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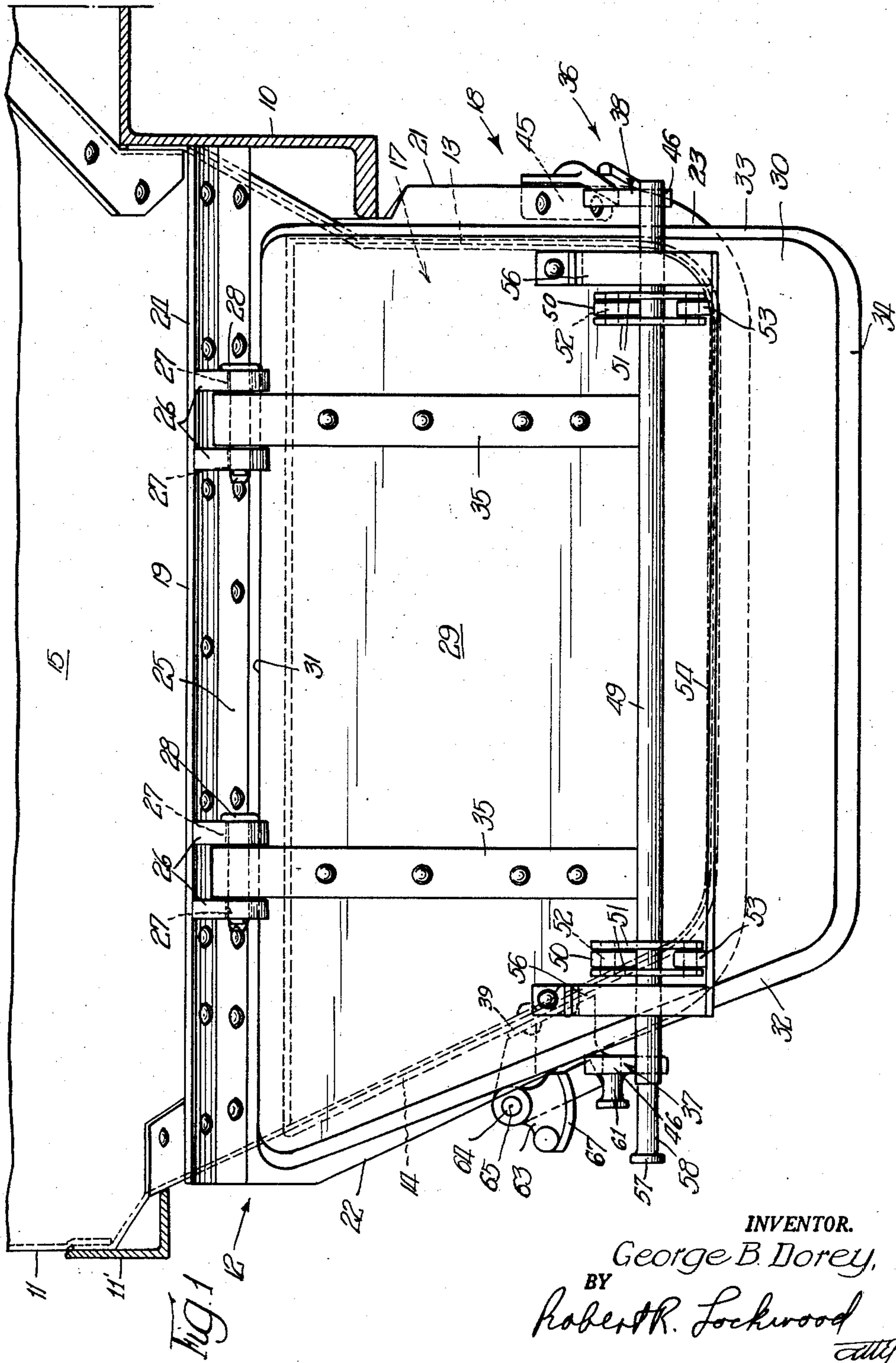
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LATCHING DEVICE FOR RAILWAY HOPPER CAR DOORS

Filed April 22, 1959

4 Sheets-Sheet 1



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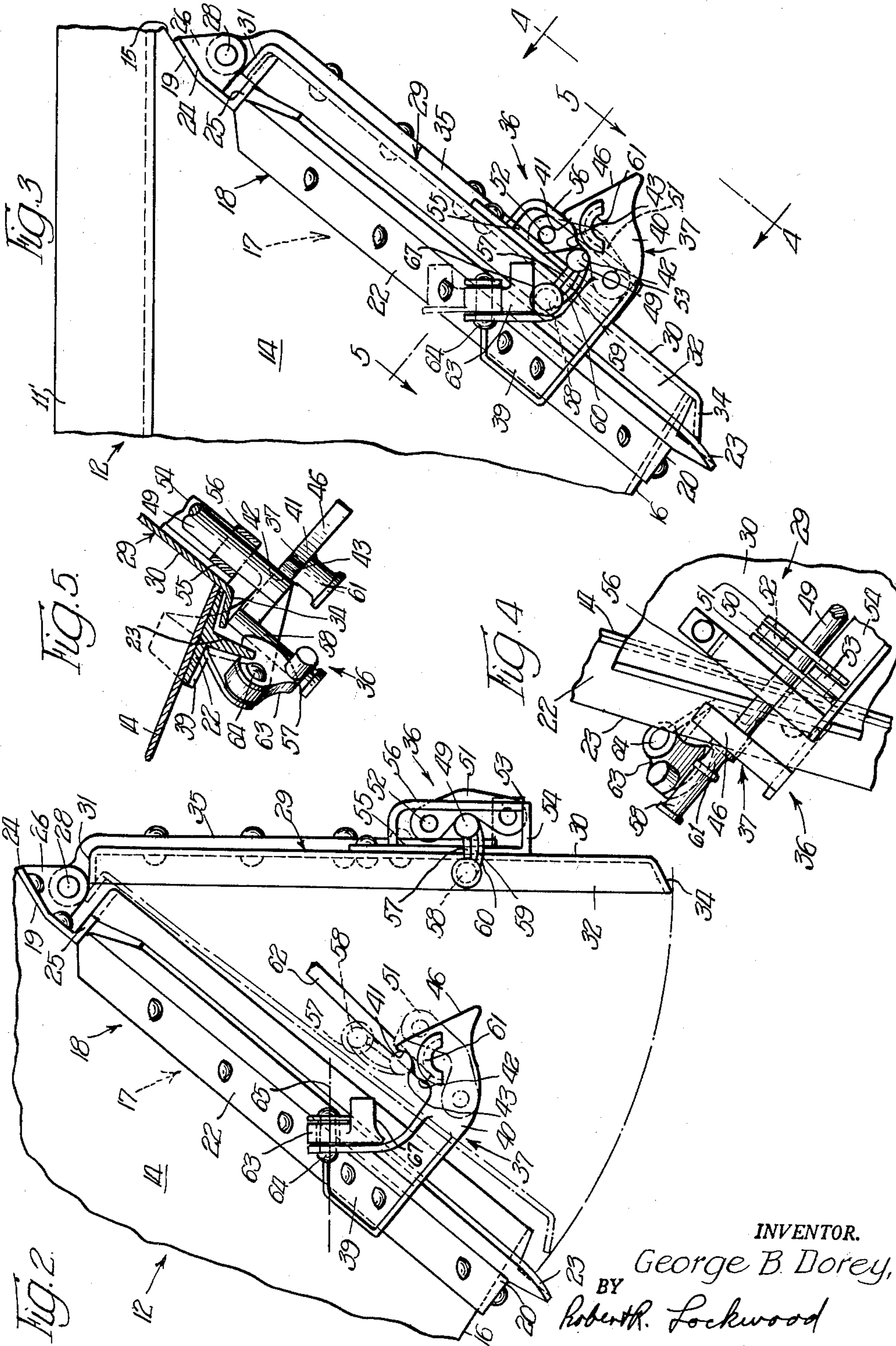
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4 Sheets-Sheet 2



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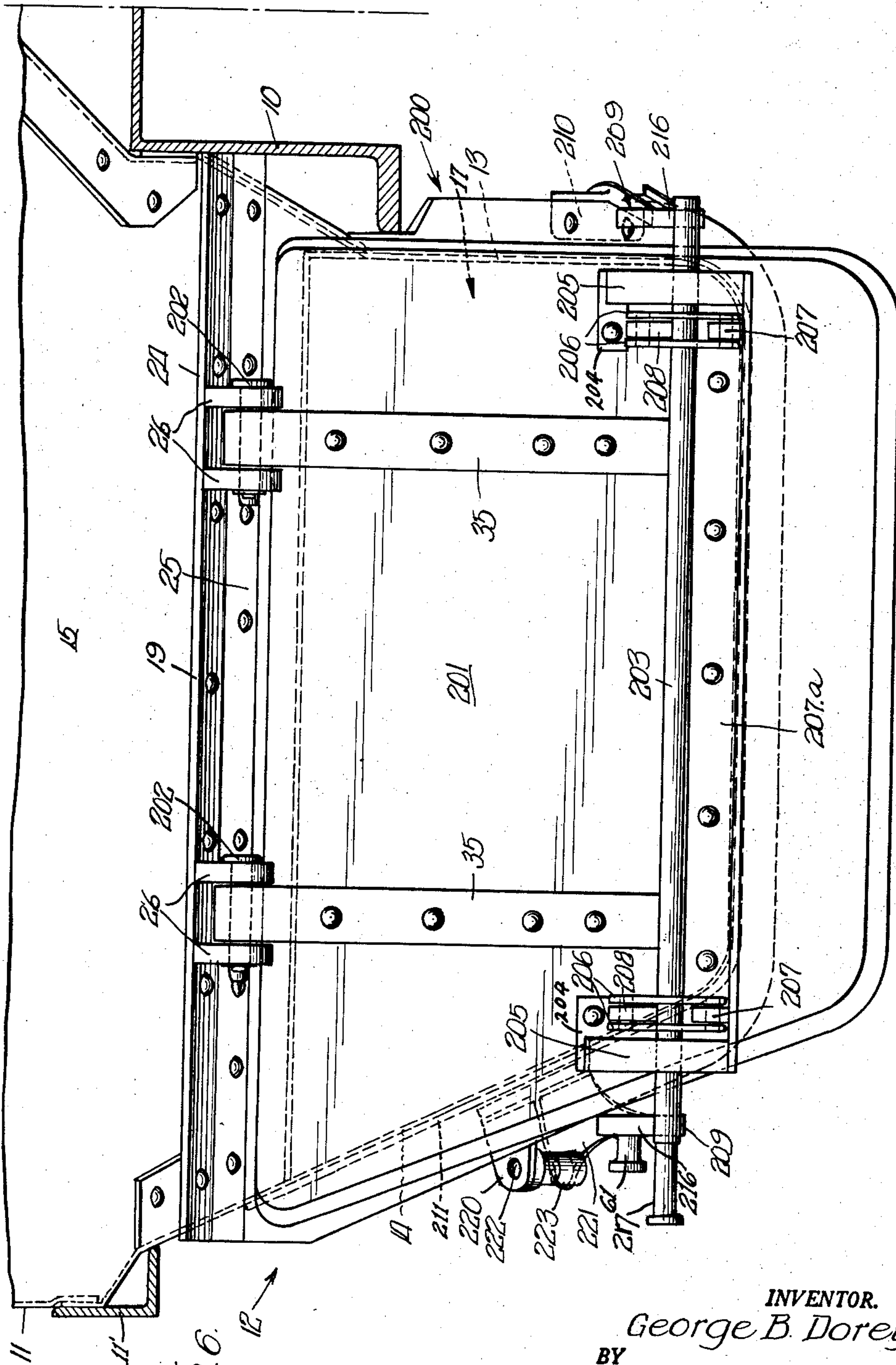


Fig. 6.

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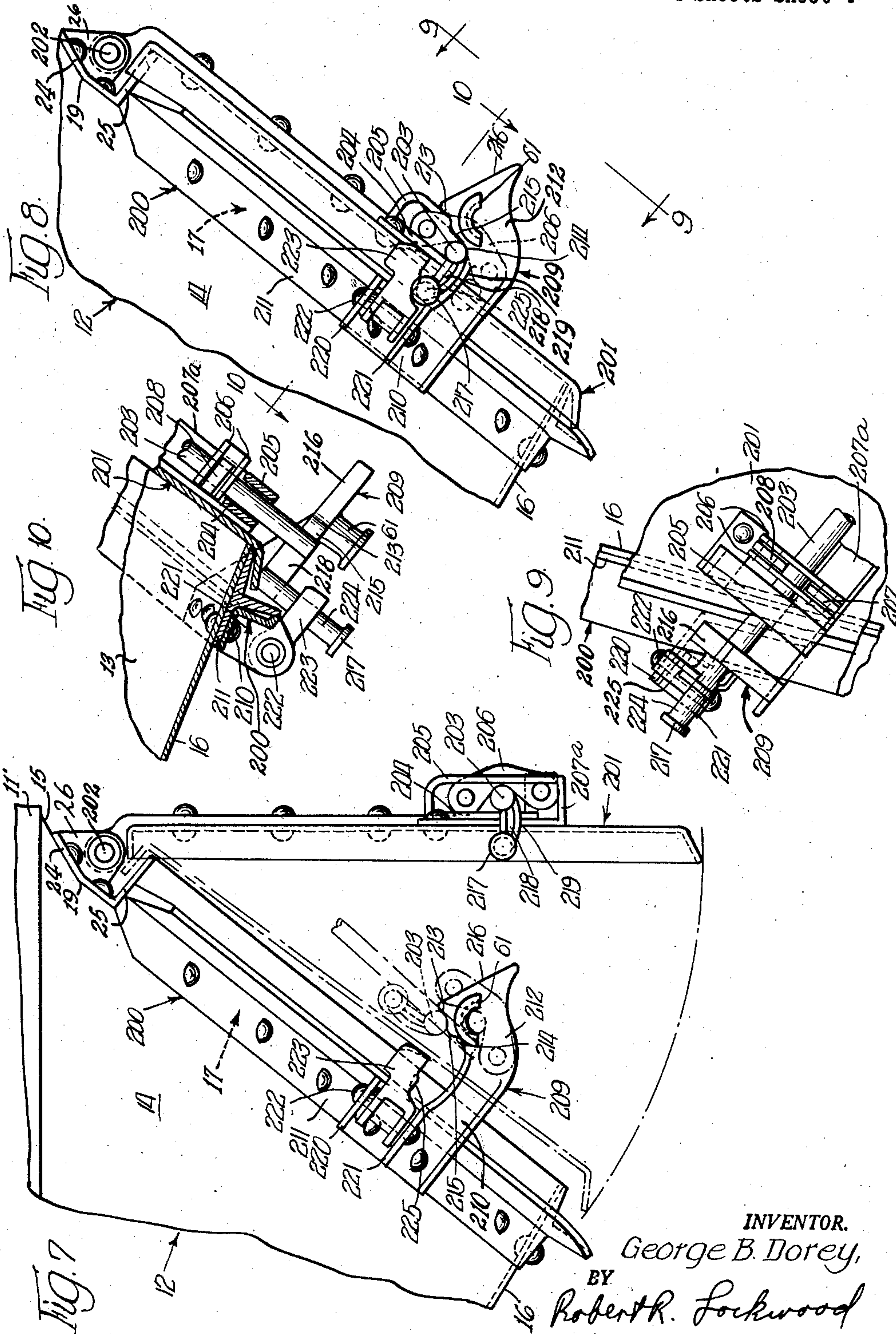
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4 Sheets-Sheet 4



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## LATCHING DEVICE FOR RAILWAY HOPPER CAR DOORS

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2 Claims. (Cl. 105-253)

The invention relates to an improved latching device for railway hopper car doors and the like and relates more particularly to that type of door which is swingingly mounted to gravitate to a substantially vertical open position and swingable therefrom to an inclined closed position.

It is an object of the invention, among others, to provide means for arresting the swinging movement of a pendulously mounted door and holding it in a partially closed position irrespective of the position of the usual supplementary latching dog. Swinging doors of the type referred to are generally retained in closed position in relation to the hopper structure on which the door is pivotally mounted by latching mechanism including a movable latch carried by one of the parts and a keeper carried by the other part with a supplementary latching dog carried by the part having the movable latch thereon for securing the latch against displacement. This arrangement of double latching employing a dog mounted on the same part which carries the latch presents disadvantages in that the dog is frequently left in locking position on the latch with the door open and the latch then functions as a rigid member with the result that damage results to the door and its associated parts as the door swings violently under train movements and when the car is being shunted. This condition is one of particular concern in connection with so-called transversely mounted doors which swing on axes disposed transversely to the longitudinal center of the car inasmuch as such doors swing to and fro under running conditions. The damage to cars from this source has increased due to the rapid handling of freight trains and as switching of cars in hump yards has become more general.

The present invention has for one of its objects a development predicated on separating the movable latch from its associated dog with provision for automatically catching and retained the door in a preliminary state of closure as it swings before it impacts on the car structure and irrespective of the position of the latching dog. Another object of the invention is to provide a dog swingable on an axis normal to the direction of movement of the latch.

For further comprehension of the invention reference may be had to the accompanying drawings wherein the improvement is shown as applied to a conventional type of hopper car having doors hinged on axes extending transversely to the direction of movement of the car.

In said drawings, FIGURE 1 is a vertical transverse sectional view taken through the lower portion of a railway hopper car and showing approximately one half the width of the car, the door being shown in the open pendulous position.

FIGURE 2 is a vertical side elevational view of the door structure shown in FIGURE 1 with the position of the door shown when in open position and showing by conventional dot and dash lines the position of the latch parts and door when the door is automatically retained in partly closed position upon excessive swinging movement of the door.

FIGURE 3 is a view, similar to FIGURE 2, except that the door is shown in fully closed and latched position.

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FIGURE 4 is a fractional frontal view of the outer end of the latch as viewed on a line 4-4 of FIGURE 3.

FIGURE 5 is a sectional fractional plan view of the outer end of the latching mechanism as viewed on a line 5-5 of FIGURE 3.

FIGURE 6 is a vertical transverse sectional view of the lower part of a hopper showing substantially one half the width of the car and embodying a modified form of locking dog, said view showing the door in open position.

FIGURE 7 is a side elevational view of the door structure of FIGURE 6 showing in conventional dot and dash lines the position of the parts when the door is automatically retained in partly closed position.

FIGURE 8 is a view similar to FIGURE 7 except that the door is shown when in closed position.

FIGURE 9 is a fractional frontal view of the outer end of the latching mechanism as viewed on a line 9-9 of FIGURE 8.

FIGURE 10 is a fractional sectional plan view of the outer end of the latching mechanism as viewed on a line 10-10 of FIGURE 8.

Referring first to the construction shown in FIGURES 1-5 inclusive, the car structure is indicated by a center sill 10 and a side wall 11 above a side sill 11' and interposed between said sill and side wall is a hopper 12 which is formed in part by inner and outer side walls 13 and 14 in combination with oppositely sloping floors 15 and 16. The marginal edges of the floors 15 and 16 and side walls 13 and 14 are spaced from each other to form a discharge area 17 which is surrounded by a frame 18 which includes an upper beam portion 19 underlying the upper sloping floor 15 and a stirrup-like lower section extending around the hopper including a lower beam section 20 underlying the lower sloping floor 16 and inner and outer leg portions 21 and 22 having walls overlying respectively the hopper inner wall 13 and outer hopper wall 14. The stirrup portion is of generally T shape in cross-section with the stem 23 of the member laterally outstanding.

The upper beam member 19 is of angle shape with one flange 24 underlying the floor 15 and the adjacent flange 25 projecting forwardly to meet with the body of the leg portions 21 and 22 and form therewith a chutelike extension projecting beyond the marginal edges of the floors 15 and 16 and side walls 13 and 14. Pairs of hinge butts 26-26, which are carried by the beam member 19, are apertured at 27 for the accommodation of hinge pintles 28 which pivotally support a swinging door 29. The door 29 is preferably formed of a flat plate 30 with upwardly flanged edges as at 31, 32, 33 and 34 to form a pan-shaped member which, when the door 29 is in closed position, encloses the chutelike extension of the frame 18. The door 29 is reinforced by hinge straps 35 which are suitably secured to the body of the door 29 by rivets and at their upper ends are formed with an enlarged portion for receiving the respective hinge pintle 28.

The door 29 is retained in partially closed position as well as in the fully closed position by latch mechanism generally indicated at 36 in cooperation with shouldered keepers 37 and 38. The keeper 37, which is located adjacent the outer side wall 14 of the hopper 12, includes a wall portion 39 overlying the wall of the leg portion 22 of the frame 18 and extends around the stem 23 of the T to present a forwardly projecting body section 40 having stepped shoulders 41 and 42 joined by an inclined runway portion 43, said shoulder 41 being in advance of shoulder 42.

The keeper 38 is disposed adjacent the inner wall 13 of the hopper 12 and includes a wall 45 resting on the stem 23 of leg portion 21 and in like manner to keeper 37 includes a body portion having stepped shoulders con-



ected by an intervening inclined runway. The forwardly projecting portions of the keepers 37 and 38 are formed with a beveled portion 46 which constitutes an inclined approach to the stepped shoulders 41 and 42 and operates as a striker to displace a shaft 49 from its biased lowermost position.

The latch mechanism 36 preferably includes the bodily movable latch shaft 49 extending in parallelism with the axis about which the door 29 swings and is movable by rotation through the medium of arms 50 fixedly mounted on the shaft 49 and linkage 51 pivoted at one end to the arms 50 at 52 and pivoted at the opposite end to lugs 53. The lugs 53 are fixedly carried by an angle beam member 54 which preferably extends from side to side of the door 29 and is provided at each end with a bearing plate 55 against which the latch shaft 49 bears when the door 29 is in closed position. Straps 56 overlie the latch shaft 49 and in combination with bearing plates 55 form guides between which the movable latch shaft 49 is guided throughout its bodily movement.

The latch shaft 49 adjacent the outer side wall 14 of the hopper 12 is provided with a cranklike portion 57 including a bar 58 spaced from the axis of rotation of the latch shaft 49 and connected with the latter by means of a deflector 59 having an arcuate surface 60 adapted to ride on inclined striker surface 46 of the keeper 37. The latch shaft 49 is biased to latching position and the purpose of arcuate surface 60 is to displace the latch shaft 49 from its lowermost position as the door 29 is moved to closed position. Upon closing movement of the door 29, the latch shaft 49 is first moved along the inclined runway 46 and into engagement with the primary holding steps 41 on the keepers 37 and 38.

A fulcrum 61, which extends laterally from the outer face of the keeper 37, forms a convenient rest for a bar 62, FIGURE 2, for levering against the crank portion 57 and forcing the latch shaft 49 from preliminary holding position shown in FIGURE 2 to the final closed position shown in FIGURE 3. The latch shaft 49 is held in its final closed position by means of a locking dog 63 pivoted on a trunnion 64 formed on the keeper 37. The locking dog 63 swings on an axis 65 and is formed with an arcuate surface 67 which sweeps along the cranklike portion 57 of the latch shaft 49 and in wedging relation therewith.

It will be noted that the latch shaft 49 is movable to engage the primary shoulders 41 on the keepers 37 and 38 and hold the door 29 in preliminary closed position irrespective of the position of the locking dog 63, as well shown in FIGURE 3, consequently there is no possibility of the door 29 being damaged because, upon excessive swinging movement of the door 29, the arcuate surface 60 rides on the inclined striker surface 46 of the keeper 37. The latch shaft 49 then engages the shoulders 41 on the keepers 37 and 38 and the door 29 is automatically retained against reverse swinging movement before any damage to the parts takes place. This is clear by reference to FIGURE 2.

Referring now to the construction shown in FIGURES 6 to 10 inclusive, it will be observed that the car and hopper construction is the same as described above. The structure is shown as including a frame 200 having a T-shaped cross section and a door 201 pivotally mounted thereon on pintles 202. Latching mechanism carried by the door 201 includes a latch shaft 203 bodily movable between guiding walls 204 and 205 through linkage 206 which is pivoted at one end on lugs 207 welded to an angle member 207a and at its opposite end to arms 208 fixedly mounted on the latch shaft 203. The latch shaft 203 projects beyond the sides of the door 201 and cooperating with said projecting portions are shouldered keepers 209 each having a flange 210 secured to the respective hopper wall and to the overlying base flange 211 of the frame 200. Each keeper 209 is formed with a shank portion 212 having stepped shoulders 213 and 214 which are connected by an intervening inclined runway 215. Lead-

ing to the shoulder 213 is an inclined runway or striker surface 216 which acts as a striker to displace the latch shaft 203.

The outer end of the latch shaft 203 is provided with a cranklike portion 217 which is connected with the main body of the latch shaft 203 by a deflector 218 having an arcuate surface 219 for engagement with the inclined runway or striker surface 216 for displacing the latch shaft 203 from its lowermost position, it being understood that the latch shaft 203 by reason of its weight is normally biased to its lowermost position which, when the door 201 is closed, is the latching position.

The outer keeper 209 is reinforced along the flange 210 by spaced walls 220 and 221 lying in a plane substantially normal to the main plane of the door 201 when in closed position. These said walls 220 and 221 carry a pintle 222 which forms a pivot for a locking dog 223 which is sandwiched between the said walls 220 and 221. The locking dog 223 is adapted to swing about its pivot 222 to overlie the crank portion 217 of the latch shaft 203 and prevent accidental displacement of the latter. The pintle 222 disposed to provide for swinging movement of the locking dog 223 on an axis lying substantially normal to the plane of movement of the latch shaft 203 and is adapted to be retained in position by wedging contact between the upper surface 224 of the crank portion 217 on the latch shaft 203 and the under surface 225 of the dog 223.

It will be noted by reference to FIGURE 7 that the door 201 will be held by the keepers 209 should excessive swinging movement of the door 201 take place to the extent of causing the latter to impact against the edge of the framing irrespective of the position of the locking dog 223. This is due to the fact that the locking dog 223 will be swung out of locking position by engagement of the under surface 225 by the cranklike portion 217 as the door 201 is swung to closed position and thus is automatically moved out of the way.

What is claimed as new is:

1. In combination, a hopper having a discharge opening and a door for closing the opening,
  - (a) said door being pivotally mounted on said hopper adjacent one side of the opening to assume an open pendant position and swingable to an inclined closed position;
  - (b) means for retaining the door in partially closed position and in fully closed position and including:
  - (c) a keeper carried by the hopper having stepped shoulders including a primary shoulder for holding the door in partially closed position and a secondary shoulder for holding the door in fully closed position, and
  - (d) a latch element on the door adjacent said keeper and movable to and away from the pivotal axis of the door and biased away from said pivotal axis and toward the distal end of said door to normally gravitate to a biased latching position; and
  - (e) means for automatically displacing the latch element from its biased latching position including:
  - (f) an inclined runway on said keeper leading to the primary shoulder adapted to engage with the latch element and displace the said element from its biased latching position by movement of the door toward closed position, and
  - (g) a locking dog pivotally mounted on the hopper and in locking engagement with the latch element only when the said element is in engagement with the secondary shoulder.
2. The invention, as set forth in claim 1,
  - (a) wherein the latch element is movable by rotation and includes a crank arm adapted to ride on the runway for displacing the latch element from its biased latch position, and
  - (b) wherein the locking dog engages with the crank arm only when the latch element is in engagement



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with the secondary shoulder to hold the latch element in locked position.

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