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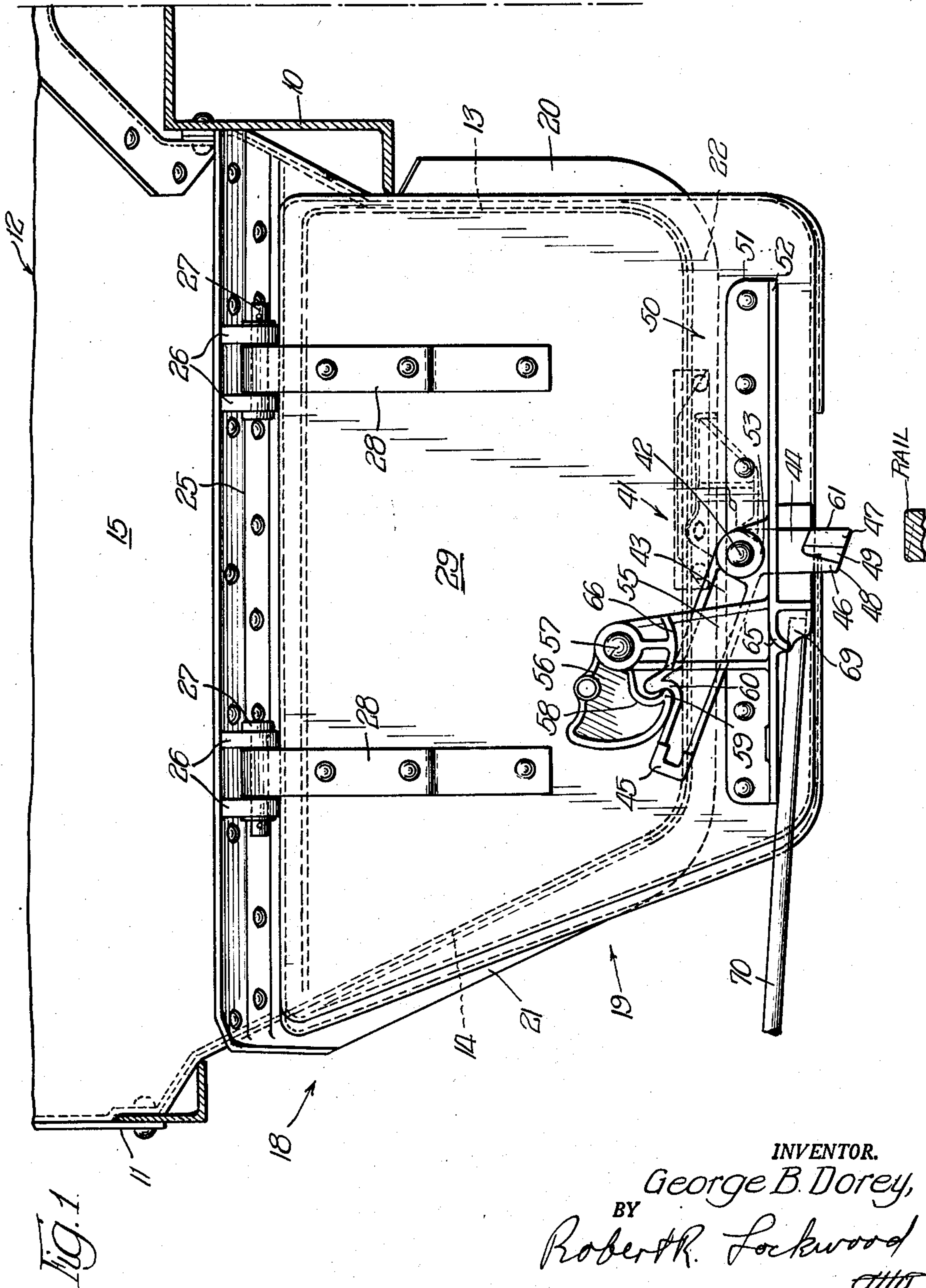
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2,624,293

HOPPER CAR DOOR LATCH

Filed Nov. 22, 1950

4 Sheets-Sheet 1



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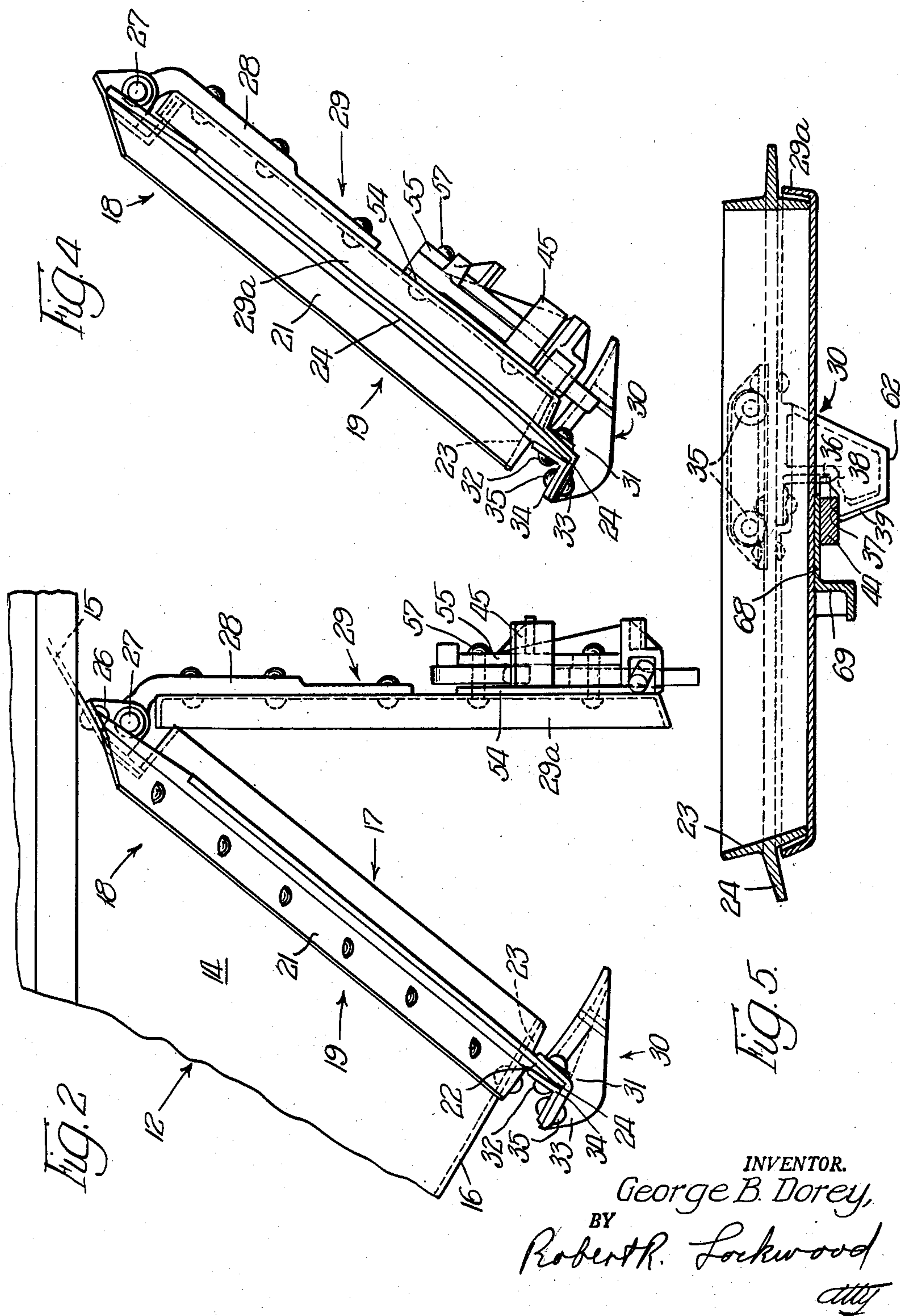
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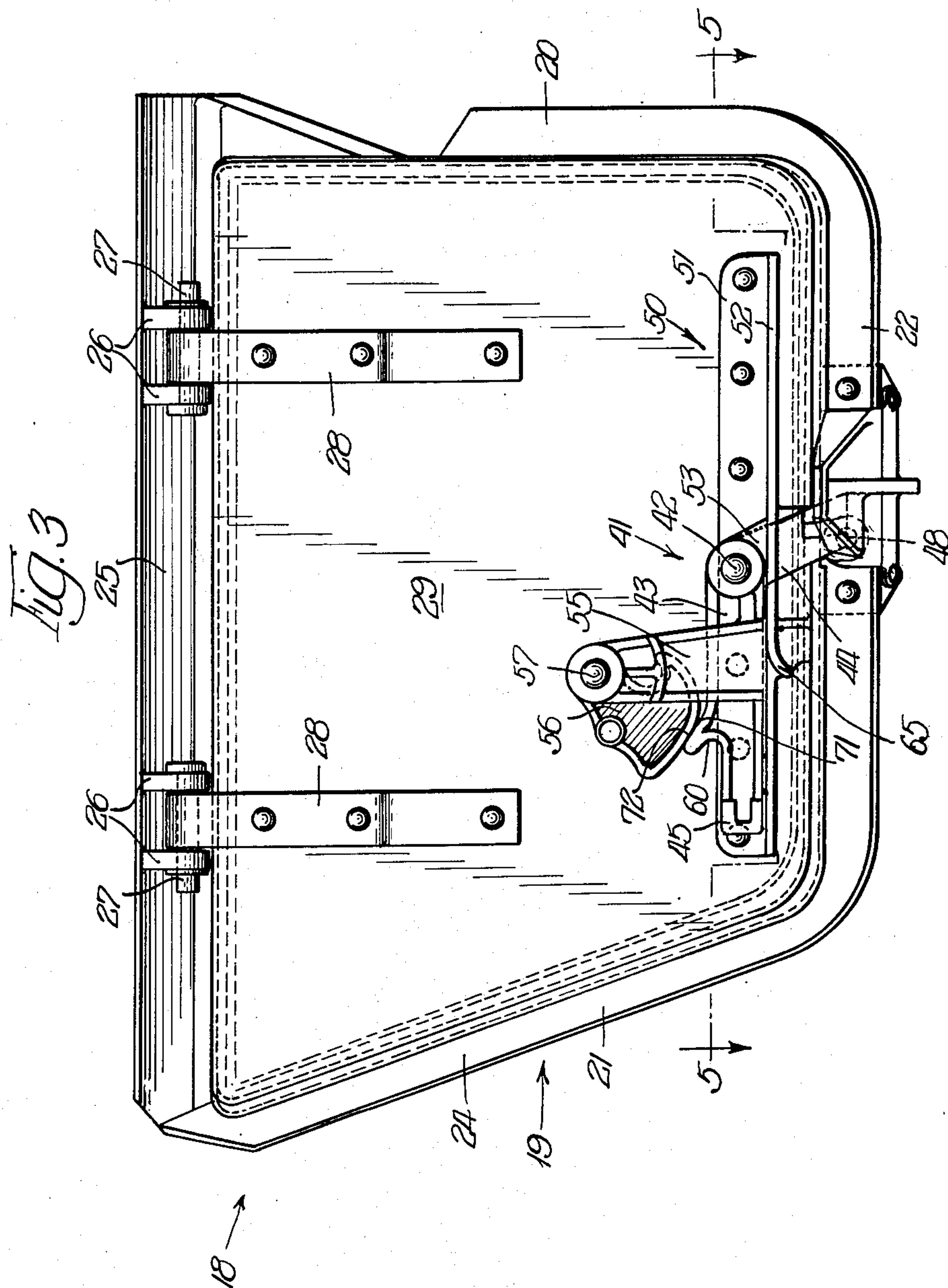
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4 Sheets-Sheet 3



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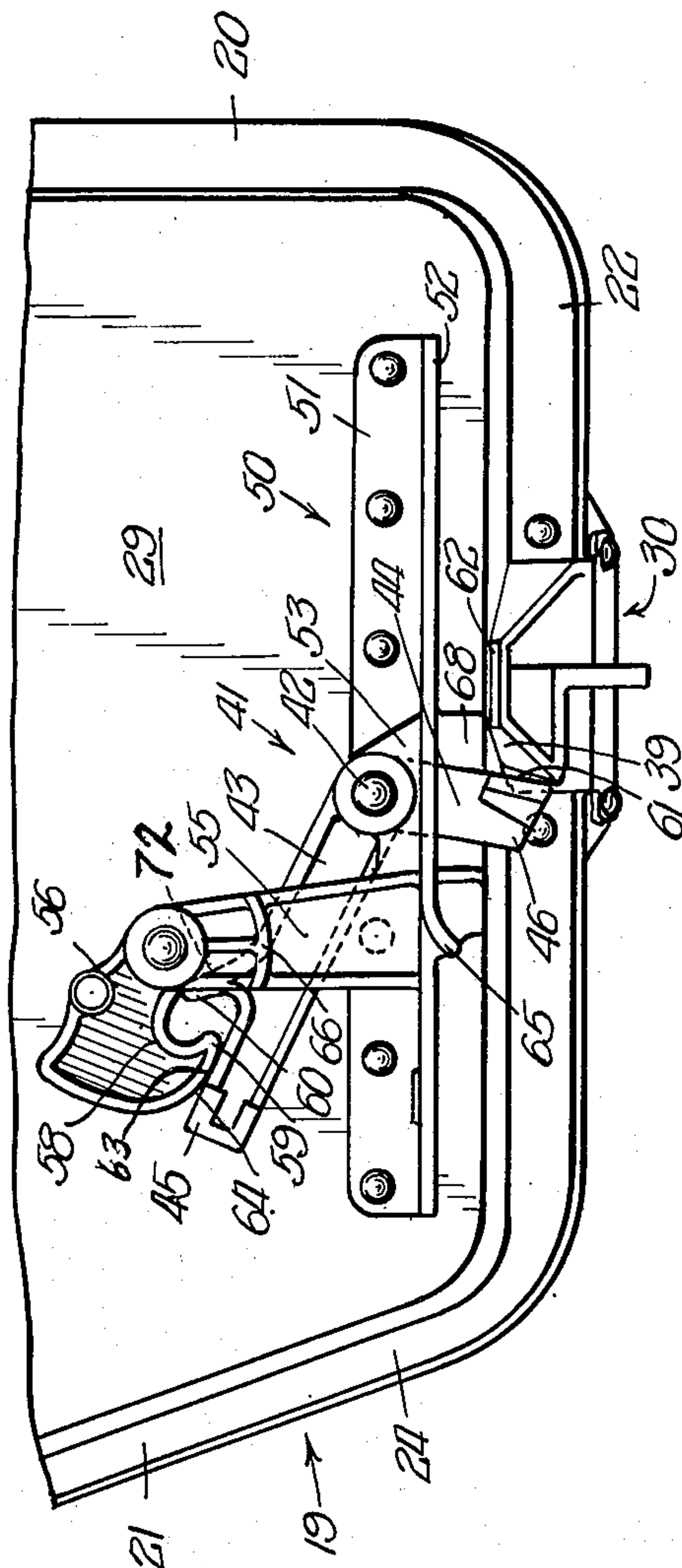
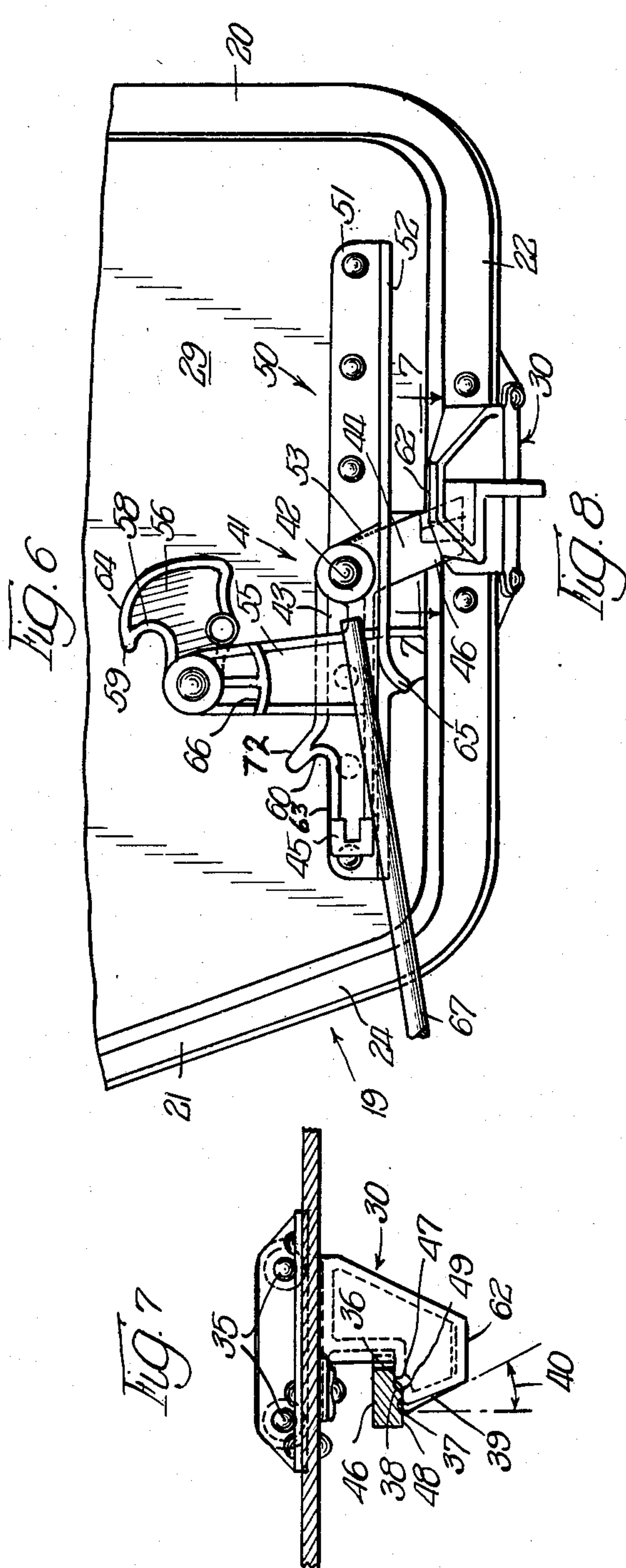
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HOPPER CAR DOOR LATCH

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,624,293

HOPPER CAR DOOR LATCH

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Application November 22, 1950, Serial No. 197,068

6 Claims. (Cl. 105—308)

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This invention relates, generally, to an improved latch for use in connection with a pivotally mounted swinging door of a type which is usually swung or kicked to closed position and the latch is employed for retaining the door adjacent its closed position.

This invention has to do particularly with that type of hopper door which is hinged along its upper edge to the upper edge of a discharge opening and is arranged to assume a substantially vertical pendulate open position. Such a door is usually arranged to be swung to an inclined position to meet with the edge portion of a sloping floor extending to the lower edge of the discharge opening. In such a structure the lower edge of the sloping floor is placed as close to the rails as is consistent with running clearance limitations and the door, as it moves to open position, swings with its outer edge in close proximity to the rails.

In a hopper door of the identified type it is usual to provide cooperating latching members carried by the door and hopper respectively with the members so related as to provide a striker on one member for displacing the other member as the door is moved to closed position. The use of a striker surface of extended length in structures of this type, owing to the proximity of the hopper to the rails, restricts the use of conveyors beneath the hopper for withdrawing the lading from the discharge opening and also acts to hinder the door closing operation due to the impingement of one or the latch members against the striker surface.

It is therefore one of the objects of this invention, among others, to provide latching mechanism which will enable the positioning and retention of a latch in a location intermediate its extreme positions of movement and thus retain the advantages of a latch having a wide range of movement without incurring the necessity of impinging on a long striker surface; to provide for the pre-positioning of the latch by the employment of a pivoted cam which in one position will operate as a retaining member for holding the latch in an intermediate position and which will be movable to another position in the path of movement of the latch for maintaining the latter in operative latching position; and to provide an improved latch which will retain the door in partially closed position and move the latter to fully closed position by further operation of the latch.

This invention further resides in certain details of construction such as will be pointed out hereinafter.

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For a more complete understanding of the nature and scope of this invention reference may be had to the following description taken together with the accompanying drawings, in which:

Figure 1 is a view in front elevation of the door of a hopper for a hopper type of car in which the present invention is embodied, the door being shown in pendant open position facing the opening with the hopper being shown between the center sill and side wall of a conventional type of railway car, the latch in this figure being shown as retained in its intermediate position;

Figure 2 is a vertical elevational side view of the structure shown in Figure 1;

Figure 3 is a frontal elevational view of a door and frame assembly, the view being shown with the door in closed and latched position on the frame assembly;

Figure 4 is a vertical side view of the structure shown in Figure 3;

Figure 5 is a horizontal sectional view taken through the door and frame assembly and on a line corresponding substantially to a line 5—5 of Figure 3;

Figure 6 is a fractional elevational view of the lower part of the door and frame assembly, illustrating the position of the latch parts with the latch in normal biased position and with the locking cam in overbalanced released position, preparatory to releasing the latch;

Figure 7 is a fractional horizontal sectional view taken on line 7—7 of Figure 6 showing the latch in engagement with the keeper; and

Figure 8 is a fractional elevational view of the door and frame assembly, illustrating the position of the latch as the latter reaches the position of maximum possible displacement which can be imparted by the striker surface.

Referring to Figures 1 and 2 of the drawings, the invention is shown as applied to a so-called W type of hopper and to a door on one side of the center sill. The reference character 10 designates a center sill of a conventional railway car having a side wall 11 spaced therefrom with a hopper 12 therebetween. The hopper 12 is formed by inner and outer side walls indicated at 13 and 14 respectively, a top sloping floor 15 and a lower floor 16 which slopes downwardly to an opening 17. Surrounding the opening 17 is a frame that is indicated, generally at 18. The frame 18 includes a lower stirrup portion indicated, generally, at 19 which has sides 20 and 21 extending along the walls 13 and 14 adjacent the opening 17 and a bottom portion 22 extending

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along the lowermost edge of the floor 16 and interconnecting the sides 20 and 21.

It will be observed that the sides 20 and 21 and the bottom 22, making up the stirrup portion 19, are generally of T-shape in cross section and that they include a wall 23 overlying the sides 13 and 14 and floor 16 and an outstanding flange or stem 24 lying midway of the wall 23. The frame 19 is completed by an upper beam portion 25 which extends along the lower edge of the top sloping floor 15. Hinge butts 26 extend downwardly from the upper beam portion 25 for carrying hinge pintles 27 that support hinge straps 28 which may be secured, as by rivets, to the outer surface of a door that is indicated, generally, at 29. The door 29 is generally pan shaped and has an outflared flange 29a which encloses the outer portion of the frame 18 when the door 29 is closed.

With a view to locking the door 29 in closed position, a shouldered keeper 30 is rigidly mounted on the frame 18 having a body portion 31 disposed in the angle presented by the forward portion of wall 23 and the stem 24 and is secured to the latter by a rivet 32. The body portion 31 is extended downwardly beyond the stem 24 and is formed with a rearward extension 33 heeled against an angle shaped member 34 and secured thereto as by rivets 35. The keeper 30 is formed with a shouldered portion which includes stepped shoulder faces 36 and 37 and an intervening inclined wedging surface 38.

Leading to the outer stepped shoulder 37 there is a beveled approach striker surface 39 which is disposed at an acute angle 40, Figure 7, to the general swinging direction of the door 29 for the purpose of engaging with and automatically displacing in a sidewise direction, a downwardly extending latching element 41 which is pivotally mounted on the door 29. The latching element 41 is pivotally mounted at 42 on the outer face of the door 29 to swing in a plane which is substantially parallel with the main plane thereof. The latching element 41 is generally of bell crank formation with arms 43 and 44 extending in generally opposite directions from the pivot 42. The arm 43 extends laterally outwardly from the hinge pivot 42 towards the side wall 11 of the car and is formed at its outer end with an outwardly extending fulcrum projection 45. The opposite arm 44 extends downwardly and slightly outwardly from the pivot 42 to provide a latch section 46 projecting beyond the swinging edge of the door 29. The section 46 is in the form of stepped faces 47 and 48, Figure 7, connected by an intervening inclined wedging face 49, the faces 47, 48 and 49 being arranged to register with the faces 36, 37 and 38, respectively, of the keeper 30, when the door 29 is in closed and latched position.

The latching element 41 is mounted on a reinforcing beam member 50 which is preferably of angle shaped cross section including a wall 51 overlying the outer face of the door 29 and another flange 52 outstanding therefrom. The beam member 50 is provided with a wall 53 which overlies the latching element 41 adjacent its pivot 42 and in cooperation with wall 51 forms a pair of walls which carry the pivot and between which the latching element 41 is received and guided. Intermediate the pivot 42 and the fulcrum projection 45 the beam member 50 is provided with a pair of spaced walls 54 and 55 between which the latch arm 43 is movably guided.

Positioned between walls 54 and 55 adjacent

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the upper portion thereof is a locking cam 56 which is rockably mounted on a pivot 57. The cam 56 is formed on one side with a hook shaped portion 58 having a finger 59 arranged to engage with a similarly formed hook shaped portion 60 on the arm 43 of the latching element 41 whereby it may be held at an intermediate position as shown in Figure 1. With the latching element 41 thus held in the intermediate position the edge portion 61 of the latching arm 44 is in position to impinge on the inclined striker surface 39 of the keeper 30, it being understood that the latching arm 44 when the latching element 41 is freely movable to latching position, Figure 6, lies in the path of the blunt end surface 62, Figure 7, of the keeper 30 which is disposed to the latching arm 44 in non-wedging relation.

Assuming that the parts are positioned as in Figure 1 with the latching element 41 retained in its intermediate position, the latching arm 44 upon movement of the door 29 in a closing direction contacts the inclined striker surface 39 of the keeper 30 and the arm 44 thereby is displaced sideways to clear the nose of the keeper 30 and drop rearwardly of the outer shouldered face 37. The door 29 is thereby retained in partially closed position. During the displacement of the latch arm 44, as effected by the striker surface 39, the latch arm 43 is displaced upwardly from the position shown in Figure 1 to that shown in Figure 8. There is a camming movement between the upper surface 63 of the latch arm 43 and the arcuately shaped surface 64 of the locking cam 56 which operates as a dampening movement to cushion the violent upthrow of the latch arm 43 which normally takes place by reason of the hammer-like blow imparted thereto by impact on the striker surface 34. This dampening action is disclosed in copending Dorey application Serial No. 128,209 filed November 18, 1949, and assigned to the assignee of this application.

Fulcrum ledges are provided on the beam member 50 as indicated at 65 and 66 for the purpose of receiving a removable bar 67 between the projection 45 of the latch arm 43 for either releasing or forcing the latching element 41 home. In Figure 6 the bar 67 is shown in releasing position.

The beam member 50 is provided with a downwardly extending guide plate 68, Figure 5, for supporting the latching arm 44 against bending and adjacent thereto there is provided a pocket 69, Figure 5, for receiving and holding the outer end of a door lifting bar as indicated at 70 in Figure 1.

The locking cam 56 is provided with an arcuate shaped camming surface 71 adapted to be swung, as shown in Figure 3, into registering engagement with a flat seating surface 72 of the latch arm 44 to retain the latching element 41 in operative latching position.

It will be apparent that this invention, by providing for advance movement of the latching element 41, enables the employment of a keen wedging angle between the latching arm 44 and the striker surface 39. Such contact between the striker surface 39 and the latch arm 44 is effective for only a limited degree of door swinging movement. This results in smoothness and ease of operation and also avoids the necessity of employing an extremely long striker surface such as is necessary with the conventional type of latch wherein the latching element engages with the striker surface 39 throughout its entire range of movement.

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In operation, assuming that the door 29 is latched closed, as shown in Figures 3, 4 and 5, the locking cam 56 is swung to the position shown in Figure 6. The bar 67 then is placed as there shown under the fulcrum projection 45 with one end on the fulcrum ledge 65. On raising the other end of the bar 67 the latching element 41 is pried out of the latched position where the arm 44 clears the keeper 30. The door 29 then is free to swing to the open position under the force of gravity and of the lading acting on it.

When the door 29 is to be closed, the latching element 41 is first swung manually to the position shown in Figure 1 and then the locking cam 56 is rocked until its hook shaped portion 58 interfits with the hook shaped portion 60 on the latch arm 43. The door lifting bar 70 is inserted in the pocket 63 and thereby the door 29 is swung toward the closed position. Since the locking cam 56 holds the latching element 41 in the intermediate position described previously with the edge portion 61 shifted away from the position which it otherwise would occupy if it were not so held, the length of the striker surface 39 can be made correspondingly shorter since it need be long enough to complete the displacement of the latch arm 44 past the keeper 30. The accompanying movement of the latch arm 43 is dampened by the locking cam 56. The latching element 41 rocks in a counter clockwise direction and the shoulder face 36 engages the face 48 thereby holding the door 29 partly closed. The bar 67 or 70 then is placed upon the fulcrum projection 45 with one end underneath the fulcrum ledge 66. The other end is pushed downwardly to complete the movement of the latching element 41 to the fully latched position shown in Figure 3. It is locked in this position by rocking the locking cam 56 to its position here shown.

Since certain changes can be made in the foregoing construction and different embodiments of the invention can be made without departing from the spirit and scope thereof, it is intended that all matter shown in the accompanying drawings and described hereinbefore shall be interpreted as illustrative and not in a limiting sense.

What is claimed as new is:

1. In a railway car having a hopper with a discharge opening and a door hinged along the upper side of the opening for closing the latter, in combination, a shouldered keeper carried by said hopper adjacent the swinging edge of said door and projecting beyond the face of said opening, a latch swingable with said door and projecting beyond the swinging edge thereof for engagement with the shouldered portion of said keeper, said keeper beyond its shouldered portion having an end disposed in the path of swinging movement of said latch when the latter is in latching position on said door and having an inclined striker surface extending at a keen angle to the path of swinging movement of said door, and interengaging relatively movable fingers carried respectively by said door and said latch for holding said latch in an intermediate location between its extreme limits of travel in a position where said latch can engage said striker surface upon swinging movement of said door in a closing direction, said fingers being freely separable when said latch engages said keeper whereby said latch is free to move as a result of the engagement of said latch and said inclined striker surface of said keeper.

2. In a railway car having a hopper with a

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discharge opening and a door hinged adjacent the upper side of said opening for closing the same, in combination, a shouldered keeper carried by said hopper adjacent the swinging edge of said door, a latching element pivotally mounted on the outer face of said door to swing in a plane substantially parallel with said outer face and being biased to urge a latching portion of said latching element into engagement with the shoulder of said keeper, said keeper beyond said shoulder being formed with a blunt nose and an inclined striker surface adjacent thereto, said blunt nose and inclined striker surface when said latching element is in its biased position lying in the path of swinging movement of said projecting latching portion as said door is swung to closed position, and means for holding said latching element in an intermediate position between biased and released positions and positioning said latching portion in position to engage said striker surface, said means including a member pivotally mounted on the door and interlocking fingers carried by said member and said latch element respectively.

3. In a railway car having a hopper with a discharge opening and a door hinged adjacent the upper side of said opening for closing the same, in combination, a shouldered keeper carried by said hopper and having an inclined striker surface, a latch pivotally mounted on said door to swing in a plane substantially parallel thereto, said latch being arranged to engage with the shoulder of said keeper for maintaining said door in closed position, said latch being biased to engage with said keeper and being swingable therefrom to released position free of said shoulder of said keeper, and a locking cam pivotally mounted on said door and swingable in one position to lock said latch in biased position and swingable to another position to engage said latch and retain the latter in an intermediate position between biased and released positions where said latch can operatively engage said striker surface.

4. In a railway car having a hopper with a discharge opening and a door hinged adjacent the upper side of said opening for closing the same, in combination, a shouldered keeper carried by said hopper and having an inclined striker surface, a latch pivotally mounted on said door to swing in a plane substantially parallel thereto, said latch being arranged to engage with the shoulder of said keeper for maintaining said door in closed position, said latch being biased to engage with said keeper and being swingable therefrom to released position free of said shoulder of said keeper, and a locking cam pivotally mounted on said door and swingable in one position to lock said latch in biased position and swingable to another position to engage said latch and retain the latter in an intermediate position between biased and released positions where said latch can operatively engage said striker surface, said locking cam and latch being provided with interlocking fingers for retaining the latter in said intermediate position, said interlocking fingers being readily disengageable when on closing movement of said door said latch engages said striker surface.

5. In a railway car having a hopper with a discharge opening and a door hinged adjacent the upper side of said opening for closing the same, in combination, a shouldered keeper carried by said hopper adjacent the swinging edge of said door and having an inclined striker surface, a latch in the form of a bell crank pivotally mount-

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ed on said door to swing in a plane substantially parallel thereto with one arm projecting generally downwardly beyond said swinging edge of said door and the other arm extending generally laterally towards one side of said door, said one arm of said latch being arranged to engage with the shoulder of said keeper for maintaining said door in closed position, said latch being biased by the weight of said other arm to engage with said keeper and being swingable therefrom to released position free of said shoulder of said keeper, and a locking cam pivotally mounted on said door and swingable in one position to lock said latch in biased position and swingable to another position to engage said other arm of said latch and retain it in an intermediate position between biased and released positions where said one arm can operatively engage said striker surface.

6. In a railway car having a hopper with a discharge opening and a door hinged adjacent the upper side of said opening for closing the same, in combination, a shouldered keeper carried by said hopper adjacent the swinging edge of said door and having an inclined striker surface, a latch in the form of a bell crank pivotally mounted on said door to swing in a plane substantially parallel thereto with one arm pro-

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jecting generally downwardly beyond said swinging edge of said door and the other arm extending generally laterally towards one side of said door, said one arm of said latch being arranged to engage with the shoulder of said keeper for maintaining said door in closed position, said latch being biased by the weight of said other arm to engage with said keeper and being swingable therefrom to released position free of said shoulder of said keeper, and a locking cam pivotally mounted on said door and swingable in one position to lock said latch in biased position and swingable to another position to engage said other arm of said latch and retain it in an intermediate position between biased and released positions where said one arm can operatively engage said striker surface, said locking cam and other arm of said latch having interlocking fingers for holding said latch in said intermediate position, said interlocking fingers being readily disengageable when on closing movement of said door said one arm of said latch engages said striker surface for displacing said latch out of the path of said keeper.

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No references cited.