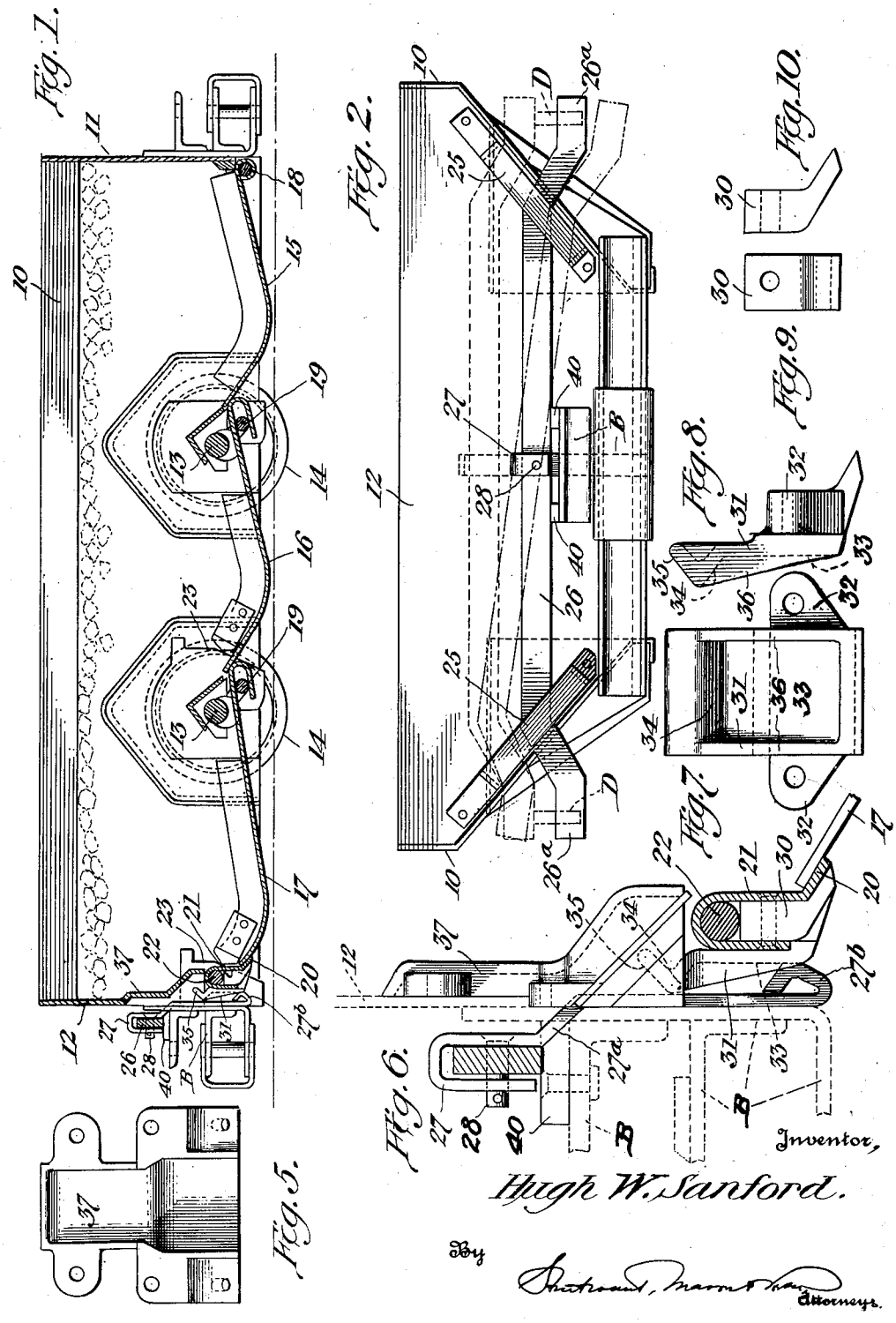
May 14, 1935. H. W. SANFORD 2,001,471

LATCH FOR AUTOMATIC DUMPING VEHICLES

Filed Dec. 3, 1932 3 Sheets-Sheet 1



May 14, 1935. H. W. SANFORD 2,001,471

LATCH FOR AUTOMATIC DUMPING VEHICLES

Filed Dec. 3, 1932 3 Sheets-Sheet 2

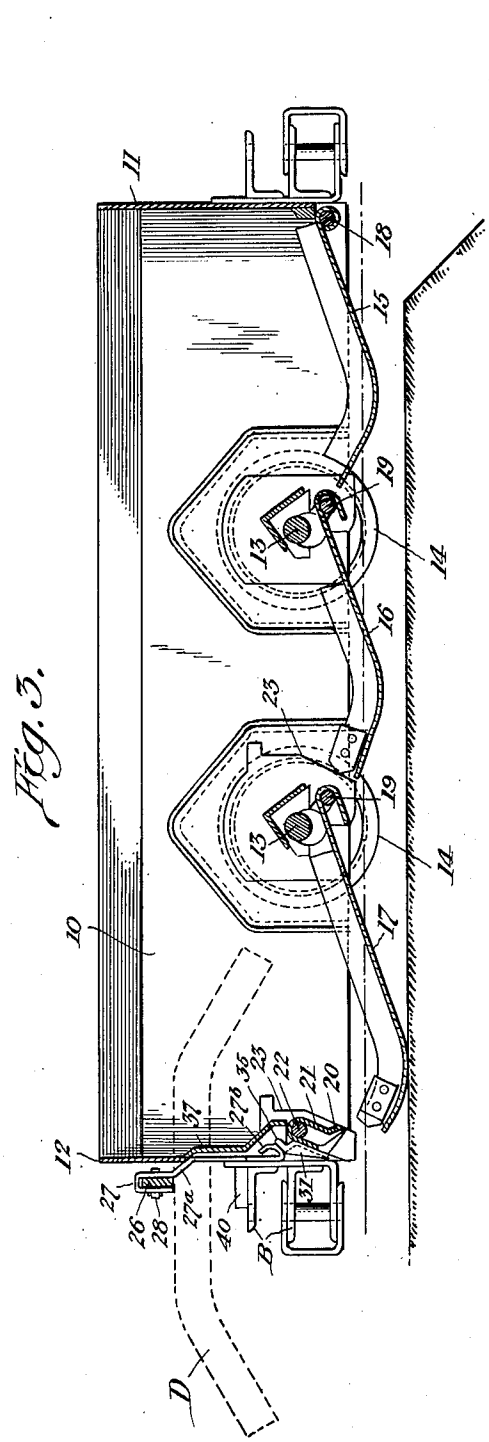


Fig. 3.

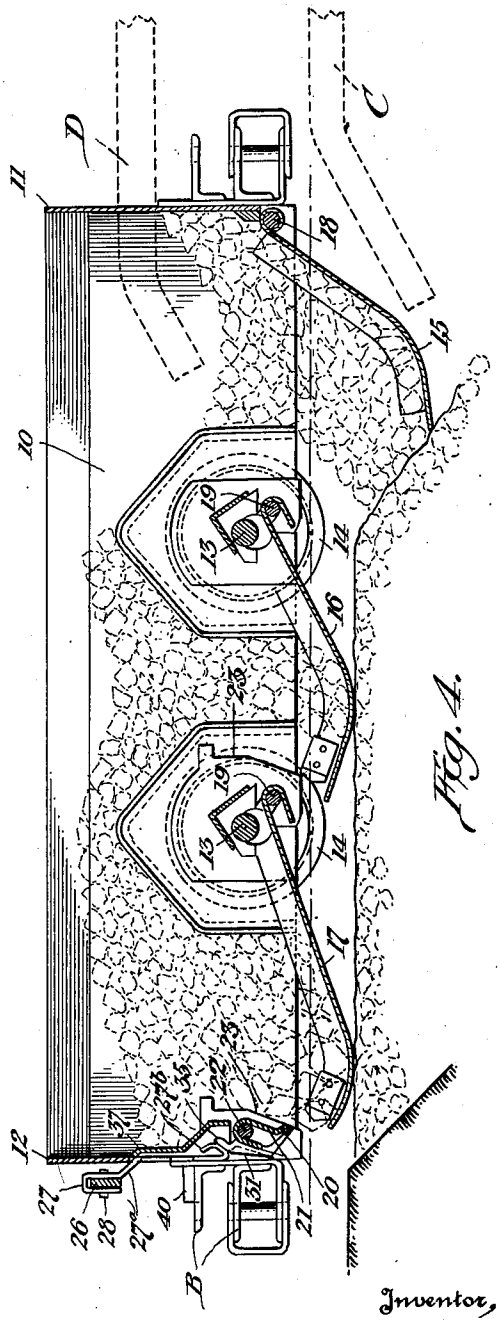


Fig. 4.

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May 14, 1935. H. W. SANFORD 2,001,471

LATCH FOR AUTOMATIC DUMPING VEHICLES

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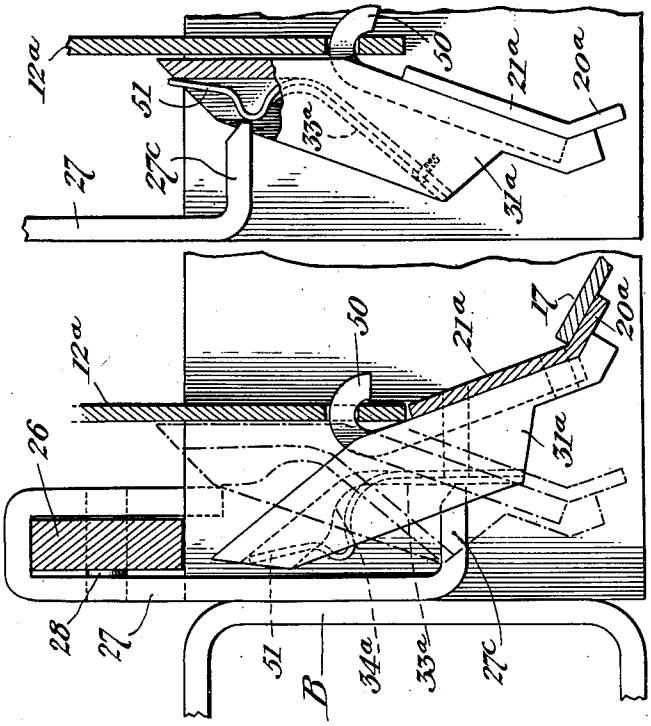


Fig. 12.

Fig. 11

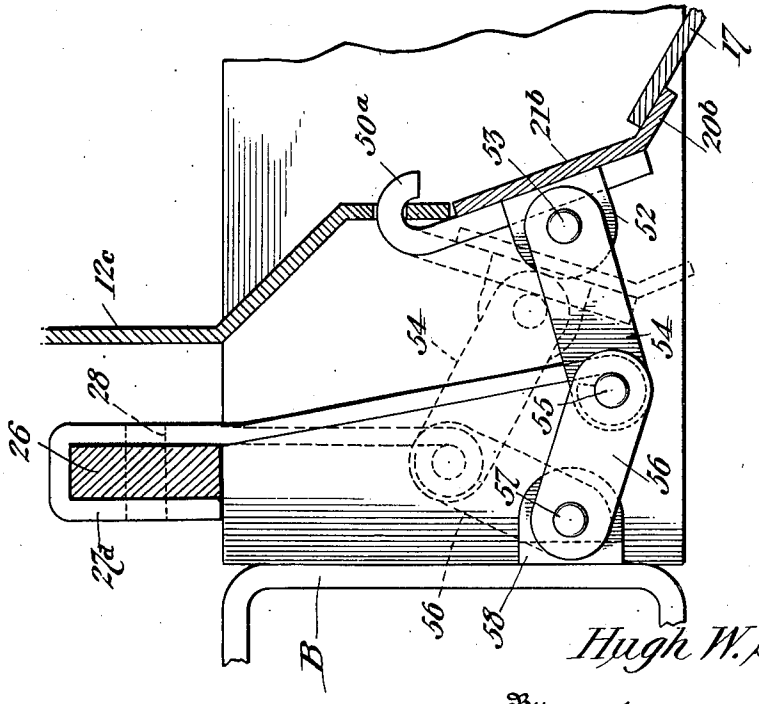


Fig. 13.

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2,001,471

LATCH FOR AUTOMATIC DUMPING VEHICLES

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Application December 3, 1932, Serial No. 645,603

15 Claims. (Cl. 105—253)

This invention relates to a latch apparatus for preventing the dumping of the load of an automatic dump vehicle, which is adapted for operation at a predetermined point for the release of the load.

One feature of the present invention is the provision of such a latching apparatus with means to prevent accidental or inadvertent dumping at an undesired point.

Another feature of the present invention is the provision of latching means cooperable with two latch release devices located at the predetermined point for dumping, which cooperate at this point by causing a double energization of the latch releasing structure.

A further feature of the present invention is the provision of a latch apparatus in which the latch may be moved through certain predetermined limits without release of the latch, but which upon further movement operates to release the latch, this further movement only being imparted by the coincidence of operation of a plurality of external operators.

Still another feature of the present invention is the provision of a latch apparatus including a single latch controlling bar which may be engaged intentionally or accidentally at one point thereof without causing a release of the latch: and which must be actuated at a predetermined plurality of points in order to produce actuation of the latch.

A still further feature of the invention relates to improvements in latches which are adapted to cooperate with such an operating system by permitting partial movements of one latch device without release of the latch, but enable an immediate and quick release of the latch, and hence the preparation of the car for dumping, upon a further movement.

Other features of the invention relate to specific constructions of the several parts, as will be set forth in the following specification and claims.

Illustrative forms of practicing the invention are set forth on the accompanying drawings, in which:

Figure 1 is a longitudinal vertical section showing the application of the present latch apparatus to a vehicle which is illustrated as being a bottom dump mine car.

Figure 2 is an end elevation of the same.

Figure 3 is a longitudinal vertical section corresponding to Fig. 1, but showing the latch released, and the doors moving toward a preparatory dumping position.

Figure 4 is a section corresponding to Fig. 3 but showing one of the doors releasing its load.

Figure 5 is a detail view on a larger scale of a housing member for the latch assembly.

Figure 6 is a detail view showing the relationship of this housing to the latch elements.

Figures 7 and 8 are face and side elevations of a latch piece.

Figures 9 and 10 are face and side elevations of a latch reinforcing element.

Figures 11 and 12 are views, on a larger scale, of a modified form of latch, shown in longitudinal vertical section.

Figure 13 is a similar view of a further modified form of latch.

In these drawings the invention is shown illustratively as applied to a mine car of the bottom dump type having a plurality of bottom dump doors which are secured in transport position by their interengagement and by the securing of the rear door by a latch apparatus of the present type. This latch apparatus is intended to be released at a predetermined dumping point by the conjoint action of a plurality of releasing devices located along the right of way, so that the said rear door is thus released preparatory to dumping, and in turn this rear door enables the successive release of the forward doors. While the car is in transit, accidental or inadvertent movement of the latch releasing structure for example at a point which it cooperates with one of the plurality of actuating devices does not lead to the release of the latch, and further, for example, the contact of the releasing structure with lumps of coal, mine timbers or other obstacles does not cause a "false" dumping along the right of way.

The car is illustrated as having a body comprising side walls 10, end walls 11, 12, axles 13, wheels 14 and a plurality of bottom dump doors 15, 16, 17. The front bottom dump door 15 is mounted on a fixed pivot 18 and extends at its rear edge so that it rests in transport position (Fig. 1) upon the forward edge of the next rearward door 16. In the illustrated form, this next rearward door 16 has a downwardly and backwardly folded portion formed from its sheeting to engage a pivot 19 extending transversely between the side walls, so that it may both pivot and slide with respect thereto: this middle door 16 likewise has its rear edge extending over and resting upon the forward edge of the rear door 17 while in transport position. The rear door 17 likewise has a downwardly and rearwardly folded portion engaging a transversely extending pivot member 19 so that it may swing and slide

with respect thereto: the rear door 17 has its rearward edge supported by the downwardly and forwardly inclined shelf 20 of a pivoted latch member 21 which fits over a transversely extending latch pivot 22.

In the illustrated form, the middle and rear doors 16, 17 have parts which engage during their closing movement with fixed wedging members 23 usually located adjacent and secured to the side walls 10, so that these doors 16 and 17 are forced bodily forward relative to the side walls 10 toward the end of their closing movement, resulting in a sliding of the doors with respect to their pivots 19 into the aforesaid overlapping and interengaging position as shown in Fig. 1. These fixed cam pieces 23 likewise serve to prevent relative rearward sliding movement of these doors while in transport position, so that all doors are held in load-containing position by the single latch shelf 20.

On the end wall 12 of the car are provided the guide straps 25 which have their intermediate portions spaced from the end walls and serve to prevent longitudinal movement of a transverse latch actuating bar 26 relative to the car body, while permitting it to be rocked or to be raised bodily. As shown in Fig. 2, a vertically sliding latch control member 27 is secured by a pivot 28 to the latch actuating bar 26 at an intermediate point of its length. The projecting ends 26*a* of the bar 26 extend laterally beyond the lading walls of the car body so that they may be engaged by the latch releasing devices D located at a predetermined point along the right of way (Figs. 2 and 3).

The vertically slidable member 27 may be bent and offset as shown at 27*a* in Fig. 6 to pass within the bumper and coupler structure, and is provided at its lower end with an inwardly extending portion 27*b* which serves as the latch control piece. The latch member 21 preferably is formed of plate material, and extends from side to side of the car to furnish a ledge 29 for affording ample support to the rear edge of the rear door 17, being stiffened from point to point by the reinforcing pieces 30 (Figs. 7, 9 and 10), which likewise prevent any upward movement of this latch member with respect to its pivot 22. Centrally of the car the latch member is cut away for the reception of a latch control element 31 (Figs. 6, 7 and 8) which has perforated lateral ears 32 by which it may be rigidly secured to the latch member 21, these ears extending between the two arms of the U formed by the latch member 21 and serving to reinforce the same adjacent the cutaway point. This latch control element 31 has a central wall 33 which is vertical when the latch is engaged (Fig. 6) and is provided adjacent its upper end with an angularly disposed wall 34 (Figs. 6 and 8) located above the axis of the latch pivot 22, and this element 31 terminates at the top in a reversely inclined wall 35. Lateral flanges 36 are preferably provided for assisting in guiding the vertical movement of the latch control element 27*b* which is thus presented by the vertically sliding member 27 between the inward wall of the end structure B and the aforesaid flat surface 33, and thus blocks any clockwise swinging movement of the latch member 21 so long as the element 27*b* is below the axis of latch pivot 22.

The latch structure is preferably protected against contact by the lading of the car by a housing 37 (Fig. 5), which may be formed as a casting and secured inside the end wall 12 which is suitably cut away at this point to afford free vertical movement for the latch control element 27, this housing 37 extending downwardly substantially to the latch member 21.

The end structure B carries two supporting blocks 40 (Fig. 2) upon which the bar 26 rests while in its lowermost position.

While the car is in loaded condition, with the doors in the latched position shown in Fig. 1, no engagement of either end 26*a* of bar 26 will cause a release of the latch and thus a dumping of the car. If the left-hand end 26*a* (Fig. 2) is raised (dash and double dot lines), the bar swings about the right-hand support block 40 and the pivot pin 28 is raised only a short distance. The vertically sliding member 27 is raised a corresponding distance, but its control element 27*b* still remains below the axis of latch pivot 22, and hence in blocking position for preventing the clockwise movement of latch 21. Thus, the latch is not released by such inadvertent or accidental movement of either end of the bar 26.

Upon arriving at the predetermined dumping point, however, the trackside ramps D (Figs. 2 and 3) engage both ends 26*a* of bar 26, and by their conjoint action the bar is raised bodily (Fig. 2, dotted line position), thus raising the sliding control element 27 and its control piece 27*b* until the latter is above the latch pivot 22, so that the latch 21 is now free to swing in a clockwise direction (Fig. 6). The continued upward movement of the control element 27*b* brings the latter into engagement with the surface 34, and causes a positive clockwise swinging of the latch into door-releasing position, and ultimately the element 27*b* comes to rest over and against the surface 35 (Figs. 3 and 4), in which the latch 21 is held in a rocked position, so that the rear door 17 is not obstructed in its return movement. This clockwise movement of the latch 21 has released the rear door 17 so that the latter may fall downward under the weight of its load. By its weight and lading, and under the endwise pressure given to this rearward door by the action of the middle door 16 thereon, and by the dragging of this door upon the right of way, this rear door slides relatively rearward with respect to its pivot 19 (Fig. 3) so that it in turn releases the middle door 16, and this in turn may release the front door 15. The doors are thus freed to fall to the right of way, but owing to clearances, no substantial part of the load is thus discharged, but the lading continues forward with the car over a dumping point which is shown in Figs. 3 and 4 as comprising a hopper located between the rails. As each door comes to an unfilled part of the hopper it may move farther downward at its rear edge to release its load, so that the lading is gently deposited in the hopper by the doors as they successively come to such an empty point (Fig. 4).

The doors are thereafter engaged by rails C located between the track rails, and thus are individually and successively raised into their closed positions. The front door 15 is swung upward substantially in the position shown by Fig. 1. The middle door 16 is then swung upwardly, and as it passes toward its position shown in Fig. 1, the engagement with the fixed wedging member 23 causes a relatively forward bodily movement of this door into the former overlapping and interengaging position as shown in Fig. 1. The rear door 17 is similarly raised and moved forward into the position shown in Fig. 1.

During this time, the trackside latch operating members D have been holding the bar 26 in its

raised position, but shortly after the rear door 17 has been raised, the trackside devices D release the bar 26 and permit it to move downwardly with its vertically sliding member 27 so that the element 27b thereof again enters into blocking relationship between the end structure B and the flat surface 33 at a point below the axis of latch pivot 22: this action occurs while the rear door 17 is still being held in raised position by the closing rail C. It will be noted that the downward movement of sliding member 27 positively rocks the latch and its shelf 22 into holding relationship with the rear door 17.

In Figs. 11 and 12 a modified form of latch assembly is shown in which the end wall 12a has apertures near its bottom to support the pendulum pieces 50 which are connected to the latch plate 21a, which extends across the car and has a shelf 20a for supporting the rear door 17. A latch actuating member 31a is connected to latch 21a and extends outside of the rear wall 12a, being provided with a flat surface 33a which is vertical when in latching position (Fig. 11) and being joined at the top to an inclined surface 34a. These surfaces cooperate with the inwardly extending end 27c of the vertically sliding member 27. In order to compensate for any wear or inaccuracy in these parts and to cushion the operation of the parts, a blade spring 51 is secured in a groove in surfaces 33a and 34a and extends above surface 34a so that it is engaged by the projection 27c (Fig. 12) when the sliding member 27 is raised.

The operation of this construction is substantially the same as before. The positive bodily raising of bar 26 upon conjoint action of trackside rams causes an upward movement of sliding member 27 so that the portion 27c is withdrawn from its blocking position (Fig. 11) until it is above the pivot point of latch 21a, and comes into engagement with the spring 51 and surface 34a and thus positively effects a clockwise rocking of the latch 21a to release the door 17, and then is held in this position so that the latch does not interfere with the free return or closing movement of the door 17 as before.

In the form of construction shown in Fig. 13, the latch 21b has a ledge 20b to support the rear door 17, as before, and is supported by the pendulum pieces 50a which are supported in apertures at the lower end of the end wall 12c. The latch 21b is provided with an ear 52 supporting the pivot 53 of a first toggle link 54 which is joined by an intermediate pivot 55 to a second toggle link 56 mounted by pivot 57 on an ear 58 supported on the end structure B. The bar 26 is connected by a pivot 28 as before to a vertically movable member 27d, which at its lower end engages the intermediate pivot 25.

While in transport position (Fig. 13, full lines) any slight rocking movement of the bar 26 does not raise the intermediate pivot 55 to the line of centers of the three toggle pivots, and its upward movement is opposed by the resistance opposed to counterclockwise rocking of the latch 21b by the weight of the load on door 17, which produces a return of the toggle elements to the position shown in full lines. When, however, the bar 26 is raised bodily, the vertical member 27 pulls the intermediate pivot 55 above the line of centers of the two outer pivots, so that the toggle rapidly collapses with an upward movement of the intermediate pivot 55 into the dotted line position, this being effected by the aforesaid pressure of the door 17, so that the door is quickly and immediately released, and in turn may serve to release other doors.

It will be noted that in each form of construction conjoint operation at a plurality of points is necessary for the definite release of the latch structure: and that minor movements of the latch structure, as may be occasioned by operation at less than all such plurality of points, does not lead to a release of the doors.

It is obvious that the invention is not limited solely to the form of construction shown, but that it may be modified in many ways without departing from the scope of the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position, a latch controlling member located adjacent the center of the width of the vehicle, and means having a plurality of parts pivotally connected to said member and exposed for conjoint operation by a plurality of elements located along the route of said vehicle for actuating said member to release said latch, said means moving pivotally relative to said member and being inoperative upon movement of less than all said parts for causing the release of said latch.

2. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position, a latch controlling member, and means including an arm pivotally connected intermediate its ends to said member and having its ends exposed for simultaneous operation by a plurality of elements located at a predetermined point along the route of said vehicle for actuating said member to release said latch, said means moving pivotally relative to said member and being inoperative upon movement of less than all said ends for causing the release of said latch.

3. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position, a latch controlling mechanism including a latch bar having a pivot connection adjacent its center and extending laterally beyond the lading portions of said body for conjoint operation to release said latch, and a latch controlling member attached to said pivot connections, said bar moving pivotally relative to said member and being inoperative when operated at one end only for causing the release of said latch.

4. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position, and a latch controlling mechanism including a latch bar and a latch-controlling member pivotally connected to the bar adjacent the center of the latter so that the bar may rock about said pivot without releasing the latch, said bar operating when raised at both ends to move said member for releasing the latch.

5. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position, a member movable between a position in which it holds the latch in securing relationship to the door and a position in which it holds the latch out of engagement with the door, and means pivotally connected to said member and having a plurality of parts exposed for conjoint operation by a plurality of elements located along the route of said vehicle for bodily actuating said member to release said latch, said means moving pivotally relative to said member and being inoperative upon movement of less

than all said parts for causing the release of said latch.

6. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position, a member movable between a position in which it holds the latch in securing relationship to the door and a position in which it holds the latch out of engagement with the door, and means pivotally connected to said member and having a plurality of parts exposed for simultaneous operation by a plurality of elements located at a predetermined point along the route of said vehicle for bodily actuating said member to release said latch, said means moving pivotally relative to said member and being inoperative upon movement of less than all said parts for causing the release of said latch.

7. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position and mounted for movement about a pivot axis fixed with respect to said body, a wall fixed with respect to said body, said latch having a surface paralleling said wall below said axis and inclined toward said wall above said axis, a latch controlling member engaging said wall and said surface, and means for moving said member in a substantially vertical direction between a position where it acts between said wall and surface below said axis to prevent a rocking movement of said latch in the releasing direction and a position where it acts therebetween above said axis to prevent a rocking movement of said latch into engagement with the door.

8. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position, and means for controlling said latch; said means including a vertically movable member movable between a normal position in which it acts to prevent a releasing movement of said latch and a position in which it permits such releasing movement, and a bar extending transversely of the vehicle and pivotally connected adjacent its center to said member and adapted to be raised at both ends at a predetermined dumping point whereby to move said member into the permitting position, said bar being inoperative when raised at one end only for moving said member into the permitting position.

9. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position, and means for controlling said latch; said means including a vertically movable member movable between a normal position in which it acts to prevent a releasing movement of said latch and a position in which it permits such releasing movement, and a bar extending transversely of the vehicle and pivotally connected adjacent its center to said member and adapted to be raised at both ends at a predetermined dumping point whereby to move said member into the permitting position, said bar being inoperative when raised at one end only for moving said member into the permitting position, means fixed relative to the body adjacent the member for limiting the downward movement of said bar and operating as a fulcrum for said bar when the bar is raised at one end only.

10. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position, a structure fixed relative to the body and located adjacent to and spaced from the latch when the latch is in door-securing position, a latch controlling device operating when a part of said device is gravitationally held in a lower position to fill the space between said latch and structure for holding said latch in door-securing position, and means operable for raising said part into an upper position in which it does not fill said space whereby to release said device and latch from door-securing position and permit said latch to move toward said structure.

11. A dump vehicle as in claim 10, in which said device includes two connected toggle links of which one is pivoted to said structure and the other to said latch, and said means operates to raise said links adjacent their mutual connection.

12. A dump vehicle as in claim 10, in which said device includes two connected toggle links of which one is pivoted to said structure and the other to said latch, and said means is pivotally connected to said links adjacent their mutual connection, and means are provided for limiting the downward movement of said means so that the toggle links in their lower position hold the latch in securing position, and so that the raising of said means operates to raise said links above the line joining their frames and latch pivot axes.

13. A dump vehicle as in claim 10, including yielding means interposed between said device and latch for holding said latch out of door-engaging position so long as said part is in raised position.

14. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position, and means for controlling said latch; said means including a vertically movable member movable between a normal position in which it acts to prevent a releasing movement of said latch and a position in which it permits such releasing movement, and a bar extending transversely of the vehicle and connected adjacent its center to said member and adapted to be raised to a predetermined dumping point whereby to move said member into the permitting position.

15. A dump vehicle including a body and a dumping door, a latch for securing said door in closed position and means for controlling said latch including a bar extending transversely of the vehicle from side to side thereof and projecting at both sides for engaging with corresponding elements located along the route of said vehicle for bodily raising said bar, and means connected thereto adjacent the longitudinal center line of the vehicle for releasing the latch when said bar has been raised a predetermined distance at said connection.

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