March 10, 1953 A. E. ZIMMER 2,630,770

LATCHING MECHANISM FOR HOPPER DOORS

Filed Aug. 25, 1949 3 Sheets-Sheet 1

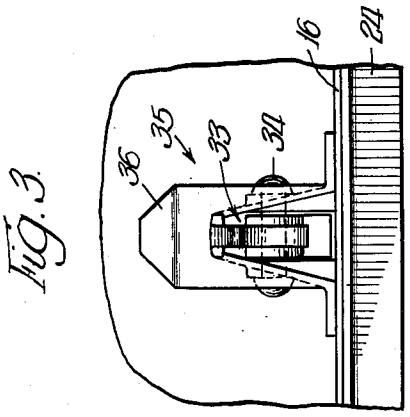


Fig. 3.

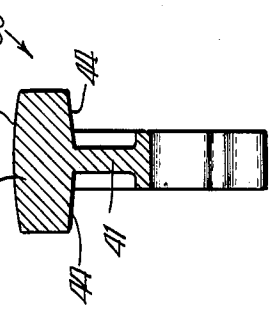


Fig. 4.

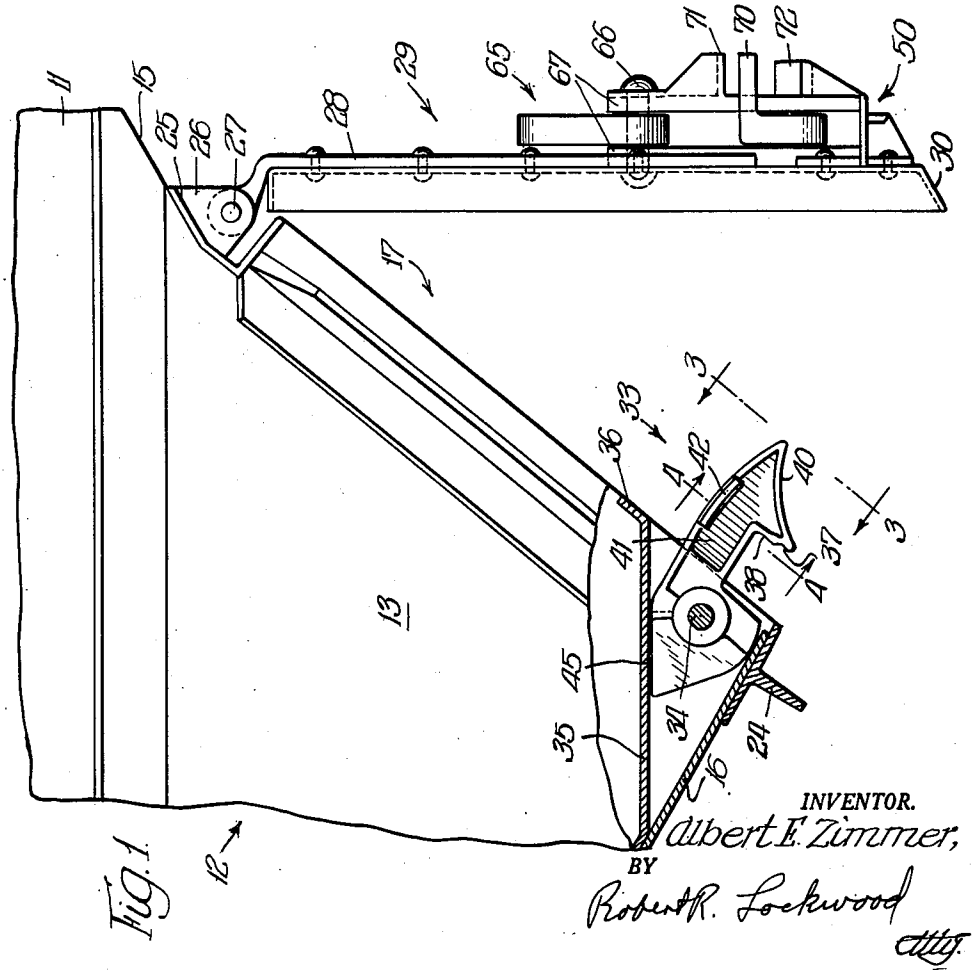


Fig. 1.

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LATCHING MECHANISM FOR HOPPER DOORS

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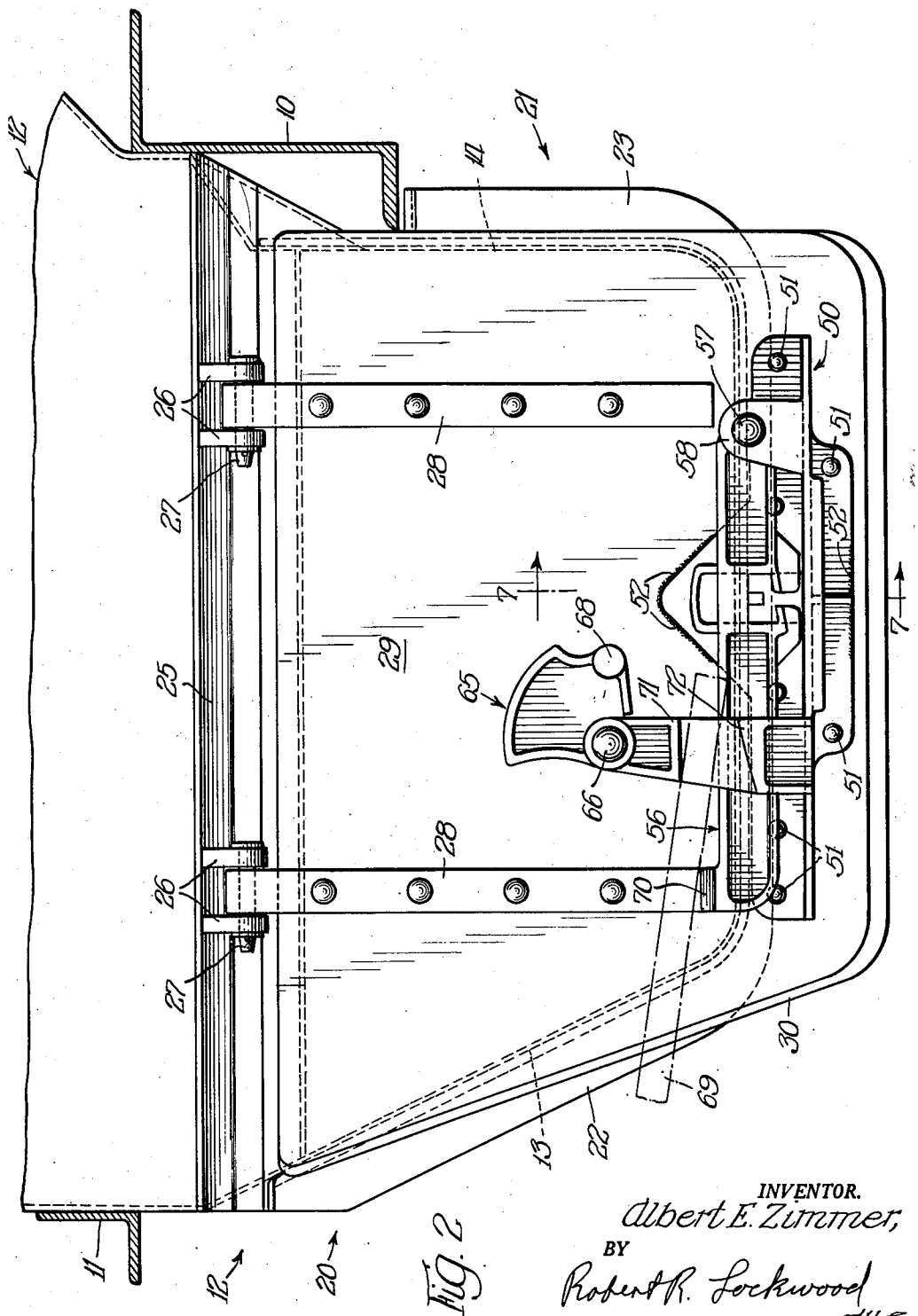


Fig. 2

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LATCHING MECHANISM FOR HOPPER DOORS

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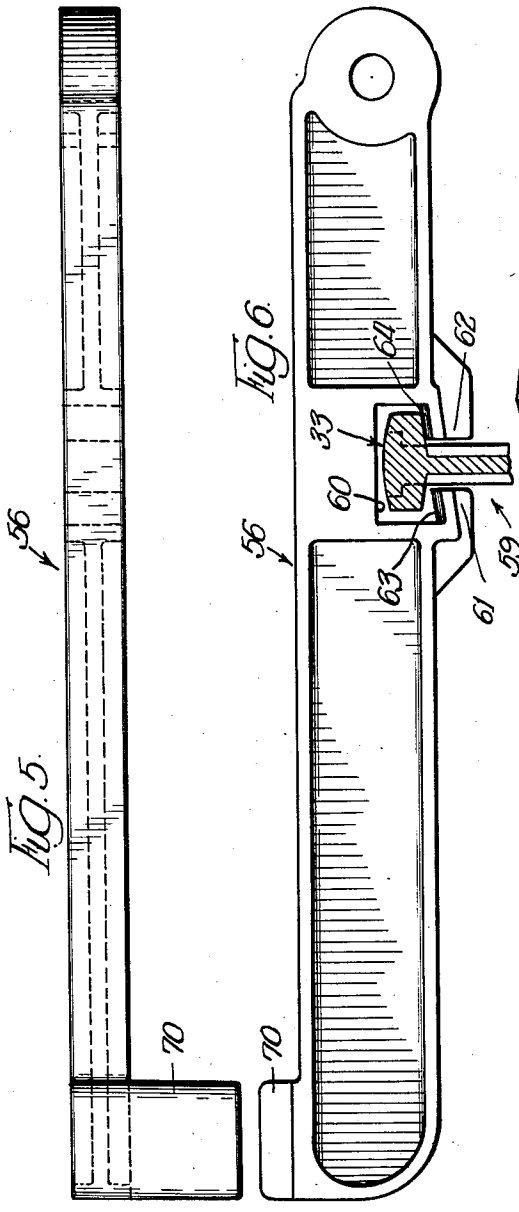


Fig. 5.

Fig. 6.

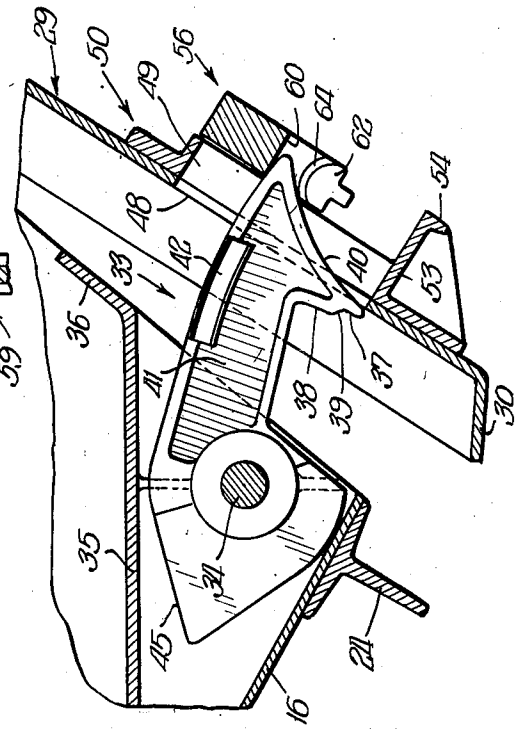


Fig. 7.

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LATCHING MECHANISM FOR HOPPER DOORS

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10 Claims. (Cl. 105—308)

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This invention relates, generally, to the construction of hopper type railway cars, and it has particular relation to latch mechanisms for the discharge hopper doors thereof.

Among the objects of this invention are: To mount a locking element on the floor of a hopper for engaging a hopper door to hold it closed; to move the locking element into and out of locking position by a locking bar carried by the door; to construct the locking element and the locking bar so as to interfit with each other in operative position; to provide different holding positions for the locking element; and to arrange the locking bar so as to receive an operating bar for moving the former to and from the locked position.

Other objects of this invention will, in part, be obvious and in part appear hereinafter.

This invention is disclosed in the embodiment thereof shown in the accompanying drawings and it comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

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

Figure 1 is a view, in side elevation, of a conventional hopper for a hopper type railway car showing the door in the open position and having a latch mechanism associated therewith constructed in accordance with this invention;

Figure 2 is a view, in front elevation, of the door and latch assembly as shown in Figure 1;

Figure 3 is a view along line 3—3 of Figure 1 looking in the direction of the arrows;

Figure 4 is a detail sectional view at an enlarged scale taken along the line 4—4 of Figure 1;

Figure 5 is a top plan view of the locking bar;

Figure 6 is a view, in front elevation, of the locking bar shown in Figure 5 with the locking element shown in section therein; and

Figure 7 is a detail sectional view at an enlarged scale taken along the line 7—7 of Figure 2.

Referring now particularly to Figures 1 and 2 of the drawings, it will be observed that the reference character 10 designates a center sill and that the reference character 11 designates a side frame of a railway car having a hopper, indicated generally at 12, therebetween. The hopper

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12 is formed by side walls 13 and 14, a top wall 15 and a floor 16 which slopes downwardly to a discharge opening that is indicated, generally, at 17. Surrounding the opening 17 defined by the walls 13, 14, and 15 and the floor 16 is a frame that is indicated, generally, at 20. The frame 20 comprises a lower stirrup portion, indicated generally at 21, which has sides 22 and 23 extending along the edges of the side walls 13 and 14 adjacent the opening 17 and a bottom 24, extending along the lowermost edge of the floor 16, connecting the sides 22 and 23. It will be observed that the sides 22 and 23 and the bottom 24 making up the stirrup portion 21 are generally T-shaped in cross section so as to provide the necessary strength and rigidity. The frame 20 is completed by an upper beam portion 25 which extends along the lower edge of the top wall 15.

Hinge butts 26 extend downwardly from the upper beam portion 25 for carrying hinge pintles 27 for supporting hinge straps 28 that may be secured, as by rivets, to the outer surface of a door which is indicated, generally, at 29. The door 29 is generally pan shaped and has an outflared 30 for overlying the lowermost edges of the hopper 12 around the opening 17.

With a view to locking the door 29 in the closed position, a shouldered locking element, indicated generally at 33, is rockably mounted on a rivet 34 which extends through a bracket housing 35 that is carried by the floor 16 and may be secured thereto by any suitable means such as by welding. As shown in Figure 3 the rivet 34 extends through the bracket housing 35 which is provided for overlying the locking element 33 and preventing the leakage of lading therepast when the door 29 is closed. It is to assist in preventing leakage of the lading that the bracket housing 35 has a flange 36 extending outwardly therefrom for engagement with the inner side of the door 29 when the same is closed. It will be observed that the rivet 34 extends parallel to the hinge pintles 27 so that the locking element is pivotally mounted on the hopper 12 about an axis which is parallel to the axis about which the door 29 is hinged. Also, it will be observed that the locking element extends at right angles to the door 29.

As illustrated more clearly in Figure 7 of the drawings, the locking element 33 is generally hook shaped and it has seats 37 and 38 which are in stepped relation with respect to each other and are interconnected by a sloping connecting portion 39. The seats 37 and 38 are sections of

cylinders the center of each of which is the axis of rotation of the locking element 33 or the longitudinal axis of the rivet 34. The purpose of the stepped seats 37 and 38 will be set forth presently. Near its outer end the locking element 33 has a curved undersurface 40 for facilitating the automatic rotation thereof in a counterclockwise direction when the door 29 is slammed shut.

The shouldered locking element 33 has a shank portion 41 which has a generally T-shaped section, Figure 4. The T-shaped section includes a top bar portion 42 the upper surface 43 and under surface 44 of which are curved to facilitate entrance of the T-shaped section into a locking bar to be described presently. It will be observed that the upper surface 43 is convexedly curved both lengthwise of the locking element 33 and transversely along the upper surface of the top bar portion 42. The under surface 44 is convexedly curved transversely of the locking element 33 and along the under side of the top bar portion 42 but it is curved in a concave fashion on the under side in the direction of the length of the locking element 33.

With a view to limiting the rotation of the locking element 33 in the clockwise direction when the door 29 is opened, the locking element 33 is provided with a flat upper surface 45. As shown in Figure 1, this flat upper surface 45 engages the under side of the bracket housing 35 and thus serves to hold the locking element 33 in the position there shown.

The manner in which the locking element 33 engages and holds the door 29 in the closed position will be apparent from Figure 7. As there shown the door 29 is provided with an opening 48 through which the shank 41 is arranged to project. Also the shank 41 projects through an opening 49 coextensive with the opening 48, in a beam member, shown generally at 50, which extends along the lower edge of the door 29 and may be secured thereto, in part, by rivets 51 and in part by welding, as indicated at 52. At the bottom of the opening 49 the beam member 50 is provided with an outstanding flange 53 which has a seat portion 54 along its outer edge. The seat portion 54 has a curved outer surface which is a section of a cylinder the center of which is the axis of rotation of the locking element 33 when the door 29 is closed. The seat portion 54 is arranged to be engaged by either of the seats 37 or 38 depending upon the position of the locking element 33 with respect thereto.

With a view to moving the locking element 33 into and out of locking engagement with the door 29, a locking bar, shown generally at 56, may be employed. The locking bar 56 is pivoted at one end, as indicated at Figure 2, on a rivet 57 which extends through ears 58 that are formed integrally with the beam member 50. The locking bar 56 has a T-shaped opening, shown generally at 59 in Figure 6, which is arranged to receive the T-shaped section of the shank portion 41 of the locking element 33. At the upper end of the T-shaped opening 59 there is a flat surface 60 for engaging the curved upper surface of the locking element 33. Also, the locking bar 56 is provided with hook shaped portions 61 and 62 which define, in part, the lower portion of the T-shaped opening 59. These hook shaped portions 61 and 62 have curved upper surfaces 63 and 64, respectively, for interfitting with the correspondingly curved under surface 44 of the top bar portion 42. Because of the movement of the locking bar 56 at right angles to the rotation of the locking element 33 and the interfitting relationship between the T-shaped portion of the shank portion 41, the curved upper surface 63 is spaced further from the flat surface 60 than is the curved upper surface 64. Preferably the surface 63 is a projection of the surface 64 along a line extending through the axis of rotation of the locking bar 56 at an angle to its longitudinal axis through the flat surface 60.

The locking bar 56 is held in the locked position by a locking dog 65. It will be noted that the locking dog 65 is pivoted on a rivet 66 which extends between ears 67 that project upwardly from and are formed integrally with the beam member 50. The locking dog 65 has an integrally formed boss 68 which may be engaged by a removable operating bar 69 to move it from the locked position. For this purpose the operating bar 69 may be fulcrumed on a projection 70 which extends from and is formed integrally with the locking bar 56. Figure 5.

When the locking bar 56 is to be moved to the closed position, the operating bar 69 may be inserted between the projection 70 and a ledge 71 which is formed integrally with and extends laterally from one of the ears 67. A ledge 72 is provided to serve as a fulcrum for the operating bar 69 when it is applied underneath the projection 70 for lifting the locking bar 56 from the locked position.

In describing the operation of the latching mechanism shown in the drawings and described hereinbefore, it will be assumed that the door 29 is being swung from its position shown in Figures 1 and 2 to the closed position. Here the locking bar 56 is in a generally horizontal position and the locking element 33 is in its lowermost position. As shown in Figure 7, the forward end of the curved under surface 40 of the shouldered locking element 33 engages the lower side of the opening 48 in the door 49 and, on continued closing movement of the door 29, the locking element 33 is rocked in a counterclockwise direction until the lowermost portion has been moved upwardly far enough to slide over the upper surface of the flange 53. At this time the forward end of the locking element 33 enters the T-shaped opening 59 in the locking bar 56 and the flat under surface 60 is engaged by the forward top surface of the shank portion 41 so that the locking bar 56 is rocked upwardly a corresponding amount. The door 29 continues in its closing movement until the seat 37 is moved past the seat portion 54 whereupon the weight of the locking element 33 and of the locking bar 56 is sufficient to bias the former downwardly so that the seat 37 interfits with the seat portion 54. Now the operating bar 69 is positioned between the ledge 71 and the upper surface of the projection 70 and pressure is applied to the outer end for moving the locking bar 56 downwardly. As a result of this movement the sloping connecting portion 39 of the locking element 33 rides over the outermost edge of the flange 53 until the seat 38 is in position to engage the seat portion 54. Thereupon the locking element 33 rocks downwardly still further with the seat 38 overlying the seat portion 54. This movement of the locking element 33 to the fully closed position causes the door 29 to engage the periphery of the opening 17 and to seal the same tightly. Thereafter the operating bar 69 is removed and the locking dog 65 is rotated in a counterclockwise direction so as to engage the upper side of the locking bar 56 and hold it in the locked position.

When the door 29 is to be unlocked, the oper-

ating bar 69 is positioned between the boss 68 and the upper side of the projection 70. Pressure is applied to the outer end of the operating bar 69 and the locking dog 65 is withdrawn from the locking position. Thereafter it is rotated to the position shown in Figure 2. Now the operating bar 69 is positioned underneath the projection 70 with the outer end resting on the upper surface of the ledge 72. On application of pressure to the outer end of the operating bar 69, the locking bar 56 is rocked in a clockwise direction as viewed in Figure 2. In the locked position of the locking bar 56 the T-shaped section of the shank portion 41 interfits with the T-shaped opening 59 as shown in Figure 6. Therefore, as the locking bar 56 is rocked in a clockwise direction, as just described, the curved upper surfaces 63 and 64 engage the under surface 44 of the top bar portion 42 and lift the locking element 33 so that the seat 38 moves out of engagement with the seat portion 54. On continued upward movement of the locking bar 56, as described, the locking element 33 is rocked upwardly far enough to clear the seat 37 from the seat portion 54. Thereupon, the pressure of the lading against the inside of the door 29 causes the same to swing to the open position in addition to the force of gravity exerted thereon.

From the foregoing description it will be apparent that the locking bar 56 with the T-shaped opening 59 cooperates with the locking element 33 and particularly with the T-shaped section of its shank portion 41 so as to rock the locking element 33 toward or away from the locked position depending upon the direction in which the locking bar 56 is rocked by the operating bar 69.

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 an inclined discharge opening and a door hinged along the upper side of said opening for closing the same, said hopper including a floor sloping downwardly toward the lower side of said opening for directing lading thereto and said door being swingable to meet the lowermost edge of said floor in closed position; in combination, a seat member carried by said door, a locking element pivotally mounted on said hopper to swing about an axis parallel to the hinge axis of said door, said locking member having a downwardly extending hook member and being biased to swing the same downwardly and cooperating with said seat member when said door is swung toward closed position to cam said hook member upwardly until it overrides said seat member whereupon it is moved downwardly toward locking engagement therewith, means cooperating with said locking member to hold the same in position to have said hook member engaged by said seat member when said door is swung toward closed position, a locking bar pivotally mounted on said door to swing parallel thereto, and interfitting means on said locking element and said locking bar whereby downward movement of said locking bar moves said hook member into full locking engagement with said seat member and upward movement of said locking bar moves said hook member out of locking engagement with said seat member.

2. In a railway car having a hopper with an inclined discharge opening and a door hinged along the upper side of said opening for closing the same, said hopper including a floor sloping downwardly toward the lower side of said opening for directing lading thereto and said door being swingable to meet the lowermost edge of said floor in closed position; in combination, a seat member carried by said door, a locking element pivotally mounted on said hopper to swing about an axis parallel to the hinge axis of said door, said locking member having a downwardly extending shouldered hook member having stepped shoulders and being biased to swing the same downwardly and extending through said door and cooperating with said seat member when said door is swung toward closed position to cam said hook member upwardly until it overrides said seat member whereupon it is moved downwardly toward locking engagement therewith to hold said door partially closed, means cooperating with said locking member to hold the same in position to have said hook member engaged by said seat member when said door is swung toward closed position, a locking bar pivotally mounted on said door to swing parallel thereto, and interfitting means on said locking element and said locking bar whereby downward movement of said locking bar moves said hook member from partial locking engagement into full locking engagement with said seat member and upward movement of said locking bar moves said hook member out of locking engagement with said seat member.

3. In a railway car having a hopper with an inclined discharge opening and a door hinged along the upper side of said opening for closing the same, said hopper including a floor sloping downwardly toward the lower side of said opening for directing lading thereto and said door being swingable to meet the lowermost edge of said floor in closed position; in combination, a seat member carried by said door, a locking element pivotally mounted on said hopper to swing about an axis parallel to the hinge axis of said door, said locking member having a downwardly extending hook member and being biased to swing the same downwardly and cooperating with said seat member when said door is swung toward closed position to cam said hook member upwardly until it overrides said seat member whereupon it is moved downwardly toward locking engagement therewith, means cooperating with said locking member to hold the same in position to have said hook member engaged by said seat member when said door is swung toward closed position, a locking bar pivotally mounted on said door to swing parallel thereto, and interfitting means on said locking element and said locking bar including a T-shaped section on the former and cooperating hook-shaped means on the latter for engaging upper and lower sides of the cross of said T-shaped section whereby downward movement of said locking bar moves said hook member into full locking engagement with said seat member and upward movement of said locking bar moves said hook member out of locking engagement with said seat member.

4. In a railway car having a hopper with an inclined discharge opening and a door hinged along the upper side of said opening for closing the same, said hopper including a floor sloping downwardly toward the lower side of said opening for directing lading thereto and said door being swingable to meet the lowermost edge of said floor in closed position; in combination, a

seat member carried by said door, a locking element pivotally mounted on said hopper to swing about an axis parallel to the hinge axis of said door, said locking member having a downwardly extending shouldered hook member having stepped shoulders and being biased to swing the same downwardly and extending through said door and cooperating with said seat member when said door is swung toward closed position to cam said hook member upwardly until it overrides said seat member whereupon it is moved downwardly toward locking engagement therewith to hold said door partially closed, means cooperating with said locking member to hold the same in position to have said hook member engaged by said seat member when said door is swung toward closed position, a locking bar pivotally mounted on said door to swing parallel thereto, and interfitting means on said locking element, and said locking bar including a T-shaped section on the former and cooperating hook shaped means on the latter for engaging upper and lower sides of the cross of said T-shaped section whereby downward movement of said locking bar moves said hook member from partial locking engagement into full locking engagement with said seat member and upward movement of said locking bar moves said hook member out of locking engagement with said seat member.

5. In a railway car having a hopper with an inclined discharge opening and a door hinged along the upper side of said opening for closing the same, said hopper including a floor sloping downwardly toward the lower side of said opening for directing lading thereto and said door being swingable to meet the lowermost edge of said floor in closed position; in combination, a seat member carried by said door, a locking element pivotally mounted on said hopper to swing about an axis parallel to the hinge axis of said door, said locking member having a downwardly extending hook member and being biased to swing the same downwardly and cooperating with said seat member when said door is swung toward closed position to cam said hook member upwardly until it overrides said seat member whereupon it is moved downwardly toward locking engagement therewith, means cooperating with said locking member to hold the same in position to have said hook member engaged by said seat member when said door is swung toward closed position, a locking bar pivotally mounted on said door to swing parallel thereto, and interfitting means on said locking element and said locking bar including a T-shaped section on the former and the latter having a T-shaped opening for receiving said T-shaped section whereby downward movement of said locking bar moves said hook member into full locking engagement with said seat member and upward movement of said locking bar moves said hook member out of locking engagement with said seat member.

6. In a railway car having a hopper with an inclined discharge opening and a door hinged along the upper side of said opening for closing the same, said hopper including a floor sloping downwardly toward the lower side of said opening for directing lading thereto and said door being swingable to meet the lowermost edge of said floor in closed position; in combination, a shouldered locking element pivotally mounted on said hopper to swing about an axis parallel to the hinge axis of said door, said locking element having stepped shoulders for successively engaging a cooperating seat portion on said door, and a locking bar pivotally mounted on said door, said locking element and locking bar each having upper and lower oppositely reacting interfitting shoulder means whereby downward movement of said locking bar moves said locking element into full locking engagement with said seat portion and upward movement of said locking bar moves said locking element out of locking engagement with said seat portion.

7. In a railway car having a hopper with an inclined discharge opening and a door hinged along the upper side of said opening for closing the same, said hopper including a floor sloping downwardly toward the lower side of said opening for directing lading thereto and said door being swingable to meet the lowermost edge of said floor in closed position; in combination, a shouldered locking element pivotally mounted on said hopper to swing about an axis parallel to the hinge axis of said door, said locking element having stepped shoulders for successively engaging a cooperating seat portion of said door, a locking bar pivotally mounted on said door, said locking element and locking bar each having upper and lower oppositely reacting interfitting flange means whereby downward movement of said locking bar moves said locking element from a position where one shoulder engages said seat portion to a position where the other shoulder engages the same and upward movement of said locking bar moves said locking element out of locking engagement with said seat portion, a ledge on said door providing a fulcrum, and a projection on said locking bar, said ledge and projection being arranged and adapted to receive an operating bar to force said locking element from the first mentioned position to the second mentioned position.

8. In a railway car having a hopper with an inclined discharge opening and a door hinged along the upper side of said opening for closing the same, said hopper including a floor sloping downwardly toward the lower side of said opening for directing lading thereto and said door being swingable to meet the lowermost edge of said floor in closed position; in combination, a shouldered locking element pivotally mounted on said hopper to swing about an axis parallel to the hinge axis of said door for engaging a seat portion thereon, and a locking bar pivotally mounted on said door to swing parallel thereto, said locking element and locking bar each having upper and lower oppositely reacting interfitting shoulder means whereby downward movement of said locking bar moves said locking element into full locking engagement with said seat portion and upward movement of said locking bar moves said locking element out of locking engagement with said seat portion, said locking element having a beveled upper surface for engaging an under surface of said locking bar to displace the latter upwardly when said door is swung to the closed position.

9. In a railway car having a hopper with an inclined discharge opening and a door hinged along the upper side of said opening for closing the same, said hopper including a floor sloping downwardly towards the lower side of said opening for directing lading thereto and said door being swingable to meet the lowermost edge of said floor in closed position; in combination, a locking element pivotally mounted centrally of said hopper for engagement with said door to hold the same closed, and a locking bar pivotally mounted on one side of said door for operating said lock-

ing element, said locking element and locking bar each having upper and lower oppositely reacting interfitting shoulder means whereby downward movement of said locking bar moves said locking element into full locking engagement with said door and upward movement of said locking bar moves said locking element out of locking engagement with said door.

10. In a railway car having a hopper with an inclined discharge opening and a door hinged along the upper side of said opening for closing the same, said hopper including a floor sloping downwardly toward the lower side of said opening for directing lading thereto and said door being swingable to meet the lowermost edge of said floor in closed position; in combination, a shouldered locking element for holding said door in closed position, support means pivotally mounting said shouldered locking element above said floor to swing in a plane perpendicular to the hinge axis of said door, said locking element extending through the plane of said door for locking engagement therewith, and a locking bar pivotally mounted on said door to swing parallel thereto, said locking element and locking bar each having upper and lower oppositely reacting interfitting shoulder means whereby downward movement of said locking bar moves said locking element into full locking engagement with said door and upward movement of said locking bar moves said locking element out of locking engagement with said door.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,536,015	Kadel	Apr. 28, 1925
1,809,850	Hosceit	June 16, 1931
1,820,136	Hankins et al.	Aug. 25, 1931
1,861,152	Campbell	May 31, 1932