of rivet heads within the plane of the raised panel plate portion 43. The bearing surface of depressed portion 68 merges in a rib 68a which constitutes a runway on which the latch bar E is adapted to bear throughout its entire range of movement.

The keeper D is provided with a bearing face adapted to conform to the shape of the door, said bearing face including surfaces 60 and 70 adapted to respectively contact with faces 43 and 37 of the door, and said respective faces 69 and 70 are united with a sloping portion 71 adapted to lie in a plane substantially parallel with the sloping face 44 of the door embossment but spaced therefrom a short distance, as indicated at 72, thereby allowing for any variations in the positioning of the door in relation to the frame. The integral portion 35 of the frame is preferably hollowed out, as indicated at 73, for the purpose of saving weight and the lower sloping bottom floor plate 16 is coped out as indicated at 74 in order to straddle the said triangular extension 36.

Referring now to the construction shown in Figs. 6 to 10, inclusive, wherein the parts entering into the construction of the frame and door are formed of forged or metal parts pressed to shape and welds employed to obtain unitary structures. In said drawings the centersill construction is indicated at 100, the hopper construction at 101, and the frame structure which consists of a lower stirrup-shaped portion 102 and an upper angle-shaped member 103, said lower and upper members are welded together as indicated at 104 and 105 respectively. The stirrup portion is preferably formed of a commercial T-shaped section and includes inner and outer substantially vertically disposed portions 106 and 107 respectively, and a lower horizontal portion 108. At the inner end of the frame the upper part of the T-shaped portion 106 is sheared off as indicated at 109, to correspond to the inclination of the top member 103, and the weld 105 is made between the two parts. The outer leg 107 of the frame is coped out as indicated at 110 to conform to the shape of the angle 103, and the weld 104 is effected along both flanges of said angle 103, the united parts thus forming an integral frame extending around the four sides of the discharge opening. Welded to the underlying flange 111 of the top frame member are a pair of hingebutts 112, said hingebutts being preferably formed of drop forgings and welded to the said flange 111, as indicated at 113. A portion of each forging 112 extends beyond the angle frame section, as indicated at 114, for the purpose of increasing the bearing area of the frame and providing greater stability for the parts.

At the lower portion of the frame and centrally thereof there is provided a keeper 115 which includes a triangular shaped portion 116 and a projecting hook shaped portion 117. The keeper member also includes a flange portion 118 which is welded to the upper face of the horizontal beam portion 108 of the frame structure. Adjacent the rear portion of the T-frame the center portion thereof is depressed, as indicated at 119, in order to permit the keeper member to extend beneath the hopper floor, as indicated at 120, it being understood that the hopper floor sheet 121 is coped out, as indicated at 122 (Fig. 10), for the purpose of straddling the said triangular shaped portion 116. The arrangement of the lower stirrup-shaped section, in combination with the upper angle-shaped member and the hingebutts and keeper means all welded in a one-piece unit, provides an integral rigid construction interchangeable with the cast steel member described in connection with the embodiment shown in Figs. 1 to 5 inclusive.

The door 123 includes a flat body portion 124 flanged upwardly on four sides, as indicated at 125, to provide a pan-shaped door which, when in closed position, encloses the four sides of the frame. Extending upwardly above the body portion of the door is a box-like pan-shaped embossment 126 which is formed with a flat panel portion 127 of generally triangular shape connected to the main body portion of the door by sloping offsets.

The door is pivotally supported on the hingebutts by means of forged hinged pieces 128 which are welded to the door as indicated at 129. The door is perforated, as indicated at 130, to accom-

modate the projecting hook-shaped portion 117 of the keeper. To maintain continuity of reinforcement there is provided on the outer side of the door a reinforcing member 131, consisting of a plate member having portions 132 and 133 overlying the panel portion 127 and the adjacent connecting wall section 134 and welded to the said respective wall sections, as indicated at 135 and 136. Extending outwardly from the door, the said member 131 has a rigidifying flange 137 extending lengthwise of the embossment for an appreciable distance on each side of the perforation 130. The reinforcing member is slightly raised, as indicated at 138, around the margins of the perforation 130 to provide bearing area and strength. Mounted within the said embossment is a latch bar 139 and a latch dog 140, said latch bar being pivotally mounted adjacent one corner of the embossment as indicated at 141. The latch dog is pivotally mounted, as indicated at 142, and is adapted to have cooperating engagement with the swinging end of the latch. At the pivotal end of the latch bar, there is disposed a plate 143 which overlies the latch bar and is welded at 144 to the body section of the door plate, said plate being in effect substantially a continuation of the outer plane of the main body of the door. The pivot 141 for the latch 139 is a rivet which extends through the plate 143 and through the panel portion 127, the latter being indented as shown at 145 to provide space in which the head 146 of the rivet is contained.

Adjacent the swinging edge of the latch, there is disposed a plate-like member 147 which overlies the latch bar 139 and the dog 140, said member 147 being riveted to the main body portion of the door, as indicated at 148, and adjacent its upper portion forming a support for one end of a rivet 149 constituting the pivotal mounting for the dog 140. The member 147 has a lateral projection 150 for cooperation with a projecting portion 151 of the latch in combination with a removable bar, as indicated conventionally at 152, for lifting the latch. The member 147 is also provided with an outstanding lug portion 153 formed with a perforation 154 adapted to receive a removable bar (Fig. 7) for forcing the door to a closed position.

Rearwardly of the latch bar and dog, the panel 127 is formed with a depressed portion 155 which forms a guiding wall for the latch and dog, and serves to space said members from the main body of the panel, said indent also forming a recess for the reception of the head 156 of the rivet 149.

The attainment in a completely assembled structure of a door framing having means for attachment to the car structure, framing for the four edges of the door opening, hingebutts for the door, and integral keeper means, in combination with a door hinged to the framing and having self-contained latching means for cooperating engagement with the keeper on the frame, is a great advantage in the construction of railway cars, inasmuch as the door framing and door parts can be completely assembled and fitted together prior to application to the car.

The improved door construction including an embossment of triangular shape with one connecting wall of the embossment extending contiguous with the swinging edge of the door and having another wall extending in substantially a diagonal direction, provides for reinforcement of the door along the lines of maximum bending tendency and provides for strengthening of the door adjacent the door mechanism.

While I have shown the triangular-shaped embossment in combination with the door latching means contained therein, it will be appreciated that such an embossment may be used in other types of doors and mechanisms as the triangular-shaped embossment is such as to strengthen the door diagonally across the span of greatest extent and also lengthwise of the door adjacent the free edge thereof where the door is subjected to severe service.

I claim:

1. In a railway car door having a plate-like body portion and an embossment raised above said body portion; a pivoted door retaining latch lying in said embossment and of substantially the depth thereof; a pivoted latching dog also lying in said embossment and cooperating with the latch for retaining the latter in position; and a guide member overlying the latch and dog, said guide member lying against the plate-like body portion of the door and secured thereto, said latch and dog being provided with lateral projections extending beyond the guide member.

2. In a railway car door having a plate-like body portion, a pan-shaped embossment raised above the body portion, a door retaining latch in the said embossment and of substantially the depth thereof with its outer surface substantially in the plane of the body portion, said latch being pivotally mounted adjacent one end of the embossment and having its swinging end disposed adjacent the opposite end of the embossment; and a guide member overlying the latch adjacent its swinging end, said guide member overlying and being secured to the plate-like body portion of the door with its inner surface substantially in the plane of the body portion of the door.

3. In a railway car door having a main body portion, and an embossment raised above said body portion; a pivoted door retaining latch lying in and of substantially the depth of said embossment; a pivoted latching dog also lying in said embossment and cooperating with the latch for retaining the latter in position; and a guide member overlying the latch and dog, said guide member lying against and secured to the main body portion of the door and having its inner surface substantially in the plane of said body portion.

4. In a railway car, a door having a plate-like body portion and an embossment raised above said body portion; a door retaining latch lying in said embossment, said latch being pivoted to swing in a plane substantially parallel with the plane of the door and having a body portion of elongated form and of a depth corresponding substantially to the depth of the embossment; guiding means overlying the latch adjacent its swinging edge, said means including a plate-like member overlying the body portion of the door and secured thereto, said guide member having an outstanding lateral projection; and a lateral projection on the latch extending in the plane of the first named lateral projection whereby a removable bar may be inserted between the respective projections for operating the latch.

5. In a railway car door having a body portion extending adjacent the margins of the door and presenting a flat surface lying in substantially a single plane; an embossment raised above the plane of the body portion, said embossment including a panel portion united with the main body portion of the door by connecting wall portions, one of said connecting wall portions ex-

tending contiguously with the swinging edge of the door; an opening centrally disposed of the door above the free edge thereof, said opening presenting a break in the continuity of the connecting sloping wall; and a reinforcing flange on the outer side of the door adapted to compensate for said opening, said flange having portions thereof on each side of the opening lying substantially in the plane of the said connecting wall portion.

6. In a railway car door, the combination of a flat body plate portion extending around the margins of the door and presenting a surface lying in a substantially single plane, said door having a raised embossment disposed inwardly of said flat margins; and door latching means mounted on the exterior of the door and lying in the said embossment, said latching means including a latch bar pivotally mounted adjacent one end of the embossment and having its outer surface substantially in the plane of said body plate surface, said latch bar having a projecting portion extending outwardly beyond said body plate surface for engagement by means of a removable bar.

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