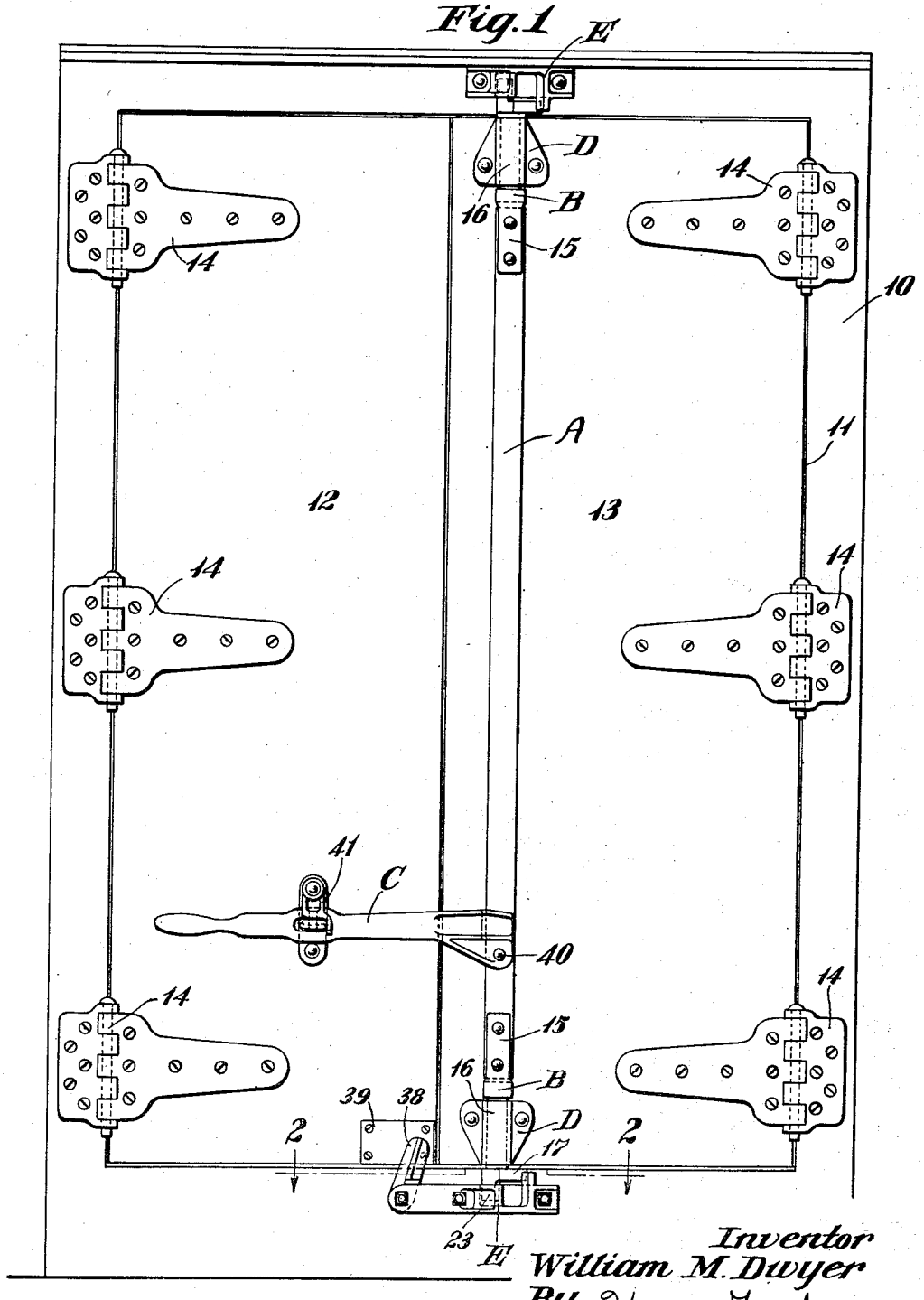
April 1, 1941. W. M. DWYER 2,236,594

DOOR FASTENER

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Fig. 1




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Fig. 2

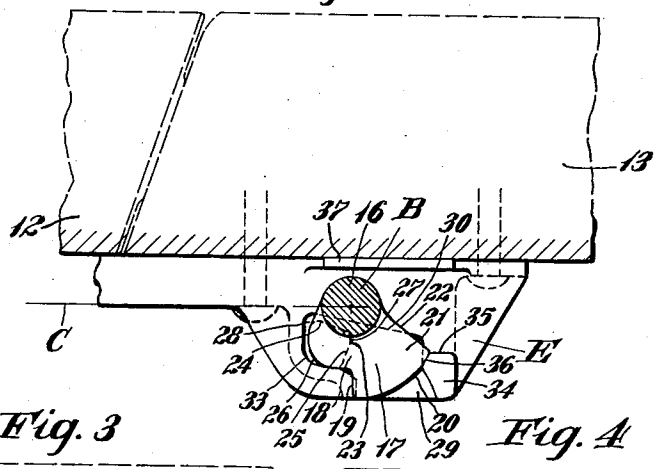



Fig. 3

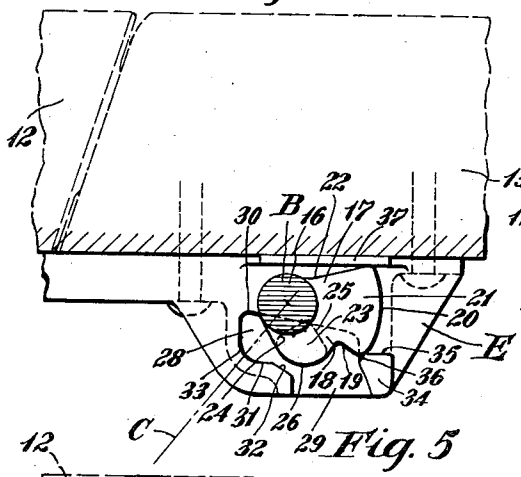



Fig. 4

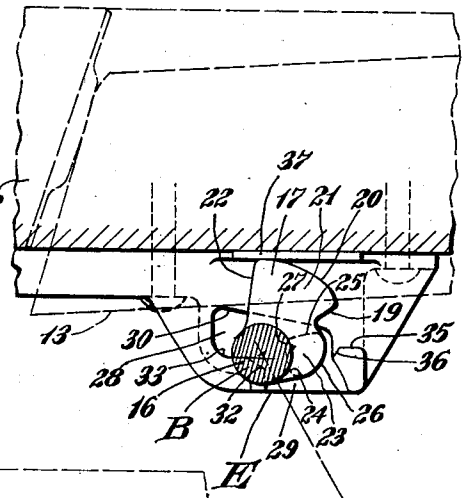
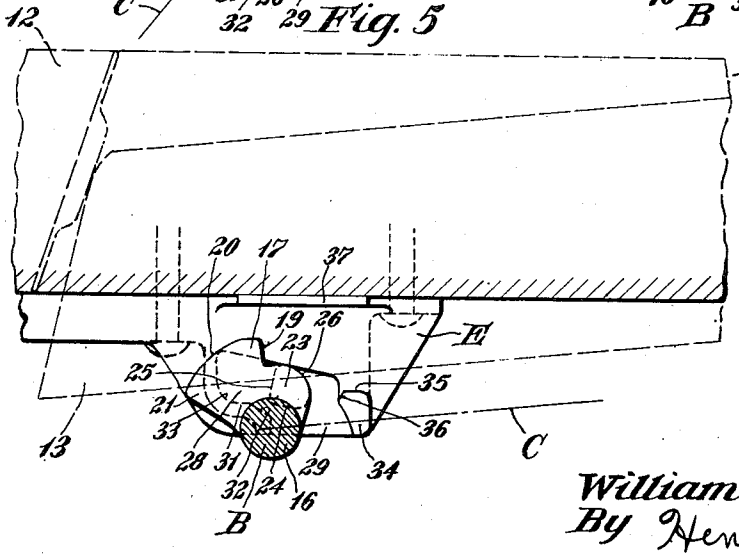



Fig. 5




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Fig. 6

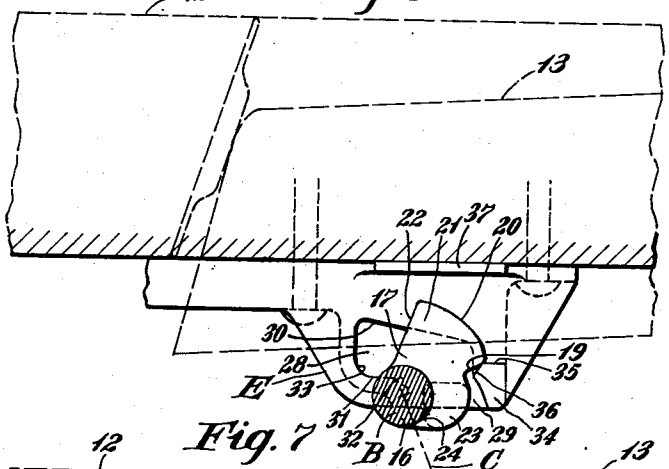



Fig. 7

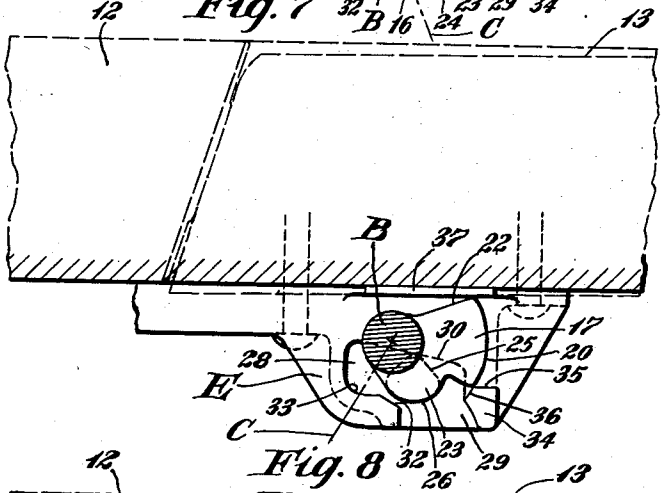
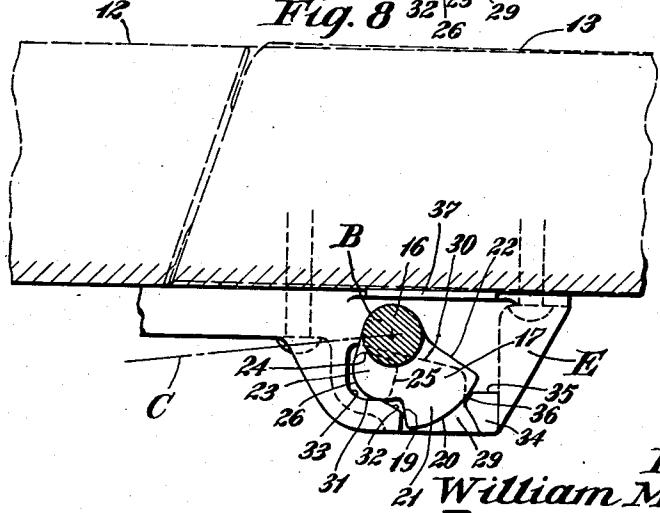



Fig. 8




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Patented Apr. 1, 1941 2,236,594

# UNITED STATES PATENT OFFICE

2,236,594

## DOOR FASTENER

William M. Dwyer, Chicago, Ill., assignor to W. H. Miner, Inc., Chicago, Ill., a corporation of Delaware

Application December 2, 1938, Serial No. 243,608

10 Claims. (Cl. 292—241)

This invention relates to improvements in fasteners especially adapted for hinged doors of refrigerator cars.

One object of the invention is to provide in a rotary door operator or fastener for double hinged doors of refrigerator cars cooperating keeper engaging means and keepers on the rotary door fastener and car, respectively, having interengaging locking portions adapted to maintain the doors positively locked in closed position after the same have been forced into the door opening by rotation of the fastener, the interengaging means of the keeper engaging means and keepers being arranged and disposed to effectively resist any tendency of the operating bar to be accidentally rotated through forces reacting between the keeper engaging means and keepers due to outward thrust exerted on the doors through the compressed condition of the insulating packing material with which the latter are universally provided.

Another object of the invention is to provide a door operating mechanism adapted for use in connection with hinged doors including a manually actuated rotary operating bar mounted on one of the doors and having keeper engaging means at opposite ends thereof cooperating with keepers fixed to the door frame above and below the door opening, wherein the keeper engaging means includes a hooked arm engaging with a lug on the keeper to move the door inwardly and force the same tightly into the door opening, and wherein the keeper engaging means and keepers are provided with interengaging cam portions which are designed and arranged so that the same are located at opposite sides of the line of outward thrust extending through the axis of rotation of the bar when the door is tightly closed, to prevent accidental rotation and release of the bar through outwardly directed forces exerted by compressed insulation of the door.

A still further object of the invention is to provide a rotary door fastener for hinged doors having cooperating keeper engaging means and keepers acting to force the door open and closed by rotation of the fastener respectively in reverse directions, wherein the opening operation is performed by successively acting cam members, and the keeper engaging means and keepers are provided with interengaging abutment portions for maintaining the door locked in closed position until released by manual rotation of the fastener in door opening direction.

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 front elevational view of a pair of vertically disposed hinged doors of a refrigerator car, illustrating my improved operating mechanism in connection therewith. Figure 2 is a horizontal sectional view on an enlarged scale; corresponding substantially to the line 2—2 of Figure 1. Figures 3, 4, and 5 are views similar to Figure 2, but showing the parts in different positions assumed during successive stages of the door opening operation. Figures 6, 7, and 8 are views similar to Figure 2, but showing the parts in different positions assumed during successive stages of the door closing operation.

In said drawings 10 designates the side wall member of a refrigerator car having a door opening 11 therein, which is closed by a pair of hinged doors 12 and 13. Each of the doors is provided with the usual sets of hinges 14—14—14 along the vertical outer edges thereof by which they are swingingly supported. The door 12, which is the first closed, and the door 13 have meeting edges which are beveled and so inclined that the door 13 will maintain the door 12 in closed position and wedge the same shut when the door operating mechanism is actuated. The edges of the two doors and the cooperating edges of the door frame are also provided with the usual insulating packing material, not shown.

My improved door operating mechanism proper comprises broadly a locking bar A; a pair of end castings B—B having keeper engaging door actuating and locking cam means thereon; an operating handle C; guide or bearing plates D—D; and a pair of keepers E—E with which the cam means cooperate.

The operating bar A is of substantially rectangular cross section and has the end castings B—B riveted thereto. Each end casting has a forked portion 15 of well-known form, which embraces the flat bar A on opposite sides and has rivet members extending therethrough. Outwardly of the forked portion, each member B has a cylindrical bearing section 16 which is rotatably supported in the corresponding bracket or guide plate member D. As shown in Figure 1, the bar or shaft A is vertically disposed and two bearing members D—D are employed, the same being arranged respectively adjacent the top and bottom edge portions of the door 13 and secured thereto in any suitable manner. Outwardly of the bearing sections 16, each end cast-

ing B has a platelike arm 17 in a plane at right angles to the axis of rotation of the bar. The platelike arm 17 has a portion 18 thereof inset with respect to the remainder of said arm, thereby providing a substantially radial shoulder 19. The outer edge 20 of the larger portion 21 of said platelike arm is curved, as shown, and forms a locking cam face, as hereinafter pointed out. The back edge 22 of the arm 17 is substantially straight, as clearly shown in Figures 2 and 3. The platelike portion thus has the shape of a hook member and, in effect, provides a hook for pulling the door tightly shut and camming the same into the door opening, as hereinafter pointed out.

The portion 18 of the arm 17 is provided with a lug 23, outstanding from the arm at right angles to the plane thereof. The lug 23 is eccentric to the axis of rotation of the bar A and is of substantially triangular outline in horizontal section, having two straight sides 24 and 25 and a curved side 26. The curved side 26 forms a cam face for a purpose hereinafter pointed out. The corner at the meeting point of the two straight faces 24 and 25 is preferably rounded off, as indicated at 27. The eccentric lugs 23—23 of the upper and lower end members B are respectively reversed, that is, the lug of the upper member is upstanding while that of the lower member is depending so as to properly cooperate with the respective keepers E—E.

The top and bottom keepers E—E are of similar design and reversely arranged, that is, the upper keeper faces downwardly while the bottom keeper faces upwardly. Each keeper E is preferably in the form of a casting secured to the door frame. Each casting E is provided with a cam slot 28 in which the lug 23 of the corresponding end member B of the bar A is adapted to engage. The slot 28 has a relatively wide entrance or mouth 29, which is at the forward side of the casting. The rear wall of the slot 28, which is indicated by 30, is substantially straight and extends at an inclination to the plane of the side wall of the car. Upon reference to Figures 2 to 8 inclusive, it will be seen that the entrance 29 to the slot 28 is at the right hand end of the same, a relatively short front wall 31 being opposed to the back wall 30. Adjacent the entrance 29, the front wall 31 is cut away to provide a short inclined section 32 and the surface of the remaining portion of said wall is curved inwardly to provide a relatively shallow, concave seat 33 opposed to the back wall 30. The end of the wall 31 which defines the corresponding side of the entrance or mouth 29 is substantially straight and is disposed in a plane at right angles to the plane of the side wall of the car. The opposed wall of the mouth or entrance 29 is preferably concavely curved, as clearly shown in the drawings.

At the front of each casting E, adjacent the right hand end of the slot 28, an outstanding lug 34 is provided, the lug of the bottom keeper being upstanding while the lug of the top keeper is depending. Each lug 34 has a flat vertical back face 35 and has the corner adjacent the slot 28 cut away to provide a relatively short, slightly concave face or seat 36. At the base of each casting E is a vertical abutment flange 37, the flange of the top keeper depending and that of the bottom keeper upstanding.

As shown in Figure 1, the keeper casting E at the bottom of the door opening has an extended portion on which a pivoted latch finger 38 is supported, which is adapted to engage the lower right hand corner of the door 12, as viewed in Figure 1, to hold the same in closed position, a wear plate 39 being preferably employed at the lower corner of this door with which the latch finger 38 cooperates.

The operating handle lever C is forked at the inner end thereof, as is common, and is pivotally connected to the operating bar A at said forked end, the forked portion embracing the operating bar and being connected thereto by a pivot pin 40. At the outer free end, the operating lever C is provided with the usual hand grip by which the same may be manipulated. The operating handle C is adapted to be locked, as shown in Figure 1, by any suitable locking device, as indicated by 41, and sealed in the manner customary in connection with railroad cars.

In the closed and locked position of the door, as shown in Figures 1 and 2, the curved face 26 of the lug 23 is seated in the concavity 33 of the wall 31 of the keeper E and the end portion of the curved edge face 20 of the plate 17 is seated in the concave face 36 of the lug 34.

By this arrangement of engaging faces on the keeper E and the member B, accidental rotation of the bar A which would effect release of the door from locked condition is precluded, the respective engaging positions of said faces being located at opposite sides of the axis of rotation of the bar A outwardly of the latter. All tendency of the bar to be rotated through outward thrust exerted on or through the door is thus eliminated.

To open the door 13, the handle lever C is first freed by unlocking the same from the latch 41. This lever is then pulled or swung outwardly away from the door, thus rotating the bar in a contraclockwise direction, as seen in Figure 2. During the initial rotation of the bar A, the cam face 26 of the lug 23 in passing out of the seat 33 of the keeper E will force the door slightly inwardly, as will be evident from Figure 8, which shows the position of the parts at the time the cam lug is moving out of engagement with the seat 33 and passing over the highest point or greatest inward projection of the cam face 33 of the outer wall 31 of the slot 28 of the keeper. As rotation of the bar A is continued, the back portion of the arm 17 comes into engagement with the abutment flange 37 of the keeper E, as shown in Figure 3, and cams the door outwardly, as shown in Figure 4. As will be clear upon reference to Figure 3, before the opening movement of the door through camming action of the arm 17 is initiated, the lug 23 of the keeper engaging means of the arm has been moved completely out of engagement with the front wall of the slot 28 of the keeper, and the locking face 20 of the arm 17 has passed clear of the locking concave face 36 of the lug 34, thus permitting the required outward movement of the bar A with the door 13 as the latter is forced open. Rotation of the bar A is continued until the door 13 has been pried free of the door opening. This position is shown in Figure 5. As will be evident, as the bar A is rotated to move the keeper engaging portion thereof from the position shown in Figure 4 to that shown in Figure 5, the lug 23 of the bar A performs the last part of the forcing out movement of the door by camming action on the inclined wall 32 of the cam slot 28 of the keeper, it being obvious that the lug 23 comes into engagement with the rear wall 30 of the slot 28 of the keeper upon slight

rotation of the parts beyond the position shown in Figure 4.

With the parts in the position shown in Figure 5, the door 13 is free to be swung fully open, the lug 23 being in such a position as to clear the outer wall 31 of the slot 28 and pass through the mouth 29. In the position shown in Figure 5, the operating lever handle C, which is indicated in dotted lines, is disposed substantially parallel to the door, having been swung through an angle of approximately 180°. After the door 13 has been opened and swung to clear the door 12, the latter, after release of the latch finger 38, may be manually swung to fully open position.

In closing the doors, the door 12 is first swung to closed position and may be latched by the pivoted finger 38. The door 13 is then swung inwardly to approximately the position shown in Figure 5, the lug 23 entering the slot 28 through the mouth 29 thereof and arresting movement of the door by striking against the rear wall 30 of the slot of the keeper. The handle lever C is then swung outwardly away from the door from right to left, as seen in Figure 5, thereby rotating the bar A and its keeper engaging means in clockwise direction. The hooked arm 17 is thus swung toward the lug 34 and into engagement with the same, as shown in Figure 6. Further rotation of the bar A causes the door to be forced into the door opening by camming action of the radial shoulder 19 of said hooked arm with the flat face 35 of the lug 34 of the keeper E, the parts being thus brought to approximately the position shown in Figure 7. During further rotation of the bar A, the hook of the arm 17 clears the shoulder at the corner of the lug 34 and the curved edge face 20 of the arm rides over the concave face 36 of the lug 34. As this movement of the parts is continued, the cam lug 23 of the keeper engaging end member B of the bar A comes into engagement with the outer wall 31 of the keeper, rides over the inclined cam face 32 and onto the concave cam face 33, as shown in Figure 8, to force the door tightly closed. As the lug 23 passes onto the concave face 33, it rides over the high portion thereof, thus further compressing the insulating packing material of the door by slight inward displacement of the latter, thereby spacing the convex edge 20 slightly away from the concave face 36 of the lug 34 of the keeper E. Further rotation of the bar A brings the parts to the position shown in Figure 2, thereby seating the convex cam face 26 of the lug 23 of the bar A in the seat formed by the concave face 33 of the front wall of the keeper, and seating the convex edge face 20 of the arm 17 against the concave face 35 of the fixed lug 34 of said keeper. The slight outward displacement of the door to effect seating of the lug 23 and the edge face of the arm 17 is produced by slight expansion of the compressed inherently resilient insulation of the door. When the parts reach the position shown in Figure 1, the bar A has been rotated through an arc of approximately 180° and the handle lever C is in position parallel to the door and may be locked by the latch 41 and sealed in the usual manner.

When the door has been thus completely closed, it is held in locked position by the lug 23 and the arm 17 being seated in the concavities of the wall 31 and fixed lug 34 of the keeper E, as hereinbefore pointed out, and there is no possibility of accidental rotary displacement of the bar A which would permit displacement of the door through outwardly acting forces transmitted thereto. The danger of the effectiveness of the seal between the door and the walls of the door opening being destroyed by outward displacement of the door is thus entirely eliminated and consequent loss of refrigeration avoided.

I have herein shown and described what I now consider the preferred manner of carrying out my invention, but the same is merely illustrative and I contemplate all changes and modifications that come within the scope of the claims appended hereto.

I claim:

1. In a fastener for doors, the combination with a rotary operating bar mounted on the door; of a fixed keeper having a cam slot therein and an upstanding lug thereon; and means on said bar rotatable therewith for forcing the door closed including an arm engageable with the lug and a cam lug engageable within said slot.

2. In a fastener for doors, the combination with a rotary operating bar mounted on the door; of a fixed keeper having a cam slot therein; an upstanding lug on said keeper; and means on said bar rotatable therewith for forcing the door closed including a hooked arm engageable with said lug, and a cam lug engageable within said slot.

3. In a fastener for doors, the combination with a rotary operating bar mounted on the door; of a fixed keeper having inwardly facing, spaced abutment faces at opposite sides of the axis of rotation of the operating bar, when said bar is in position to hold the door closed; and means on said bar rotatable therewith and engageable with said keeper for camming the door shut, said means including an arm and a lug spaced therefrom, said arm and lug having respectively locking faces engageable simultaneously with said spaced abutment faces of the keeper for holding the door against outward displacement.

4. In a fastener for hinged doors of railway cars, the combination with a rotary operating bar mounted on the door; of a slotted keeper on the car, said slot of the keeper having an inwardly facing short outer wall, and outwardly facing elongated inner wall slightly inclined with respect to the plane of the car wall; an upstanding abutment lug on said keeper at one end of said slot; and means on said bar rotatable therewith for forcibly camming the door outwardly through rotation of said bar including an arm and a cam lug, successively engageable with the car wall, and said inner wall of the slot of the keeper, said lug and arm having curved abutment faces thereon respectively engageable with the outer wall of the slot and said lug for holding the door against outward displacement.

5. In a fastener for hinged doors of railway cars, the combination with a rotary operating bar mounted on the door; of a slotted keeper fixed to the car; an upstanding lug on said keeper; and means for prying said door open when said bar is rotated in one direction and forcibly camming the door shut when rotated in a reverse direction, including a cam lug engageable within the slot of the keeper and a hooked arm engageable with said lug when said bar is rotated in said second named direction.

6. In a fastener for hinged doors, the combination with a rotary operating bar mounted on the door; of a fixed slotted keeper having an upstanding cam lug thereon provided with a concave face, the slot of the keeper having a concave seat in one of its walls; and means on said bar rotatable therewith for forcibly cam-

ming the door shut by rotation of said bar in one direction, including an eccentric cam lug and a cam arm, said cam lug being engageable within the slot, said cam lug and arm having rounded cam faces respectively engageable within the concavity of said seat and the concave face of the lug to lock the bar against rotation when the door is closed.

7. In a fastener for hinged doors, the combination with a rotary operating bar mounted on the door; of a fixed keeper having a slot provided with a forwardly opening flaring mouth, a relatively short front wall at one side of said mouth, and an upstanding lug at the opposite side of said mouth; and means rotatable with said bar for forcibly camming the door shut by rotation of said bar in one direction including an eccentric cam lug and a hooked arm, said arm being engageable with said upstanding lug to initially pry the door inwardly to a predetermined extent, and said cam lug being engageable with one of the walls of said flaring mouth to force said door further inwardly, said arm and upstanding lug and said cam lug and front wall having respectively cooperating seating faces engageable with each other after the door has been forced tightly shut to hold the latter against outward displacement.

8. In a fastener for hinged doors, the combination with a rotary operating bar mounted on the door; of a keeper provided with a slot extending in a direction lengthwise of the door when closed, said slot having opposed inner and outer walls, said outer wall being cut away at one end to provide a mouth for said slot, the cut away end of said outer wall being inclined to provide a cam face, the inner side of said outer wall having a concave seat adjacent said mouth, said seat facing the inner wall of said slot; an upstanding post on said keeper adjacent the mouth of said slot, on the side opposite to the end of said outer wall; and means rotatable with said bar for forcibly camming the door shut by rotation of said bar in one direction, including a cam lug eccentric to said bar and an arm extending radially from said bar, said lug having a rounded face portion successively engageable with said inclined cam face and seat of said front wall, said arm having a radial face and a rounded end edge, successively engageable with said post.

9. In a fastener for hinged doors, the combination with a rotary operating bar mounted on the door; of a fixed keeper having a slot having inner and outer walls and an entrance opening through said outer wall; an upstanding post on said keeper; an abutment flange spaced inwardly from said post; and means on said bar rotatable therewith for forcing the door in and out of the door opening including a platelike, outwardly flaring arm, and a cam lug on said platelike arm, said arm and lug, when said bar is rotated in one direction, being respectively engageable with said flange and the inner wall of the slot to force said door outwardly, said platelike arm having a radial shoulder and said lug having a rounded face engageable respectively with said post and outer wall of the slot when the bar is rotated in a reverse direction to force said door inwardly, said platelike arm having the outer edge thereof curved, said curved outer edge and said rounded face of the lug simultaneously seating against said post and outer wall of the slot when the door is completely closed to hold the latter against outward displacement.

10. In a fastener for hinged doors, the combination with a rotary operating element having a radially extending platelike arm thereon, said arm being outwardly flared and having a rounded outer edge, a cam lug eccentric to said operating element, said cam lug being inset with respect to the outer edge of said platelike arm and having a rounded face on one side thereof; of a fixed keeper member having a slot therein adapted to accommodate said lug, said slot having inner and outer walls, engageable by said lug in rotation of said bar in reverse directions, said outer wall having a concave seat engageable by said rounded face of the lug, said outer wall having a beveled cam face adjacent said seat engageable by said lug in advance of the seat when the bar is rotated in door closing direction, an upstanding post on said keeper having a rearwardly facing flat surface engageable by the forward side edge of said flaring arm in advance of the operation of said lug when the bar is rotated in said door closing direction to initiate inward movement of the door, said post having a concave seat adjacent said flat surface thereof, said rounded outer edge of the arm and said rounded face of the cam lug simultaneously seating respectively in said concave seats of the post and said outer wall respectively to lock said door against outward movement after the door has been cammed shut.

WILLIAM M. DWYER.