Dec. 9, 1952 G. B. DOREY 2,620,746

LATCHING MEANS FOR HOPPER DOORS OF RAILWAY CARS

Filed Sept. 17, 1949 4 Sheets-Sheet 1

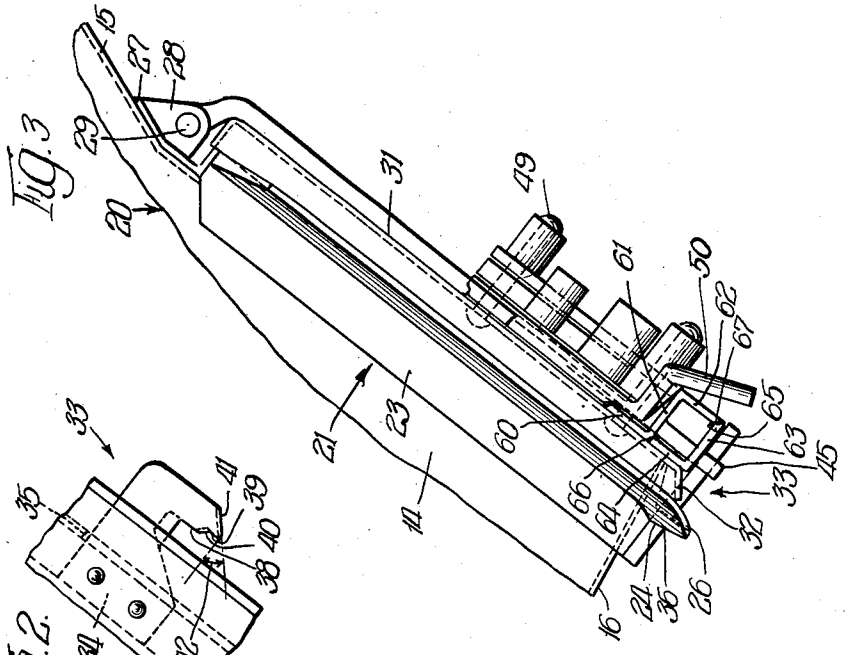


Fig. 3



Fig. 2

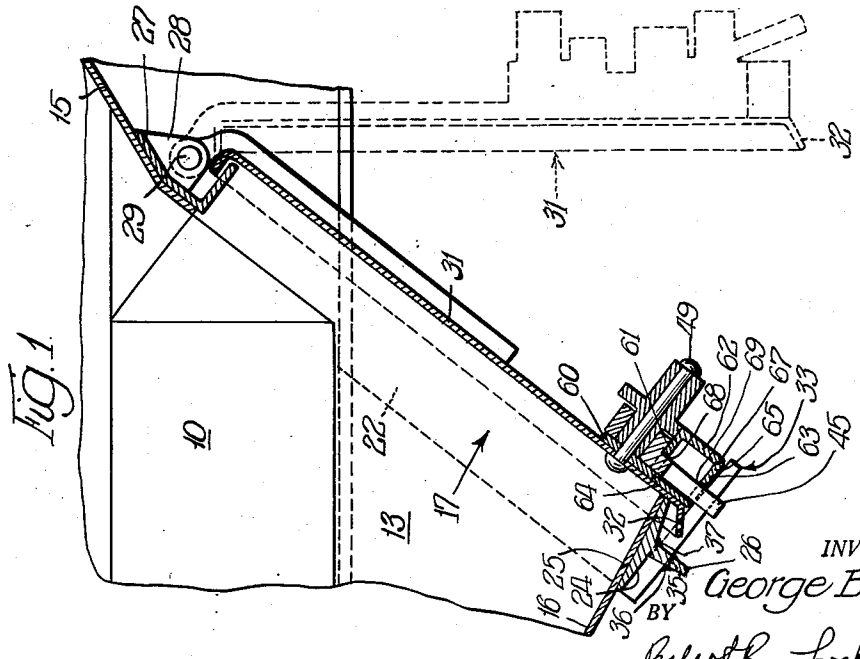


Fig. 1

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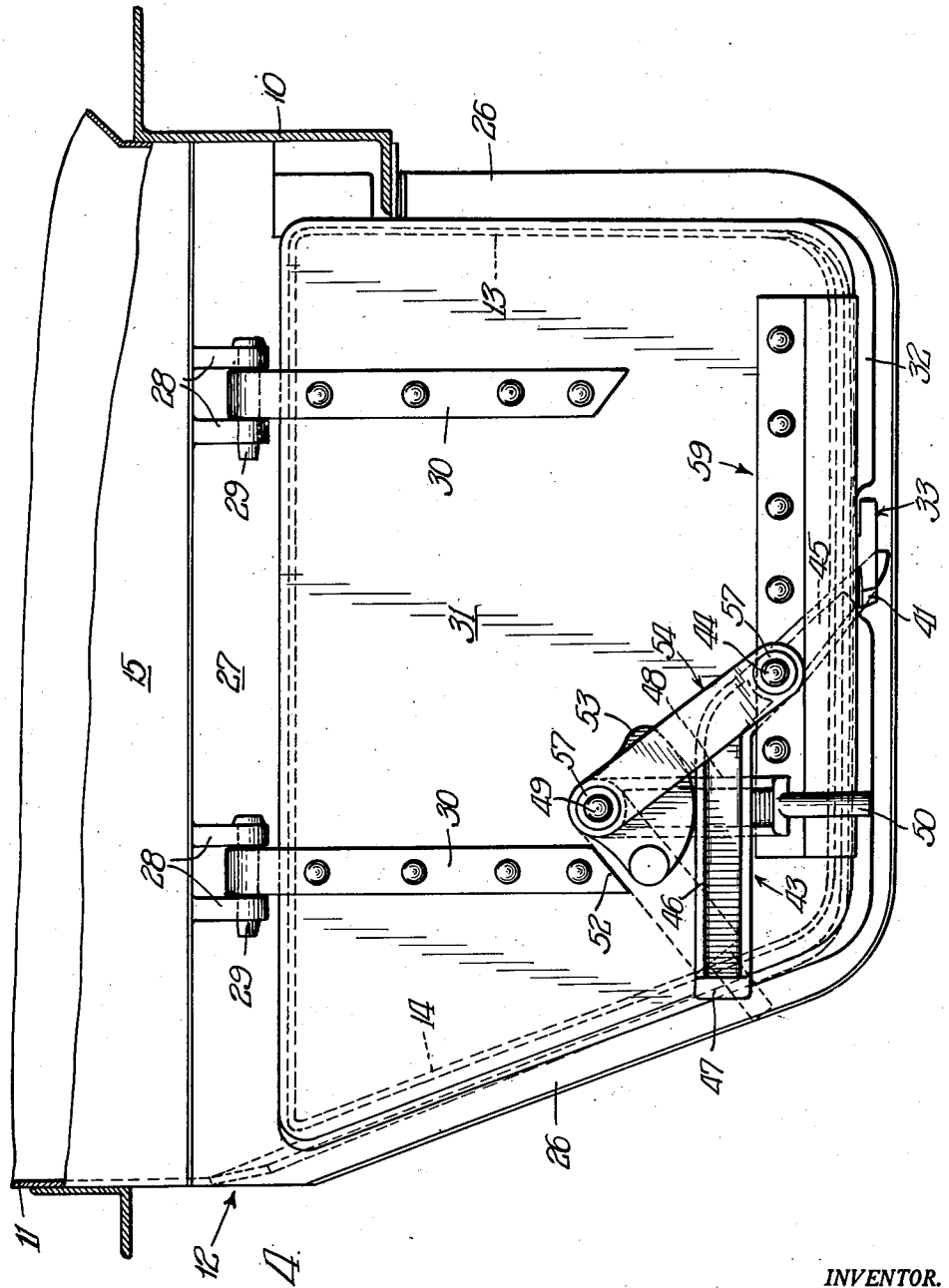



Fig. 4.

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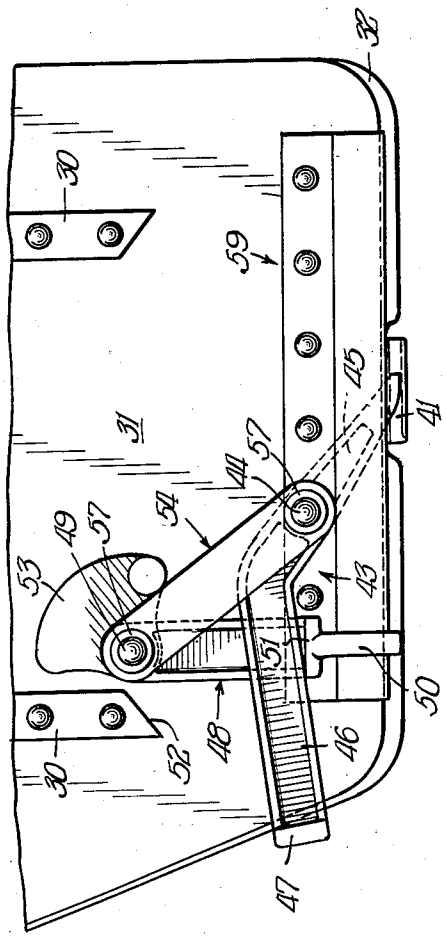



Fig. 5

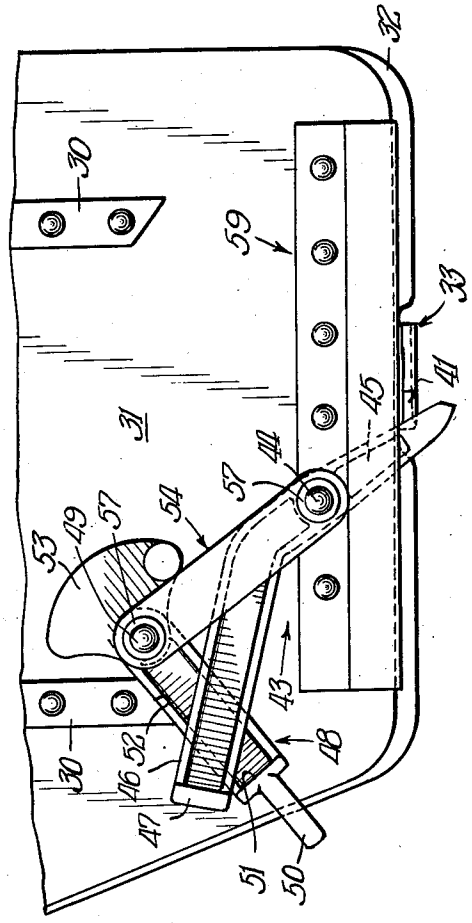


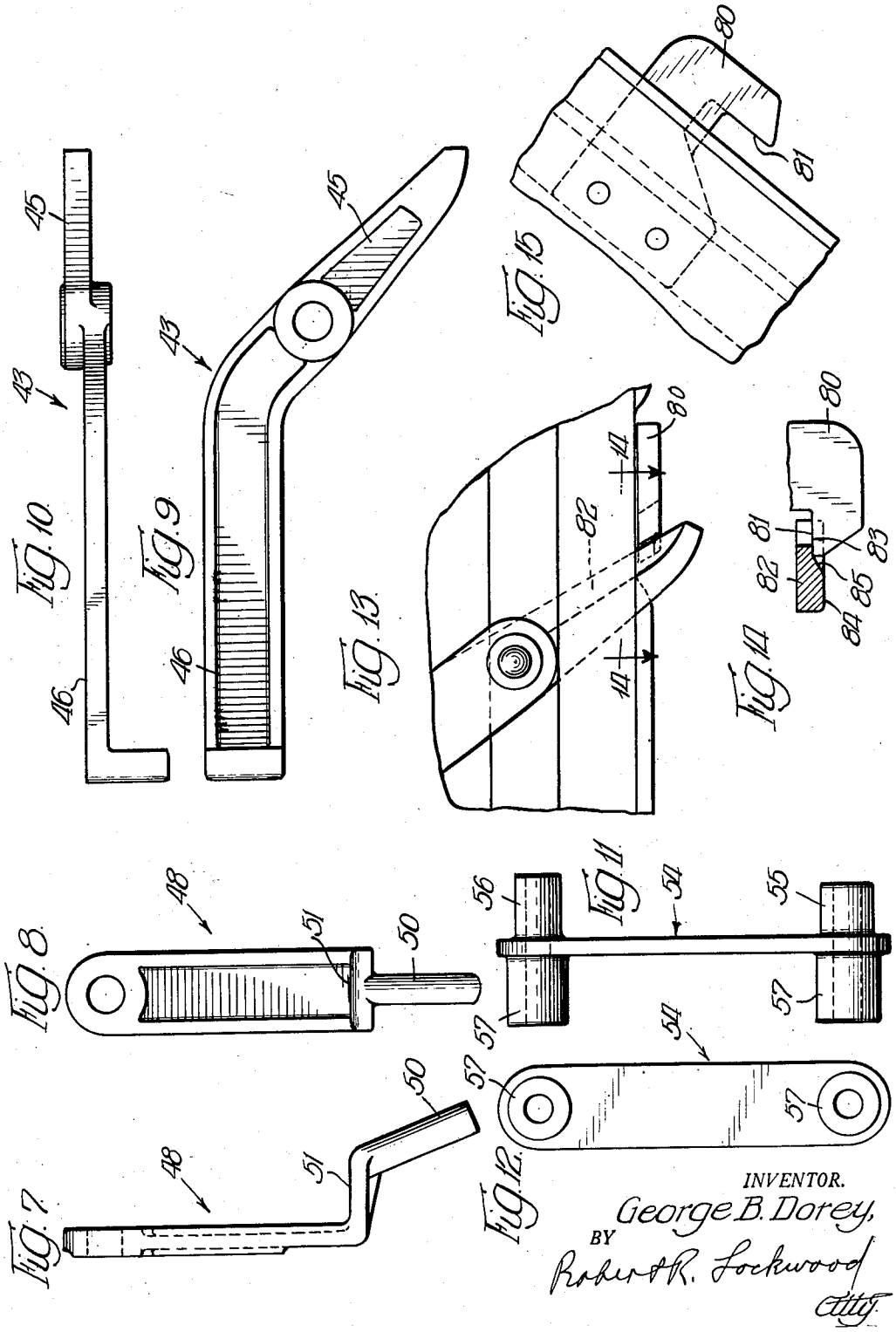

Fig. 6

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LATCHING MEANS FOR HOPPER DOORS OF RAILWAY CARS

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# UNITED STATES PATENT OFFICE

2,620,746

## LATCHING MEANS FOR HOPPER DOORS OF RAILWAY CARS

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12 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 the construction and arrangement of the latching means which is employed for holding the doors in the closed position.

This invention has to do particularly with that type of hopper door which is hinged along its upper edge and along the upper edge of a discharge opening and is arranged to assume a pendulate open position. Such a door is arranged to be swung to an inclined closed position to meet with a sloping floor extending to the lower edge of the hopper opening. In such a structure the swinging edge of the door in the open position lies in close proximity to the rail. It is conventional practice to place a movable conveyor underneath the door for conveying lading from the hopper opening outwardly therebeyond. One of the objects of this invention is to construct a latch mechanism for the door which has no part extending beyond the swinging edge of the door when it is opened.

Other objects of this invention are: To provide for retracting a portion of the latch mechanism from beyond the swinging edge of the door where it is positioned in the closed position of the door to hold the same shut; to provide for displacing the latch from its retracted position; to pivotally mount a lifting handle on the door and arrange it to swing so that it projects beyond an edge thereof, thereby providing a purchase outwardly of the door for closing the same; to operatively interconnect the latch and the lifting handle so that the former is moved by movement of the latter; and to provide different arrangements of interengaging surfaces on the keeper and latch.

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

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

Figure 1 is a view in longitudinal section through a portion of a hopper of a hopper type railway car showing by full lines the door in the closed position and by broken lines the door in the open position, the door being provided with a latch mechanism constructed in accordance with this invention;

Figure 2 is a top plan view of the shouldered keeper which is secured to the underside of the floor of the hopper and projects flatwise therefrom;

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Figure 3 is a view, in side elevation, of a door and a portion of the hopper, the door being shown in the closed position and provided with the latch mechanism of the present invention;

Figure 4 is a view of the door in front elevation, the door being shown in the closed position;

Figures 5 and 6 are views, in front elevation, of the door showing the latch bar and associated parts in different operating positions;

Figure 7 is a view, in side elevation, of a lifting handle which is pivotally mounted on the door;

Figure 8 is a view, in front elevation, of the lifting handle shown in Figure 7;

Figure 9 is a view, in front elevation, of a latching bar which is pivotally mounted on the door;

Figure 10 is a view, in top plan, of the latching bar shown in Figure 9;

Figure 11 is a view, in side elevation, of a latch strap which is employed in mounting certain of the parts on the door;

Figure 12 is a view, in front elevation, of the latch strap shown in Figure 11;

Figure 13 is a view, in front elevation, of a modified form of latch bar and cooperating keeper;

Figure 14 is a detail sectional view taken along the line 14—14 of Figure 13; and

Figure 15 is a top plan view of the modified form of shouldered keeper which is illustrated in Figures 13 and 14.

Referring now to Figures 1 through 6 of the drawings, it will be observed that the reference character 10 designates a center sill of a hopper type railway car one of the side walls of which is indicated at 11. A hopper indicated generally at 12 is located between the center sill 10 and the side wall 11. The hopper 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 in Figure 1. Surrounding the opening 17, defined by the walls 13, 14, 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 portion 24 extending along the lowermost edge of the floor 16 and interconnecting 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 and that they include a wall 25 overlying the sides 13 and

14 and floor 16 and an outstanding flange 26 lying midway of the wall 25. The frame 20 is completed by an upper beam portion 27 which extends along the lower edge of the top wall 15. Hinge butts 28 extend downwardly from the upper beam portion 27 for carrying hinge pintles 29 that support the hinge straps 30 which may be secured, as by rivets, to the outer surface of a door that is indicated, generally, at 31. The door 31 is generally pan shaped and has an outflared flange 32 overlying the lowermost edges of the hopper 12 around the opening 17 when the door 31 is closed.

With a view to locking the door 31 in the closed position, a shouldered locking element or keeper, indicated generally at 33 in Figure 2, is rigidly mounted flatwise on the underside of the sloping floor 16. Specifically it is mounted, as indicated more clearly in Figure 1, on the outer surface of the wall 25 of the frame 20. The keeper 33 includes a body portion 34 which extends through a slotted opening 35 in the outstanding flange 26 of the frame 20. The keeper 33 is preferably welded around the sides of the opening 35 as indicated at 36 and 37 in Figure 1. The body portion 34 extends beyond the floor 16 in the general direction thereof and beyond the same. It is formed with a shouldered portion which includes a main locking shoulder 38, Figure 2, a secondary shoulder 39 and an intervening inclined wedging section 40. Leading to the secondary shoulder 39 there is a beveled approach edge 41 which is disposed at an acute angle 42 to the general direction of movement of the door 31 for the purpose of automatically displacing a latching bar 43, Figures 9 and 10, which is pivotally carried by the door 31 in a manner to be described.

The latching bar 43 is pivotally mounted on the outer face of the door 31 at 44 so as to swing in a plane which is substantially parallel with the plane of the door 31. The pivot 44 is located to one side of and above the keeper 33 when the door 31 is closed. Extending in opposite directions from the pivot 44 are arms 45 and 46 which together make up the latching bar 43. The arm 45 extends downwardly, as indicated in Figure 4, at an incline from the pivot 44 so as to engage the keeper 33. The arm 46 extends substantially horizontally outwardly toward the outer side of the door 31 and is there formed with an outwardly extending operating head 47. The arm 46, which constitutes the operating arm of the latching bar 43, is considerably heavier than the companion arm 45 and, therefore, it functions to bias the latter to the latching position with the keeper 33.

The arm 45, in the normal latching position shown in Figure 4 when in engagement with the keeper 33, projects beyond the swinging or lowermost edge of the door 31 and appreciably beyond the keeper 33. This provides for latching security by guarding against separation of the keeper 33 from the latching bar 43 due to deflection of the sloping floor 16 or other variations in the parts making up the hopper 12. This improved construction, however, provides for automatic retraction of the projecting end of the arm 45 when the door 31 swings freely to the open position by withdrawing the outer end automatically to a position within the swinging clearance of the door 31 proper as shown more clearly in Figure 5. This movement of the latching bar 43 is accomplished by allowing the weighted arm 46 to gravitate beyond its normal position as here



shown. This causes the latching end of the arm 45 to be moved to a position within the swinging clearance of the door 31 as shown.

With a view to returning the latching bar 43 from its retracted position, as shown in Figure 5, a combined door lifting and latch operating lever or lifting handle 48, Figures 7 and 8, is pivotally mounted on the door 31 at 49. The lifting handle 48 is provided with a handle portion 50 adjacent its swinging end which may be grasped by the hand of the operator. Intermediate the handle portion 50 and the pivot 49 there is provided a seat 51 on which the operating arm 46 of the latching bar 43 bears when the arm 45 is in the fully retracted position as shown in Figure 5. The lifting handle 48 in its normal position depends in a substantially vertical position with the handle portion 50 contained within the swinging clearance of the door 31. The lifting handle 48 is swingable upwardly and outwardly to dispose the handle portion 50 outwardly of a side edge of the door 31. Its upward swinging movement is limited by a stop 52 which may be the lower end portion of one of the door hinge straps 30. By reason of the engagement of the seat 51 of the lifting handle 48 and the latch arm 46, the upward swinging movement of the lifting handle 48 effects a lifting movement of the latch arm 46 beyond its normal latching position to place the arm 45 in position where it can engage at its lower end with the beveled approach edge 41 of the keeper 33 as shown more clearly in Figure 6. In order to hold the latching bar 43 in the latched position, shown in Figure 4, a locking dog 53 is provided. As shown it is mounted for rocking movement about the pivot 49.

The mounting of the latching bar 43 and associated parts is effected preferably through the medium of a latch strap 54, Figures 11 and 12, having integral ferrules 55 and 56 for respectively receiving the latch bar 43 and the lifting handle 48 together with the locking dog 53. Outwardly of the latch strap 54 are projections 57 which constitute fulcrums on which a removable bar (not shown) is adapted to engage in cooperation with the operating head 47 for prying the latching bar 43 to either the closed or the open position. The centers of the projections 57 coincide with the centers of the respective ferrules 55 and 56 and rivets extend therethrough as indicated to hold the parts in position on the door 31.

Extending along the swinging edge of the door 31 a reinforcement 59 is provided which is preferably in the shape of a Z with one flange 60, Figure 1, overlying and secured to the door 31 by suitable means, such as rivets. The reinforcement 59 includes a web 61 which extends outwardly and is slotted to accommodate the arm 45 of the latching bar 43 therethrough. The opposite flange 62, which is spaced outwardly from the door 31, extends downwardly toward the swinging edge thereof. Extending for an appreciable distance to each side of the arm 45 is an angle shaped member 63 which is disposed with one flange 64 overlying the door and the adjacent flange 65 disposed in parallelism with the web 61 of the Z-shaped reinforcement 59. The angle member 63 may be welded to the reinforcement 59 as indicated at 66 and 67, thereby providing a box shaped reinforcement. It will be noted that the lower portion of the latch arm 45 is guided by slots 68 and 69 which are formed in the flanges 61 and 65 respectively.

In operation it will be assumed that the door 31

is in the open pendant position as shown in Figure 5. The operator grabs the handle portion 50 and swings the lifting handle 48 outwardly and upwardly until it engages the stop 52 as illustrated in Figure 6. During this movement he swings the door 31 to the closed position. It will be observed that the outward swinging movement of the lifting handle 48 picks up the operating end 46 of the latching bar 43 on the seat 51 and thereby so positions the latching end 45 that continued movement of the door 31 in a closing direction operates to further displace the latching bar 43 by reason of engagement with the acute angle beveled approach edge 41 of the keeper 33. The latch portion of arm 45 then engages with the secondary shoulder 39 and retains the door 31 in a position which is not the completely closed position. The operator then releases the lifting handle 48. Thereafter he bears down on the operating end 47 of the latching bar 43 and forces the latch arm 45 from the secondary shoulder 39 to the final or fully latched position in engagement with the shoulder 38. This final operation may be conveniently effected by inserting a removable bar between the underside of the lower projection or fulcrum 57 and the upper side of the operating head 47. The locking dog 53 then is swung into engagement with the operating arm 46 of the latching bar 43 and the parts then assume the relative positions shown in Figure 4.

For opening the door 31 the foregoing operations are reversed. First, the operator swings the dog 53 to an over-balanced released position as shown in Figure 6. Then a removable bar may be inserted between the upper side of the lower projection or fulcrum 57 and the underside of the operating head 47. By upward movement of the outer end of the operating bar the latching bar 43 is released from the keeper 33. It is to be observed that the complete opening operation cannot be carried out through the medium of the lifting handle 48. The reason for this is that the stop 52 is so positioned as to limit further movement of the lifting handle 48 the seat 51 of which is still in engagement with the underside of the arm 46. In this position, as shown in Figure 6, the latching end of the arm 45 is in engagement with the secondary shoulder 39. In this manner the safety of the operator is assured since an attempt to release the latching bar 43 in such an unauthorized manner by movement of the lifting handle 48 merely transfers the latching load on the keeper 33 from the main locking shoulder 38 to the secondary locking shoulder 39. Thus the door 31 will not be opened to endanger the operator.

The takeup movement of the latching bar 43, as indicated in Figure 6, which is effected by movement of the lifting handle 48 obviates the necessity of providing a long and unwieldy beveled approach on the keeper 43 such as is necessary in certain types of latching keepers previously used. Moreover, the door closing operation is facilitated inasmuch as the retarding influence incidental to the displacement of the latching bar 43 by impingement on the keeper 33 is substantially eliminated.

An alternate manner of obtaining the desired wedging effect between the latching bar and keeper is shown in Figures 13, 14 and 15 of the drawings. Here a shouldered keeper is indicated at 80 which corresponds generally to the keeper 33. However, the keeper 80 includes only a single shoulder 81. Stepped shoulders are formed on a latching bar 82 which corresponds to the latching bar 43. These shoulders are indicated at 83 and 84 and are interconnected by a wedging section 85. With this construction a most favorable downward pull is exerted on the door 31 during the movement of the latching bar 82 to the fully latched position.

Since certain further 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 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 shouldered keeper carried by said floor and projecting beyond the same with the shouldered portion positioned outwardly of said door in its closed position, a latching bar pivotally mounted on said door to swing in a plane substantially parallel thereto, said bar having a portion projecting forwardly beyond the swinging edge of said door to engage said shouldered portion of said keeper said projecting portion of said latching bar being arranged to move upwardly towards the hinge axis of said door to a position within the swinging clearance thereof upon disengagement from said locking element, and means for returning said latching bar to latching position including a lifting handle pivotally mounted on said door to swing upwardly and outwardly towards a side edge thereof and to engage said latch bar and move it to released position.

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 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, means for latching said door to said hopper including a shouldered keeper carried by said hopper and a latch bar pivotally mounted on said door to swing in a plane substantially parallel thereto, said latch bar being arranged to gravitate to a position in the plane of the shoulder of said keeper, and means independent of said keeper for swinging said latch bar out of the path of said shoulder including a door lifting handle pivotally mounted on said door having a seat adapted to engage said latch bar and move the same as aforesaid upon the application of lifting force thereto.

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 towards the lower side of said opening for directing lading thereto and said door being swingable to meet the lowermost edge of the said floor in closed position, in combination, a shouldered keeper carried by said hopper and a locking bar pivotally mounted on said door to swing in a plane parallel with the plane thereof,

said bar being pivoted intermediate its ends to present oppositely extending arms, one of said arms constituting a latching arm extending downwardly from its pivotal axis to engage with said keeper and the other of said arms extending outwardly from the pivot axis towards a side edge of said door and being of greater weight than the companion arm to bias the latter into engagement with said keeper, and means independent of said latching arm for displacing the same towards latching position including a handle pivotally mounted on said door and lying in a pendant position parallel to the plane thereof and movable upwardly and outwardly to present a lifting handle portion adjacent said side edge of said door, said handle intermediate its ends having a seat adapted to engage said weighted arm of said latch bar and move the same as aforesaid.

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 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 shouldered keeper rigidly mounted on said hopper and extending flatwise beneath said floor and with its shouldered portion projecting therebeyond, said keeper beyond the shoulder having an inclined runway surface leading to the shouldered portion, and a latch pivotally mounted on said door to swing in a plane substantially parallel with the plane thereof for engagement with said shoulder of said keeper, said latch having a striker surface adapted to ride on said runway surface for displacement of said latch by engagement between said surfaces, said latch being adapted to approach said keeper with an upward and sideward sweeping movement and biased to gravitate towards latching position to dispose said striker surface beyond said runway surface, and a lever pivoted on said door having a seat for cooperating with said latch and holding said striker surface in position to engage said runway surface.

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 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 keeper rigidly mounted on said hopper and having stepped shoulders including a main latching shoulder for holding said door in fully closed position and a secondary shoulder for retaining said door in partially closed position, said respective shoulders being connected by an inclined wedging surface and there being a projecting inclined runway leading to said secondary shoulder and lying to one side of said main shoulder, a latch bar pivotally mounted on said door to swing in a plane substantially parallel thereto, said latch bar being biased to gravitate to latching position and arranged to swing beyond said runway to lie in the plane of said main shoulder, and a lever pivoted on said door having a seat cooperating with said latch bar for holding it in position to coact with said runway upon closing movement of said door.

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 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 door lifting handle pivotally mounted on said door to swing in a plane parallel thereto and arranged to normally gravitate to a pendant position and movable upwardly and outwardly towards a side edge of said door to present a lifting handle portion at the side thereof, means for retaining said door in closed position including a shouldered keeper carried by said hopper and a latching bar pivotally mounted on said door to swing in a plane parallel to said door and arranged to interlock with the shouldered part of said keeper, and a pivotally mounted locking dog for engaging said latching bar, said dog and lifting handle being mounted on a common pivot.

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 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, and cooperating interlocking latching means carried by the door and hopper respectively, in combination, a lifting handle pivotally mounted on said door, said handle being adapted to gravitate to a pendant position parallel to the plane of said door and being swingable upwardly to project the handle beyond a side edge of said door.

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 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, and cooperating interlocking latching means carried by the door and hopper respectively, in combination, a lifting handle pivotally mounted on said door, said handle being adapted to gravitate to a pendant position parallel to the plane of said door and being swingable upwardly to project the handle beyond a side edge of said door, and stop means on said door limiting the upward sweep of said handle.

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, and cooperating interlocking latching means carried by the door and hopper respectively, in combination, a lifting handle pivotally mounted on said door, said handle being adapted to gravitate to a pendant position parallel to the plane of said door and being swingable upwardly to project the handle beyond a side edge of 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 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, means for latching said door to said hopper including a shouldered keeper carried by said

hopper and a latch bar pivotally mounted on said door to swing in a plane substantially parallel thereto, said latch bar being arranged to gravitate to a position behind the shoulder of said keeper, and a lever pivoted on said door having a seat cooperating with said latch bar for holding it away from said position behind the shoulder of said keeper where it is moved automatically to latching position in cooperation with said keeper when said door is swung to the closed position.

11. 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, means for latching said door to said hopper including a shouldered keeper carried by said hopper and a latch bar pivotally mounted on said door to swing in a plane substantially parallel thereto, said latch bar being arranged to gravitate to a position behind the shoulder of said keeper, and means independent of said keeper for holding said latch bar away from said position behind said shoulder including a lever pivotally mounted on said door having a seat adapted to engage said latch bar and hold it as aforesaid while said door is swung to the closed position.

12. 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 shouldered keeper rigidly mounted on said hopper with its shouldered portion projecting beyond said floor, said keeper beyond the shoulder having an inclined runway surface leading to the shouldered portion, a latch pivotally mounted on said door for engagement with said shoulder of said keeper and having a striker surface adapted to ride on said runway surface for displacement by engagement between said surfaces and biased to gravitate towards latching position to dispose said striker surface beyond said runway surface, and means independent of said keeper for holding said striker surface in position to engage said runway surface including a lever pivotally mounted on said door having a part to engage said latch and hold it as aforesaid while said door is swung to the closed position.

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## REFERENCES CITED

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

UNITED STATES PATENTS


| Number | Name | Date |
|---|---|---|
| 1,615,792 | Campbell | Jan. 25, 1927 |
| 1,620,097 | Hindahl | Mar. 8, 1927 |
| 1,733,736 | Kadel | Oct. 29, 1929 |
| 1,820,136 | Hankins et al. | Aug. 25, 1931 |