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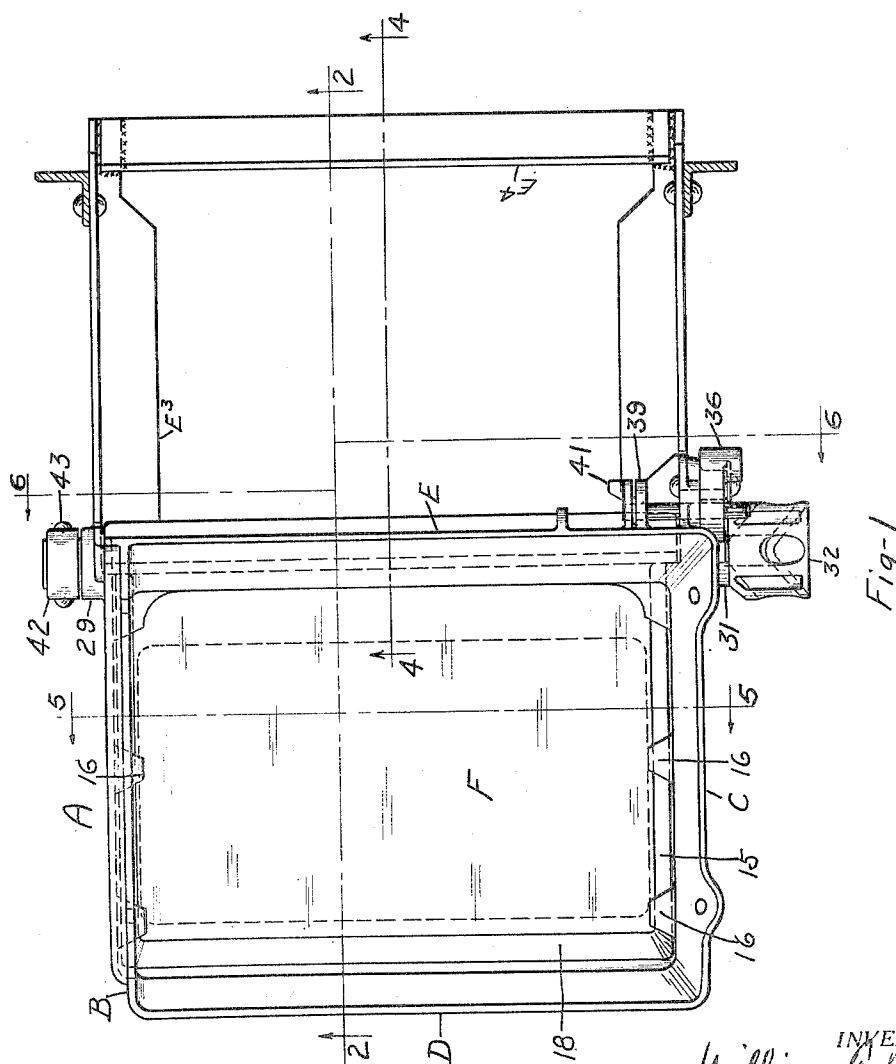
W. F. BATHO

2,222,280

LOAD DISCHARGING CAR CONSTRUCTION

Filed June 10, 1939

4 Sheets-Sheet 1



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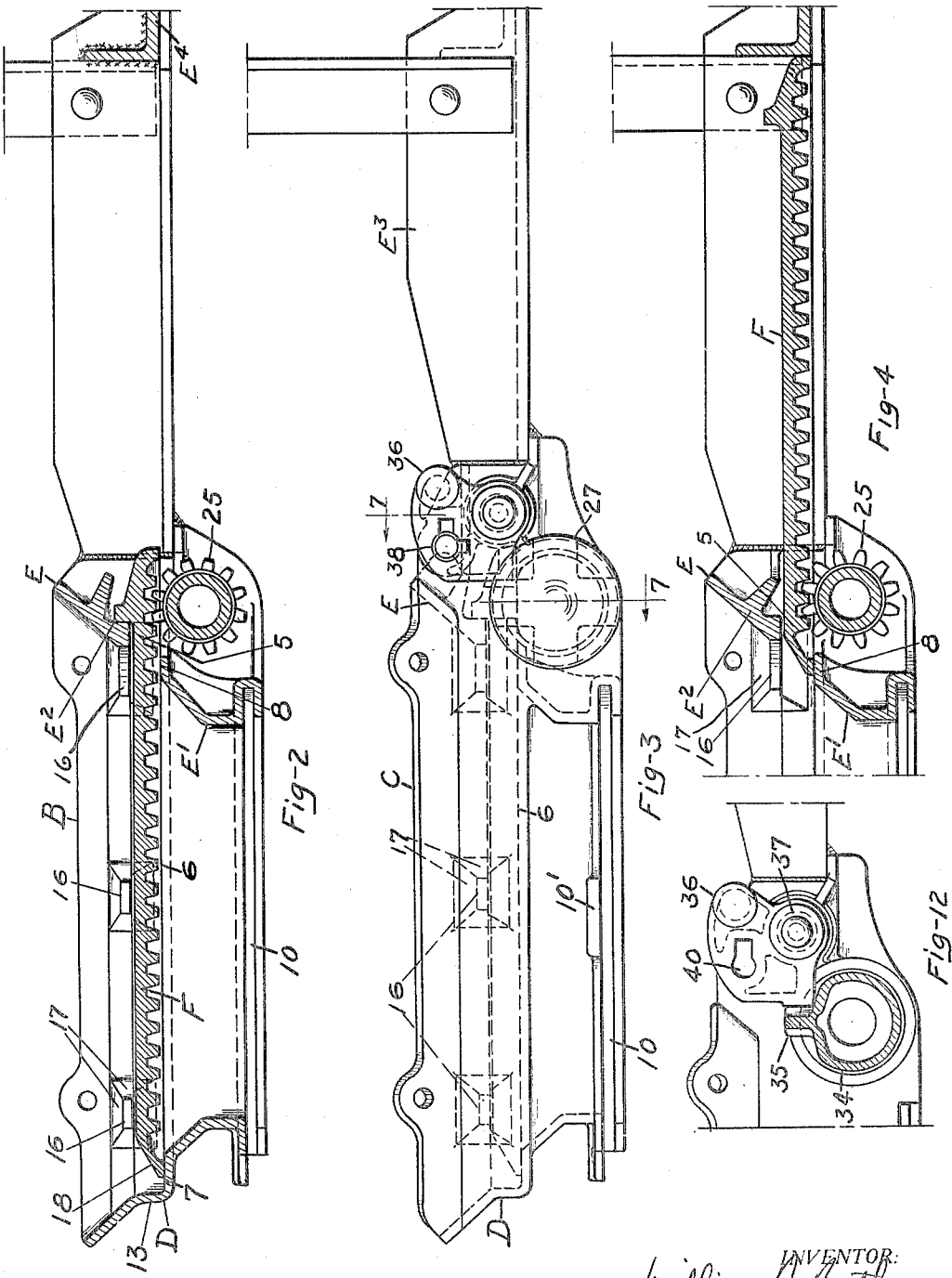
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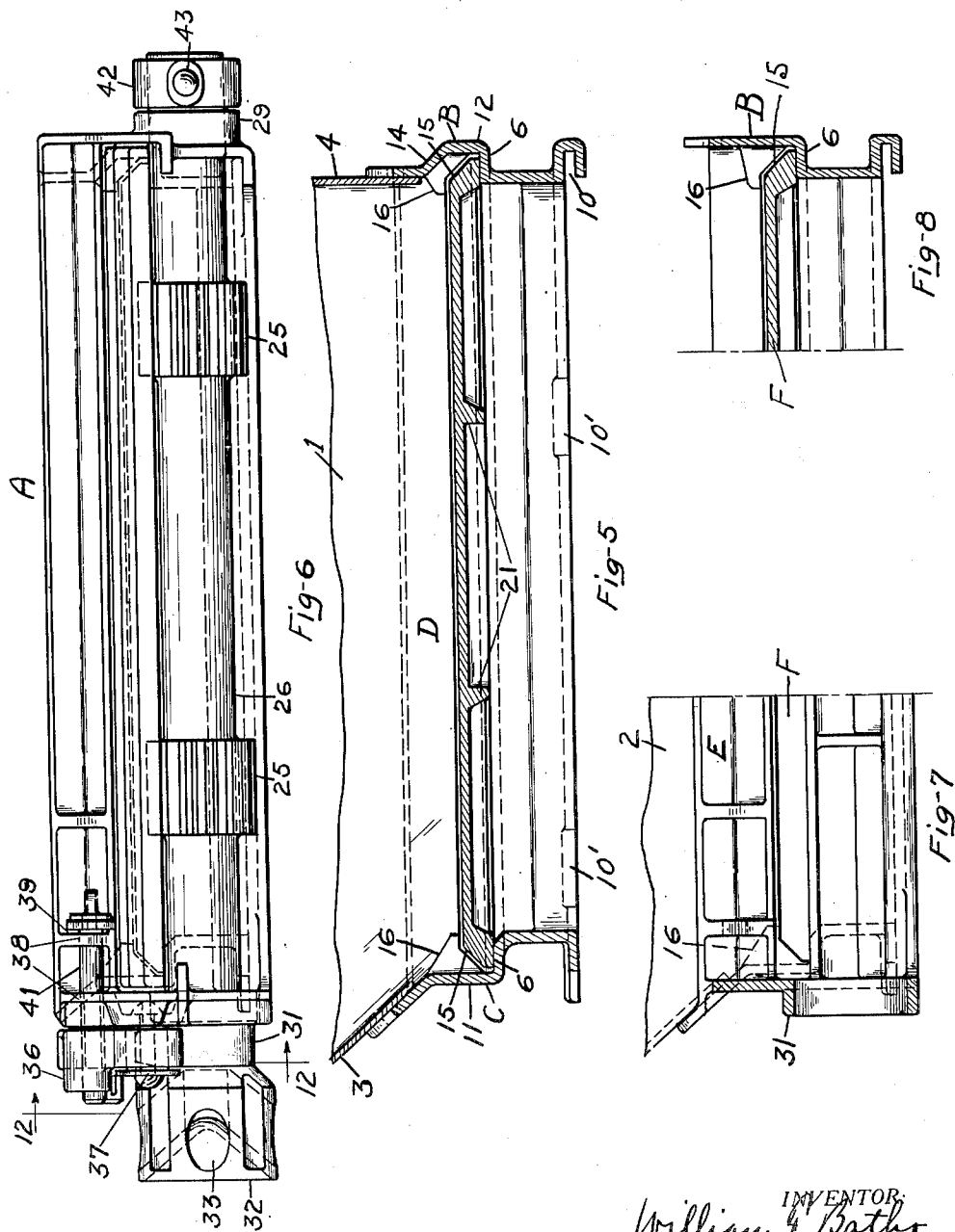
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4 Sheets-Sheet 3



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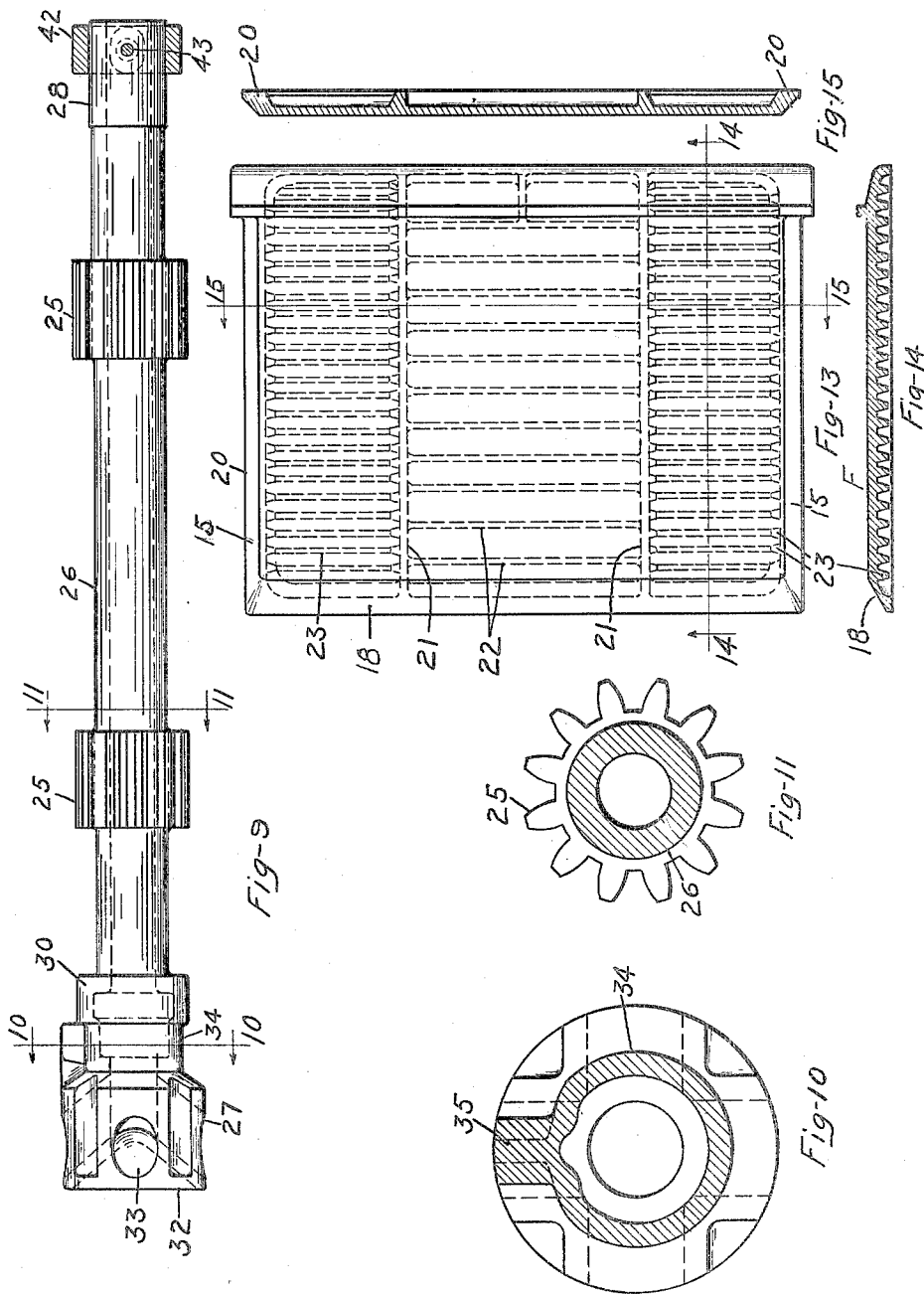
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,222,280

LOAD DISCHARGING CAR CONSTRUCTION

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Application June 10, 1939, Serial No. 278,519

3 Claims. (Cl. 105—282)

My invention relates to improvements in load discharging cars of the hopper type requiring tightly fitting doors for the hauling of bulk material which, under certain conditions, is free rolling, and under other conditions will arch and pack very tightly above the discharge openings and can only be discharged through bottom outlets after the arch has been ruptured.

One of the objects of my invention is to provide an improved door and frame therefor to relieve interference of the lading material with the free, normal movement of the door within the frame when opening or closing the door.

Another object of my invention is to provide a unitary, one-piece door operating shaft, together with means for the convenient removal and replacement of the shaft as a unit with respect to the door frame.

Other objects of my invention will appear from the following description, in connection with the accompanying drawings, which illustrate the preferred embodiment of my invention.

Referring to the accompanying drawings,

Fig. 1 is a plan view of a hopper door frame embodying my invention and illustrating the frame parts, door and door-operating mechanism in their assembled relation, with the door shown in fully closed position;

Fig. 2 is an enlarged longitudinal section substantially on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged view in side elevation of the structure shown in Fig. 1;

Fig. 4 is a partial section substantially on the line 4—4 of Fig. 1, similar to Fig. 2 but illustrating the door in fully retracted or open position;

Fig. 5 is an enlarged transverse section substantially on the line 5—5 of Fig. 1;

Fig. 6 is an enlarged transverse end view in the direction of the arrows on the line 6—6 of Fig. 1, showing the handle shaft and pinions of the door-operating mechanism;

Fig. 7 is a detail section of a portion of the width of the frame substantially on the staggered line 7—7 of Fig. 3;

Fig. 8 is a detail section of a portion of the width of the frame and door on the same line, 5—5 of Fig. 1, on which Fig. 5 is taken, but illustrating a modification of the frame structure;

Fig. 9 is an enlarged view in elevation of the handle, shaft and pinions of the door-operating mechanism;

Fig. 10 is an enlarged detail section on line 10—10 of Fig. 9;

Fig. 11 is an enlarged detail section on line 11—11 of Fig. 9;

Fig. 12 is a detail section on the staggered line 12—12 of Fig. 6;

Fig. 13 is a plan view of the sliding door member;

Fig. 14 is a longitudinal section on line 14—14 of Fig. 13; and

Fig. 15 is a transverse section on line 15—15 of Fig. 13.

The frame embodying my improvement is especially adapted for use in connection with the hoppers of load discharging cars of the type used for hauling bulk material. The hoppers of these cars usually have inner and outer side walls and end or cross walls which define at their lower margins a generally rectangular discharge opening. Usually the end walls 1 and 2, and outer wall 3, are sloped to converge towards the discharge opening while the inner wall 4 is usually vertically arranged. The hopper walls are indicated in Figs. 5 and 7 to illustrate the relation of the door frame thereto.

In my improved door frame A, the end and outer walls are correspondingly sloped, so that they may be attached to the hopper walls. The frame A is rectangular in form and is made up of inner and outer side members B and C respectively (Fig. 5), and cross or end members D and E respectively (Figs. 2 and 3). The end member E is in two parts E¹ and E², spaced apart to provide therebetween an opening 5 (Figs. 2 and 4) through which the hopper door F slides in its movement to and from closed position. The parts E¹ and E² of the cross member E are joined at their ends to the side members to maintain them in their proper relation. The side members B and C extend longitudinally of the car beyond the cross member E to provide support for the sliding door through its entire movement, and the ends E³ of these extensions are connected by a member E⁴ which is L-shaped in cross section and which acts as a brace for the frame extensions and as a limit stop for the sliding door in its opening movement.

Intermediate the depth of the frame, the inner and outer longitudinal side members of the frame are formed (Figs. 2, 3, 4, and 5) to provide horizontal ledges or shoulders 6 on their inside walls. These ledges support the marginal side edge portions of the door F and provide surfaces upon which the door can freely slide. Likewise, the one end or cross member D is formed with a horizontal ledge portion 7 which supports

the forward end of the door in its closed position.

Below the plane of the door the frame side and end members have their walls sloped to conform to the slope of the hopper walls, and their lower margins define a discharge outlet which although of standard dimensions is of lesser area than the area in the plane of the door. At their lower terminals the walls of the frame members are formed for association with a load receptacle (not shown). This formation provides a channel or slot 10 in the side member B and the cross member E and lugs 10¹ for clips on walls C and D, by which the receptacle may be conveniently attached.

The portions 11 and 12 of the walls of the outer and inner frame side members C and B rise vertically from the door-supporting ledges 6 and serve to guide the door against lateral movement. The end member D likewise has a vertical portion 13 rising from the ledge 7.

In the structure shown in Fig. 5, the inner member B has an inclined portion 14 offset inwardly from the vertical portion 12, so that the upper part of the fall of the member B overhangs the side margin of the door. However, the portion 14 is spaced considerably above the door so that the material cannot become packed in this space. If desired, however, the wall of the inner side member may be extended vertically from the ledge 6 and the offset portion 14 dispensed with, as illustrated in the modification in Fig. 8. The side margins 15 of the door are beveled upwardly and inwardly to reduce to a minimum the thickness of the edges of the door and thus reduce to a minimum the area of the door edges which come in contact with the portions 11 and 12 of the walls of the frame side members, the purpose of this arrangement being to prevent the lading material from packing between the edges of the door and the walls of the frame members, and interfering with the normal free movement of the door. Although the lading material will occupy the space around the beveled margins of the door, the fact that these door margins are beveled and the space above these beveled margins is practically unrestricted, tends to prevent the packing of the material which would otherwise occur if the marginal edges of the door were vertical, as is usually the case when the door is guided in channels or grooves formed in the frame walls.

In the present structure, I provide several short instanding integral lugs 16 which overhang the beveled margins of the door and serve as guide lugs to prevent vertical movement of the door. They do not, however, materially restrict or obstruct the space above the door margins. These lugs or projections are spaced apart at intervals along the inner and outer side walls of the frame side members, and any number of them may be employed as desired. In the present structure, three are provided along each side member, one adjacent each end of the door and one intermediate thereof. The under-faces of these lugs are beveled to correspond to the beveled margins 15 of the door so that as the door moves, the lugs will act to scrape the beveled margins of the door clean. In addition, the end and upper faces 17 are beveled inwardly so as to deflect or divert the material inwardly away from the walls of the frame members when the material is disturbed by the movement of the door. The result of this construction thus minimizes the tendency of the lading material to become

packed around the margins of the door in such manner as to interfere with the normal free movement of the door.

The forward margin 18 of the door is likewise beveled to a sharp edge so that as the door approaches its closed position this sharpened edge scrapes the material from the ledge 7, and the bevel 18 of the door tends to divert the material upwardly, thus preventing the material from packing between the end of the door and the frame wall and interfering with the full closure of the door.

The door F itself is a flat plate having a smooth upper surface and a marginal flange 20 on its underside. Two longitudinally disposed reinforcing ribs 21 are provided on the undersurface of the door, and a plurality of parallel reinforcing ribs are disposed transversely on the underside of the door and are arranged in three courses or series. The intermediate series 22, extending between the longitudinal reinforcing ribs 21, are spaced further apart and reinforce the center area of the door. The ribs 23 of the two outside courses or series, extending between the longitudinal ribs 21 and the adjacent margins, are spaced close together and are formed as rack teeth adapted to be engaged by pinions 25 carried on a transverse operating shaft 26 for operating the door. This transverse operating shaft is disposed beneath the rear end of the door and is supported by the frame side members B and C outside of the wall E¹ of the cross member E.

The shaft 26, the operating head or handle 27, and the pinions 25 are all preferably formed in one piece which is readily removable and replaceable in the assembly as a unit. The shaft is preferably a hollow tubular member having the pinions 25 integrally formed thereon and spaced apart coinciding with the series of teeth 23 on the underside of the door so as to mesh therewith. The inner end of the shaft has a slight enlargement 28 which is supported by an annular flange 29 surrounding an opening in the inner frame member and forming a bearing for the inner end of the shaft. The opposite or outer end of the shaft has an enlargement 30 which is supported in a bearing flange 31 formed on an outer frame side member C.

The bearing opening for the outer end of the shaft is somewhat larger in diameter than the diameter of the pinions 25, so that the shaft with its pinions may be readily inserted through this bearing opening or withdrawn therefrom in the act of assembling or disassembling the shaft with respect to the frame. The enlargement 30 which is supported in the bearing 31 is correspondingly enlarged to the diameter of the bearing.

The outer end of the shaft beyond the bearing is provided with a socket or handle member 32 having a transverse hole 33 into which a bar can be inserted for turning the shaft to thereby move the door in either direction. The handle or socket member has a cylindrical portion 34 of somewhat reduced diameter, which is positioned adjacent the outer end of the bearing 31 and which carries a radial lug 35 arranged to cooperate with a latch pawl 36 for the purposes of locking the shaft against rotation. This latch pawl, Figs. 3, 6, and 12, is rotatably mounted on a pivot 37 supported on the frame side member so that it can be rotated into and out of the path of the lug 35. The frame has two aligned holes 38, one of the holes being formed in a lug 39 on the frame. These holes are

aligned with a key-shaped hole 40 in the latching pawl when the latching pawl is in locking position so that a sealing pin 41 may be inserted through the pawl and the holes in the frame to prevent the latch pawl from becoming disengaged.

The operating shaft is held against lengthwise movement by means of a removable collar 42 on the inner end of the shaft which projects beyond the bearing 29. This collar is held in place by a transverse key or pin 43.

By virtue of the enlarged bearing opening 31, the operating shaft may thus be readily removed or replaced as a unit, it being simply necessary to remove the collar 42 and the transverse pin 43 at the inner end of the shaft.

It is obvious that changes may be made in the construction, operation, and arrangement of the parts without departing from the spirit of the invention, and I contemplate such changes as fairly fall within the scope of the appended claims.

I claim:

1. The combination of a frame for the hopper of a railway car, comprising side members and end members arranged in rectangular formation, said side members having horizontal ledge portions formed in their inner walls for supporting and guiding a door, a door supported on said ledges for sliding movement to and from closed position, said door having its side marginal upper surfaces beveled inwardly away from said frame walls, instanding lugs formed on the inner walls of said frame side members to overlie the side margins of the door and having their under-faces beveled to correspond to the beveled margins of the door and having their upper and end faces beveled to deflect material away from the walls of said side members as the door is moved on said ledges, and means associated with said frame for sliding the door.

2. In a structure of the class described, a frame for the hoppers of railway cars comprising side members and end members arranged

in rectangular formation to form a discharge outlet and adapted for attachment to the hopper walls, said frame side members having horizontal door-supporting ledges and wall portions extending upwardly from said ledges to guide the door and to provide an unobstructed space above the side margins of the door, a sliding door supported on said ledges along its side margins and comprising a flat plate having its upper marginal surface beveled inwardly away from said upright wall portions of the frame side members, guide lugs instanding from the walls of the side frame members and overlying the beveled margins of said door to scrape the beveled margins of the door as the door is moved along said ledges, said lugs being spaced apart lengthwise of said side members, and having beveled end and upper faces arranged to deflect the lading material away from the walls of said frame side members as the door is moved along said ledges.

3. The combination of a frame for the hopper of railway load discharging cars, comprising side and end members defining a discharge outlet, the side members having horizontal door-supporting ledges on their interior walls and upright portions rising from said ledges to provide unobstructed clearance for the material above said ledges, a door slidable along said ledges from open to closed position and having its side marginal portions beveled away from said upright wall portions, said door being guided against lateral movement by said upright wall portions, and guide lugs instanding at intervals along said frame side members to overlie the beveled margins of said door and having beveled underfaces corresponding to said beveled door margins, said lugs being arranged to scrape load material from said beveled margins as the door is moved, means on said lugs for deflecting material away from the beveled margins and frame member walls as the door moves, and means in said frame for sliding the door.

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