Oct. 5, 1937. W. F. DIETRICHSON 2,094,979

RAILWAY HOPPER CAR

Original Filed June 19, 1933 3 Sheets-Sheet 1

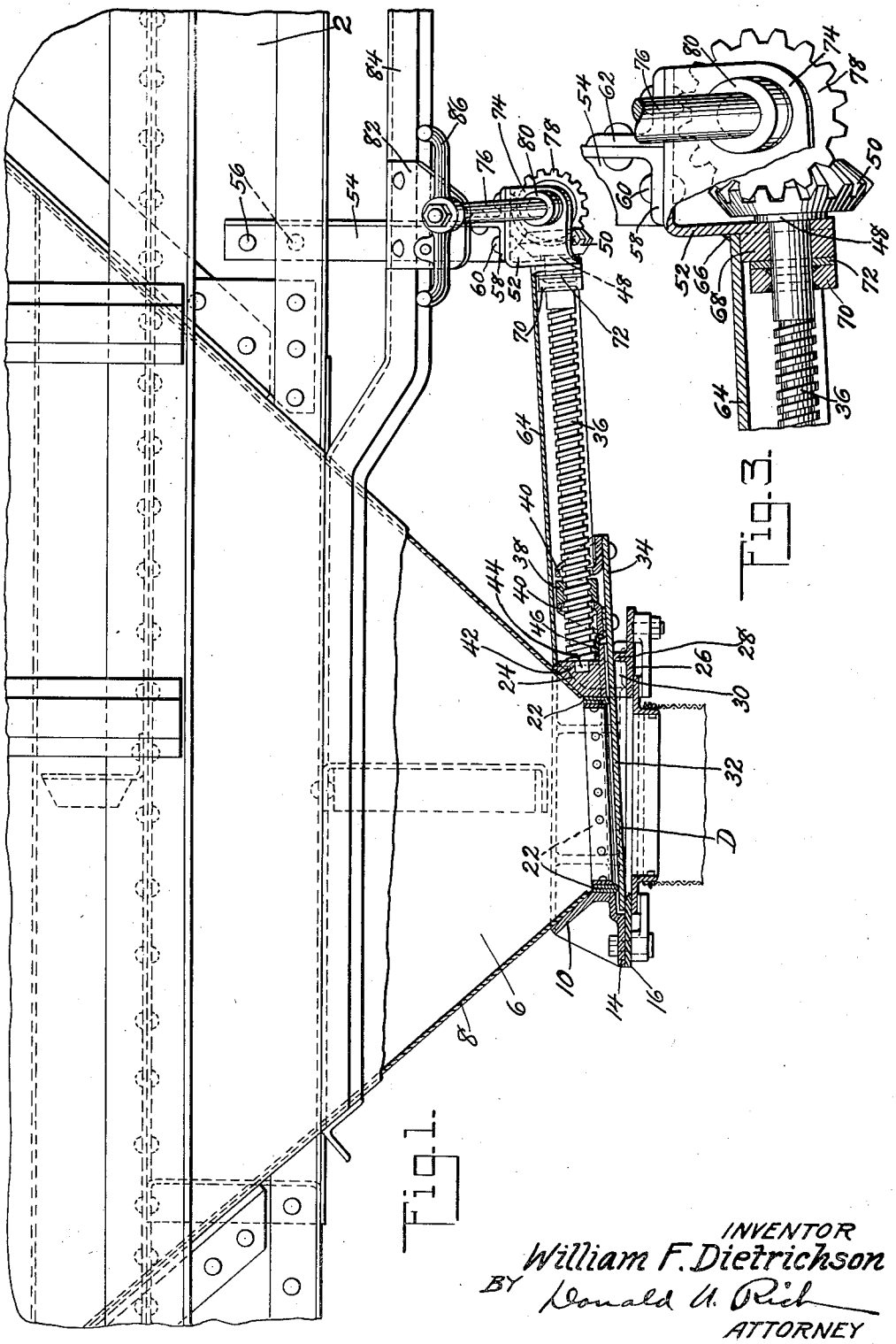

Fig. 1.

Fig. 3.

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RAILWAY HOPPER CAR

Original Filed June 19, 1933 3 Sheets-Sheet 2

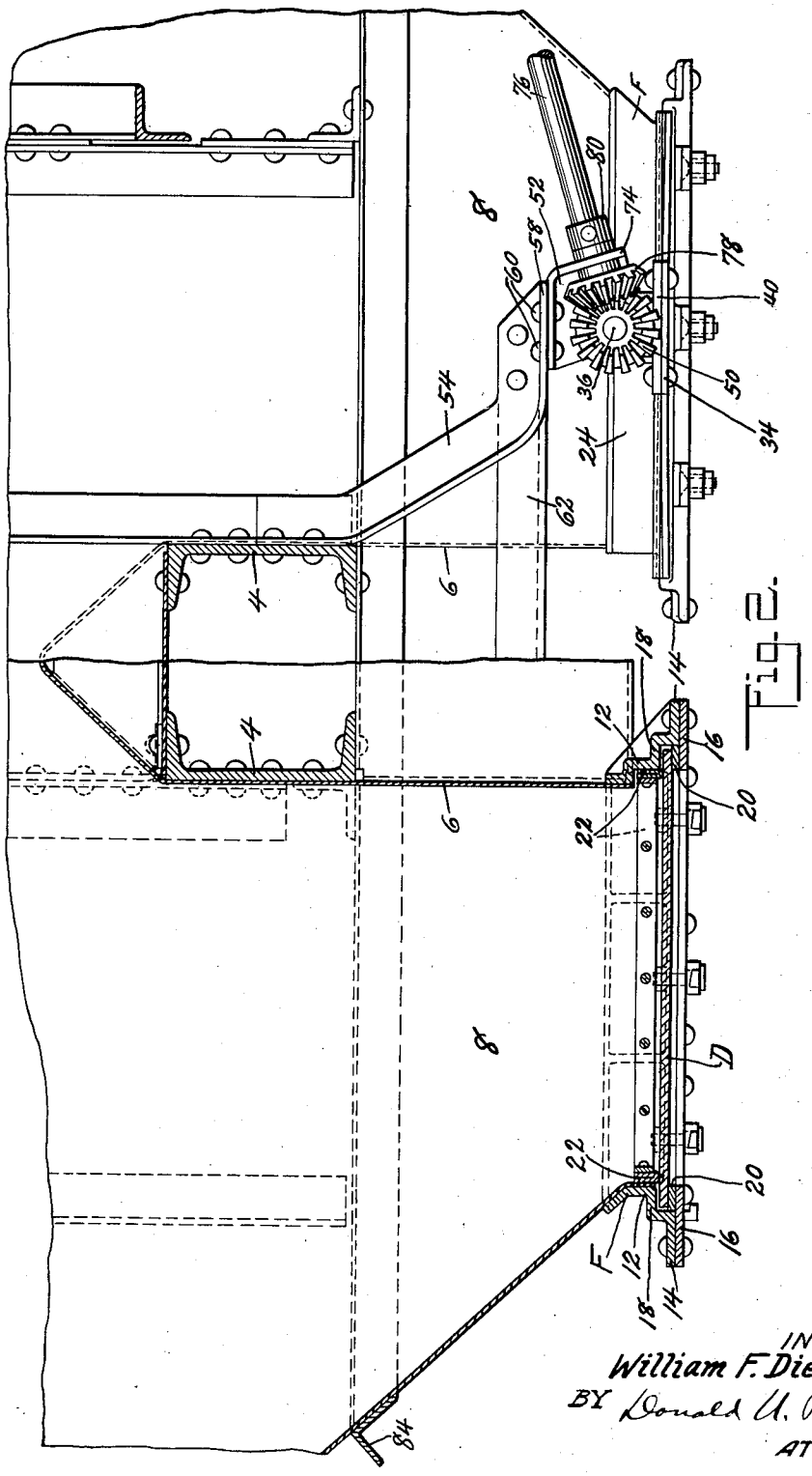

Fig. 2.

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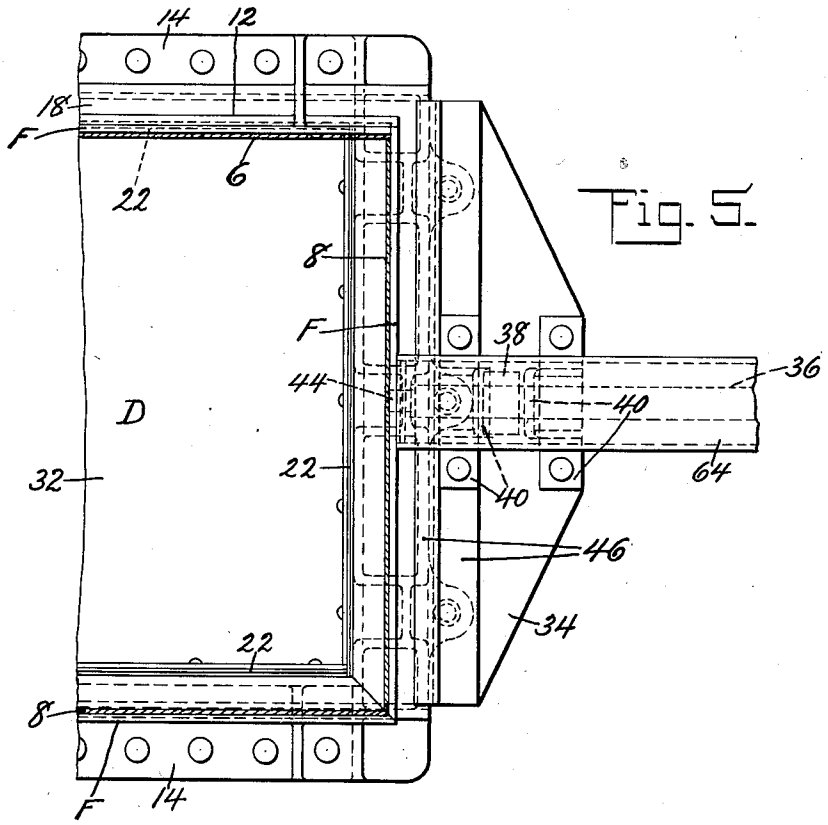
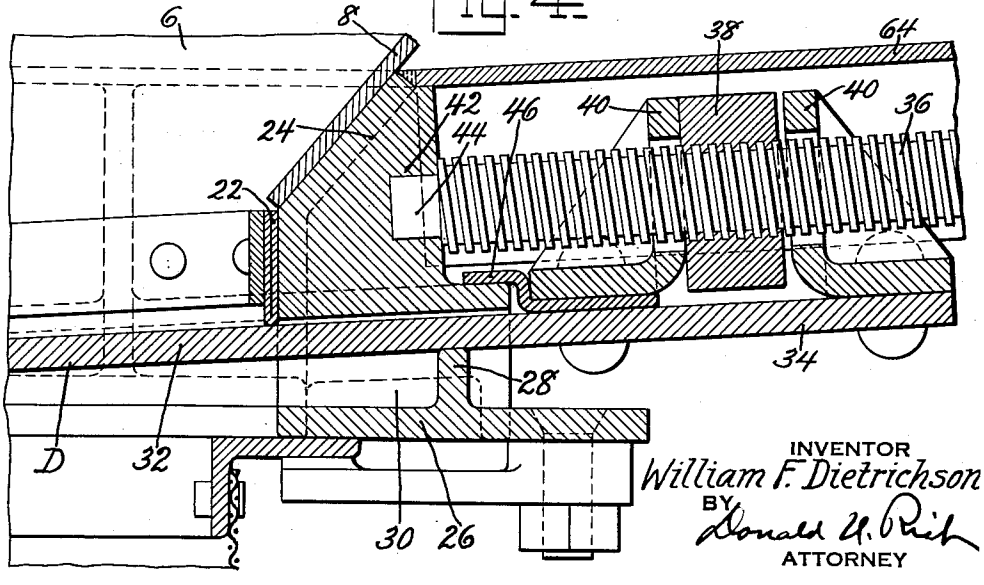


Fig. 5.

Fig. 4.



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RAILWAY HOPPER CAR

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Original application June 19, 1933, Serial No. 676,465. Divided and this application September 20, 1934, Serial No. 744,782

8 Claims. (Cl. 105—282)

This invention relates generally to railway hopper cars adapted particularly for transportation of cement or other fine or granular materials and is a division of my application filed June 19, 1933, Serial No. 676,465, for Railway hopper car.

One object of this invention is the provision of means for closing the hoppers against discharge of lading therethrough.

Another object of this invention is the provision of new and improved means for operating hopper doors to and from closed position.

A further object of this invention is the provision of a railway car having hoppers, the discharge outlet portions of which are closed by doors slidable longitudinally with respect to the car body; the invention also including an actuating means for the doors so arranged as to be operative from adjacent the side wall of the car.

Other objects and advantages of this invention will be apparent from the following description taken in conjunction with the accompanying drawings in which:

Figure 1 is a side elevation of a portion of a railway car, certain parts being shown in section, the view also showing the new and improved hopper outline arrangement of the actuating means for the door.

Fig. 2 is a front view of a pair of hoppers of the form shown in Fig. 1, one of the hoppers being shown in section.

Fig. 3 is an enlarged fragmentary view, partly in section, showing the operating means for the screw shaft shown in Figs. 1 and 2.

Fig. 4 is an enlarged fragmentary sectional view of a part of the construction shown in Fig. 1, said view including a portion of the hopper with its door supporting frame and further showing a part of the actuating shaft, and

Fig. 5 is a top plan view of the construction shown in Fig. 4.

Referring now more particularly to the drawings, Fig. 1 shows a portion of a hopper car which is more or less conventional and comprises a center sill indicated at 2 which, as shown more clearly in Fig. 2, is formed of a pair of channels 4 to the webs of which are secured the depending inside sheets 6 of spaced hoppers 8. The remainder of the sheets of the hoppers slope inwardly and downwardly to the mouth or lower end of the hopper as clearly shown in the drawings.

The present invention is directed primarily to the door arrangement for closing the lower ends of the hoppers and, as can be clearly seen in the drawings, secured to the lower end of the hopper is a frame indicated in the drawings generally at F, said frame being adapted to support the hopper door D and also serving to reinforce the walls of the hopper as will be apparent.

The frame F is preferably though not necessarily a casting and, as shown clearly in the drawings, generally conforms to the contour of the hopper at the lower end portion thereof. The frame is suitably connected to the hopper as by being welded or riveted and the rear end wall 10 thereof and the side walls 12 are provided with horizontally extending flanges 14 which serve as attaching elements for door supporting plates 16. The door supporting plates 16, as clearly shown in Fig. 2, cooperate with offset portions 18 of the frame F to form guideways for the door D which are arranged longitudinally of the car. Supported by the plates 16 are wear plates 20 on which the door D rides during its movements to and from closed position. Secured within the frame F is a sealing member in the form of a flexible gasket 22 which is adapted to cooperate with the door D to seal the hopper against discharge of lading when the door is in closed position. The front wall of the frame F is shown at 24 and, at the front wall, the door D is supported by a tie 26 formed as an integral part of the frame and provided with an upstanding supporting shelf 28; the tie 26 being spaced from the remainder of the frame to provide a slot 30 through which the door D is shiftable.

The door D comprises a metal plate 32 of a length sufficient to extend beyond the hopper frame F when the door is in closed position whereby to provide a supporting means 34 for the door actuating mechanism. The actuating mechanism for the door comprises a screw shaft 36 extending through and threadedly engaged with a nut 38 arranged between stops 40 secured to the extending portion 34 of the door. Formed with the front portion or wall 24 of the frame F is a bearing block 42 into which the reduced end portion 44 of the screw shaft 36 extends, block 42 constituting an end thrust member as will be apparent hereinafter. Attached to the extending portion of the door and retained thereon by the fasteners which secure the innermost stop member 40 thereto is a flashing 46 which engages over a portion of the bearing block 42, as clearly shown in Fig. 1, when the door is in closed position, whereby to prevent drainage of moisture into the hopper.

In the construction shown in the drawings, the

door is inclined upwardly from the rear to the forward portion of the hopper and the screw shaft **36** is correspondingly inclined upwardly and its outer end is connected with the hub **48** of a beveled gear **50** supported in a bracket **52** carried by a support **54** riveted as at **56** to the center sill **2**. The support **54**, in the instance shown, is an angle having its lower end portion bent to provide an attaching flange **58** to which the bracket **52** is riveted as shown at **60**. For stiffening the bracket **52** and for providing a further supporting means therefor, an angle brace **62** is riveted to the bracket and to the angle **54**, as clearly shown in Figs. 1 and 2.

Enclosing the screw shaft **36** is a channel-shaped housing **64** welded at one end portion to the bearing block **42** and having its opposite end portion welded to the bracket **52** as shown at **66** and to a bearing plate **68** through which the screw shaft **36** extends; said bearing plate **68** being also suitably connected to the bracket **52** and providing a supporting element for the screw shaft **36**. It will be apparent that the housing **64** provides a bracing element between the hopper and the bracket **52**.

The before-mentioned nut **38** is preferably squared and is arranged within the housing **64** thereby being restrained against rotation relative to the screw shaft **36**. The screw shaft **36** extends through the bracket **52** into the hub **48** of the beveled gear **50** and is provided with a bearing collar **70** welded or otherwise rigidly attached thereto and adapted to bear against a thrust bearing plate **72** interposed between said collar and the bearing plate **68**.

The bracket **52** is also provided with a bearing **74** through which the lower end portion of a drive or operating shaft **76** extends, said shaft carrying a beveled gear **78** arranged in meshing relation with the gear **50** and adapted upon rotation to drive the latter to actuate the screw shaft **36**.

The doors D of the hoppers are movable longitudinally of the car body as will be apparent from the drawings but the drive shaft **76** is arranged transverse to the longer dimension of the car and extends upwardly at an incline from the bracket **52** and is provided with a collar **80** adjacent its lower end portion adapted to bear against the bearing **74**. The drive shaft **76** extends through and is supported by a bracket **82** secured to and depending from a supporting element **84** in the form of an angle attached to and extending between the adjacent hoppers as clearly shown in Figs. 1 and 2. At its upper end portion the drive shaft **76** is provided with an operating handle **86**.

From the above description it is believed that those skilled in the art will recognize that the construction shown in the present invention provides doors which are movable or shiftable longitudinally of the car body and thus, when in open position, do not project beyond the side walls of the body as may be the case in the hopper doors shiftable transversely of the car. The screw shaft **36** is arranged substantially longitudinally of the car body but the drive shaft **76** is arranged transversely of the car body. In the construction of the present invention it can readily be seen that the drive shaft **76** may be of a length such that it will not project beyond the vertical plane of the side wall of the car.

It will also be apparent that upon rotation of the drive shaft **76** in one direction the screw shaft **36** is actuated to shift the door D from closed to open position, the end portion **44** of said shaft bearing against the bearing block **42** during this movement. Obviously reversal of direction of movement of drive shaft **76** causes rotation of shaft **36** in the opposite direction and hence a return of the door D to closed position with respect to the hopper.

The drawings herein illustrate one embodiment of the present invention but it is to be understood that they are for illustrative purposes only and various changes in the form and proportions of the construction may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. In a railway hopper car, a hopper door arrangement comprising a frame secured to the hopper at its discharge end portion and provided with spaced guideways arranged in a direction longitudinally of the car, a door arranged in said guideways and slidable therein in a direction longitudinally of the car, a screw shaft connected with the door and having bearing engagement against the frame, said screw shaft being arranged in a direction longitudinally of the car, bracket means supporting the free end of the screw shaft, a housing covering said screw shaft and interposed between and supported by the bracket and said frame, an operating shaft arranged in a direction transverse of the car and having one end portion supported by the before-mentioned bracket, gearing connecting the operating shaft and screw shaft and arranged within the bracket, and additional bracket means secured to the hopper for supporting the opposite end portion of said operating shaft.

2. In a railway hopper car, a sliding door for closing the hopper, sealing means in the hopper engaging the door when the latter is in closed position, a bearing at the hopper beneath and relative to which the door is slidable to and from closed position, a screw shaft having one end portion rotatably supported by the bearing and its opposite end portion supported by means supported from a car part, brackets supported by the door and through which the screw shaft extends, a nut nonrotatably mounted on the screw shaft between the brackets and cooperative with the latter for effecting sliding movement of the door during actuation of the screw shaft, and a shield on the door overlapping a portion of the bearing when the door is in closed position.

3. In a railway hopper car, a door for closing the hopper, means at the outlet end of the hopper providing guideways for supporting the door for sliding movement longitudinally of the car, said door having a part projecting beyond the hopper when the door is in closed position to provide a supporting portion, spaced bracket members on the supporting portion, a bearing member at the hopper, a screw shaft arranged longitudinally of the car and extending through the bracket members and having one end portion rotatably supported in said bearing member, means supported by a car part for supporting the opposite end portion of the screw shaft, a drive shaft arranged transversely of the car and operatively connected with the screw shaft to rotate the latter, a housing covering the screw shaft and extending between the bearing member and the supporting means for the screw shaft, and a nut on the screw shaft betwen the bracket members and restrained against rotation by said housing, said nut being adapted to contact with said bracket members

during rotation of the screw shaft to effect sliding movement of the door.

4. In a railway hopper car having an underframe including sill members, and a hopper having its discharge end portion positioned below the sill members, a hopper door arrangement comprising a frame secured to the hopper at its discharge end portion and provided with spaced guideways, a door slidably supported in the guideways, said frame at its forward end portion being formed with a slot through which said door extends and is movable, a rotatable actuating screw shaft, an end thrust member on the frame for supporting one end portion of the shaft, bracket means supported by a car part for supporting the opposite end portion of the shaft, spaced bracket members secured to the door and through which the shaft extends, and means engaged with said shaft and restrained against rotation relative to said shaft, said means being arranged between said bracket members and adapted to contact therewith during actuation of said shaft to shift said door.

5. In a railway hopper car, a sliding door for closing the hopper, a door frame secured to the hopper at its discharge end, means on the frame providing guides for the support of the sliding door, a substantially horizontal projection at one side of the frame beneath and relative to which the door is slidable to and from closed position, a bearing above the projection, a screw shaft having one end portion rotatably supported by the bearing and its opposite end portion supported by means carried by a car part, brackets supported by the door and through which the screw shaft extends, a nut non-rotatably mounted on the screw shaft between the brackets and cooperative with the latter for effecting sliding movement of the door during actuation of the screw shaft, and a shield on the door overlapping said projection when the door is in closed position.

6. In a railway hopper car, a sliding door for closing the hopper, a door frame secured to the hopper at its discharge end, means on the frame providing guides for the support of the sliding door, a substantially horizontal projection at one side of the frame beneath and relative to which the door is slidable to and from closed position, means carried by the frame and car for operating said door, and a shield on the door overlapping said projection when the door is in closed position.

7. In a railway hopper car, a sliding door for closing the hopper, sealing means in the hopper engaging the door when the latter is in closed position, a door frame secured to the hopper at its discharge end, means on the frame providing guides for the support of the sliding door, a substantially horizontal projection at one side of the frame beneath and relative to which the door is slidable to and from closed position, means carried by the frame and car for operating said door, and a shield on the door overlapping said projection when the door is in closed position.

8. In a railway hopper car, a sliding door for closing said hopper arranged for movement longitudinally of the car body, a door frame secured to the hopper at its discharge end, said door frame being inclined longitudinally of the car, means on said frame providing guides for the support of the sliding door, a substantially horizontal projection on one side of the frame beneath and relative to which the door is slidable to and from closed position, a bearing above the projection, a screw shaft having one end portion rotatably supported by the bearing and its opposite end portion supported by means carried by a car part, said screw being positioned in alignment with the inclined door frame, and terminating at its outer end above the lower clearance line of the car, brackets supported by the door and through which the screw shaft extends, a nut non-rotatably mounted on the screw shaft between the brackets and cooperative with the latter for effecting sliding movement of the door during actuation of the screw shaft, a shield on said door overlapping said projection when the door is in closed position, and a housing enclosing said screw shaft.

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