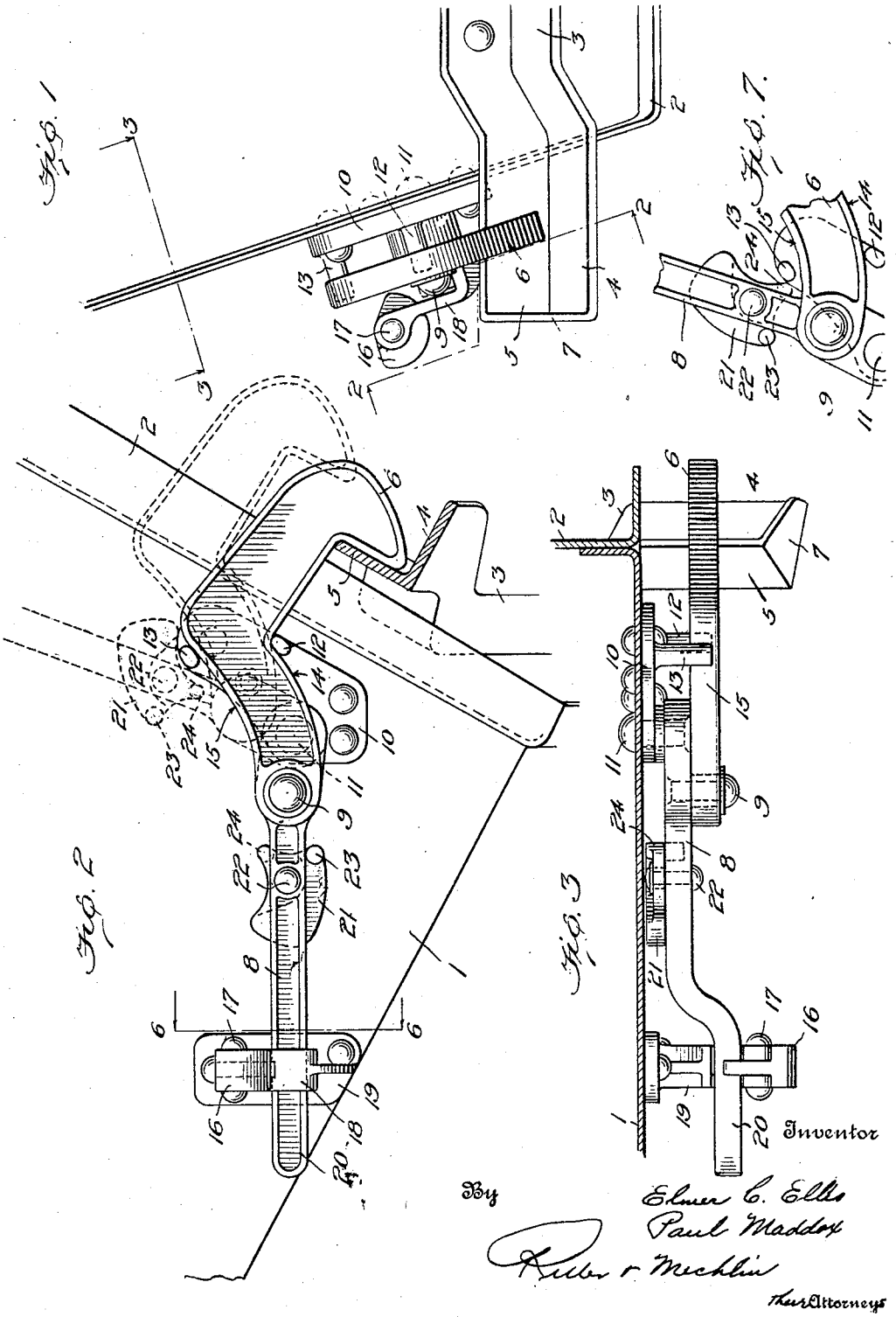
Nov. 3, 1931. E. C. ELLIS ET AL 1,830,389

CAR DOOR MECHANISM

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Fig. 4

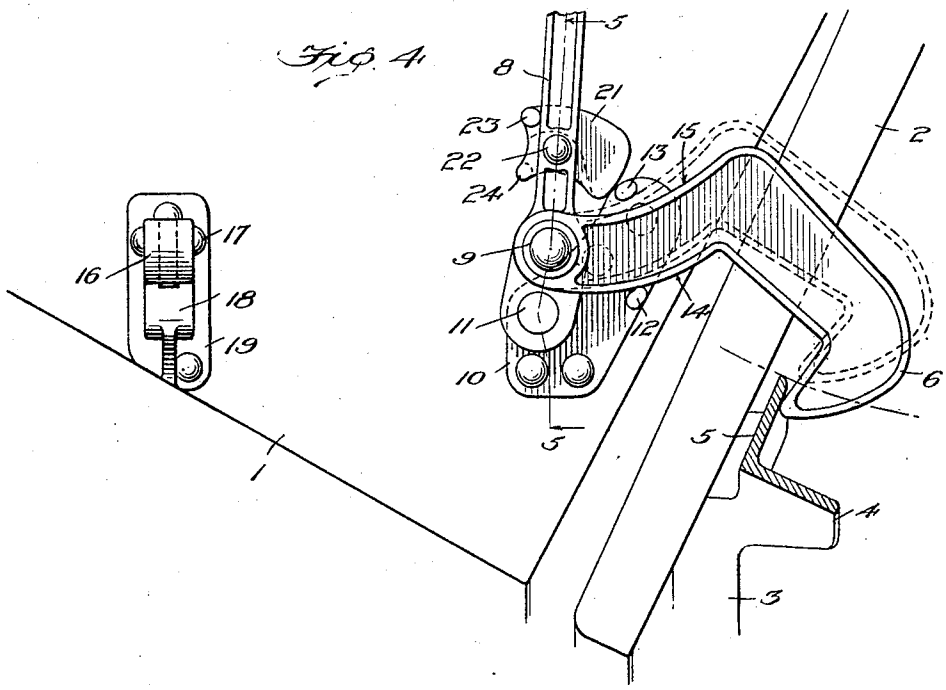


Fig. 5

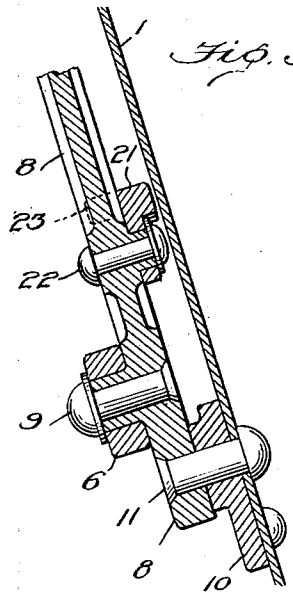
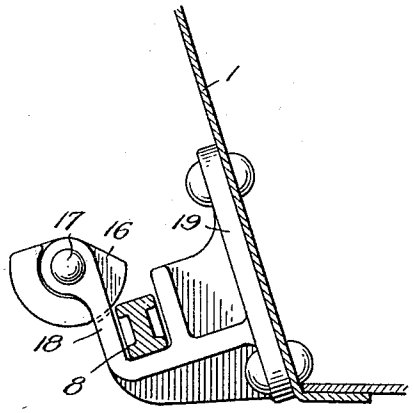


Fig. 6



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Patented Nov. 3, 1931 1,830,389

UNITED STATES PATENT OFFICE

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CAR DOOR MECHANISM

Application filed July 20, 1926, Serial No. 123,654. Renewed November 16, 1929.

Our invention relates to car door mechanism for controlling the lading discharge doors of freight cars of the dump type. The primary object of the invention is to provide simple and efficient means for causing the door to assume fully closed position and for maintaining it securely locked.

The principal feature of the invention consists in providing toggle means mounted on the car body for cooperating with a hinged door guarding the lading discharge opening of the car, the door being equipped with a laterally projecting arm, and the toggle means including a lever to which a hook is pivotally connected for cooperation with the door arm, the lever being pivotally mounted on the car body and means being provided for cooperating with the hook to disengage the latter from the door arm when the lever is moved to door releasing position.

A further important feature of the invention consists in providing the hinged door of the discharge opening with an arm cooperating with a door supporting hook which is adapted to be actuated by a lever pivotally mounted on the car body, and in associating therewith means for causing the hook to assume door releasing position when the lever is rotated, together with means for preventing the lever from accidentally returning to door releasing position after it has been brought to an intermediate position following the disengagement of the hook from the door arm.

Other features of the invention pertaining to relations of parts and advantageous forms of construction will hereinafter appear and be particularly pointed out in the claims.

In the drawings illustrating a preferred embodiment of the invention

Figure 1 is an end elevational view of a portion of a hopper car having a door mechanism involving the invention applied thereto.

Figure 2 is a view on the line 2—2, Figure 1, illustrating in full lines the relation of parts when the door is locked in closed position and showing in dotted lines the position assumed by the parts when the door is released so as to permit it to open.

Figure 3 is a view on the line 3—3 of Figure 1.

Figure 4 is a view corresponding to Figure 2 but illustrating the position of the parts when the door is supported in partly closed position.

Figure 5 is a detail sectional view on the line 5—5, Figure 4.

Figure 6 is a detail sectional view on the line 6—6, Figure 2.

Figure 7 is a fragmentary side elevational view illustrating the manner of rotating the pawl to cause it to assume an operative position.

The door mechanism embodying the invention is shown as applied to a railway car of a well known type and therefore only a portion of one of the hoppers of said car has been illustrated. While the mechanism is especially well suited for application to hopper cars it will be appreciated that it may be applied to the doors of cars of other forms.

In the drawings 1 indicates the inclined side wall or side sheet of the hopper portion of the car and 2 is the swinging door for closing the lading discharge opening of the hopper. The door, which is of the familiar pressed metal type having outwardly extending marginal flanges, is hinged to the car body in the usual or any convenient manner. Secured to the outer face of the door and extending transversely of the car is a door spreader or door stiffener 3 which may advantageously be in the general form of an angle iron offset at its outer end around the outer marginal flange of the door so as to provide an outwardly projecting locking arm 4 whose upstanding flange 5 forms a seat or ledge for cooperating with the door supporting hook 6. If desired the flanges of the door arm may be tied together at their outer ends by a transverse connecting web 7 as illustrated in Figures 1 and 3.

The mechanism for applying power to the door to force it shut after it has been supported in partially closed position and for locking it in fully closed position is formed as a toggle mechanism including the hook 6 and the manually operated lever 8 for actuating the latter. The lever is pivotally

mounted on the car body adjacent the lading discharge opening of the hopper and the hook 6 is pivotally attached to the lever, as by means of a rivet 9. The pivotal axis of the lever and that of the hook are spaced apart so as to cause the outer end of the hook to move toward the discharge opening of the hopper when the lever performs a door closing operation and to move outwardly therefore when the lever is rotated to unlock the door.

The means for pivotally mounting the lever upon the car body preferably is formed as a bracket 10 rigidly riveted to the side sheet 1 of the hopper, the lever 8 being pivoted thereto by means of a rivet 11. Formed integral with the bracket are outwardly projecting lugs or studs 12 and 13 respectively which are spaced to receive the shank of the hook 6 between them. The portion of the hook which operates between lugs 12 and 13 is formed on its underside with a curved cam surface 14 and on its upper side with a cam surface 15, the former being designed to cooperate with the lug 12 to effect an unlocking rotation of the hook when the lever is swung to door releasing position, as indicated in dotted lines in Figure 2, and the latter cooperating with the lug 13 to insure movement of the hook to locked position when the lever is operated to force the door shut. It will also be perceived that the lug 13 constitutes means for preventing the hook 6 from moving to door releasing position independently of the appropriate movement of the operating lever 8.

While the relation of the pivotal point 9 of the hook and the pivotal point 11 of the operating lever are such that the load upon the door tends to maintain the parts in locked relation when the door is shut, other means are preferably provided for preventing accidental rotation of the lever when the door is in closed position. For this purpose a gravity actuated latch 16 may advantageously be employed, the latch being pivotally mounted, by means of a rivet 17, at the upper end of an arm 18 forming a part of a bracket 19 secured to the side sheet of the hopper. The latch 16 is weighted on one side so that it automatically swings to a position above the offset handle portion 20 of the lever as the latter has been fully operated to close the door. When the handle of the lever 8 comes into contact with the latch 16 toward the end of the door closing movement of the lever, the said latch is automatically rotated so as to permit the lever to pass beneath it as will be readily understood.

Because of the fact that the swinging doors for closing the lading discharge opening become warped or distorted in service it is a matter of considerable difficulty to fully close them. It is however a comparatively easy matter to swing such a door to partially closed position and accordingly the mechanism is constructed so as to facilitate its employment as a means for sustaining the door in partially closed position as well as for forcing it shut and securely retaining it in the latter condition. To this end means are provided for preventing the lever 8 from accidentally returning to door releasing position after having been brought to an intermediate position following the disengagement of the hook 6 and door arm 4, thereby permitting the lever to resist the door releasing rotation which is induced by the weight of the door when the latter is supported in a position of partial closure as illustrated in Figure 4. An advantageous means for this purpose is a pawl 21 pivotally secured to the lever by means of a rivet 22 and adapted to cooperate with a portion of the bracket 10 upon which the lever is rotatably mounted. This pawl is weighted upon one side so as to assume by gravity the position shown in Figure 2 when the lever is in a position corresponding to the fully closed position of the door. A lug 23 with which the pawl is provided overlaps the adjacent face of the lever so as to limit the extent of rotation of the pawl upon its pivot. During the door releasing operation of the mechanism, when the projection 24 of the pawl comes into contact with the bracket 10 the continued movement of the lever in the same direction results in effecting a rotation of the pawl so as to shift its weighted portion toward the free end of the hook 6 as indicated in dotted lines in Figure 2. When thereafter the lever 8 is moved to an intermediate position, as illustrated in Figure 4, the pawl 21 automatically gravitates so as to interpose itself between the lever and the bracket 10, thereby enabling the lever to withstand the pull of the hook 6 while yet permitting the latter to cooperate with the door arm so as to hold the door in partially closed position. When the lever 8 is operated to move the door from partially closed to fully closed position, the pawl 21 under the influence of gravity automatically reassumes the position shown in Figure 2. Of course the lever 8 may be manually retained in an intermediate position permitting the hook 6 to have the required freedom of swinging movement necessary to enable it to drop behind the door arm and support the door in partially closed position as the latter is swung toward the discharge end of the hopper, but it is more advantageous to employ the pawl 21 for that purpose.

When the door is in closed position the relations of the parts are shown in full lines in Figure 2. Upon rotating the lever 8 to permit the door to open the outer end of the hook 6 moves in a direction away from the discharge opening of the hopper and the portion of the hook which engages the door arm is simultaneously elevated through the cooperation of the cam surface 14 of the hook with

the lug 12 of the bracket. By this means, as indicated in dotted lines in Figure 2, the hook is caused to be disengaged from the door arm 4, thereby permitting the door to swing open. After the door has been brought to the partially closed position so as to be supported by the hook 6, as shown in Figure 4, rotation of the lever in a counter-clockwise direction results in moving the outer end of the hook toward the hopper discharge opening thereby forcing the door to closed position. During this movement the lug 13 of the bracket cooperates with the cam surface 15 on the shank of the hook to force said hook into full locking contact with the flange or seat 5 of the door arm. When the lever 8 is in door locking position it is held against accidental release by the catch 16, as heretofore described.

We claim:—

1. Car door mechanism involving, in combination with a door hinged to the car body, said door being movable to open position under the influence of gravity, a door arm carried by the door and projecting beyond an edge thereof, and toggle means mounted on the car body for cooperating with said arm to close the door and retain it in closed position, said means including a lever, a pivoted hook for engaging the door arm to control opening movement of the door, the hook being movable with respect to the lever and being adapted to be actuated thereby, and immovable means mounted on the car body cooperable with said hook for rotating the latter to disengage it from the door arm when the lever is moved to door releasing position and for forcing the hook into door retaining position with the arm when the lever is moved to door closing position.

2. Car door mechanism involving, in combination with a door hinged to the car body, the door being movable to open position under the influence of gravity, a door arm carried by the door and projecting beyond an edge thereof, and toggle means mounted on the car body for cooperating with said arm to close the door and retain it in closed position, said means including a pivotally mounted lever, a hook pivotally connected to the lever and adapted to engage said arm to prevent the door from swinging to open position, means for cooperating with the hook to disengage the latter from the door arm when the lever is moved to door releasing position, and means independent of said lever for cooperating with the hook to prevent the latter from rotating with respect to the lever when the door is closed.

3. Car door mechanism involving, in combination with a door hinged to the car body, a door arm carried by the door, toggle means mounted on the car body for cooperating with said arm to retain the door in closed position, said means involving a hook and a lever device for actuating the hook, the latter being pivotally mounted to automatically engage the said arm when the door is moved towards closed position, means for causing the hook to be disengaged from the arm when the lever device is moved to door releasing position, and means mounted on the car body and engageable with the hook for preventing the latter from moving to door releasing position independently of movement of the lever device, said hook when in door supporting engagement with the door arm being slidable with respect to the car body to effect a closing movement of the door.

4. Car door mechanism involving, in combination with a door hinged to the car body, a door arm carried by the door, a lever pivotally mounted on the car body, a hook pivotally mounted on the lever and engageable with the door arm, said hook and arm being adapted to cooperate to prevent the door from swinging to open position, means cooperable with the hook for rotating the latter to disengage it from the door arm and means for engaging the lever to prevent rotation of the latter when the door is closed.

5. Car door mechanism involving, in combination with a door hinged to the car body, a door arm carried by the door, a lever pivotally mounted on the car body, a hook adapted to be actuated by the lever, the hook being pivotally mounted on the lever eccentric to the pivotal axis of the latter and being adapted to engage the door arm to prevent opening movement of the door, means for engaging the lever to prevent rotation thereof when the door is closed, and means independent of the lever for preventing an unlocking rotation of the hook with respect to the lever when the door is closed.

6. Car door mechanism involving, in combination with a door hinged to the car body, a door arm carried by the door, a lever pivotally mounted on the car body, a hook pivotally mounted on the lever and adapted to be actuated thereby, the hook being cooperable with the door arm to prevent opening movement of the door, the pivotal axis of the lever and that of the hook being in spaced relation, and gravity actuated means mounted on the car body engageable with the lever for preventing accidental rotation of the latter when the door is in closed position.

7. Car door mechanism involving, in combination with a door hinged to the car body, a door arm carried by the door, a lever pivotally mounted on the car body, a hook pivotally mounted on the lever and adapted to be actuated thereby, the hook being adapted to engage the door arm to prevent opening movement of the door, means for causing the hook to turn upon its pivot when the lever is rotated, and means for preventing the lever from accidentally returning to door releasing position after having been brought to an

intermediate position following disengagement of the arm from the hook.

8. Car door mechanism involving, in combination with a door hinged to the car body, a door arm carried by the door, a lever pivotally mounted on the car body, a hook pivotally mounted on the lever and adapted to be actuated thereby, the hook being adaped to engage the door arm to prevent opening movement of the door, and means for maintaining the lever in a position permitting the hook to swing upon its pivot so as to engage said arm and support the door in partially closed position.

9. A car door mechanism involving, in combination with a door hinged to the car body, a door arm carried by the door, means mounted on the car body for cooperating with said arm to close the door and retain it in closed position, said means including a pivotally mounted lever and a hook pivotally connected to said lever and adapted to engage said arm to prevent opening movement of the door, the hook being movable with respect to said lever and being adapted to be actuated thereby, and means on the car body cooperable with the hook for causing the latter to turn upon its pivot when the lever is actuated, said means comprising a plurality of spaced members respectively disposed on opposite sides of the hook, one of said members being cooperable with the hook to prevent the latter from rotating with respect to the lever when the door is closed.

10. A door mechanism involving, in combination with a door hinged to the car body, a door arm carried by the door, a lever pivotally mounted on the car body, a hook pivotally mounted on the lever and adapted to be actuated thereby, the hook being adapted to engage the door arm to prevent opening movement of the door, and means mounted on the car body cooperable with the hook for causing the latter to turn upon its pivot when the lever is actuated, said means comprising a plurality of spaced members respectively disposed on opposite sides of the hook, the members and hook being formed and arranged so as to permit the latter to freely swing upon its pivot to engage said arm and support the door in a partially closed position.

11. A car door mechanism involving, in combination with a door hinged to the car body, a door arm carried by the door, a lever pivotally mounted on the car body, a hook pivotally connected to said lever and adapted to be actuated thereby, the hook being adapted to engage the door arm to prevent opening movement of the door, and a bracket secured to the car body having spaced portions to receive a portion of the hook therebetween, one of said spaced portions being engageable with the hook for forcing the latter from engagement with the arm when the lever is actuated in one direction and the other of said portions being engageable with the hook for forcing the latter into and maintaining it in engagement with the arm when the lever is actuated in another direction.

12. A car door mechanism involving, in combination with a door hinged to the car body, an arm carried by the door, a lever pivotally mounted on the car body, a hook pivotally connected to said lever and adapted to be actuated thereby, said hook being engageable with the door arm to support and retain the door in closed position, and a bracket mounted on the car body forming a pivotal support for said lever, said bracket having means cooperable with said hook for causing the latter to turn upon its pivot when the lever is actuated and to maintain the hook in engagement with the arm when the door is closed.

13. A car door mechanism for the hopper of a railway car involving, in combination with a door hingedly associated with the hopper, an arm carried by the door, a locking member movably mounted on the side of the hopper for cooperating with the arm to support the door in partially closed and in fully closed position, means rigidly secured to the hopper for guiding the locking member from one position of closure to the other, and movable means for maintaining the locking member in partiallly unlocked position whereby the latter projects into the path of movement of the door arm when the door is swung toward closed position, said door arm being adapted to actuate said locking member to cause an unlocking movement of the latter and said movable means being adapted to permit the locking member to move toward unlocking position when the latter is engaged and actuated by the arm.

14. A car door mechanism for the hopper of a railway car involving, in combination with a door hingedly associated with the hopper, an arm carried by the door, means movably mounted on the side of the hopper involving a locking member and a pawl, said locking member being engageable with the arm to support the door in partially closed and in fully closed position, and a bracket rigidly secured to the side of the hopper cooperable with said member for guiding the latter from one door-supporting position to the other, said pawl being adapted to cooperate with the bracket for maintaining the locking member in position to automatically engage the door arm when the door is swung to said partially closed position.

15. A car door mechanism for the hopper of a railway car involving, in combination with a door hingedly associated with the hopper, an arm carried by the door, a locking member movably mounted on the side of the hopper adapted to cooperate with the arm to support the door in partially closed and in

fully closed position, means for moving said member to force the door from partially closed to fully closed position, a bracket carried by the side of the hopper for guiding the member from one door-supporting position to the other, and means operatively associated with said member and engageable with the bracket for maintaining the member in an elevated position to automatically engage the door arm when the door is swung to said partially closed position.

In testimony whereof we affix our signatures.

ELMER C. ELLIS.
PAUL MADDOX.