Feb. 14, 1933. J. A. SHAFER 1,897,594

LOCK

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Fig. 1.

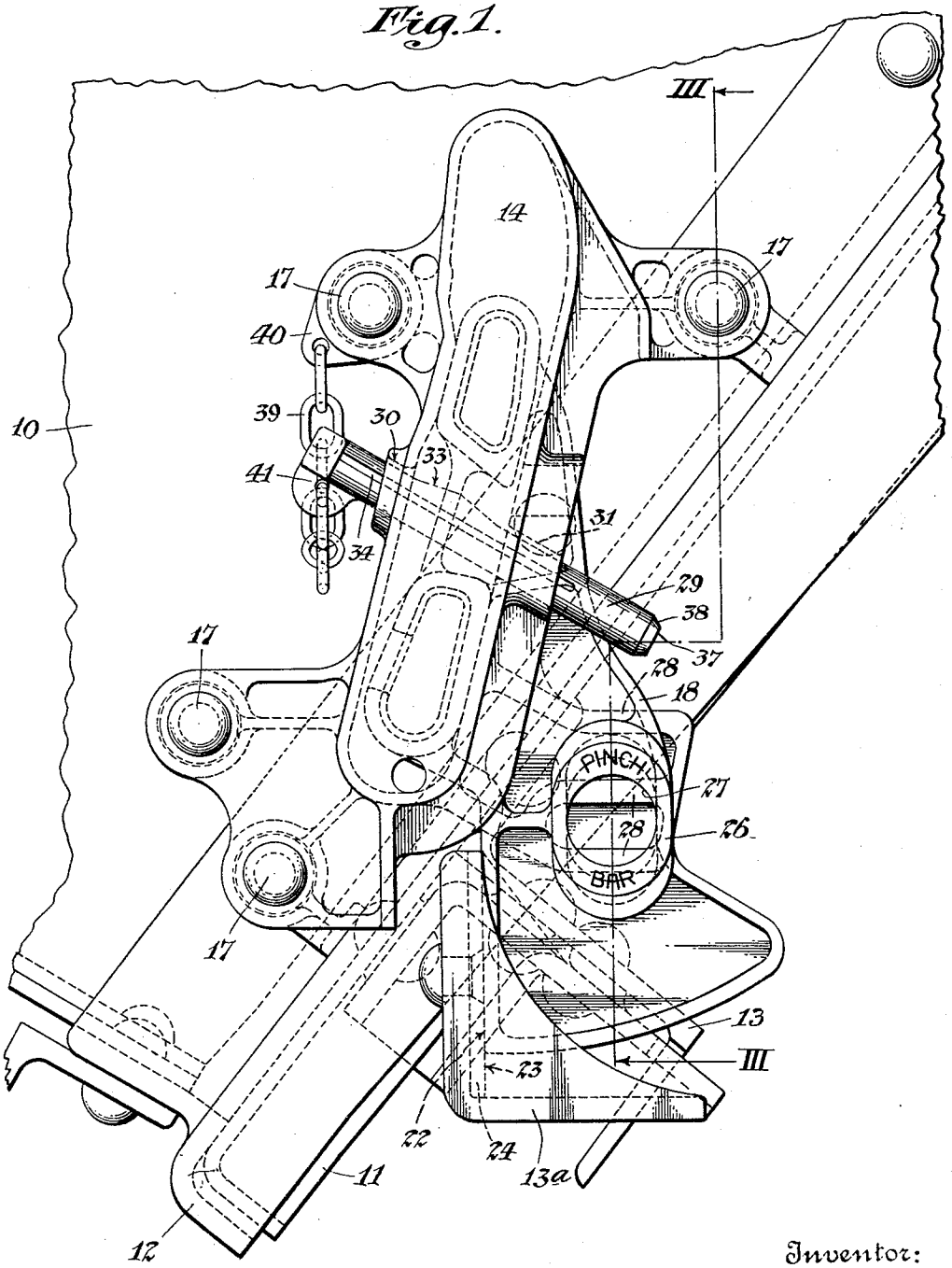


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Fig. 2.

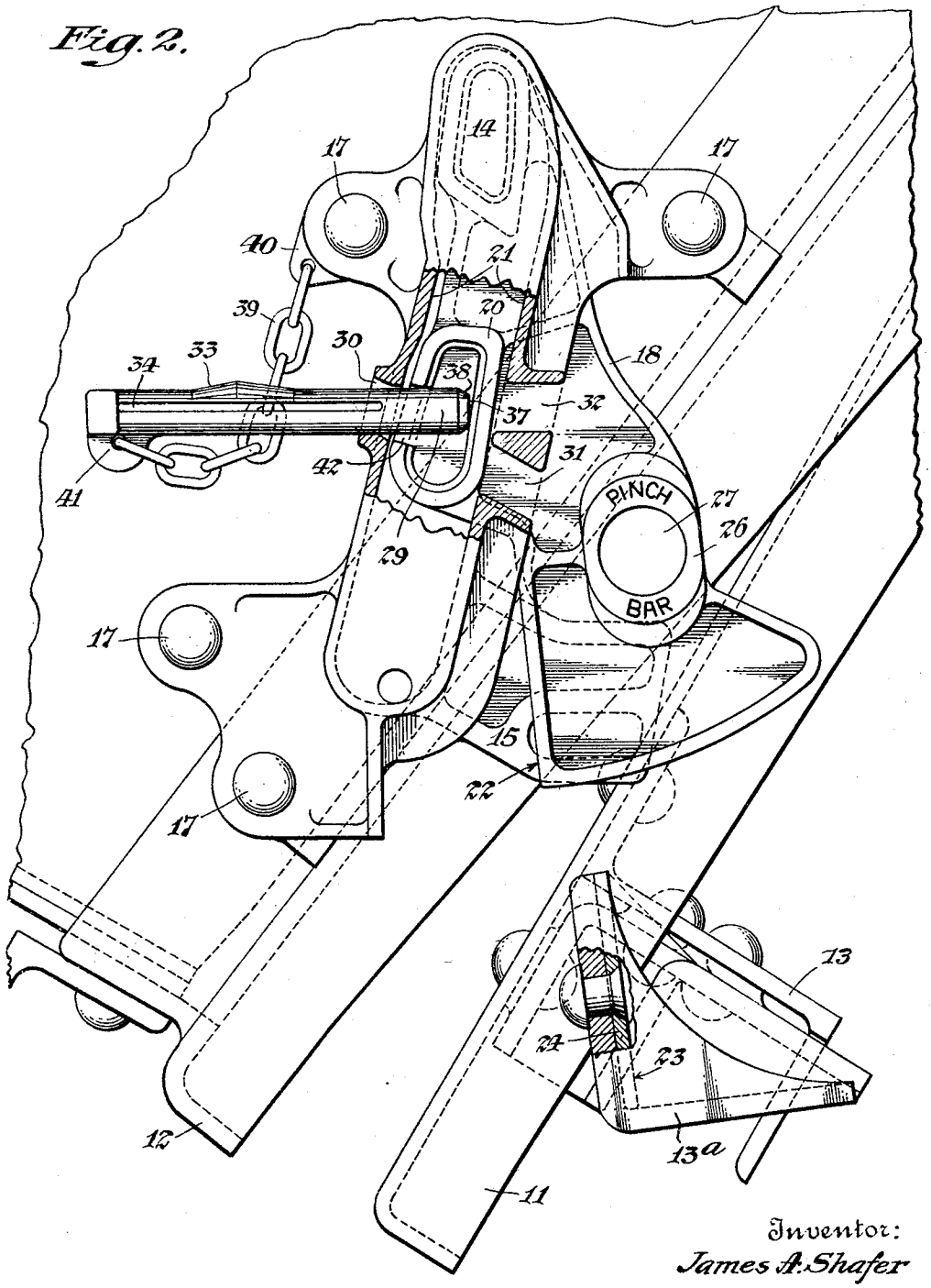


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Fig. 3.

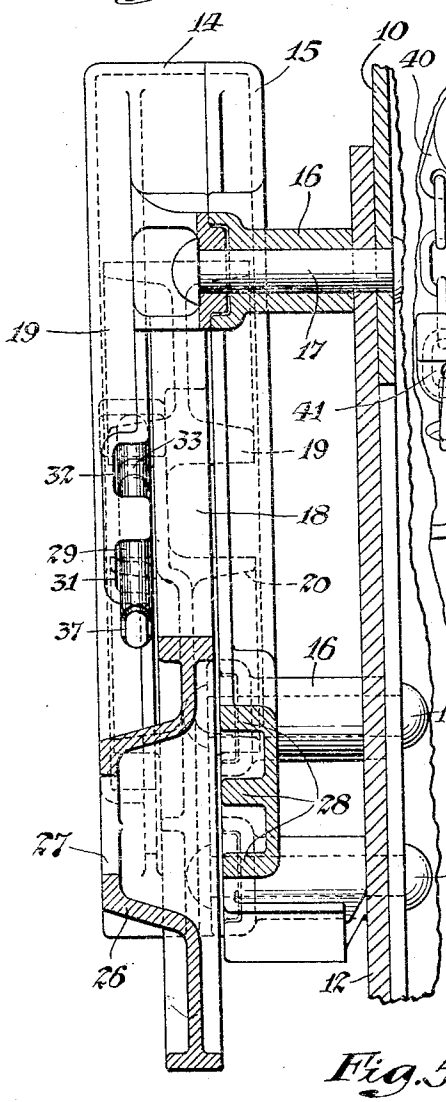



Fig. 4.

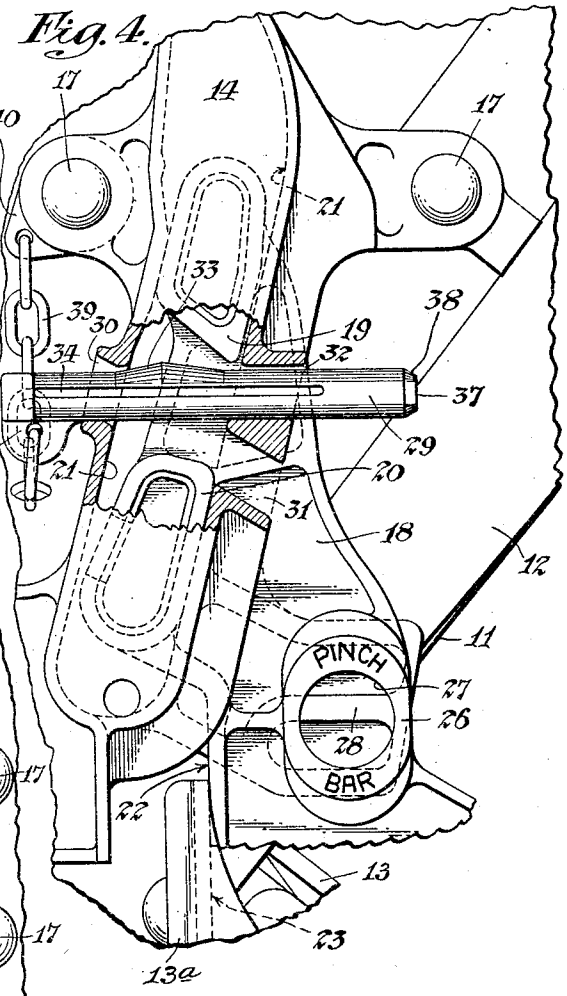
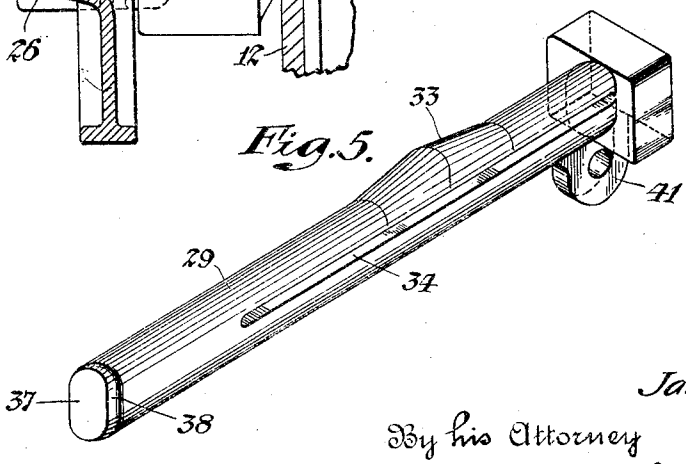



Fig. 5.

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Patented Feb. 14, 1933 1,897,594

# UNITED STATES PATENT OFFICE

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## LOCK

Application filed October 23, 1930. Serial No. 490,562.

This invention relates to improvements in locking mechanism and more particularly has reference to devices provided in connection with the discharge doors of railway hopper cars.

In my co-pending applications Serial Numbers 280,668, filed May 26, 1928 now Patent 1,861,032 of May 31, 1932, and 362,907 filed May 14, 1929 now Patent 1,860,369 of May 31, 1932, there are disclosed suitable mechanisms for locking and releasing the discharge doors of hopper cars and the present invention is primarily directed to simplification and improvement of the locking devices embraced by these prior applications. It has been a particular object of the present invention to provide a simple construction which will effectively lock the discharge doors against accidental opening and one which is not only inexpensive to build but is simple to operate and positive in its action. The construction contemplated is such that the hands of the operative are free to perform a single function at a time in the release of the lock and are entirely free, after such release, to force the door open in the event that it has become stuck, as by the action of ice forming around it during cold weather. As will more clearly appear hereinafter, the mechanism as a whole is made lighter than that provided in previous constructions, and due to its simplicity, its mode of operation is so obvious as to be readily determined by operatives who may have had no previous experience with it.

Other features and advantages of the invention will be referred to or made clear in connection with the detailed description of one admirable form of the invention which will now be given with respect to the accompanying drawings, in which:

Figure 1 is a side, elevational view of the locking mechanism as applied to a hopper and its discharge door.

Figure 2 is a similar view partly in section showing the lock parts shifted to releasing position and the door partly open.

Figure 3 is a sectional view taken through the lock along the line III—III of Figure 1.

Figure 4 is an elevational view, partly in section, of a portion of the structure shown in Figure 1 with the lock in slightly shifted position, and

Figure 5 is a perspective view of a locking pin employed in the mechanism.

For purposes of illustration the invention is shown herein as applied to a hopper car of standard construction. As disclosed more fully in my prior applications, cars of this type usually embody a plurality of hoppers arranged in pairs on opposite sides of the central transverse axis of the car. Each hopper is provided with a discharge door and the doors of the hoppers on the same side of the central transverse axis are suitably connected by a door spreader. Locking devices engaging the spreader for retaining the hopper doors in closed position are provided on the outer sides of the hoppers. Inasmuch as the present invention relates to the form and arrangement of only one of these locking mechanisms, which will simply be duplicated at the other points of the car where they are required, the disclosure will be confined to the construction of a single lock.

Referring now to the drawings, the side wall of a hopper is designated by the reference character 10. A discharge door 11, pivoted at any suitable point, not shown, adjacent the forward or outer end of the hopper is provided to close the opening at this end of the hopper whenever the contents of the car is to be retained therein for transportation and to permit discharge of the contents when desired. A hood 12 may be provided at the end of the hopper for cooperation with the discharge door 11 and will serve to assist in preventing the loss of the load carried by the car. The pair of aligned doors cooperating with the adjacent pair of hoppers may be joined together by a spreader 13 of any suitable construction, preferably formed of steel angle members as shown.

On the side of the hopper there is provided a lock housing which may conveniently comprise a pair of sections 14 and 15 spaced from the side wall 10 of the hopper by means of spacing collars 16 which may be integral with or separate from the inner casing member 15, as desired. A plurality

of rivets 17 cooperating with recesses and depressions in the housing elements 14 and 15 and passing through the openings in the collars 16 will serve to permanently secure the housing to the side of the hopper.

Adapted for sliding movement within the housing, there is provided a latch member 18 having laterally extending bosses or trunnions 19 near the top and similar bosses 20 at an intermediate point for the purpose of retaining and guiding the latch. These bosses extend on opposite sides of the main, central portion of the latch and are adapted to cooperate with guiding surfaces or walls 21 formed as integral portions of the housing members 14 and 15. These guiding surfaces, as shown, are arranged at an angle to the vertical and, as more fully explained in the prior applications, are preferably provided with a bend at the upper end to permit the desired action of the latch in freeing and engaging the door. As viewed in Figures 1 and 2, the guiding of the latch member 18 is primarily effected by means of the left sides of the projections 19 in cooperation with the left guide walls 21 and the right side of the projections 20 in cooperation with the right guide walls 21. Toward its lower end the member 18 is provided with a substantially vertical shoulder 22 adapted to cooperate with a substantially vertical surface 23 of an extension 13*a* of the spreader 13. It will be understood that the surface 23 is in its substantially vertical position only at a time when the door 11 is held closed. This surface is preferably provided with a shim 24 which is riveted or otherwise secured to the angle member forming the main portion of the door spreader extension. In this way it is possible by the provision of a shim of any desired thickness to accommodate the locking mechanism to varying conditions and constructions. The appropriate shim thickness should be adopted which will insure proper closing of the discharge door when the latch member 18 is in its latching position.

For the purpose of forcibly shifting the latch member in the direction determined by the sliding of the bosses 19 and 20 along the guideways 21, a hub-like extension 26 is provided near the lower end of the member. In this extension an opening 27 is formed of sufficient size to permit the insertion of a pinch bar whose end may cooperate with any one of a series of ribs 28 projecting from the inner housing member 15. These ribs are suitably spaced and are provided with suitable depressions between them to permit the insertion of the end of the pinch bar so that the proper action of the bar between the selected one of the ribs and either the upper or lower edge of the opening 27 of the latch is permitted according to whether the latch is to be lifted or lowered.

It will be understood that when it is desired to open the discharge door of the hopper the pinch bar will be inserted through the opening 27 and into the depression between a pair of the ribs 28 so that by an upward movement of the free end of the bar the latch will be lifted. The bar may then be partially withdrawn and inserted in the next higher depression to permit further elevation of the latch. As the projections 19 and 20 slide along the guide surfaces 21, the shoulder 22 of the latch will be shifted slightly to the right and will permit the discharge door to swing open to a certain limited extent. When the latch is elevated to a sufficient extent to carry the shoulder 22 above the surface 23 of the spreader, the door may swing completely open. When it is desired to latch the door, the latch member 18 is moved downwardly by the opposite action of the pinch bar and as the surface 22 of the latch slides downwardly along the surface 23 of the spreader bar, the door will be forced more tightly against the discharge end of the hopper.

For the purpose of retaining the latch in its door-locking position, a locking pin 29 is provided. It will be apparent that in the absence of some suitable locking means for the door latch there would be danger that the latch would work loose and free the door to discharge the contents of the car under the continual jar and vibration to which the car is frequently subjected. The locking means for the latch must be effective to prevent release under the most severe conditions of operation. The means contemplated for this purpose by the present invention is particularly effective and yet is extremely simple and inexpensive to produce. Pin 29 is adapted to be inserted through an opening 30 provided in one side of the guide wall 21 integral with the housing member 14. In the opposite wall of the guide way openings 31 and 32, the latter above the former, are provided. These openings, as shown in Figure 3, may suitably be formed simply as depressions in the guide wall of the housing member 14 and may be closed at their open ends by the surface of the latch member 18. When the latch is shifted to substantially its lowermost position, the pin 29 may be inserted through the opening 30 and extended across the guide way to the lower opening 31. In the insertion of the pin it will be passed between the bosses 19 and 20 projecting from one side of the latch. Should it be impossible to shift the latch to a position as low as that indicated in Figure 1 due to the complete closing of the discharge door when the latch is in a position in which the projection 20 extends slightly above the lower edge of the opening 31, as shown in Figure 4, the pin 29 may be passed through the upper opening 32. It will be noted that the lower end of the projection 19 will, under the conditions speci-

fied, be sufficiently elevated to permit the insertion of the pin in the upper opening.

In a practical embodiment of the invention, a longitudinal movement of the latch member 18 of about three-quarters of an inch may be permitted between the positions represented by the selective insertion of the pin in either the upper or lower opening 32 or 31, respectively. This longitudinal movement of the latch may be made equivalent to a movement of about three-sixteenths of an inch of the lower end of the door. Also, due to the clearance between the pin 29 and the adjacent surfaces of the projections 19 and 20, a movement of the latch member to the extent of about three-quarters of an inch is permitted in whichever position the pin may be placed. This movement, as already explained, due to the angular relation of the guide surfaces, will correspond to an opening of the lower end of the door to the extent of only about three-sixteenths of an inch. This is not sufficient to permit the discharge of any of the contents of the car. Furthermore, it is to be understood that the locking pin 29 is in reality a safety device which under normal conditions will not be called into play. The latch member 18 will under usual circumstances remain in its lowermost locking position until forcibly lifted by the use of a pinch bar. The locking pin 29 serves quite adequately as a safeguard against the opening of the discharge door to any harmful extent should the car be subjected to unusual jars and vibration.

In order to insure at all times the locking of the pin 29 in the openings 30 and 31 or 32, a slight projection or hump 33 is provided on the pin to form a wedging surface and a longitudinal slot 34 is provided throughout a substantial portion of the length of the pin. As the pin is inserted through the opening 30 and either of the openings 31 and 32, the wedging surface 33 will cooperate with the surface on the housing member 15 surrounding the opening 30 to produce an inward force upon the pin. This will cause the two sides of the slot 34 to be pinched together temporarily until the hump 33 clears the opening and is placed in a position intermediate the two side walls of the guide way 21. In order to overcome the resistance offered by the surface 33 it is necessary in inserting the pin to strike a comparatively sharp blow on the end with a hammer or the like. While the pin has a certain amount of play between the two sides of the guideway it will not be accidentally jarred out of place due to the action of the hump. Whenever it is desired to remove the pin to permit release of the latch and opening of the discharge door, it is simply necessary to strike the free end 37 of the pin with an implement, using the same amount of force as in the insertion of the pin. In order to facilitate the insertion of the pin into either of its locking positions, the free end is preferably bevelled, as indicated at 38. A chain 39 connected at one end to a projecting ear 40 of the housing member 14 and attached at its lower end to a projection 41 integral with the pin may serve to prevent loss of the pin when it is not actively employed in locking the mechanism.

In order that the pin may be utilized to advantage to retain the latch 18 in its upper or releasing position, in addition to the locking functions mentioned, an opening 42 may be provided in the lower, outer projection 20 of the latch, as best shown in Figure 2. This opening may be so situated that when the latch is in its uppermost position it will be aligned with the opening 30 to permit insertion of the pin. Retention of the latch in its upper position in this way leaves the operative free to use both of his hands to effect release of the door in the event that it may be stuck and held in closed position as by an accumulation of ice in the winter time, or from some similar cause.

In the handling of the locking devices, the operative is in fact called upon to perform only one function at a time. Assuming that the door is fully locked, as shown in Figure 1, it is simply necessary to loosen the pin 29 by striking a blow against the end 37. The pin may then be completely removed. Attention may next be directed entirely to the operation of the pinch bar for lifting the latch. After the latter has been elevated to the position shown in Figure 2, the pin may be inserted freely through the aligned openings 30 and 42 to retain the latch. If the door, due to sticking, should not have automatically opened in the course of releasing the latch, both hands of the operator are free to pry it open. The locking means contemplated is not only effective under all conditions, but it is simple to put into action or to unlock. Its mode of operation is so simple that any ordinary railroad operative will appreciate how it is intended to be operated without instruction. It is lighter than constructions ordinarily provided for the same purpose and it is less expensive to manufacture.

While one admirable form of the invention has been disclosed in detail, it is to be understood that various modifications may be made and the locking mechanism may be applied to structures quite different from the particular one illustrated, all within the contemplation of the invention. The terms employed herein are to be regarded as simply descriptive of the illustrative embodiment of the invention and not as imposing any limitations thereon.

What I claim is:

1. Locking mechanism for car hopper doors which comprises guide means secured

to the hopper, door locking means slidable in said guide means to locking and releasing positions, and a pin adapted to cooperate with said guide means and locking means to hold the latter in either locking or releasing position as desired.

2. Locking mechanism for car hopper doors which comprises a housing attached to the hopper, a door latch slidable in said housing, and a locking pin adapted to be inserted transversely across said housing in a plurality of angularly disposed positions to lock said latch.

3. Locking mechanism for car hopper doors which comprises a housing attached to the hopper, a door latch slidable in said housing, and a locking pin adapted to be inserted transversely across said housing to hold said latch in either latching or releasing position.

4. Locking mechanism for car hopper doors which comprises a housing attached to the hopper, a door latch slidable in said housing, and a locking pin adapted to be inserted transversely across said housing to lock said latch, said pin having a longitudinally extending slot therethrough and a protrusion adapted to cooperate with a portion of said housing to prevent accidental removal of said pin from the housing.

5. Locking mechanism for car hopper doors which comprises a housing secured to the hopper, guide walls carried by said housing, a door latch slidable within said housing, projections on said latch adapted to cooperate with said guide walls, said guide walls having openings therein, and a pin adapted to be inserted through said openings and to cooperate with said projections to lock said latch.

6. Locking mechanism for car hopper doors which comprises a housing secured to the hopper, guide walls carried by said housing, a door latch slidable within said housing, projections on said latch adapted to cooperate with said guide walls, said guide walls having openings therein, and a pin adapted to be inserted through said openings and to cooperate with said projections to lock said latch, said pin when in locking position permitting limited movement of said latch.

7. Locking mechanism for car hopper doors which comprises a housing secured to the hopper, guide walls carried by said housing, a door latch slidable within said housing, projections on said latch adapted to cooperate with said guide walls, said guide walls having openings therein, and a pin adapted to be inserted selectively through said openings to lock said latch in one of a plurality of positions.

8. Locking mechanism for car hopper doors which comprises a housing secured to the hopper, guide walls carried by said housing, a door latch slidable within said housing, projections on said latch adapted to cooperate with said guide walls, said guide walls having openings therein, and a pin adapted to be inserted selectively through said openings to lock said latch in one of a plurality of positions, said pin in any of its locking positions permitting limited movement of said latch.

9. Locking mechanism for car hopper doors which comprises a housing secured to the hopper, guide walls carried by said housing, a door latch slidable within said housing, projections on said latch adapted to cooperate with said guide walls, said guide walls having openings therein, and a pin adapted to be inserted selectively through said openings to lock said latch in one of a plurality of latching positions, said pin being adapted to cooperate with one of said projections to hold said latch in released position.

10. Locking mechanism for car hopper doors which comprises a housing secured to the hopper, guide walls carried by said housing, a door latch slidable within said housing, projections on said latch adapted to cooperate with said guide walls, said guide walls having openings therein, and a pin adapted to be inserted through said openings and to cooperate with said projections to lock said latch, said pin being provided with wedging means cooperating with the wall of one of said openings to retain said pin in locking position.

11. Locking mechanism for car hopper doors which comprises a housing secured to the hopper, guide walls carried by said housing, a door latch slidable within said housing, projections on said latch adapted to cooperate with said guide walls, said guide walls having openings therein, and a pin adapted to be inserted selectively through said openings to lock said latch in one of a plurality of positions, said pin being provided with wedging means cooperating with the wall of one of said openings to retain said pin in locking position.

12. Locking mechanism for car hopper doors which comprises a housing secured to the hopper, guide walls carried by said housing, a door latch slidable within said housing, projections on said latch adapted to cooperate with said guide walls, said guide walls having openings therein, and a pin adapted to be inserted through said openings and to cooperate with said projections to lock said latch in latching position, one of said projections having an opening therein adapted to receive said pin to hold the latch in released position.

13. Locking mechanism which comprises a plurality of members to be locked together, a latch slidably mounted on one member and adapted to engage and hold another member, means on said one member for guiding said latch, a pin having a resilient section cooperating with said guide and latch for

holding the latter against release, and means for setting up a resilient force in said pin in effecting removal thereof.

14. In a combination, a hopper having a discharge opening, a door for closing said opening, a member projecting outwardly from said door, a slidable latch on said hopper adapted to be raised by said member upon closing of the door, and cooperating with said member to hold the door in closed position, a housing for said latch, and a pin passing through said housing and latch and adapted to retain the latch in locking position.

In testimony whereof, I have signed my name to this specification this 20th day of Oct. 1930.

JAMES A. SHAFER.