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RAILWAY HOPPER CAR DISCHARGE DOOR

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This Invention relates to discharge doors for railway hopper cars. The invention provides a hopper car door of rigid and substantial construction and adapted for assembly and cooperation with a locking mechanism in a simplified and facile manner. A further feature of the invention resides in the provision of a hopper door which provides for increased cubical capacity of the car. Other features of the invention will be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a view in front elevation showing a hopper car door embodying my invention, together with a locking mechanism cooperating therewith, a portion of the hopper being also shown.

Fig. 2 is a detail elevational view, partly in section, of structure associated with the door at the left hand end thereof.

Fig. 3 is a detail elevational view, partly in section, of structure associated with the door at the right hand end thereof.

Fig. 4 is a horizontal sectional view taken on line IV—IV of Fig. 1.

Fig. 5 is a detail vertical sectional view on line V—V of Fig. 1.

Fig. 6 is a fragmentary front elevational view showing a detail, and

Fig. 7 is a detail vertical sectional view on line VII—VII of Fig. 1.

My present invention has been developed in connection with a door locking mechanism of the type shown in my pending application Serial No. 491,840, filed October 29, 1930, and is here illustrated in conjunction with such locking mechanism.

Referring to the drawings of the present application, a portion of a conventional hopper of a railway hopper car is indicated at 5. My improved hopper door is shown at 7. This door consists of a solid, integral structure formed as castling. The cast door includes as an integral part thereof hinges 8, 8 whereby the door may be pivotally connected through pins 8', 8" to the usual hinge butts (not shown) on the hopper.

The door 7 is a fitting within a marginal reinforcing flange 9 of conventional type secured to the hopper. The inner or upper face of the door has a flange 10 extending therearound and projecting upwardly therefrom and this flange 10 is received within the hopper flange 9 as shown. Also, the inner or upper face of the door 7 is provided with upwardly extending reinforcing projections 11. These projections are shown as of the same height as the flange 10 but they may instead be of substantially less height than said flange.

On its lower or outer face the door has an integral outwardly extending projection 12 which forms a pivot lug for the bar 13 of the locking mechanism, said bar having a hole 13' through which said pivot lug is adapted to extend. Also, integral with said outer face at the lower right hand edge thereof is a projection 14 having an aperture 15 through which the locking bar 13 is adapted to project. A lug 16 integral with the door and projecting from the lower left hand portion of the outer face thereof forms a bearing for the adjacent portion of said locking bar. A housing 17 is adapted to be fastened to the door by rivets 19, 19, the latter being insertible through holes 20, 20 (Fig. 6) in the door. Between the housing 17 and the door, and pivotally mounted on one of the rivets 19, is an eccentric locking element 18 adapted to engage the bar 13. The projection 16 includes arm portions 16', 16" extending laterally from the respective ends thereof and terminating in bosses 21, 21', said arm portions and bosses being likewise an integral part of the door. The upper boss 21, as shown in Fig. 5, forms a bearing for an end portion 18' of the cam or eccentric element 18, while the lower boss 21' is engaged by flange portion 17' of housing 17. The rivet holes 20, 20 extend through said bosses 21, 21' as shown.

The locking bar 13, as in my pending application previously specified, cooperates with brackets or latch members 22, 23 respectively, riveted to the hopper at opposite sides of the door. The member 22 is provided with an inclined face 24, a ledge 25 adjacent a shoulder 26, and an upwardly facing notched portion 27 including a shoulder 27' adjacent said ledge. The latch member 23 has a downwardly facing portion, including an inclined surface 28 for receiving the locking bar.

During the swinging of the door 7 toward closed position the locking bar 13 rides up the inclined face 24 of the outer latch member 22 and is thereby swung about its pivot, the end of said bar adjacent member 22 being raised and the end of said bar adjacent member 23 being lowered. When the end portion of the bar 13 cooperating with member 23 passes over shoulder 26 of said member, said end portion drops into engagement with ledge 25. It will be seen that by the engagement of shoulder 26 with the bar 13 the door is positively held in partially closed position and is prevented from being moved toward open position. A pinch bar 29 may now be so positioned...
that one end fulcums on a lug 30 of member 22 and another portion bears on locking bar 13, and through said bar the door may be forced to a closed position, the bar 13 now being engaged with notch 27. Engagement of said bar with the notch 27 may now be effected by turning the bar 13 about its pivot 12 into engagement with said notch 27, in which position said bar 13 may be firmly locked by member 18. During said movement of bar 13 into notch 27 the end of said bar adjacent the inner latch member 23 is raised into engagement with said member. In case the parts should for any reason not operate freely, the bar 13 can be forced fully into closed or locking position in the notch 27 through the operation of a pinch bar inserted at right angles to the car between a projection 31 on said bar 13 and a flange 25a on member 22; said pinch bar fulcuring on the underside of said flange 25a and bearing on the upper surface of said projection 31. The end portion of the bar 13 which is received in the inside latch member 23 is beveled as shown at 22 (Fig. 3) for cooperation with inclined surface 28 of said member. At the time that the bar 13 rests upon the ledge 25 said bar does not engage the latch member 23, and there is a tendency for the door to sag, due to its weight at the side adjacent said member 23. The position of bar 13 with respect to member 23 at the time said bar engages ledge 25 of member 13 is indicated in dot-dash lines in Fig. 3. By the provision of the inclined surfaces 28 and 32 the bar 13 during its upward movement in said latch member 23 concurrently with its engagement with notch 27 is guided into the position shown in Fig. 3, and the sag of the door is taken up.

As has been noted, my hopper door 7, together with its marginal flange 10, reinforcing flanges 11, pivot lug 12, guide member 14, and bearing member 15, with its projections 16, 18a, and bosses 21, 21', constitutes a single integral casting. Preferably the door structure is of cast steel though it may be composed of other cast metal. The cast structure aforesaid possesses marked advantages. It eliminates the necessity of providing a separate pivot lug, separate guide and bearing members, and instead provides these elements as part of an integral structure cast in its entirety at one time. Assembly of the door and cooperating locking mechanism is particularly facilitated. It is simply necessary, first, to position the door with its hinges 8 between the usual hinge butts on the hopper and apply the hinge pins 8'. The locking bar 13 is then passed through the opening 15 in the guide projection 14 and positioned on the pivot lug 12. The housing member 17, together with the eccentric element 18, is then positioned in proper relation to the bosses 21, 21' of member 16 and the rivets 19 passed through the holes 20 for retaining said housing member and eccentric element in position. The assembly of the parts on the door is now complete and the locking bar 13 is now ready for cooperation with the brackets 22, 23, which are fastened to the side sheets of the hopper. It will be noted that the assembly of the parts on the door is accomplished in a decidedly facile manner and with the application of but two rivets.

The provision of the flange 10 on the upper or inner face of the door results in spacing the face of the door outwardly from the hopper and thus increasing the capacity of the car, as is apparent from Fig. 4, while at the same time retaining effectively the function of the door as a closure for the hopper. Since four hoppers are usually employed on a car a corresponding increase of cubical capacity is attained by the employment of each of said hoppers of a door embodying this feature.

It may be noted that a portion of one of the ribs 11 is located immediately opposite the pivot lug 12 as shown in Fig. 4. Also, as is shown in Figs. 5 and 6, one of the ribs 11 has an extension 11' behind the boss 21 while an extension 10' of the marginal flange 10 lies behind boss 21'. Reinforcement is thus provided at the aforementioned points.

As indicated at 33 in Fig. 2, clearance is provided between the door flange 10 and the hopper reinforcing flange 9 and clearance is also provided between the locking bar 13 and the bracket or latch member 22 as indicated at 34. As a result of these clearances casting of the hinges 8 in accurate and precise vertical relation to the door is not required.

To unlock the door, the locking bar 13 (after locking element 18 has been manipulated to unlocking position) may be readily forced out of 100 engagement with latch members 22 and 23 through operation of a pinch bar inserted between the upper surface of member 23. The position of bar 13 with respect to member 23 is indicated in Fig. 3. By the provision of the inclined surfaces 28 and 32 the bar 13 during its upward movement in said latch member 23 concurrently with its engagement with notch 27 is guided into the position shown in Fig. 3, and the sag of the door is taken up.

I claim:

1. A hopper car door consisting of an integral casting having on its lower face a pivot lug for a locking bar and a projection having an opening for receiving said bar, and also having on said face a projection providing a bearing for a portion of said bar, the last mentioned projection having portions forming bosses adapted to receive fastening elements.

2. A hopper car door consisting of an integral casting having on its lower face a pivot lug for a locking bar and a projection having an opening for receiving said bar, said door having on its upper face an upwardly extending marginal flange engageable with a hopper.

3. In combination, a cast metal door for a hopper car having on its lower face a pivot lug, a locking bar mounted on said pivot lug, a projection integral with said door at one side thereof and having an opening through which said locking bar extends, a projection integral with said door at the opposite side thereof providing a bearing for said bar, bosses integral with said door and provided with openings, fastening elements extending through said openings, and a housing member for said bar secured to the door by said fastening elements.

4. In combination, a cast metal door for a hopper car having on its lower face a pivot lug, a locking bar mounted on said pivot lug, a projection integral with said door at one side thereof and having an opening through which said locking bar extends, a projection integral with said door at the opposite side thereof providing a bearing for said bar, bosses integral with said door and provided with openings, fastening elements extending through said openings, and a housing member for said bar secured to the door by said fastening elements.
7. A hopper car door consisting of an integral casting having on its lower face a pivot lug for a locking bar and a projection having an opening for receiving said bar, said door also having on said face bosses adapted to receive fastening elements, said door having reinforcing ribs on its upper face.

8. A hopper car door consisting of an integral casting having on its lower face a pivot lug for a locking bar and a projection having an opening for receiving said bar, said door also having reinforcing ribs on said upper face, as well as an upwardly extending marginal flange engageable with a hopper and constructed and arranged to space said upper face from said hopper.

9. A cast hopper door adapted for cooperation with a hopper and comprising a main body portion having a continuous flange extending upwardly from the edges of said body portion and around the same, the edge of said flange being engageable with said hopper to space the body portion from the hopper.

10. A cast hopper car door adapted for cooperation with a hopper and comprising a main body portion having a continuous flange extending upwardly from the edges of said body portion and perpendicular thereto, the edge of said flange being engageable with said hopper to space the body portion from the hopper.

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