No. 610,505. Patented Sept. 6, 1898.

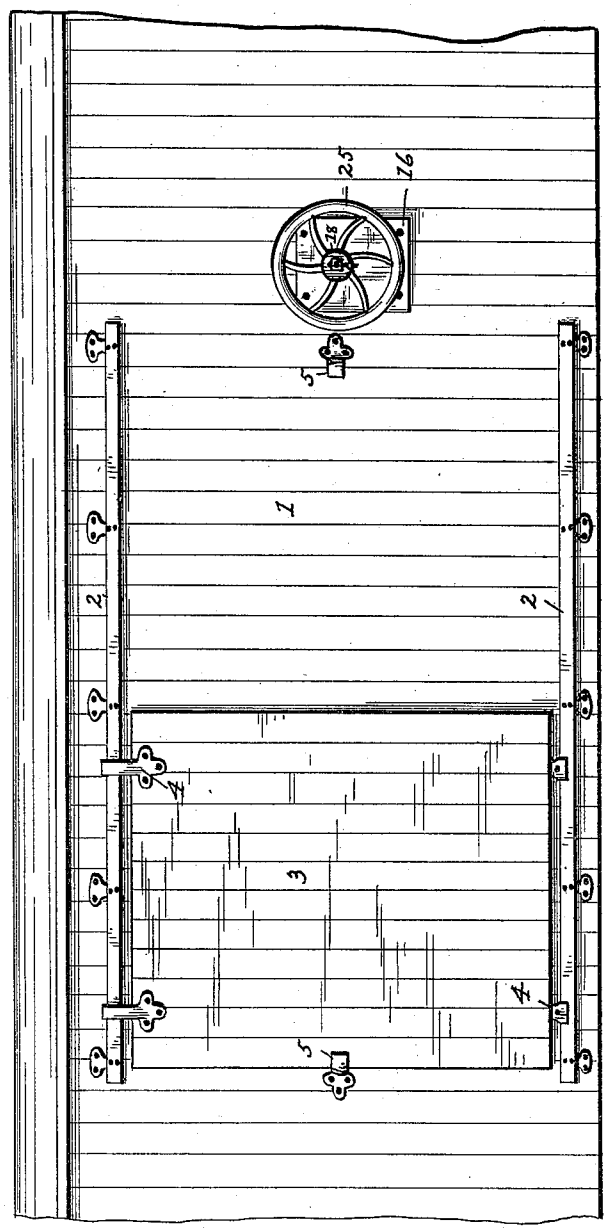
E. C. VANSTONE.

CAR DOOR OPERATING AND LOCKING MECHANISM.

(Application filed Nov. 29, 1897.)

(No Model.) 5 Sheets—Sheet 1.

FIG. 1



Witnesses
David R. Turner
C. C. Hines.

Inventor
Enoch C. Vanstone.
By R. H. R. Lacey
his Attorneys

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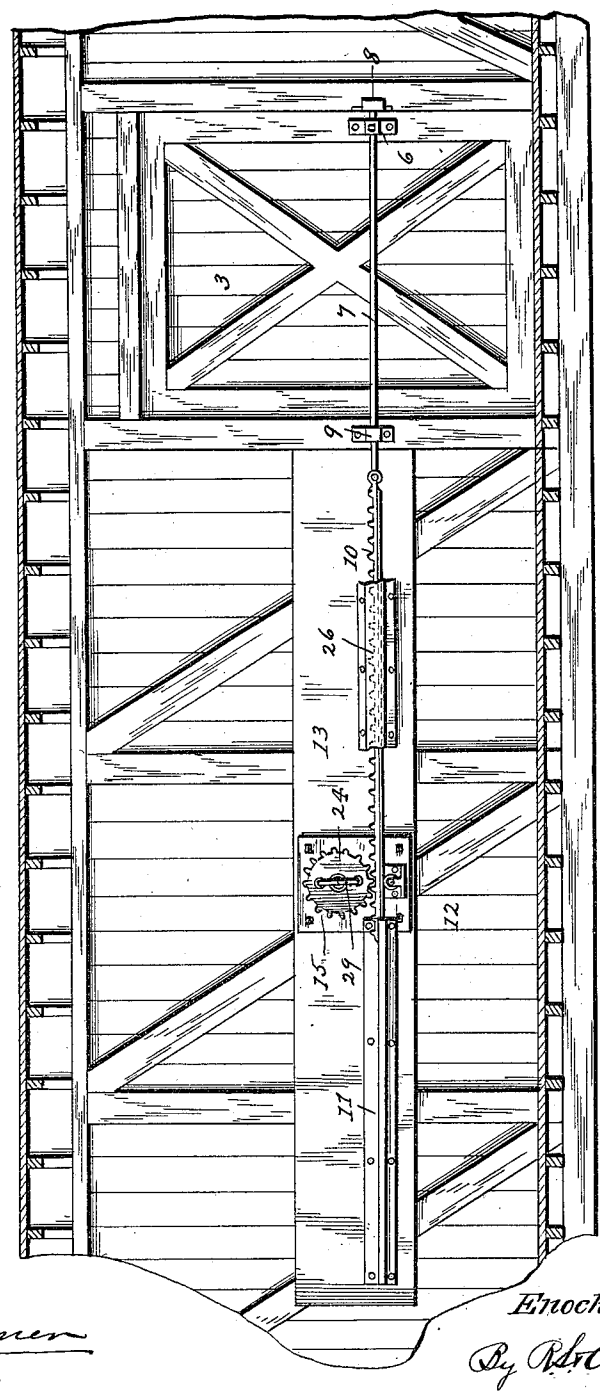
E. C. VANSTONE.

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FIG. 2.



Witnesses
Saml R. Turner
C. B. Hines

Inventor
Enoch C. Vanstone.
By R. & A. D. Lacey,
his Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 610,505. Patented Sept. 6, 1898.

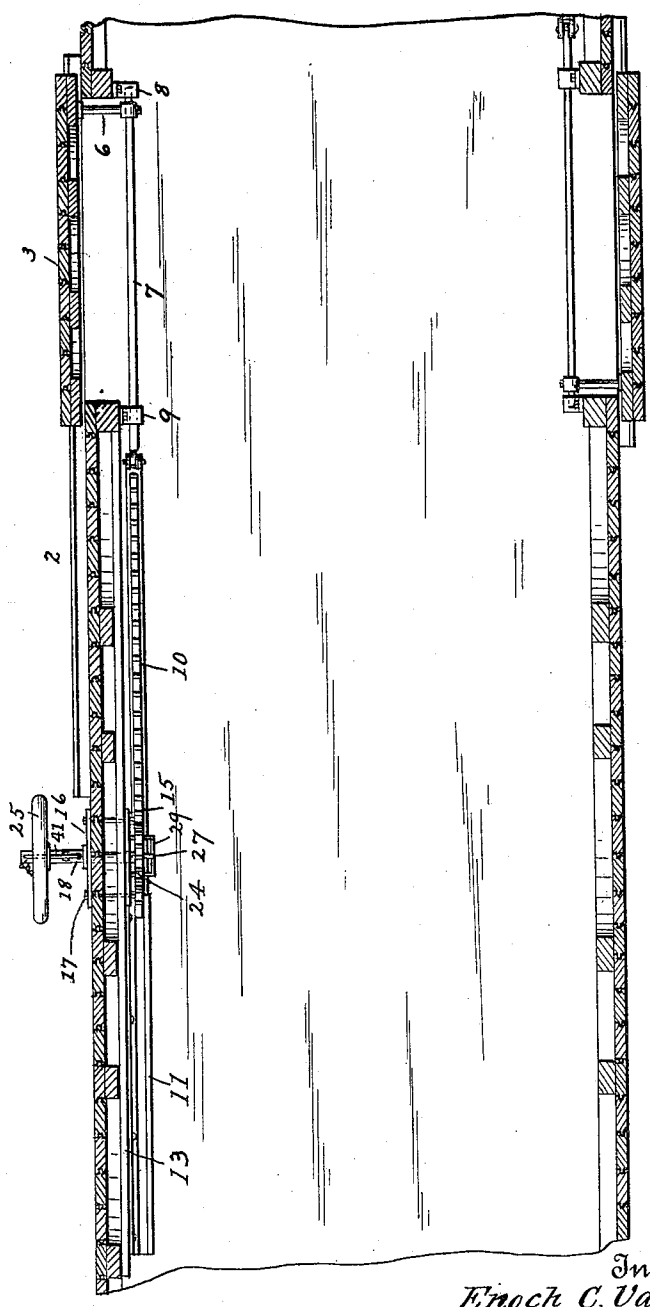
E. C. VANSTONE.

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FIG. 5



Witnesses
Sam'l R. Turner
C. C. Hines.

Inventor
Enoch C. Vanstone.
By R. & C. B. Lacey,
his Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 610,505. Patented Sept. 6, 1898.

E. C. VANSTONE.

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FIG. 4.

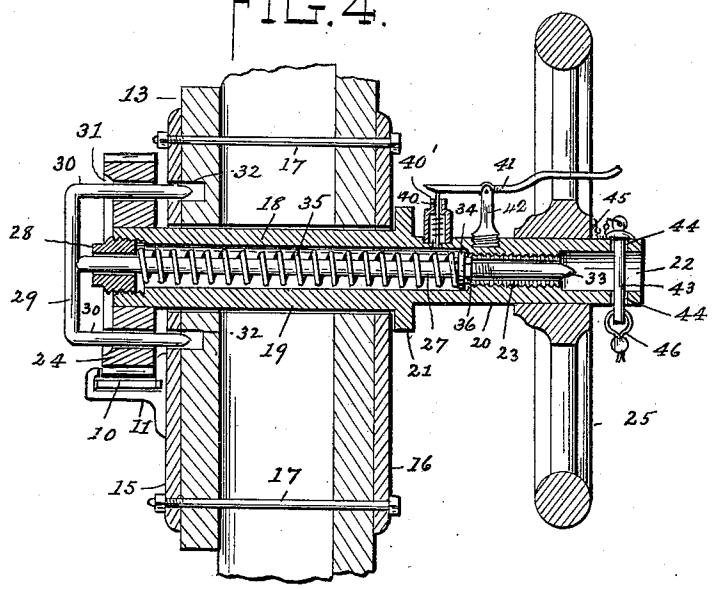


FIG. 5.

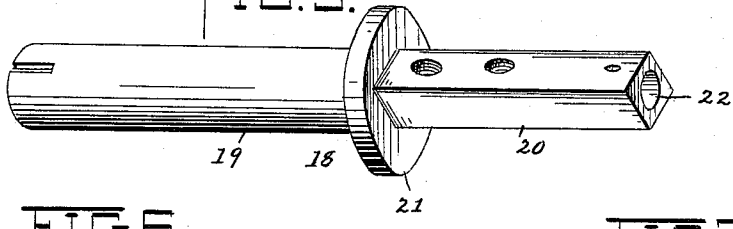


FIG. 6.

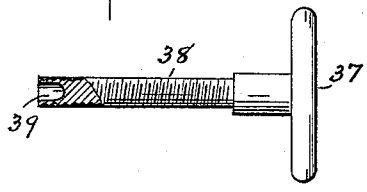


FIG. 7

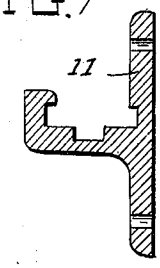
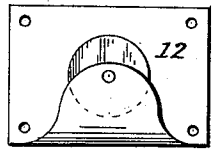


FIG. 8.



Witnesses
David R. Turner
C. B. Hines.

Inventor
Enoch C. Vanstone.
By R. S. & D. Lacey.
his Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 610,505. Patented Sept. 6, 1898.

E. C. VANSTONE.

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(Application filed Nov. 29, 1897.)

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FIG. 9.

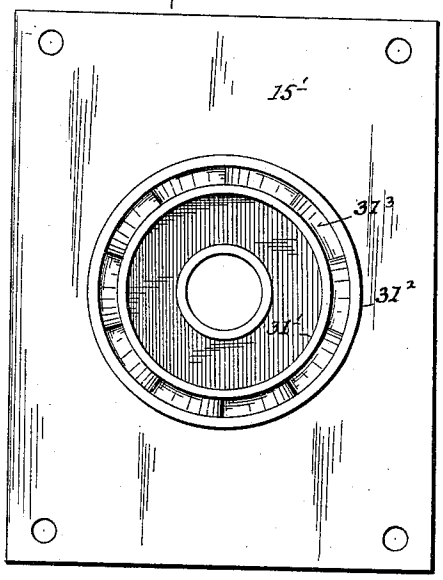
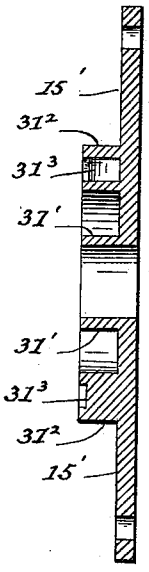


FIG. 10.



Witnesses
Saml. R. Turner
C. C. Hines.

Inventor:
Enoch C. Vanstone,
By Rhodes Lacey,
his Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ENOCH C. VANSTONE, OF CAMBRIA, WYOMING.

CAR-DOOR OPERATING AND LOCKING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 610,505, dated September 6, 1898.

Application filed November 29, 1897. Serial No. 660,154. (No model.)

To all whom it may concern:

Be it known that I, ENOCH C. VANSTONE, a citizen of the United States, residing at Cambria, in the county of Weston and State of Wyoming, have invented certain new and useful Improvements in Car-Door Operating and Locking Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in mechanism for operating and locking sliding doors, and is primarily designed for use in connection with freight-car doors.

The invention has for its object to provide novel operating mechanism whereby the door may be opened and closed with ease and facility and novel locking mechanism to prevent opening of the door by unauthorized persons.

To these ends my invention consists in the features and in the construction, arrangement, and combination of parts hereinafter described, and specifically set forth in the appended claims, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is an exterior side elevation of a portion of a freight-car embodying my invention. Fig. 2 is an interior side elevation of the same. Fig. 3 is a horizontal section through the side walls of the car, showing my invention in plan view. Fig. 4 is an enlarged detail horizontal sectional view through a portion of the wall of a car and my invention applied thereto. Fig. 5 is an enlarged detail perspective view of the hollow shaft. Fig. 6 is a side elevation of the screw-key, a portion being broken away to expose the concavity in the end thereof. Fig. 7 is a cross-sectional view of the guide-rail. Fig. 8 is a front view of the bearing-bracket; Fig. 9, a side view of the inner bearing-plate on an enlarged scale, showing a modification in the construction; Fig. 10, a central vertical section of same.

Referring now more particularly to the said drawings, 1 represents the side wall of the frame of a car, 2 track-rails arranged on the exterior side thereof above and below the door-opening, and 3 a sliding door mounted upon hangers 4, having rollers adapted to traverse said rails. 5 represents check or top plates adapted to arrest the progress of the door when moved to its full open or closed position. These parts may be of the ordinary or approved construction.

To the inner side of the door is connected an arm 6, carried by a rod 7, the outer end of which is adapted to engage a keeper 8 to prevent the closed door being forced open outwardly. This rod slides in a guide 9 and is jointed at its inner end to a rack-bar 10, flanged to slide within a grooved guide-rail 11 and supported upon a roller-bracket 12. The guide-rail and roller-bracket are mounted upon a board or base-plate 13, suitably secured to the brace-bars and struts 14.

Arranged upon the inner and outer sides of the wall 1 are bearing-plates 15 16, held by tie-bolts 17, passing through said wall and the board or bed-plate 13, and these plates are provided with alined openings which register with corresponding openings in the wall and bed-plate, as shown. Extending through these openings and mounted to rotate in the bearing-plates is a shaft 18, which, as shown in Fig. 5, is formed with a cylindrical body portion 19, a rectangular shank 20, a collar or flange 21 at the intersection of said body portion or shank, and a longitudinal bore 22. Adjacent to the outer end of the shaft this bore is contracted and screw-threaded to form a keyway 23, and the threads of this keyway are preferably made left-handed, for a purpose hereinafter described. Keyed or otherwise fastened onto the inner end of the cylindrical body portion of the shaft 18 is a gear-wheel 24, which meshes with the rack-bar 10, and rigidly fixed upon the shank 20 is a hand-wheel 25, by means of which the said shaft may be rotated from the exterior. By this construction it will be seen that when the shaft is rotated to the left the gear-wheel 24, acting on the rack-bar 10, will draw the door open and that, on the other hand, when the shaft is rotated to the right it will force the door closed. It will also be seen that this construction provides a simple and powerful door-operating mechanism whereby a door which is hung, choked, or caught may be readily opened with but slight exertion and without delay or inconvenience. The shaft

is prevented from having undue longitudinal play by the collar 21 and gear-wheel 24, which limit its movement in both directions.

In order to prevent clogging of the gearing-wheel on the inside of the car and injury thereto by freight, I contemplate inclosing the same within a case or housing 26, of which a portion is shown in Fig. 2.

The locking mechanism for holding the door closed and preventing movement of the door-operating mechanism above described comprises a bolt-rod or plunger-rod 27, fitted to slide within the bore 22 of the shaft and through a guide-tap 28, tapped into the inner end of said bore. The plunger-rod carries at its inner end a bolt 29, having two parallel shanks 30, adapted to project through locking-orifices 31 in the gear-wheel 24 and engage corresponding locking-slots 32 in the bearing-plate 15 and base-plate 13. When the bolt is projected and the gear-wheel held locked, as shown in Fig. 4, the outer end of the plunger-rod occupies the keyway 23 and projects a little beyond the same, and its extremity 33 is reduced or tapered to enter the concavity of the key, as hereinafter described. Encompassing the plunger-rod between the guide-cap 28 and an adjustable collar 34 thereon is a spiral spring 35, which serves to normally force said plunger-rod outward and hold the bolt projected, and in order to regulate the tension of this spring I provide a binding-nut 36, whereby the collar 34 may be adjusted to a limited extent on the rod to compress or relax the spring and hold it firmly in adjusted position.

The bolt is adapted to be retracted to release the gear-wheel by a key, such as is shown in Fig. 6, which consists of a hand-wheel 37, having a threaded shank 38, formed in its outer end with a concavity 39. As tools somewhat similar to this key, but having right-hand threads and minus the concavity, are in common use, I prefer, in order to insure absolute safety from malefactors, to make the threads of the key-shank and keyway 23 left-handed. In operation the shank is introduced into the outer end of the bore 22 until the tapered extremity 33 of the plunger-rod is inclosed within the concavity 39. This brings the shank into position to engage the keyway, and then by rotating the key to the left said shank may be threaded along the keyway and the plunger-rod forced inward to retract the bolt, as will be readily understood. To permit of the withdrawal of the key and still hold the bolt retracted, I provide a thumb-latch consisting of a spring-pressed detent 40, movable in a case 40′ and adapted to bear against the outer face of the collar 34. This detent is connected with one end of a lever 41, pivoted to an upright 42 and having its free end arranged in convenient position to the hand-wheel 25 to be depressed to retract said detent.

To render it difficult to get access to the plunger-rod 27 and to indicate that an attempt has been made to do so, the outer end of the bore 22 may be closed or obstructed by a seal of suitable construction. In the present instance I have shown a pin 43, fitted in transverse orifices 44 in the end of the shank 20 and attached at one end to said shank by a chain 45 and carrying at its other end a seal 46, which must be destroyed before the pin can be withdrawn.

Figs. 9 and 10 show a modification in the construction of the inner bearing-plate. In this construction the plate 15′ is formed on its inner side with two circular concentric guide-flanges $31'$ 31^2, and a continuous series of beveled rack-teeth 31^3 between the same. These flanges are adapted to serve as guides for the shanks 30 of the bolt 29, and the rack-teeth provide a series of locking members with which said shanks are adapted to engage to lock the door in any desired position.

From the above description, taken in connection with the accompanying drawings, the construction, mode of operation, and advantages of my improved mechanism will be readily understood. It will be seen that I have provided simple and positive means for opening and closing a car-door and in addition thereto improved locking means to effectually prevent the door from being opened by malefactors. The advantages of my device over the ordinary car-seal, which merely indicates that the door has been opened without providing effectual means to prevent entrance to the car, will be manifest.

Having thus fully described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is—

1. The combination, in a freight-car, of a sliding door, a rack-bar connected with the inner side of the door, a hollow shaft extending through the wall of the car and carrying a gear meshing with said rack, and locking mechanism adapted to engage and hold the gear-wheel immovable, said locking mechanism being accessible through the bore of said shaft, substantially as described.

2. The combination, in a freight-car, of a sliding door, a rod connected with the inner side of the door, a grooved guide-rail, a rack-bar connected with said rod and flanged to fit and slide in the guide-rail, and a shaft extending through the side wall of the car and carrying at its inner end a gear meshing with said rack-bar and at its outer end a hand-grasp, substantially as described.

3. In door-operating mechanism, the combination with the door-frame carrying a keeper, and a sliding door, of a rod carrying an arm connected with the inner side of the door and having one end projecting beyond the arm and adapted to engage the keeper, and means for actuating the rod to close said door, substantially as described.

4. The combination, in a freight-car, of a sliding door, a base-plate secured to the inner side of the side wall of the car, bearing-plates on the inner and outer sides of said

wall, a shaft extending through said wall and having bearing in said plates, a rod connected with the inner side of the door, a rack-bar connected with the rod, and a gear-wheel mounted on the inner end of the shaft and meshing with said rack-bar, substantially as described.

5. The combination, in a freight-car, of a sliding door, a base-plate secured to the inner side of the side wall of the car, bearing-plates on the inner and outer sides of said wall, a shaft extending through said wall and having bearing in said plates, a rod connected with the inner side of the door, a rack-bar connected with the rod, a gear-wheel mounted on the inner end of the shaft and meshing with said rack-bar, and a locking device adapted to engage the gear-wheel and hold it and the shaft immovable, substantially as described.

6. The combination, in a freight-car, of a sliding door, a rack-bar connected with the inner side of the door, bearing-plates on the inner and outer sides of the car-wall, a hollow shaft having bearing in said plates, a gear-wheel on the shaft provided with locking-orifices and meshing with said rack-bar, and a plunger-rod in said shaft carrying a bolt adapted to engage the said locking-orifices, substantially as described.

7. The combination, in a freight-car, of a sliding door, a rack-bar connected with the inner side of the door, a hollow shaft having bearing in the side wall of the car, a gear-wheel carried by the shaft and meshing with the rack, a plunger-rod fitted in the bore of said shaft and carrying a bolt adapted to lock said gear-wheel, and means for normally acting on the plunger-rod to hold the bolt projected, substantially as described.

8. The combination, in a freight-car, of a sliding door, a rack-bar connected with the inner side of the door, a hollow shaft having bearing in the side wall of the car, a gear-wheel carried by the shaft and meshing with the rack, a plunger-rod fitted in the bore of said shaft and carrying a bolt adapted to lock said gear-wheel, and a spiral spring encompassing the plunger-rod and acting thereon to normally hold the bolt projected, substantially as described.

9. The combination, in a freight-car, of a sliding door, a rack-bar connected with the door, a hollow shaft carrying a gear-wheel meshing with the rack, a plunger in the shaft carrying a bolt adapted to engage the gear and hold it immovable, means for normally holding the bolt projected, and a key adapted to be inserted into the bore to retract said rod and bolt, substantially as described.

10. The combination, in a freight-car, of a sliding door, a rack-bar connected with the door, a hollow shaft carrying a gear-wheel meshing with the rack, a plunger in the shaft carrying a bolt adapted to engage the gear and hold it immovable, means for normally holding the bolt projected, and a seal adapted to be applied to the outer end of the shaft to prevent access to the bore thereof, substantially as described.

11. The combination, in a freight-car, of a sliding door, a rack-bar connected with the door, a hollow shaft carrying a gear-wheel meshing with the rack, a plunger in the shaft carrying a bolt adapted to engage the gear and hold it immovable, a spring for normally holding the rod and bolt projected, and a detent for holding said rod and bolt retracted against the tension of the spring, substantially as described.

12. A key for the purpose described, comprising a hand-wheel having a shank formed with left-hand threads and a concavity in its outer end, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ENOCH C. VANSTONE.

Witnesses:

EDWIN W. GRANT,

J. G. DODD.