June 20, 1950 H. A. WITHALL 2,512,451

CLOSURE FOR RAILROAD CAR HOPPER DISCHARGE CHUTES

Filed April 8, 1948 2 Sheets-Sheet 1

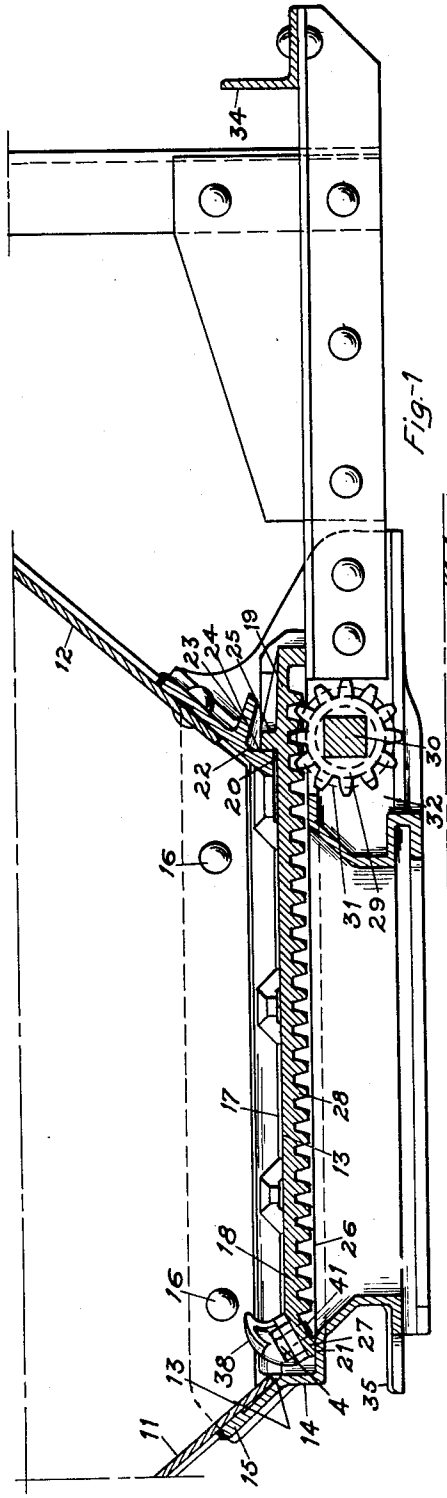



Fig-1

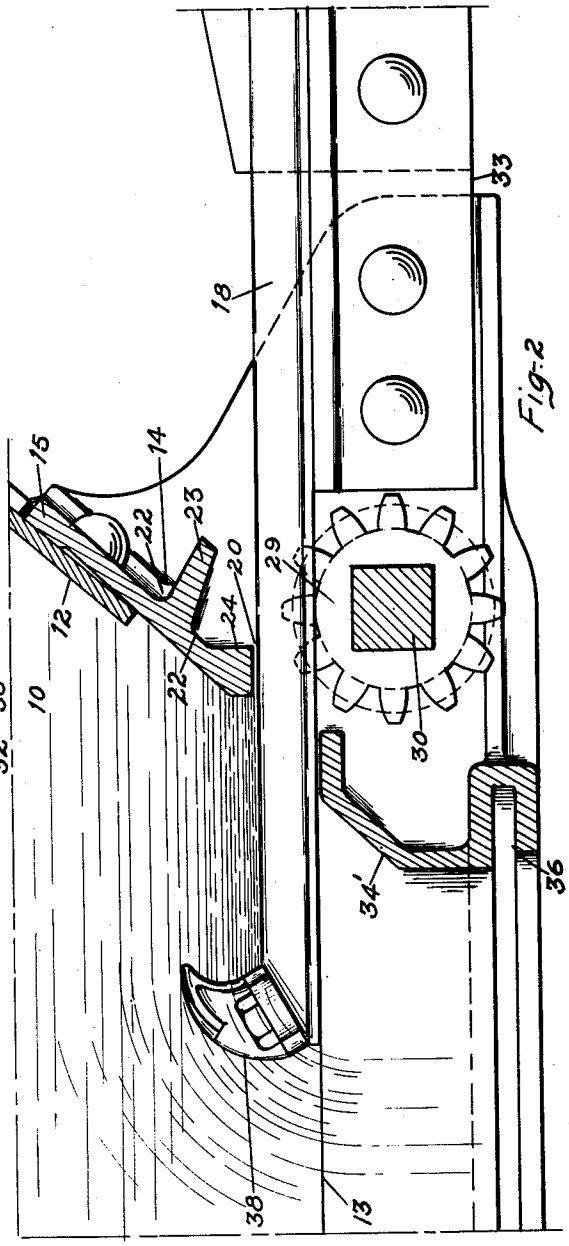



Fig-2

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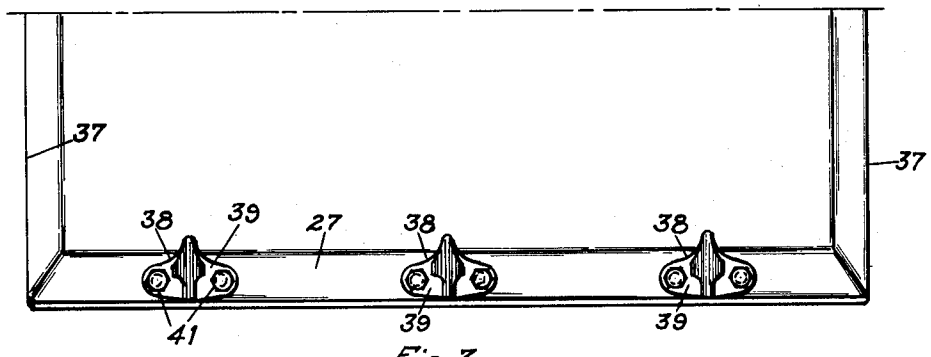



Fig.-3

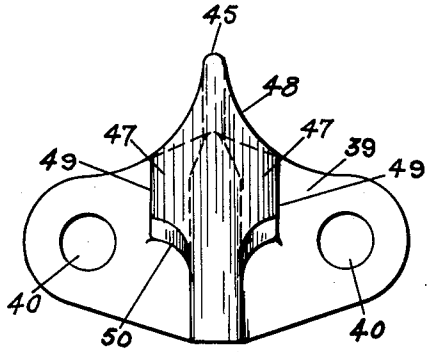



Fig.-4

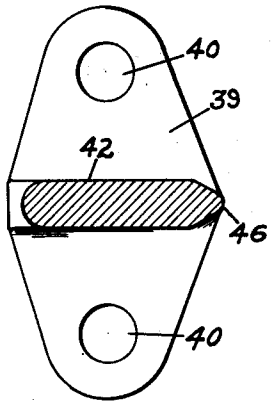



Fig.-7

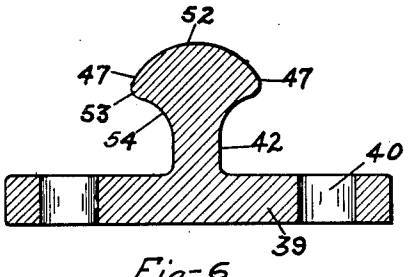



Fig.-6

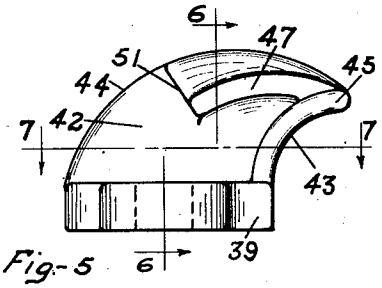



Fig.-5

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# UNITED STATES PATENT OFFICE

2,512,451

## CLOSURE FOR RAILROAD CAR HOPPER DISCHARGE CHUTES

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Application April 8, 1948, Serial No. 19,806

4 Claims. (Cl. 105—282)

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This invention relates to car hopper discharge closures, more particularly to a construction wherein a closure is employed which normally closes a discharge opening, and, when shifted, opens the discharge opening, and permits the lading to pass therethrough. An example of a car having this type of hopper and closure is shown in Campbell Patent No. 2,072,292, issued March 2, 1937.

In railyway cars of the type mentioned, when the lading is of a fine powdered character, it frequently packs into a compact mass which results in bridging and failure to pass through the discharge opening, even though the hopper closure is fully opened. Under these circumstances it becomes necessary to poke a hole in the compacted lading, or otherwise loosen the same, to start its flow, a procedure which is difficult and inconvenient because of the limited space available for such operations.

An object of the present invention, therefore, is to provide means, actuable by movement of the closure, which are designed to break and agitate the packed and bridged portions of the lading adjacent to the discharge opening, and start the flow freely through the opening.

Another object of the invention is to provide a construction of this character wherein a sliding closure for the discharge opening is equipped with plow means which project above, and move with, the closure, and are designed so as to pass into the compacted lading and break up and pull down the lading. Thus, when the closure is opened free flow through the discharge opening is effected.

Other and further objects of the invention will appear more fully from the annexed specification and claims, and from the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view taken through a portion of a railway car showing a hopper and closure embodying the invention, with the closure in a closed position;

Figure 2 is an enlarged sectional view similar to Figure 1, showing the closure moving in an opening direction, and the plow means loosening the compacted lading for passage through the discharge opening;

Figure 3 is a broken top plan view of the closure showing the plow means in position thereon;

Figure 4 is an enlarged detailed top plan view of one of the plow means;

Figure 5 is a side elevational view of the plow means shown in Figure 4;

Figure 6 is a transverse sectional view, corresponding substantially to the line 6—6 of Figure 5; and

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Figure 7 is a horizontal sectional view corresponding substantially to the line 7—7 of Figure 5.

My improved construction is applied to a hopper car of the type shown in the Campbell Patent 2,072,292 referred to above. This hopper car has a plurality of hoppers, each of which may have associated therewith a construction embodying the subject matter of the invention. The portion of the car shown in the drawings includes a hopper having an inner vertical wall 10 (Figures 1 and 2), and an outer, downwardly and inwardly sloping wall, not shown, together with oppositely sloping plates or walls 11 and 12, which slope in a direction lengthwise of the car. The walls 10, the outer wall, not shown, and the walls 11 and 12 define the hopper open at the bottom as indicated at 13. At the lower portion of the hopper there is provided a frame 14 having an upwardly extending wall 15 which overlies and conforms to the shape of the hopper and is riveted thereto, as by rivets 16. The frame 14 is preferably in the form of a casting, and below the attaching wall 15, the casting is formed at opposite sides with horizontal, longitudinally extending channels or grooves indicated at 17, in which is slideably carried a gate or closure 18, the latter being adapted for sliding movement lengthwise of the car to control the discharge of lading from the hopper.

The gate or closure 18, which is preferably in the form of a casting, is mounted for sliding movement in the channels 17, and is of such length, when closed, as to provide an extended portion 19, which extends through a slotted opening 20 being disposed horizontally in line with the bottom defining walls of the grooves 17. Above the slotted opening 20, the frame 14 is formed with an angularly shaped recess 22, defined by a horizontally disposed flange 23 and the vertically extending wall 24. The recess 22 is adapted to accommodate an upstanding rib 25 formed integrally with the closure 18. When the closure 18 is positioned to close the discharge opening of the hopper, the upstanding rib 25 fits into the recess 22 and the close cooperating relation between the parts provides a sealing joint at the outer edge of the closure to prevent the entry of rain or moisture into the hopper. The closure 18 is provided at the side edges thereof with runners 26 which fit in the grooves 17, and the lower surfaces of said runways are in line with the surface presented by the ledge 21. The

upper surface of the closure 18 presents a flat surface, and at the trailing edge is beveled downwardly to provide an inclined wall 27 which is effective in displacing any material which might lodge and interfere with the free operation of the door.

The closure 18, on the underside thereof, intermediate the runners 26, is provided with a series of teeth 28 which extend continuously across the closure 18 and form a series of reinforcements. The teeth 28 are adapted to mesh with pinions, indicated at 29, carried on a shaft 30 extending from side to side of the frame 14, and rotatably mounted in bearings indicated at 31. The bearings 31 are carried by walls 32, formed integrally with the frame 14, and extending rearwardly beyond the frame. The walls 32 overhang the frame proper and constitute means for supporting guiding rails, indicated at 33, for supporting the closure in its open or partially open position. The guide rails 33 are spaced transversely of the car or a distance corresponding to the width of the closure 18 and at their outer portions are connected by a bar 34, which in addition to forming a tie for the rails also forms a stop for limiting the opening movement of the closure.

The operating shaft 30 is extended beyond the outer wall 32 of the frame, and is provided with a suitable socket member, not shown, by means of which the shaft 30 may be rotated and the closure moved. For retaining the closure 18 in its closed position, a dog, not shown, is employed similar to that described in the Campbell patent heretofore mentioned.

Below the closure 18 the frame 14 is extended downwardly an appreciable distance to present a funnel-shaped outlet 34' terminating below the pinions 29. Around the outlet 34 is a ledge 35 and below the ledge a groove 36 to accommodate a removable chute, not shown.

The foregoing structure is well known in the art, as is illustrated by the Campbell Patent 2,072,292, described above. My invention is directed to the following improvement which is used in combination with the foregoing structure and finds therein a suitable environment.

In my improved structure, the forward edge of the closure 18 is provided with a plurality of plow means indicated generally at 38. Preferably three of the plow means 38 are employed, one adjacent to each of the side edges 37—37 of the closure 18, and one disposed centrally therebetween (Figure 3). All of the plow means 38 are alike, and only one will be described in detail, similar reference characters employed for like parts of each.

Each plow 38 comprises a casting having an elongated base 39 adapted to be supported upon the inclined trailing edge 27 of the closure 18. Adjacent to the ends of the base 39 there are apertures 40 (Figures 4, 6 and 7) through which are extended the shanks of headed machine screws 41. The shanks of the screws 41 are threaded into apertures in the inclined trailing edge portion 27 and terminate substantially flush with the under side of the edge 27.

Extending transversely of the base 39 and integrally formed therewith, is an upstanding blade 42, which is slightly tilted laterally of the base 39 and characterized by curved contours forming a concave leading edge 43, and a convex trailing edge 44, the edges 43 and 44 converging to form a relatively sharp point 45, and together provide a generally hook-like formation. The blade 42 along the leading edge 43 is sharpened or laterally reduced to present a leading or cutting edge 46 inwardly toward the body of the closure 18. The blade 42, for a portion starting adjacent to the point 45 and extending an appreciable distance along the trailing edge 44, and in conformity with the curvature thereof, is laterally extended to form wings 47, which in plan, as viewed in Figure 4, diverge along curved lines, as indicated at 48, from the point 45 toward a portion of maximum width, as indicated at 49, and then converge along curved lines, as indicated at 50, until cut off and merged with the blade, as at 51, the outer lateral contour of the wings 47 being rounded as at 52, the edges 53 of the wings being rounded, and the under surfaces 54 of the wings 53 being curved, all to the end that the plow 38 is formed to enter the lading at the most efficient angles and with a minimum of effort.

In operation, and assuming the closure 18 to be in closed position, and the lading in the hopper to be resting thereon, in compacted form, with a decided tendency to bridge from side to side of the hopper adjacent to the closure, and to fail to flow even when the discharge of the hopper is open, a suitable tool is employed for rotating the shaft 30, which through movement of the pinions 29, and engagement of the pinions 29 with the teeth 28 on the bottom of the closure 18, moves the closure 18 in a direction to open the discharge opening of the hopper. At the inception of the opening movement of the closure 18, the plow means 38 on the trailing edge flow into the lading, the forward wedge-shaped edges 46 cutting into and loosening the lading, and the curved wings 47 not only loosening and spreading the lading, but by reason of their curved hoop-like formation pulling the lading downwardly in the hopper, and in their travel, breaking up compacting, bridging, or tendency to bridge, of the lading, throughout all portions thereof above the closure, thereby insuring free flow of the lading. It will be noted that the plow means 38 are moved, when the closure 18 is opened, from a position beyond the left hand edge of the discharge opening or funnel shaped outlet 34' to a position beyond its other or opposite side. This insures that all the lading across this discharge opening will be loosened. The plow means 38 also form inaccessible stops which will not pass through the slot 20 in the frame 14, and prevent unauthorized tampering with, or theft of, the closure 18.

While I have herein disclosed a preferred embodiment of the invention, it will be appreciated that said embodiment may be variously changed and modified without departing from the spirit of the invention, and accordingly it will be understood that the said invention is not limited to my particular disclosure, but includes any changes or modifications which come within the scope of the appended claims.

I claim:

1. In a railway car, the combination with a discharge hopper; of a substantially flat closure cooperating with said hopper; means for shifting said closure edgewise in an opening direction; plow means carried along the free edge of said closure, said plow means including a cutting edge extending substantially at right angles to said closure, adapted to enter lading carried within said hopper, and wings at the outer end of said plow means and spaced from, and extending at an angle inclined with reference to said closure and emerging toward the free edge of said closure.

2. An article of manufacture, a plow for positioning on the closure member of a railway car

hopper or the like to loosen lading therein comprising a member having a blade portion defined by a leading edge and a trailing edge converging to form a pointed portion, said blade portion having laterally extending wings at its outer end the forward edges of which are angularly disposed toward said leading edge.

3. An article of manufacture, a plow for positioning on the closure member of a railway car hopper or the like to loosen lading therein comprising a member having a blade portion defined by a leading edge and a trailing edge converging to form a pointed portion, said blade portion having laterally extending wings at its outer end the rear surfaces of which extend to and merge with the surface of said trailing edge.

4. An article of manufacture, a plow for positioning on the closure member of a railway car hopper or the like to loosen lading therein comprising a member having a base and an upstanding blade portion defined by a leading edge and



a trailing edge converging to form a pointed portion, said blade portion having laterally extending wings at its outer end the forward edges of which are angularly disposed toward said leading edge and the rear surfaces of which extend to and merge with the surface of said trailing edge.

HARRY A. WITHALL.

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