May 10, 1927. 1,627,801

E. C. MITCHELL

HOPPER CAR DOOR OPERATING DEVICE

Filed Jan. 25, 1926 2 Sheets-Sheet 1

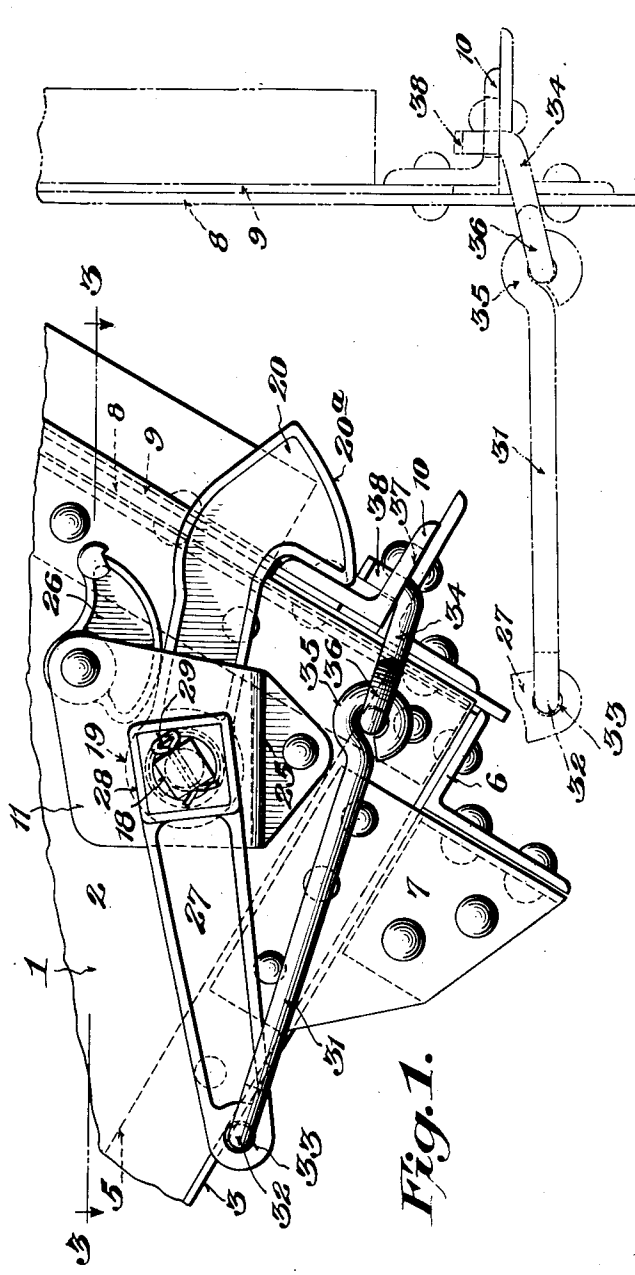


Fig. 1.

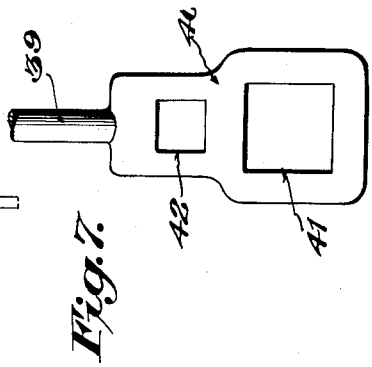


Fig. 7.

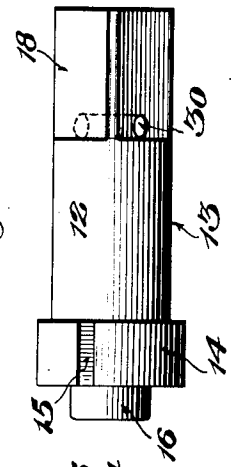


Fig. 6.

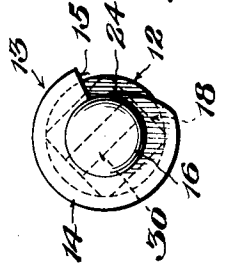


Fig. 5.

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Fig. 2.

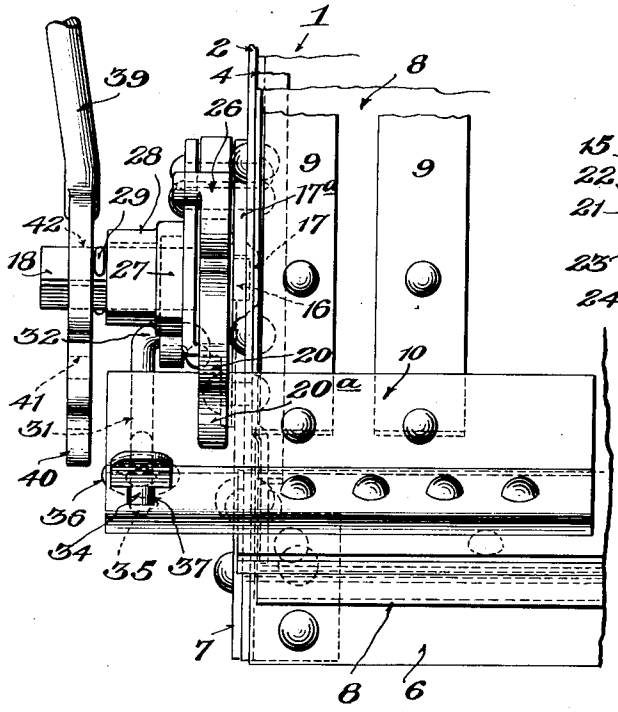


Fig. 4.

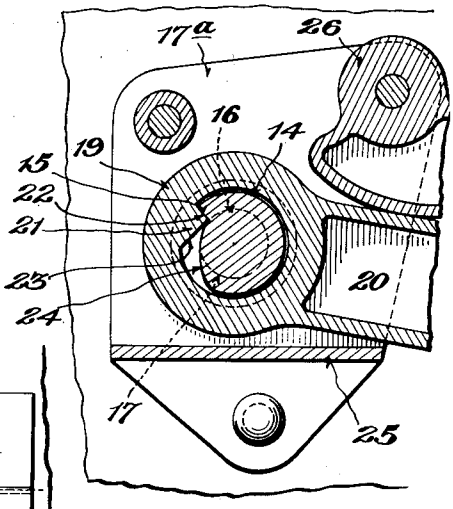
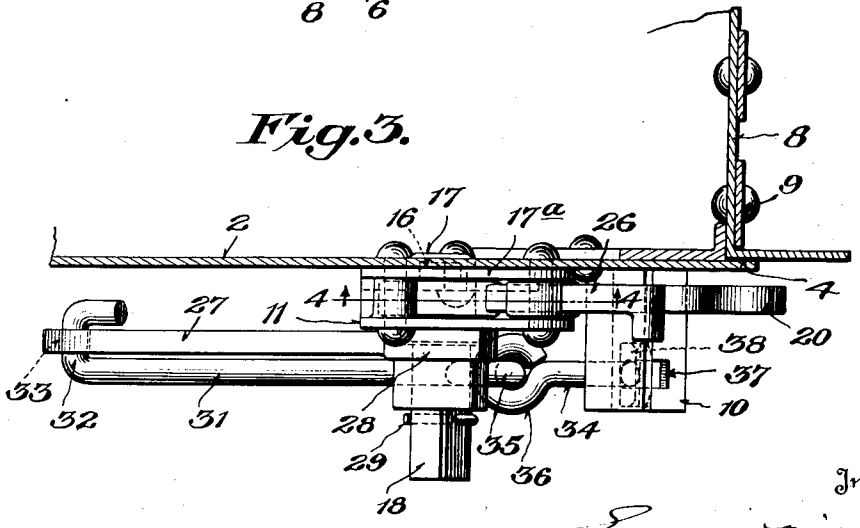


Fig. 3.



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UNITED STATES PATENT OFFICE.

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HOPPER-CAR DOOR-OPERATING DEVICE.

Application filed January 25, 1926. Serial No. 83,638.

The invention relates to railway cars and has particular reference to securing or locking means for the doors.

The primary object of the invention, generally stated, is to provide door securing or locking means embodying a link and lever mechanism for swinging the door into tightly closed position at a single operation.

Another object of the invention is to provide mechanism of this character in which a portion of the means or certain elements thereof may act to limit the opening movement of the door beyond the proper extent.

A more specific object of the invention is the provision of door securing and locking means embodying a retaining hook and a link and lever arrangement, together with cam means operatively connected with the former, both means being capable of actuation by a manually operated and removably mounted lever or wrench, the parts being so constructed and arranged that the wrench or equivalent tool is employed to effect release of the hook to permit subsequent opening of the door as well as to effect closing of the door.

Another object of the invention is to provide a hopper door securing or locking means embodying a pivotally mounted hook carried by the car and cooperating with an arm member or its equivalent carried by the door, cam means being provided in engagement with the hook for moving it into and out of engagement with the door arm.

An additional object of the invention is to provide door opening, closing and locking mechanism embodying, in combination with a door arm and a hook coacting therewith, link, lever and cam mechanism capable of manual operation, the link and lever moving simultaneously and the cam being movable independently thereof and fulfilling the function of moving the hook to operative or inoperative position, depending upon the direction of movement.

A further object of the invention is to provide door operating and locking mechanism in which the parts are so mounted and arranged that actuation thereof by means of a wrench, lever or other tool may be easily accomplished even though the car be standing adjacent a platform or the like which would interfere with operation of ordinary types of operating means.

To the attainment of the foregoing and other objects and advantages such as simplicity and cheapness in manufacture and installation, efficiency and durability in operation, together with the general improvement of the art, the invention preferably consists in the arrangement and combination of parts and the detailed construction and mounting thereof to be hereinafter more fully described and claimed, and illustrated in the accompanying drawings in which:

Figure 1 is a side elevation of a portion of a car hopper and door, showing the invention in applied position, the door being represented closed and locked in full lines and open in dotted lines,

Figure 2 is an elevation of the mechanism taken at right angles to Figure 1, the view locking toward the outside of the door, showing the operating lever in one position,

Figure 3 is a horizontal section through the hopper and door and showing a plan view of the mechanism,

Figure 4 is a detail section taken on the line 4—4 of Figure 3 and showing the cam in the position assumed by it when the hook is in operative position,

Figure 5 is an enlarged detail side elevation of the rotatable operating member carrying the cam,

Figure 6 is an end elevation thereof, and

Figure 7 is a fragmentary detail view of the wrench.

Referring more particularly to the drawings, the numeral 1 designates, generally, a portion of a car hopper having sides 2, an inclined bottom 3 and door opening 4. The usual or any preferred reinforcements 5 are provided at the corners or lower edges of the hopper, and an angle bar 6 is also provided at the edge of the door opening for stiffening purposes, this bar being located beneath the bottom of the hopper and being preferably secured to angle plates 7 which render the structure strong and rigid. The door opening 4 is normally closed by a door 8 equipped with any suitable stiffening bars 9 and carrying an arm 10 of angle bar formation suitably secured thereto and projecting beyond the side of the hopper. Obviously, these details may be varied within wide limits within the scope of the invention which concerns itself primarily with means for opening or closing the door and forcing it closely to its seat while avoiding over-closure.

Secured upon the side 2 of the hopper is

a bracket structure 11 which carries the door securing and operating means, this bracket member being preferably riveted in place at the proper location. Journaled through this bracket is the cylindrical portion 12 of a shaft or combined trunnion and cam member 13 formed near one end with a cam 14 having a radial shoulder 15. Beyond the cam, the member 13 is provided with a reduced extension 16 freely rotatable within a seat 17 in the base or bottom 17ª of the bracket so that there will be two bearing points for the member 13. This member 13 projects considerably beyond the bracket 11 and the outer end 18 is squared or of other angular shape for a purpose to be described. The cam 14 is of course located between the bracket 11 and the side of the hopper, and rotatably mounted upon the cam is the hub portion 19 of a door hook 20 adapted to engage with the door arm 10 for holding the door closed. The inner periphery of the hub portion 19 is formed with a projection 21 having a radial shoulder 22 coacting with the radial shoulder 15 of the cam and also having an inclined face 23 which coacts with the periphery of the cam, it being noted that the cam member 14 is preferably circular in cross section except for the cam surface 24 which coacts with the projection 21 in a manner to be explained.

The bracket 11 is shown as of such construction as to provide a ledge or shelf 25 which forms a stop for the hook 20 so as to prevent the hook from dropping down when the door is in open position. There is also preferably pivoted between the bracket and the hopper a locking cam 26 engageable with the door hook for holding it in its locked position and preventing accidental displacement.

The numeral 27 designates a lever having a hub portion 28 rotatably engaged upon the cylindrical portion 12 of the member 13, the outer surface of the hub 28 being squared or of other angular shape for engagement of a wrench or other tool therewith. While any suitable means may be provided for preventing displacement of the lever 27 with respect to the member 13, I have illustrated a cotter pin 29 or the like which passes through a suitable hole 30 in the member 13 immediately outwardly of the hub 28. The door mechanism further includes a link 31 which has one end pivotally connected with the free end of the lever 27. In the present instance this pivotal connection is shown as consisting of a hooked portion 32 on the end of the link passing through a suitable hole 33 in the lever though naturally there is no limitation desired in this respect. Pivotally connected with the other end of the link is a connecting element 34 movably connected with the door arm in any preferred manner. In the present instance the connection between the link 31 and member 34 in represented as consisting simply of interengaging eyes 35 and 36 and the member 34 is shown as passing through a hole 37 in the door arm, this end of the member 34 having a transverse head 38 so as to be incapable of accidental withdrawal. Clearly, the lever 27, link 31 and member 34 provide a flexible connection between the hopper and the door which will act to limit opening movement of the door as well as serving as means whereby the door may be closed.

In connection with the above described mechanism, use is made of a wrench device illustrated in Figure 7, which wrench includes a handle or lever 39 terminating in a head 40 formed with two openings 41 and 42, the former of which is of proper size to be engaged upon the hub 28 and the latter of which is of such size as to be engageable upon the squared end 18 of the member 13.

The closed and locked position of the door is illustrated in Figure 1 wherein it will be seen that the hook 20 is in engagement with the door arm 10 and held against displacement with respect thereto by means of the locking cam 26. The lever 27 extends away from the door and in a slightly downwardly inclined position. The shoulder 22 on the inside of the hub portion of the hook may be in engagement with the radial shoulder 15 of the cam. To open the door, it is first necessary to swing the locking cam 26 out of the way of the hook and then to engage the opening 42 of the wrench or lever device 39 upon the squared projecting end 18 of the member 13, subsequently to which the lever 39 is moved in a counter-clockwise direction to effect rotation of the member 13. When this is done the shoulder 15 coacting with the shoulder 22 will operate to rotate the hook 20 in a counter-clockwise direction and withdraw it from engagement with the door arm 10. The weight of the load pressing against the door 8 will then force the door open into the position shown by dotted lines in Figure 1, the lever 27 then extending downwardly in a substantially vertical position. If, for any reason, the weight of the door or of the load, if any, pressing thereagainst should be insufficient to effect opening movement, use may be made of the lever 39 by disengaging it from the squared end 18 of the member 13 and engaging the opening 41 upon the squared hub portion 28 of the lever 27, and swinging the lever in a counter-clockwise direction so as to move the lever or arm 27 and consequently the door, through the connecting means consisting of the elements 31 and 33.

When the door has been thus opened, it is clear that the hook 20 may be left in its

upwardly swung position out of obstructing relation to the door arm 10 though it is preferable that it be permitted to drop down into engagement with the shelf or ledge 25 so that it will be in such position that when the door is subsequently closed the engagement of the door arm against the inclined surface 20a of the hook will result in lifting it until it may drop behind the door arm. In case of any binding of the member 13 in its bearings, as the result of rust, freezing or any other contingency, gravity might not be sufficient to restore the hook to said position, in which event the opening 42 of the wrench may be engaged upon the squared extension or end 18 of the member 13 and the member 13 rotated so that the came surface 24 thereon will crowd against the surface 23 of the projection 21 in the hub of the hook and consequently positively force the hook downwardly into engagement with the shelf 25.

Assuming that the door has been opened and it is desired to reclose it, the opening 41 of the wrench or lever 39 is engaged upon the squared hub 28 of the arm or lever 27, subsequently to which the wrench is swung in a clockwise direction to swing the lever 27 upon the cylindrical portion 12 of the member 13 as a trunnion or pivot. Owing to the provision of the interconnected members 31 and 33 this movement of the lever or arm 27 will cause a pull to be exerted upon the door 8 which will naturally result in swinging the door into closed position. By applying considerable pressure to the wrench it is quite apparent that the door may be drawn closely to its seat. As the door swings shut, the door arm 10 will engage against and lift the hook 20 until the hook may drop over and behind the door arm. The locking cam 26 may be employed for forcing the hook into place and will also act to prevent the hook from disengagement with respect to the door arm. The wrench is then removed from the hub 28.

A hopper car door operating device constructed in accordance with this invention will be easy to operate as the parts are readily accessible and as the wrench is used in such a position that its movement would not be interfered with even though the car might be standing beside a high loading platform or the like. Furthermore, powerful leverage may be exerted for positively drawing the door to its seat while at the same time there is practically no danger of over-closure which might result in distortion of the parts. Ample provision has been made to insure ease and certainty of operation under even the most adverse conditions.

While I have shown and described a preferred embodiment of the invention, it should be understood that the disclosure is merely illustrative as it is conceivable that various changes and modifications may be made in the details of construction as well as the arrangement and location of parts provided such variations constitute no departure from the spirit of the invention or the scope of the claims hereunto appended.

Having thus described the invention, I claim:

1. Means for moving and locking the swingable door of a railway car, comprising a retaining member on the door, a hook pivoted on the car side and cooperating with said retaining member for normally holding the door closed, an arm pivoted on the car side and having a flexible connection with said retaining member, means for swinging said arm to open and close the door, and cam means for moving said hook.

2. A mechanism of the character described comprising the combination with a railway car hopper and its swingably mounted door, of a supporting structure mounted on the hopper, a retaining member carried by the door, a hook pivoted within said supporting structure and cooperating with said retaining member for normally holding said door closed, an arm pivoted on said supporting structure and operatively connected with said retaining member, and separate lever operated means for moving said arm and said hook.

3. A mechanism of the character described comprising the combination with a railway car hopper and its swingably mounted door, of a supporting structure mounted on the hopper, a retaining member carried by the door, a hook pivoted within said supporting structure and cooperating with said retaining member, an arm pivoted on said supporting structure and operatively connected with said retaining member, and means for moving said arm, the arm and the hook having a common pivot.

4. A mechanism of the character described comprising the combination with a railway car hopper and its swingably mounted door, of an arm carried by the door, a supporting bracket mounted on the hopper, a shaft member rotatably supported by and within the bracket member, a door hook pivoted on said shaft member and cooperating with said door arm for holding the door closed, and door closing means including an arm pivoted on said shaft member and flexibly connected with the door arm.

5. A mechanism of the character described comprising the combination with a railway car hopper and its swingably mounted door, of an arm carried by the door, a supporting bracket mounted on the hopper, a shaft member rotatably supported by and within the bracket member, a door hook pivoted on said shaft member and cooperating with said door arm for holding the door closed, and door closing means including an arm pivoted

on said shaft member and flexibly connected with the door arm, said last named arm member having a hub portion adapted to be engaged by a wrench.

6. A mechanism of the character described comprising the combination with a railway car hopper and its swingably mounted door, of an arm carried by the door, a supporting bracket mounted on the hopper, a shaft member rotatably supported by and within the bracket member, a door hook pivoted on said shaft member and cooperating with said door arm for holding the door closed, door closing means including an arm pivoted on said shaft member and flexibly connected with the door arm, said last named arm member having a hub portion adapted to be engaged by a wrench, coacting elements carried by the shaft member and hook, and said shaft member being engageable by a wrench for swinging the hook.

7. In a railway car door operating and locking means, a door arm carried by the door, a supporting bracket carried by the car, a shaft journaled through the bracket, a door hook pivoted on the shaft and cooperating with the door arm, coacting means on the shaft and door hook for swinging the latter when the former is rotated, and an arm pivoted on said shaft and connected with the door arm, said second named arm being movable independently of said shaft.

In testimony whereof, I have hereunto set my hand.

EDWIN C. MITCHELL.