This invention relates to an improved sliding closure for the discharge opening of a load containing hopper.

Among the objects of this invention are: The provision of a construction for a sliding closure which will contain only a limited number of moving parts and be comparatively light in weight and of rugged construction; the provision of a construction involving a series of fulcrums carried respectively by the hopper and the closure and adapted to accommodate a removable lever therebetween for closing the closure in a step by step movement; to provide a construction which will permit of operation by a removable lever arranged to swing in a plane substantially parallel to the plane of movement of the closure; to provide a frame having main runways on which the closure is adapted to slide and extension runways adapted to support the gate in open position with the extension runways lying in different planes different from those in which the main runways lie; and to provide an improved locking and sealing means for the gate in closed position.

The improvement is especially concerned with sliding gates of hopper cars for closing the openings of hoppers and is of special importance in connection with gates which necessitate the exercise of considerable effort to effect a breakaway movement of the gate in releasing it with heavily compacted lading resting thereon. The present invention is particularly useful for a hopper which is disposed above the rails and at a considerable distance inwardly of the car side walls which results in a condition making operation of the gate difficult from a location outwardly of the car side wall.

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 top plan view of the frames about the openings of a pair of hoppers, the gates for closing the same and the mechanism for opening and closing them;

Figure 2 is a view, partly in side elevation and partly in section showing the application of the invention to a pair of discharge hoppers;

Figure 3 is a detail sectional view taken generally along the line 3—3 of Figure 2;

Figure 4 is a detail sectional view taken along the line 4—4 of Figure 3; and

Figures 5, 6, and 7 show different positions of the lever which is employed for pinching the gates to the open and closed positions.

This invention is shown as applied to a hopper car having hoppers disposed above the space between the rails one of which is shown at 8 in Figure 3 of the drawings. In the drawings the present invention is shown in connection with a pair of hoppers disposed between the rails and spaced longitudinally of the car from each other. In Figures 2 and 3 of the drawings the reference character 40 indicates one of the sides of the center sill of the car having a laterally outwardly extending lower marginal flange 41. The lower portion of one of the car side walls is indicated at 42 which is spaced outwardly from the center sill to accommodate discharge hoppers disposed therebetween. Each hopper 43 is defined in part by oppositely facing longitudinally extending walls 14 and 15 meeting with and uniting with oppositely sloping transversely extending outer and inner walls as indicated at 16 and respectively, the latter being formed with a bulge 17 to extend around the lower flange 41 of the center sill and thus facilitate the placement of the discharge opening well away from the car side wall 12 and directly above the space between the rails 9.

The discharge area of each hopper 13 is bordered by a four-sided frame A having a discharge opening 18 and a sliding closure or gate B for closing the opening 18. The frame A above the closure B includes an upper attaching section including walls 19, 20, 21, and 22 overlying and respectively secured to the walls 14, 15, 16 and 17 of the hopper respectively.

Below the closure or gate B the frame A is formed with a four-sided chute-like depending structure including end walls 23 and 24 and side walls 25 and 26. The end wall 23 and side wall 25 are spaced inwardly from the corresponding upper walls 20 and 22 to provide a horizontally disposed three-sided platform including side and end runways as indicated at 27 and 28, respectively, for supporting the closure or gate B in closed position. The end wall 24 includes an upper horizontally extending ledge 29 which extends transversely below the gate B.

Extending around the lower margin of the chute-like portion there is a horizontally disposed structure including flanges 30 and 31 on two adjacent sides and U-shaped grooves 32 and 33 on the other two adjacent sides, the two latter sides constituting openings for receiving a removable extension chute (not shown) which is adapted to be positioned in the opening 18 to bear against the flanges 30 and 31 to be clamped thereto.

The gate B is adapted to slide lengthwise of the frame A on the side runways 27 and beyond...
them are provided extension rails 34 for supporting the gate B in open position. These extension rails 34 are disposed laterally inwardly of the frame A. The walls 35 are preferably disposed in alignment with and form continuations of the respective vertical side walls 25 and 26 of the opening 18 through the frame A. Since the extension rails 34 are disposed laterally inwardly from the main supporting platforms or runways 27 of the frame A, instead of following the conventional custom of disposing them as continuations of the frame bearing surfaces, this construction has the effect of allowing such accumulations of grit or lading as may find its way beneath the gate B to be dislodged over the ends of the frame runways 27 as the gate B is opened.

The outer ends of the extension rails 34 may be supported in any suitable manner. The preferred construction in a rail 24 is provided between and supported by the adjacent frames A of a pair of hoppers 13.

The gate B is adapted to be moved longitudinally by means of a removable lever L, Figure 3, such as a crowbar acting upon a series of movable and stationary fulcrums 36 of the gate B. The walls 38 are integrally united by a rearwardly disposed wall section 41 which in effect cooperates with the walls 38 in forming opened pockets disposed centrally of the gate B and with their open sides facing the car side wall 12.

The series of fulcrums 37 on the hopper 13 are preferably formed by notches 42 in the upstanding flange 43 of a longitudinally extending element or member 44 which extends lengthwise between two of the hoppers 13 and is disposed with the opposite flange 45 extending horizontally above the gates B in an open position. The flange 45 forms a guide to restrain the gates B against bouncing. The member 44 is supported at its ends on the walls 19 of the frames A and midway between the two hoppers 13 by a channel shaped reinforcement 46 which extends transversely of the car and is welded to the extension rails 34 at 47.

The upstanding flange 43 is preferably disposed at an obtuse angle to the gate B in order to better accommodate the removable lever L at an upwardly extending angle and the outer edges 48 of the transversely extending walls 33 likewise extend at a similar angle thereby disposing the engaging surfaces of the fulcrums 36 and 37 in a plane substantially normal to the lever L when held in an upwardly slanting position as shown in Figure 3.

The notches 42 of the stationary fulcrums 37 are spaced apart a greater distance than the distance between the pockets between the walls 38 on the gate B to insure that a pocket in any position of the gate B will provide properly aligned fulcrums for effecting engagement between the lever L and a respective fulcrum 36 and 37 of the gate B and hoppers 13. This condition is well illustrated by reference to Figures 1, 5 and 6. Figure 1 shows the left hand gate B in fully closed position with the lever L positioned preparatory to initiating opening movement thereof. Figure 5 indicates the normal extent of movement feasible through the coengagement of these two fulcrums. Figure 6 indicates a stage of movement achieved through the medium of another aligned fulcrum location. The closing operation is a reversal of the above and is as indicated in Figure 7 in conjunction with the right hand gate B.

In order to confine the movement of the gate B to a straight line path there are provided depending lugs 49, Figure 2, at each side for engagement with the inner edges 50 of the extension rails 34.

The gate B is secured in closed position by means of an angle shaped bolt 51 which is mounted for axial movement and lies adjacent the outer end of each of the gates B at one side thereof. The bolt 51 is formed with a head portion 52, Figure 2, adapted to extend through an elongated aperture 53, Figure 3, formed in an ear 54 extending outwardly from each of the frames A. The aperture 53 is contained in a U-shaped slotted bracket 55 which in turn is secured to a laterally projecting section 56 of each of the gates B. The bolt 51 is provided with a depending handle 57 which operates to maintain the bolt 51 in a position wherein the head 52 is disposed out of all engaging carried by the gate B, it being understood that passage of the head 52 through the aperture 53 is only possible when the handle 57 of the bolt 51 is turned upwardly and outwardly. A slotted opening 58 is formed in the head 52 for the reception of a seal.

In order to guard against unauthorized retention of a removable bar or lever L in the fulcrums 36 and 37, they are arranged to form open top pockets which will ensure automatic disengagement of the lever L under the influence of gravity upon release by the operator.

In view of the placement of the lever L to operate in a substantially horizontal plane, it will be appreciated that there are no limitations to the length of lever L which may be employed. The application of force to pinch the gate B to open or closed position is applied in a most direct manner, thereby providing great power force, overcoming the resistance encountered in initiating the opening movement of the gate B when highly compacted lading bears against it.

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 is:

1. A gate B for a railway car having inclined sides defining a hopper opening spaced inwardly from the side wall of the car, a frame around said opening, a gate carried by said frame for closing said opening, said gate being horizontally slidable from and to closed position on said frame underneath one of the inclined sides of said hopper, a flange stationarily mounted above the path of said gate at an obtuse angle to said gate and a removable lever L to be inserted in the plane substantially normal to the lever L when held in an upwardly slanting position, and means for engaging said gate in a straight line path of travel.
pocket and horizontal pinching movement of said bar, the bottoms of said pockets limiting the extent that said bar can be inserted past said fulcrums.

2. In combination, a pair of hoppers for a railway car having inclined sides defining a hopper opening spaced inwardly from the side wall of the car, adjacent sides of said hoppers defining an inverted V-shape, a frame around each hopper opening, a gate carried by each frame for closing the corresponding hopper opening, extension rails between said frames for supporting said gates in their movement from and to open position, each gate being horizontally slidable from and to closed position underneath the side of its hopper forming said inverted V-shape, a flange secured to said adjacent sides of said hoppers and extending above the paths of said gates and carrying a plurality of upstanding spaced fulcrums, an extension from each gate providing a plurality of horizontally extending pockets at the level of said fulcrums on the side thereof away from said car side wall and juxtaposed to said fulcrums and movable therealong together with the corresponding gate in either direction by insertion of a bar horizontally between a pair of fulcrums and into the adjacent pocket and horizontal pinching movement of said bar, the bottoms of said pockets limiting the extent that said bar can be inserted past said fulcrums, and lugs depending from the undersides of said gates and cooperating with said rails to guide said gates in their movement as aforesaid.

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