June 28, 1927. 1,633,762

A. CAMPBELL ET AL

CAR DOOR LOCKING MECHANISM

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Fig. 1

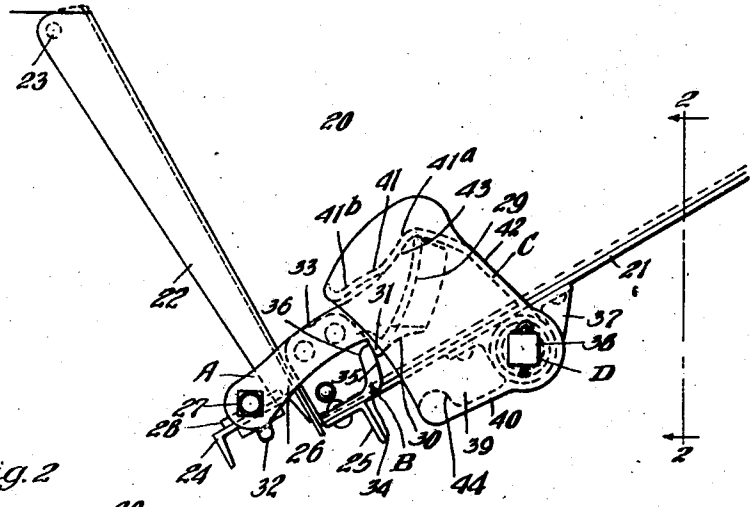


Fig. 2

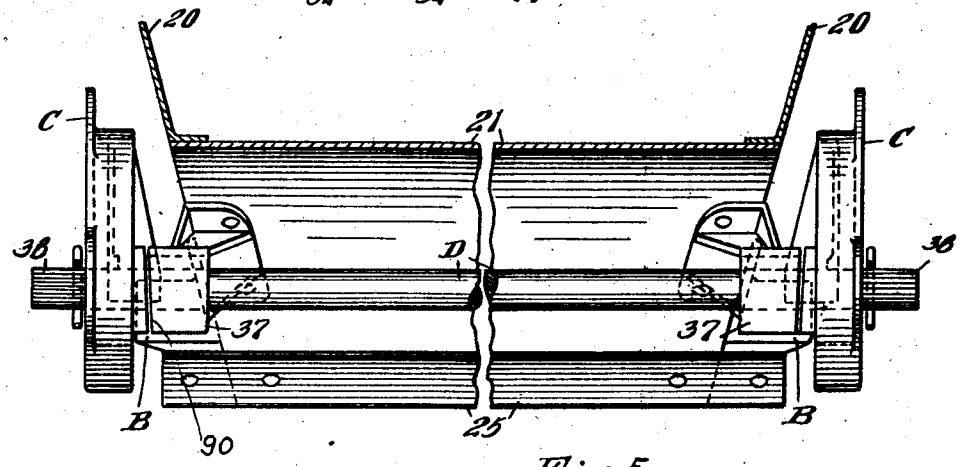


Fig. 4

Fig. 3

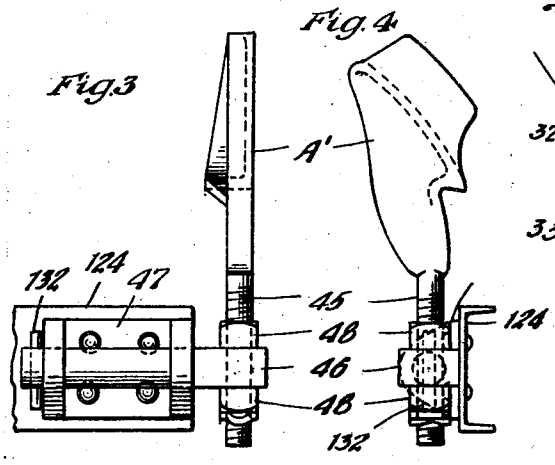
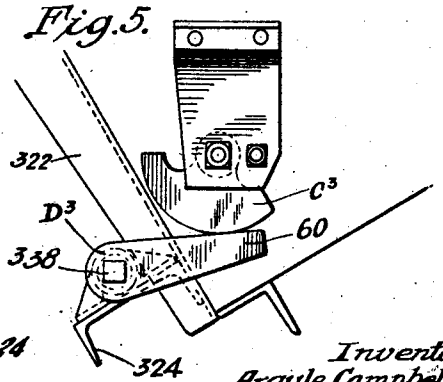


Fig. 5.



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Fig. 7

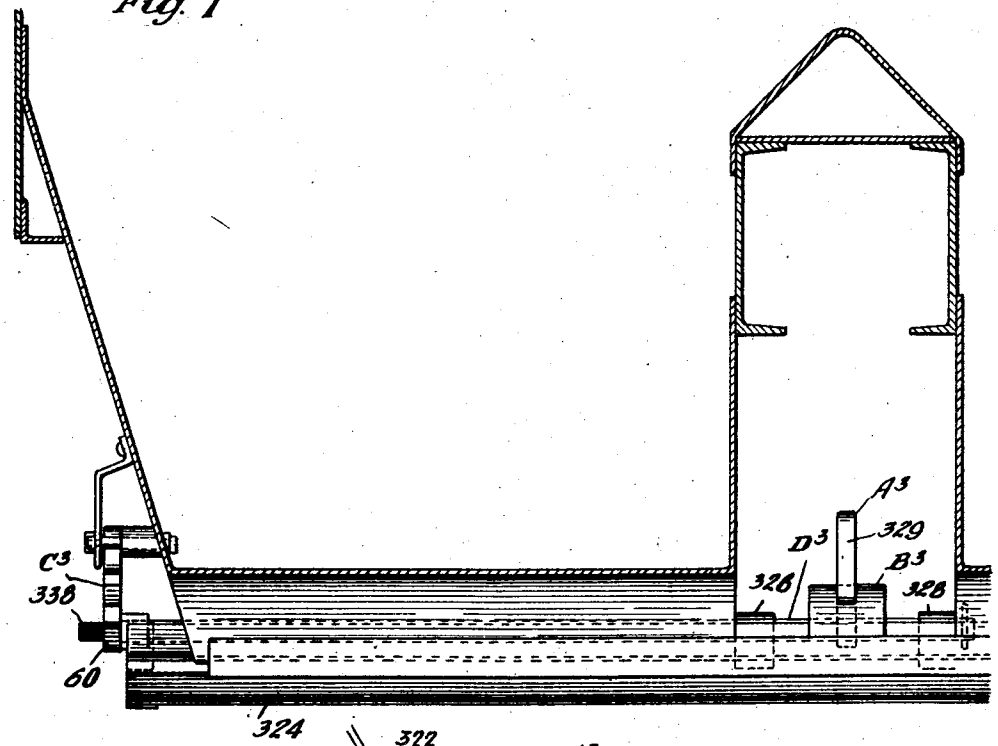


Fig. 6.

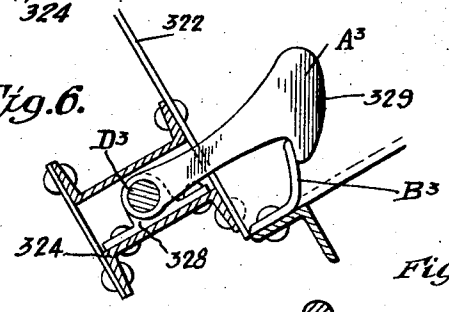


Fig. 9

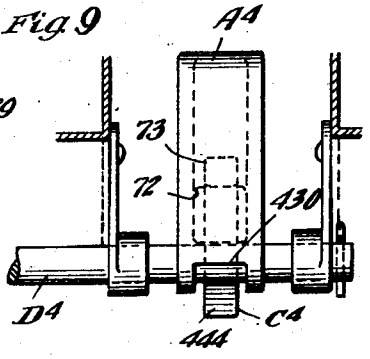
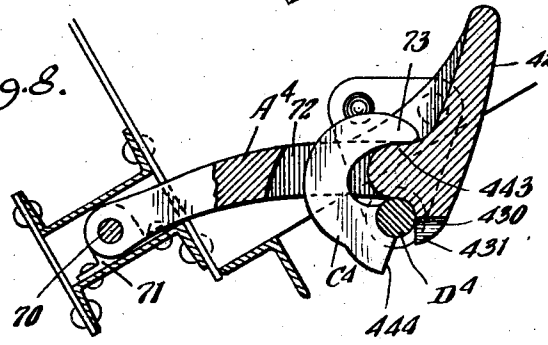


Fig. 8.



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UNITED STATES PATENT OFFICE.

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CAR-DOOR-LOCKING MECHANISM.

Application filed August 26, 1921. Serial No. 495,665.

This invention relates to improvements in car door locking mechanisms.

One object of the invention is to provide a door lock or latch arrangement for a railway car which is of simple form, relatively inexpensive to make, apply and maintain, and which will always insure the doors being fully closed when locked to thereby prevent leakage of the contents of the car while in transit.

Another object of the invention is to provide a door locking mechanism which eliminates the use of chains or equivalent flexible connections, and which is so arranged that, as the doors are pushed or kicked to closed position, the mechanism will automatically lock or latch the doors in their final closed position.

Other objects of the invention are to provide a mechanism of the character indicated in the preceding paragraphs wherein is employed a locking or latching element proper which is positively held in operative position, which may be positively disengaged to release the doors, wherein the release of the mechanism may be effected from either side of the car, and, in some instances, wherein the mechanism is duplicated at opposite ends of the doors or opposite sides of the car with uniform simultaneous operation thereof.

Other objects of the invention will more clearly appear from the description and claims hereinafter following.

In the drawings forming a part of this specification, Figure 1 is a side elevational view of a portion of a hopper car showing one form of our invention in connection therewith, the parts being in the condition assumed when the doors are in closed position. Figure 2 is a vertical section on the line 2—2 of Figure 1. Figure 3 is an elevational view of a part of the structure shown in Figure 1 illustrating the modification involving an adjustment of the latching or locking member proper. Figure 4 is an elevational view of the structure shown in Figure 3 taken at right angles thereto. Figure 5 is a side elevational view of a portion of a hopper car illustrating another embodiment of our invention. Figure 6 is a vertical sectional view taken at the center of a car showing a part of the arrangement illustrated in Figure 5. Figure 7 is a vertical transverse sectional view of a hopper car embodying the construction shown in Figures 5 and 6. Figure 8 is a part elevational view, part vertical sectional view corresponding to Figure 6 illustrating another embodiment of the invention. And Figure 9 is an elevational and sectional view of the structure shown in Figure 8 at the center of the car.

Referring first to the construction illustrated in Figures 1 and 2, the type of car shown in these figures is one having hoppers transversely alined, one on each side of the center sill construction of the car. As customary, such hoppers are formed with substantially triangular outer side sheets 20 which slope slightly inwardly and downwardly toward the center of the car. Each such hopper is also provided with a downwardly sloping hopper bottom sheet, as indicated at 21, and the opening of each hopper, on each side of the car, is adapted to be closed by a hopper door or member 22 pivotally mounted to swing about its upper edge on an axis extending transversely of the car, as indicated at 23. As customary in this type of car, the transversely alined two doors are adapted to be simultaneously operated by means of a suitable cross-brace extending along the free edges of the doors, such a brace being shown at 24, the same being of channel formation. Ordinarily, there will be a brace for the lower edge of each hopper bottom sheet 21, as indicated at 25.

In carrying out our invention, we employ, broadly, a locking element or latching element proper, as indicated at A, pivotally attached to the outer edge of each door 22; a fixed locking element or bracket B, applied to the outer face of each outside hopper sheet 20; a pivoted wedging or camming element C co-operable with each pivoted latching element A; and a shaft D extending transversely of the car and on which said wedging or camming elements C are rigidly secured.

Each latching element A consists of an elongated arm 26 pivotally attached by a suitable bolt or pivot 27 to a bracket 28 carried by the channel brace 24. At its free end, the element A is formed with a cam edge 29, and, inwardly thereof, with a second cam edge 30. At the inner edge of the cam edge 30, said element A is provided with a

shoulder 31 extending substantially at right angles to the longest dimension of the element A. In addition, the element A, adjacent its pivotal point, is provided with a lug 32 on the under side thereof which is adapted to co-operate with the underface of the web of the channel 24 to limit the swinging movements of the element A about its pivotal axis, for the purpose hereinafter described.

Each bracket B comprises a suitable web or flange 33 adapting it to be riveted to the sheet 20 of the hopper and also with a laterally extended substantially right angular flange 34, which provides a face or shoulder 35 also extending substantially at right angles to the longest dimension of the element A when the latter is in operative position.

In closing the doors of a hopper car of the type shown in Figures 1 and 2, where no chain or other flexible winding arrangement is employed, it is customary for the operators to push the doors to closed position or to kick them to closed position. By arranging the lug 32 of each element A as shown, the elements A are prevented from swinging, under the influence of gravity, to a dependent position, and, on the contrary, are so limited in their movements that the cam edges 29 thereof will always lie in the path of the edges 36 of the fixed locking elements B, so that, as the doors approach closed position, the cam edges 29 will ride up over the edges 36 and thereby guide the latches A into proper position so as to hook the shoulders 31 over the shoulders 35.

The shaft D is mounted in suitable bearing brackets 37—37 secured to the under sides of the hopper bottom sheets 21. Said shaft is squared at both ends, as indicated at 38—38, so that it may be operated with equal facility on either side of the car. The casings or wedging elements C are rigidly secured to the shaft D in planes outside of the said hopper sheets 20 and in line with the latching elements A. Each of said elements C is preferably in the form of a casting having an outer web 39, a transversely extending bottom flange 40, a transversely extending top flange 41 and a connecting flange 42. The top flange 41 is specially formed and preferably of the contour best shown in Figure 1, so that the portion 41^a thereof is adapted to ride over and wedge against, or cam against, the upper surface 43 of the latching element A. Forwardly of the portion 41^a, the flange 41 is somewhat flared, as indicated at 41^b, so as to provide ample clearance when swinging over the top edge of the latching element A. With this construction, it is evident that, as the camming elements C are rotated counter-clockwise, they positively force or jam the elements A into full locking engagement with the fixed locking or latching elements B.

At its outer or free edge, the bottom flange 40 of each element C is formed with a round enlargement, as indicated at 44, this enlargement being so located that, as the shaft D with the elements C thereon is rotated in a clockwise direction, said enlargements 44 will engage the cam surfaces 30 of the latching elements A and thereby positively lift off or disengage the pivoted latching elements from the fixed latching elements B. It will be noted from an inspection of Fig. 2 that the bearing proper of the bracket 37 and the hub of the elements C are formed with adjacent faces 90 which are slightly separated when the element C is in its operative position, said faces 90 extending in a plane slightly tilted to the axis of the shaft D. When the element C is rotated to release position, said opposed surfaces 90 will come together and are adapted to frictionally hold the shaft D temporarily in its release, or inoperative position.

From the preceding description, it will be seen that the arrangement shown in Figures 1 and 2 is automatically self-engaging as the doors are pushed to closed position; that the latching elements A will be positively cammed or jammed to fully operative position when the shaft D is rotated in a counter-clockwise direction; and that the latching elements A are adapted to be simultaneously and positively released from either side of the car.

Referring next to the construction shown in Figs. 3 and 4, the latching element A′ is of substantially the same form as that shown in Figure 1, except that it is provided with a threaded shank 45. The latter is adjustably mounted in a laterally extended block 46, which, in turn, is pivotally mounted on a two-bearing bracket 47 adapted to be secured to the cross-brace connecting the two doors. The adjusted position of the latching element A′ on the block 46 is maintained by suitable nuts 48—48. At its inner end, the journal portion of the block 46 is provided with a transversely extending heavy pin 132 which not only serves to prevent the block 46 from coming out of its bearings, but also is adapted to engage with the channel brace 124 and limit the swinging movements of the latch A′ in the same manner as does the lug 32 on the latching element A. By means of the threaded adjustable shank, it is evident that any wear on the parts of the co-operating latching elements may be compensated for by adjusting the nuts 48, as will be understood.

In the construction illustrated in Figures 5, 6 and 7, we have shown only one latching element proper A^3, the same being pivotally supported on a suitable bearing bracket 328, which is secured to one of the chan-

nel cross-braces 324 connecting the two transversely alined doors 322. Said latching element A^3 is secured to a shaft D^3, which is extended transversely of the car and has squared sections 338 at each end so that it may be operated from either side of the car. At one end, as shown in Figures 5 and 7, said shaft D^3 has rigidly secured thereto an arm 60 with which is adapted to co-operate a sector-like camming element C^3 pivoted at the side of the hopper similar to the camming element C^2. The latching element A^3 has a cam edge 329 adapted to co-operate with the fixed latching element B^3 when moving to closed position, as will be understood. In the construction shown in Figure 6, the latching element A^3 is limited in its swinging movements about its pivotal axis by means of the two channels between which it is located, so that the cam edge 329 will always travel in the path of the fixed latching element B^3 to insure proper guiding of the parts into co-operative relation.

In the construction illustrated in Figures 8 and 9, the arrangement is substantially the same as that shown in Figures 5, 6 and 7, except that the single latching element A^4 located at the center of the car beneath the center sill construction and between the two hoppers is pivotally mounted by a pin or stud 70 on a bracket 71 instead of on a shaft. Other differences are as follows: Pivotally mounted in suitable brackets secured to rigid portions of the hoppers is a transversely extending shaft D^4, the latter having squared ends so that it may be operated from either side of the car. Secured to the shaft D^4, centrally thereof, is a wedging or camming element C^4 of arcuate form adapted to work through a slot 72 in the latching element A^4. The prong or point 73 of the element C^4 is adapted to wedge or cam over a rounded shoulder 443 formed on the latching element A^4. The latter is provided with an enlarged free end providing a camming face 429 adapted to ride up over the shaft D^4 to bring the parts into operative relation. The latching element A^4 is provided also with a depending shoulder 431 adapted to hook over and lock against the shaft D^4. The enlarged end of the latch A^4 is slotted at the bottom thereof so as to provide a substantially horizontally extending shoulder 430 with which is adapted to engage the radially extending shoulder 444 on the element C^4 to positively disengage the latching element A^4 from the shaft when the latter is rotated in a counter-clockwise direction. As in the case of the construction shown in Figures 5 and 6, the latching element A^4 is limited in its swinging movements about its pivotal axis by reason of the two channel braces between which it is mounted, as clearly shown in Figure 8.

We have herein shown and described what we now consider the preferred manner of carrying out our invention. We are aware, however, that many changes in the details of construction and arrangement of parts, particularly with respect to the use of either a single latching element at the center of the car or duplicated elements at each side of the car may be made without departing from the spirit of the invention. All changes and modifications are contemplated that come within the scope of the claims appended hereto.

We claim:

1. In a car having a fixed member and a door member pivoted to swing about an axis extending transversely of the car, the combination with an element having a fixed shoulder mounted on one of said members; of a second shouldered element pivotally mounted on the other of said members to swing about an axis paralleling the pivotal axis of the door member and cooperable with said first named shouldered element to lock the door in fully closed position, said pivoted locking element having a cam edge at the free end thereof cooperable with said first named shouldered element and by which the two elements are guided into co-operative relation as the door member is swung to closed position; means, operable from either side of the car, for effecting disengagement of said two shouldered elements by positively imparting pivotal movement to said second named element, and means limiting the movement of said pivotally mounted element to a predeterined position when disengaged from said element having a fixed shoulder such that, the said cam edge of said pivoted element will necessarily engage said element having a fixed shoulder and be guided thereby as the door member is moved to closed position.

2. In a car having a fixed member and a pivoted door member, the combination with an element having a fixed shoulder mounted on one of said members; of a second shouldered element pivotally mounted on the other of said members to swing about an axis paralleling the pivotal axis of the door member and co-operable with said first-named shouldered element to lock the door when the latter is in closed position; and means mounted on said member carrying the fixed shouldered element, operable from either side of the car, for swinging said pivoted locking element about its pivotal axis to thereby disengage it from the other locking element.

3. In a car having a fixed member forming a part of a hopper, and a pivoted door, the combination with a shouldered element

rigidly mounted on said fixed part of the car; of a cross brace mounted on said door; a second shouldered element pivotally mounted on said cross brace and adapted to swing about an axis parallel to the pivotal axis of the door, said pivoted element being adapted to engage said fixed shouldered element and lock the door in fully closed position, said pivoted element having a cam edge at the free end thereof adapted to co-operate with said fixed element in guiding the two elements into operative relation as the door is closed; and means for limiting the swinging movements of said pivoted element about its axis in a plurality of directions by abutment with said cross brace to thereby maintain said cam edge in the path of the fixed element during the closing movements of the door.

4. In a car having a fixed member forming a part of a hopper, and a pivoted door, the combination with a shouldered element rigidly mounted on said fixed part of the car; of a second shouldered element pivotally mounted on the door and adapted to swing about an axis parallel to the pivotal axis of the door, said pivoted element being adapted to engage said fixed shouldered element and lock the door in fully closed position, said pivoted element having a cam edge at the free end thereof adapted to co-operate with said fixed element in guiding the two elements into operative relation as the door is closed; means for limiting the swinging movements of said pivoted element about its axis to thereby maintain said cam edge in the path of the fixed element during the closing movements of the door; and means, operable from either side of the car, for disengaging said elements by positively imparting pivotal movement to said pivoted element.

5. In a car having a fixed member forming a part of a hopper, and a pivoted door, the combination with a shouldered element rigidly mounted on said fixed part of the car; of a second shouldered element pivotally mounted on the door and adapted to swing about an axis parallel to the pivotal axis of the door, said pivoted element being adapted to engage said fixed shouldered element and lock the door when in closed position; and a cam locking element pivotally mounted on said fixed part of the car adapted to engage with said pivoted element and maintain the latter in operative position, said locking element having a shoulder thereon adapted to engage with said pivoted element to release the latter when said locking element is rotated in a releasing direction.

6. In a car having hoppers on each side of the center sill, pivotally mounted doors for each hopper and means rigidly uniting said doors for simultaneous operation, the combination with a latching element pivotally mounted on said connecting means; of a co-operating fixed latching element supported from a relatively fixed part of the car for locking the door in fully closed position; and means, operable from either side of the car for camming said pivoted latching element off from said co-operating element and thereby release the doors.

7. In a car having hoppers on each side of the center sill and transversely alined hopper doors adapted to swing about a transversely extending axis and a cross-brace connecting said pairs of doors for simultaneous operation, the combination with a latch pivotally mounted on said cross-brace to swing about an axis parallel to the axis of the door; of a co-operating shouldered element supported from a fixed part of the car; a cam edge on the free end of said pivoted latching element adapted to co-operate with said fixed element in guiding the parts into co-operative relation as the doors are swung to closed position; and means for limiting the swinging movements of said pivoted element with respect to said brace by abutment with the body portion thereof.

8. In a car having transversely alined hoppers, one on each side of the center sill, pivotally mounted doors for said hoppers and a cross-brace connecting said doors for simultaneous operation, the combination with a latching element pivotally mounted on said cross-brace at the outer end of each door, one on each side of the car; of laterally extended fixed latching elements secured to the outside hopper sheets; a shaft rotatably mounted, extending transversely of the car and operable from either end; and cam locking elements mounted on the ends of said shaft and cooperable with said pivoted latching elements, said cam locking elements being arranged to cam said latching elements to fully operative position and also to positively release the same from the fixed latching elements.

9. In a dump car, the combination with car structure having a door opening; of a door structure adapted to close said opening; a projecting bracket carried by one of said structures; a pivoted shouldered locking element carried by the other of said structures, said element being adapted to swing substantially at right angles to the bracket and adapted to have its shoulder engage the bracket to lock the door in position; and a rotatable member operable about an axis removed from the axis of said locking element adapted when rotated in one direction to act upon the locking element and lock the same in position, and when rotated in an opposite direction, being adapted to displace said locking element from its locking position.

10. In a railway car, the combination with

a hopper structure; of a dumping door structure; a plurality of independently locking elements carried by said door structure; brackets carried by the hopper structure, said brackets being co-operable with the locking elements to maintain the door structure in closed position relative to said brackets; and means for locking said locking elements in unison.

11. In a railway car, the combination with a hopper section; of a dumping door structure; a plurality of independently locking elements carried by said door structure; brackets carried by the hopper section, said brackets being co-operable with the locking elements to maintain the door structure in locked position; and means for displacing said locking elements in unison from their locked position.

12. In a railway car, the combination with a hopper structure; of a dumping door structure; a plurality of independently locking elements carried by said door structure; brackets carried by the hopper structure, said brackets being co-operable with the locking elements to maintain the door structure in locked position; and pivotally mounted means adapted when rotated in one direction to lock the elements with relation to the brackets, and when rotated in the opposite direction to displace said elements out of locking engagement with their respective brackets.

13. In a railway car, the combination with a hopper structure having a dumping opening, of a door structure adapted to close said opening; brackets carried by the car structure; a series of locking elements carried by the door structure, each of said elements being independently movable of each other, each said element being engageable with one of the brackets on the car to lock the door structure in closed position; locking means adapted to maintain the locking elements in engaged relation with the brackets; and means for displacing the various locking elements in unison.

14. In a dump car, the combination with a hopper structure having a dumping opening; of a dumping door structure adapted to close the said opening; a shouldered bracket carried by one of the said structures; a pivotally mounted shouldered latch carried by the other of said structures, said shoulder on the latch being engageable with the shouldered bracket, said latch having an extension formed therewith extending lengthwise of the latching element and beyond the shoulder; and means acting upon said extension for locking the latch in relation to the bracket, said locking means being adapted to displace said latch from engagement with said bracket.

15. In a dump car, the combination with a hopper structure having a dumping opening; of a dumping door structure adapted to close the said opening; a shouldered bracket carried by one of the said structures; a pivotally mounted shouldered latch carried by the other of said structures, said shoulder on the latch being engageable with the shouldered bracket, said latch having an extension formed therewith extending beyond the shoulder; and means acting on said extension for displacing the latch from its locked position.

16. In a dump car, the combination with a hopper structure having a dumping opening; of a dumping door structure adapted to close the said opening; a shouldered bracket carried by one of the said structures; a pivotally mounted shouldered latch carried by the other of said structures, the shoulder on the latch being engageable with the said shouldered bracket, said shouldered latch having an extension formed therewith extending beyond the shoulder; and pivotally mounted means acting on said extension, said means being in relatively fixed relation to the bracket, said pivoted means being also adapted when rotated to release the latch from its locked position.

17. In a dump car, the combination with a dump door part and a stationary part; of interengaging latching elements carried by the respective parts, one of said elements being stationary, and the other being movable; a rotatable element carried by the stationary part and having a body portion thereof overlying the movable latching element; a series of spaced projections extending laterally from the body portion, one of said projections being adapted to engage the latching element to maintain the parts in locked position, and the other of said projections being adapted to engage the latch element to release the same from engaging position with the other of said parts; and means for inducing movement of rotation of said rotatable element.

In witness that we claim the foregoing we have hereunto subscribed our names this 20th day of Aug., 1921.

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ALBERT E. ZIMMER.