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HOPPER BOTTOM CLOSURE

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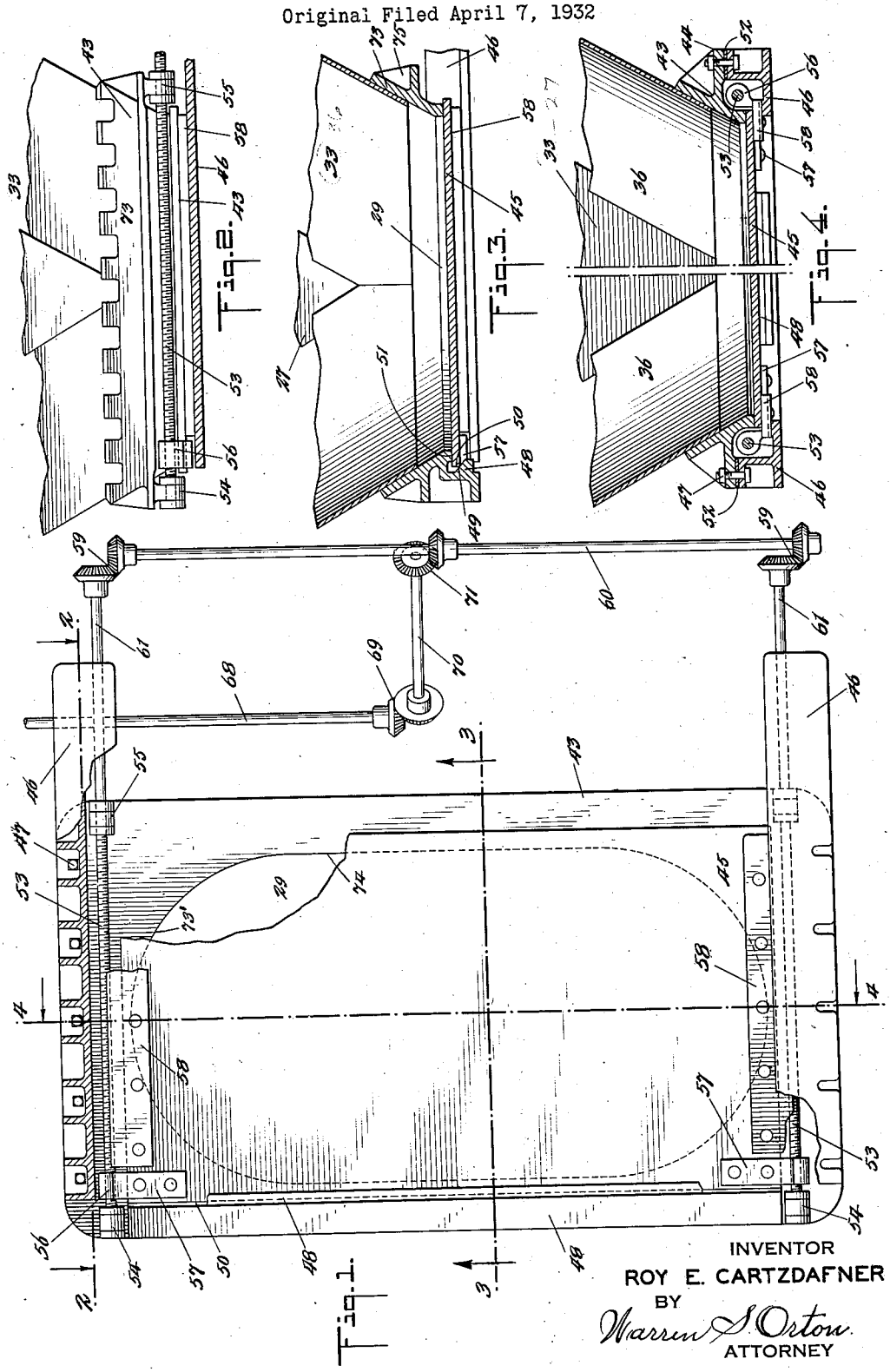


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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HOPPER BOTTOM CLOSURE

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14 Claims. (Cl. 105—282)

The invention relates in general to a railroad hopper car and particularly relates to structure at the lower portion of the hoppers including the closure and associated mechanism for controlling the opening formed by the structure at the lower ends of each of the hoppers.

The present application constitutes a division of my co-pending application Serial No. 603,698 filed April 7, 1932, entitled "Cement car".

The primary object of the invention is to provide an improved form of bottom structure to a hopper or similar discharge chute in a railroad car construction, particularly in that type of such structures where it is desired to position the discharge opening at a low point in the car and as close as is possible to the road bed.

The disclosure features a rugged structural unit for reinforcing the lower discharge end of a hopper and which structure provides a novel form of opening and a horizontally slidable closure for the same. There is also featured a closure which can be operated easily from a single source of manually applied power; which closure can be manipulated to control the rate of discharge from the hopper as desired, which can be moved easily from one to another position of its several positions and which in its closed position will insure a snug tightly closed engagement with the structural parts forming the outlet.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawing and in part will be more fully set forth in the following particular description of one form of car embodying the invention, and the invention also consists in certain new and novel features of construction and combination of parts herein set forth and claimed.

In the drawing:

Fig. 1 is a plan view of the underside of a hopper bottom discharge outlet with its associated closure and control mechanism and with parts broken away and illustrating a preferred embodiment of the invention; and

Figs. 2, 3 and 4 are detailed, transverse sectional views through the hopper bottom opening and associated closure and taken respectively on the lines 2—2, 3—3 and 4—4 of Fig. 1.

The hopper 33 is of conventional funnel shape including inclined sheet metal plates 27 and connecting quarter round corner plates 36 coacting to form a bottom discharge opening located low on the car and in close proximity to the roadbed. The bottom discharge opening of the hopper is outlined by a bottom forming frame 43 flanged as shown at 44 to provide structural strength to resist any tendency of the casting forming the lower end of the discharge opening from buckling outward. The frame extends below the hopper and includes inwardly and downwardly inclined walls 73 which form a frusto-conical downward continuation of the hopper. The frame is open therethrough to form a discharge opening 29 of elliptical form having rounded ends at 73' and straight long connecting sides 74 as shown in Fig. 1. Gussets 75 between the flanges 44 and wall 73 tend to reinforce the parts of the rugged frame 43 and gussets 75a between the outstanding flanges 46a of the tracks 46 tend to reinforce the track and contribute to the strength of the frame. The opening is controlled by a horizontally sliding closure 45 in the form of a flat rectangular plate of greater length transversely of the car than longitudinally of the car and having its shorter opposite edges slidably mounted in tracks 46 secured to the underside of flanges 44.

The frame 43 is provided at one side with a depending extension 48 which includes a bevel top ledge 49 adapted to receive the advance edge 50 of the sliding closure 45 and force the same upwardly into engagement with an overhanging stop ledge 51.

Shims 52 may be positioned between flange 44 and the tracks 46 to vary the clearance between the closure and the bottom of the frame 43. The closure is moved to and from its open and closed position by means of a pair of screw and nut feed devices at opposite longitudinal sides of the opening 29. These devices include in each case a feed screw 53 mounted for rotary movement in a pair of brackets 54—55 depending integrally from the frame 43 adjacent opposite ends of each side. The advance edge of the closure is provided at opposite ends with a nut 56 in threaded engagement with the adjacent feed screw and secured to the underside of the closure by means of a strap 57. Instead of a direct engagement between the closure and the tracks on which it it mounted, it is herein suggested that runner plates 58 be secured to opposite longitudinal edges of the closure for engagement with the tracks and incidentally to reinforce opposite short edges of the thin closure plate 45.

The feed screws are actuated in unison so as to draw evenly on both sides of the closure and thus tend to avoid canting or uneven movement of the closure along its tracks. For this purpose the feed screws are extended and connect through bevel gearing 59 with a connecting shaft 60.

The closure control is actuated from a hand wheel (not shown) carried at the outer end of a horizontal shaft 68 connected through bevel gearing 69 with a short, downwardly extending driving shaft 70 which in turn is connected at its lower end through bevel gear 71 with the shaft 60 adjacent its center.

In operation it will be understood that manipulating the shaft 68 by the rotation of the hand wheel not shown will act through the shafts 70 and 60 to rotate the two feed shafts 61 in unison and thus to slide the closure along the tracks provided therefor from the closed position shown in Fig. 1 towards the right into an open position. A reversal of the direction of rotation of the shaft 68 will cause the closure to move towards its closed position. As the closure approaches its finally closed position its advance edge 50 will ride up the inclined bevel face 49 and thus force the advance edge of the closure into snug engagement with the shoulder 51, thus sealing the opening at the advanced edge of the closure as shown in Fig. 3.

By the proper selection of the shims 52 the position of the closure may be adjusted vertically so that the closure may have a closely adjusted relation to the bottom face of the wall 73 just sufficient to permit an easy sliding movement of the closure and at the same time to minimize, if not entirely eliminate, any leakage from the hopper horizontally across the joint between the hopper and the closure.

The present disclosure features a rugged form of frame 43 which will form a downward extension from the relatively light sheet metal structure forming the hopper proper, and the arrangement of the outwardly extending flanges at opposite sides in their relation to the tracks underlapping the same provides a closed housing for the feed schews 53 thus tending to defeat leakage of material on to the feed screws. Wear which may take place during extended use will be confined largely to the track forming elements 46 which can be readily replaced when worn. The runner plates 58 may likewise be replaced without necessity of replacing the entire closure when the runner plates have worn thin.

Disposing the elliptical opening 29 with its major axis, indicated by the section line 4—4, extending transversely across the car length, provides a form of opening which distributes the lading as a ribbon extending at right angles to and between the tracks on which the car is mounted. As the closure is gradually moved from its closed towards its open position more and more of the opening is exposed and the extent of opening regulates the thickness of the ribbon-like discharge and thus controls the rate of discharge from the associated hopper.

While there has been shown, described and pointed out in the annexed claims, certain novel features of the invention, it will be understood that various omissions, substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

I claim:

1. In a hopper car, the combination of an open bottom sheet metal hopper, a preformed conical member constituting a rugged flanged casting forming a continuation of and reinforcing the open bottom of the hopper, said member provided on opposite sides with a pair of parallel horizontal tracks positioned below the hopper and each secured to a flange of the casting, a closure slidably mounted on said tracks and means including screw feeds at opposite sides of the closure for advancing the closure horizontally along said tracks to a position beneath the open bottom of the hopper and then vertically into a closing engagement with the underside of said casting, and manually actuated means for actuating said two screw feed means in unison.

2. In a hopper bottom car, the combination of an open bottom hopper, means for reinforcing the open bottom of the hopper, said means providing a pair of parallel tracks at opposite sides of the opening at the bottom of the hopper, a closure slidably mounted on said tracks, a pair of feed screws journalled in said means, nuts on the closure threaded on said screws and a control means engaging the feed screws to turn them in unison and thus advance the closure evenly along the tracks and said means including a stop ledge and therebelow a bevelled ledge for receiving the advance edge of the closure for forcing the same upwardly into firm closing engagement with said stop ledge.

3. In a hopper bottom car, the combination of an open bottom hopper, a rectangular integral member forming a casting constituting a reinforced open bottom for the hopper, means replaceably secured to the casting and providing a pair of parallel tracks at opposite sides of the opening at the bottom of the hopper, a closure for the open bottom of the casting slidably mounted on said tracks, a pair of feed screws journalled in said member located above the plane containing the open bottom and outset outwardly from the bottom and held thereby from axial movement, nuts on the closure threaded on said screws and a control means engaging the feed screws to turn them in unison and thus advance the closure evenly along the tracks.

4. In a device of the class described, the combination of a hopper provided with a bottom discharge opening, a horizontally slidable closure for said opening, means in advance of the closure as it is moved towards its closing position for limiting the advance of the closure, said means including an upper stop ledge and a lower bevelled ledge adapted to receive the advance edge of the closure and reacting thereon to lift the advance edge into engagement with the stop ledge.

5. In a hopper car, the combination of a rectangular unitary frame including opposing pairs of inclined walls integrally connected and forming a hopper bottom opening, said frame provided on opposite sides with a pair of parallel tracks positioned below the opening and offset therefrom, a closure slidably mounted on the tracks and screw feed means of rugged construction located beneath each one of the opposing pair of inclined walls and housed within and thus protected by the frame at opposite sides of and close to the opening and acting in unison for moving the closure along the tracks.

6. In a device of the class described, the combination of a structural element forming a discharge opening, a horizontally movable closure for the opening and means on the structural element engaging the advance edge of the closure and acting automatically as the closure is moved horizontally into its final closed position, for elevating the closure into snug engagement with said structural element.

7. A rectangular casting including a frustoconical inner portion forming a discharge open-

ing and provided at opposite sides with outstanding flanges, a pair of tracks underlapping and secured to the flanges, a closure for the opening having its opposite sides slidably mounted on the tracks, feed screws positioned between the tracks and flanges and nuts secured to the closure and in threaded engagement with the screws.

8. In a hopper car, the combination of structural parts forming a hopper being wider transversely of the car than it is lengthwise of the car and provided with rounded corners, and a reinforcing part for the lower end of the hopper, said reinforcing part providing a discharge opening from the hopper, said opening being approximately elliptical in plan with its major axis extending transversely of the length of the car and being relatively narrow in the direction of the lengthwise line of movement of the car, and a single flat rectangular closure for the opening, said closure having a greater length transversely of the car than width lengthwise of the car, slidably mounted for horizontal movement in a direction longitudinally of the car and adapted as it is moved initially from its closed position to provide a long, slit-like discharge opening extending across the right-of-way traversed by the car and said discharge opening gradually increasing in length until the closure is in position half closing and half unclosing the opening, and said opening when the closure is moved from its closing position being clear of obstructions between itself and the right-of-way and screw feed means offset horizontally from the opening for progressively moving the closure to and from its closed position and thus carefully to regulate the width of the slit forming the opening.

9. In a device of the class described, the combination of a frame including inwardly and downwardly inclined walls coacting to form a discharge opening and including an outstanding flange, a track bolted to the flange, the lower end of one of the inclined walls coacting with the flange and track to form a housing, a closure for the opening having one end slidably mounted on the track and a feed screw contained in said housing and operatively connected to the closure to move the same relatively to the opening.

10. In a device of the class described, the combination of a rigid horizontally extending rectangular frame forming a discharge opening of substantially elliptical form, having rounded ends and long straight connecting sides, parallel tracks carried by the frame at the rounded ends of the opening and a flat closure for the opening slidably mounted on said tracks and directly engaging the underside of the part of the frame forming the discharge opening at the rounded ends thereof, and runner plates secured to the underside of the closure, to reinforce opposite edges thereof engaging the tracks and coacting with the flat closure to fill the space between the tracks and the adjacent underside of the structural part at the rounded ends of the opening when the closure is in its closing position in engagement with the part of the frame at the rounded ends of the opening.

11. In a device of the class described, the combination of a structural part forming a discharge opening of substantially elliptical form, having rounded ends and long straight connecting sides, tracks carried by the structural part at the rounded ends, a long, narrow, flat closure for the opening slidably mounted on said tracks, runner plates secured to the underside of the closure at their narrow ends to reinforce the same and engaging the tracks, and a closure control means including a feed screw journalled in said structural part and located above the runner plates and offset from and above the opening.

12. In a device of the class described, the combination of a structural part forming a discharge opening and provided with a pair of outstanding flanges at opposite sides of the opening, a pair of feed screws underlapping and hung from said flanges, a pair of tracks underlapping and secured to the flanges, a closure for the opening having opposite sides slidably mounted on the tracks and engaging the portion of the structural part forming the discharge opening to close the same, and hung from and actuated by said feed screws and means providing for a closely adjusted relation between the feed screws, the closure and said portion of the structural part, said means comprising a shim between one of the tracks and its associated flange and acting to adjust the clearance between the adjacent side of the closure and said structural part to insure a snug, tightly closed engagement with the structural part forming the outlet.

13. An attachment for the lower discharge end of a hopper comprising a frame including inwardly and downwardly inclined walls forming a discharge opening having a flat closure engaging bottom surface and provided with outstanding flanges at opposite sides of the opening, tracks provided with flanges, one of which is secured to the frame flanges and another of which underlaps said bottom surface, a closure for said opening slidably mounted on said underlapping flanges and adapted to be moved into engagement with said bottom surface, gussets extending between the flanges of both the frame and the flanges of the tracks to reinforce the parts supporting the closure, and control mechanism for the closure hung from and positioned beneath the gusset reinforced part of the frame.

14. In a device of the class described, the combination of structural means forming a discharge opening, a pair of tracks on opposite sides of the opening, a closure slidably mounted at opposite edges on the tracks, a stop secured to said means for limiting the closing movement of the closure and the stop and advanced edge of the closure provided with means coacting for elevating the advance edge of the closure into snug engagement with said structural means as the closure is moved into its closing position limited by the stop.

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