

June 6, 1939.

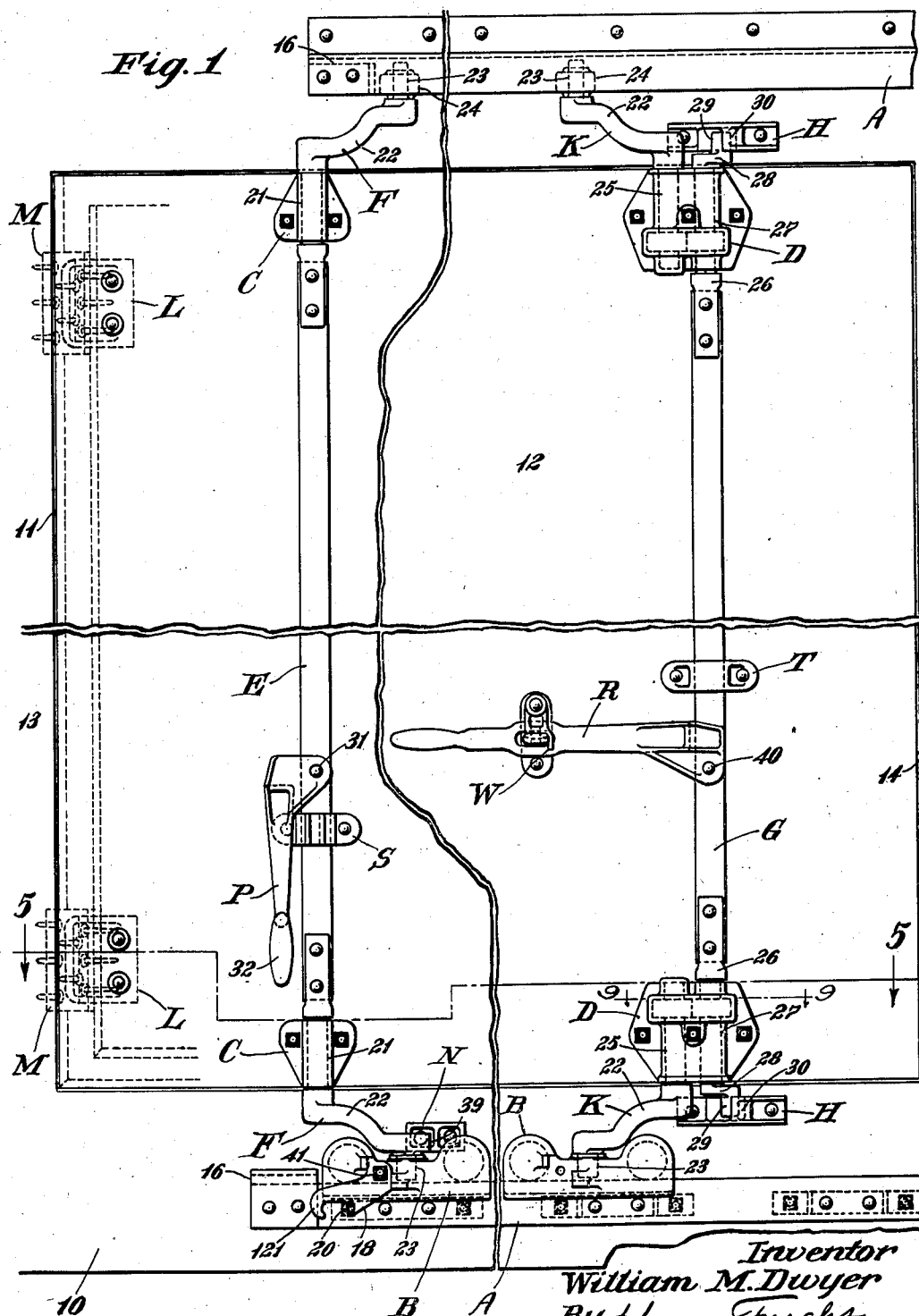
W. M. DWYER

2,160,844

REFRIGERATOR CAR DOOR

Filed Jan. 17, 1938

5 Sheets-Sheet 1



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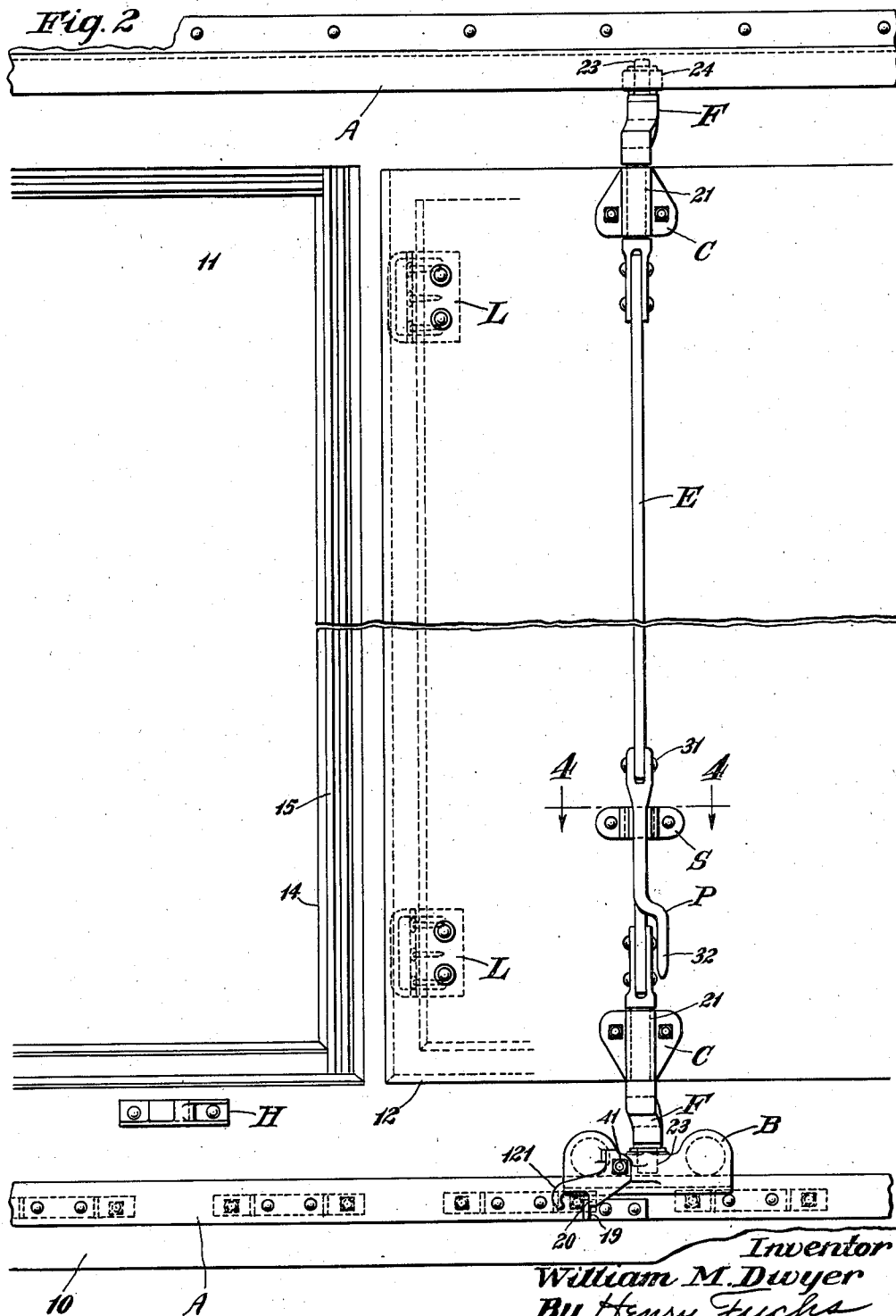
June 6, 1939.

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REFRIGERATOR CAR DOOR

2,160,844

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5 Sheets-Sheet 2



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REFRIGERATOR CAR DOOR

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5 Sheets-Sheet 3

Fig. 3

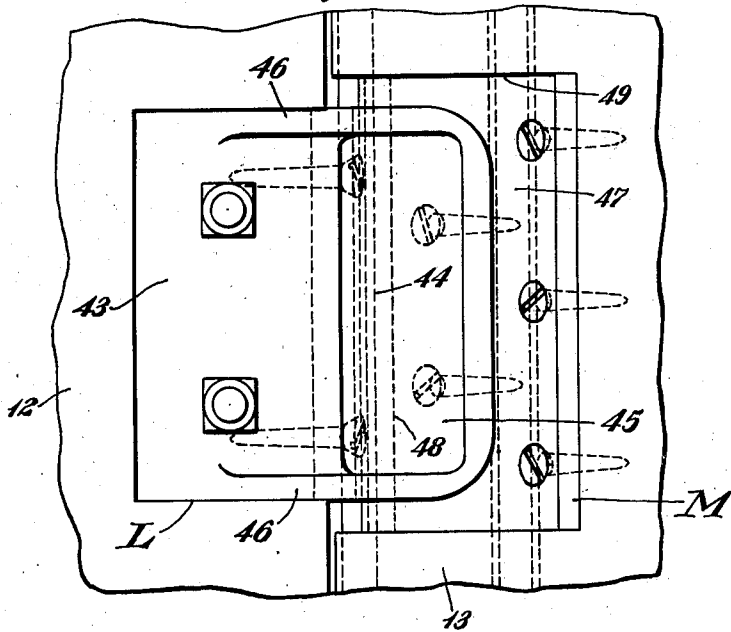


Fig. 4

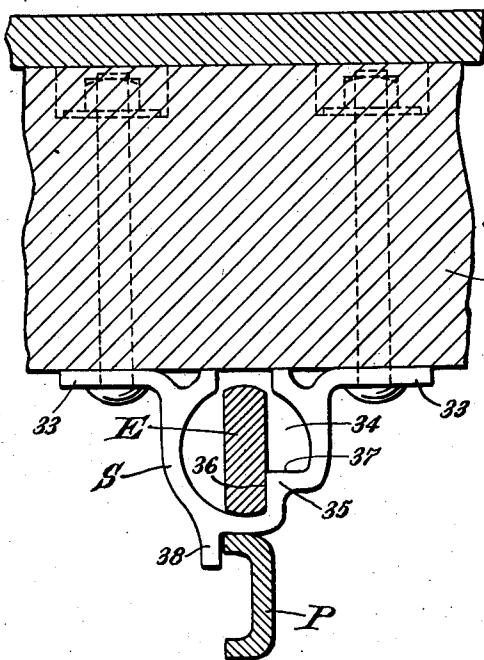
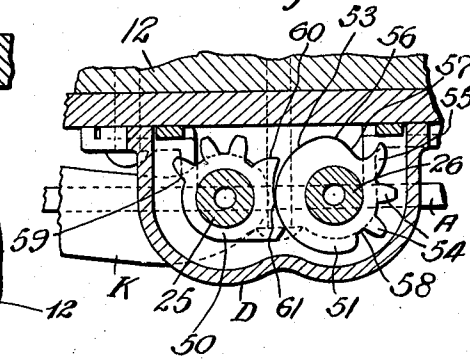


Fig. 9.



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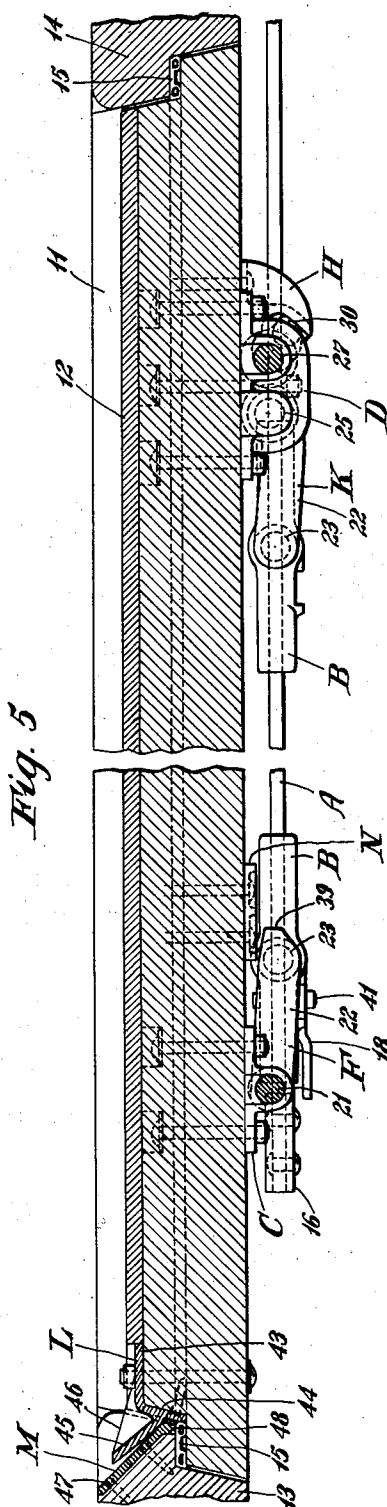
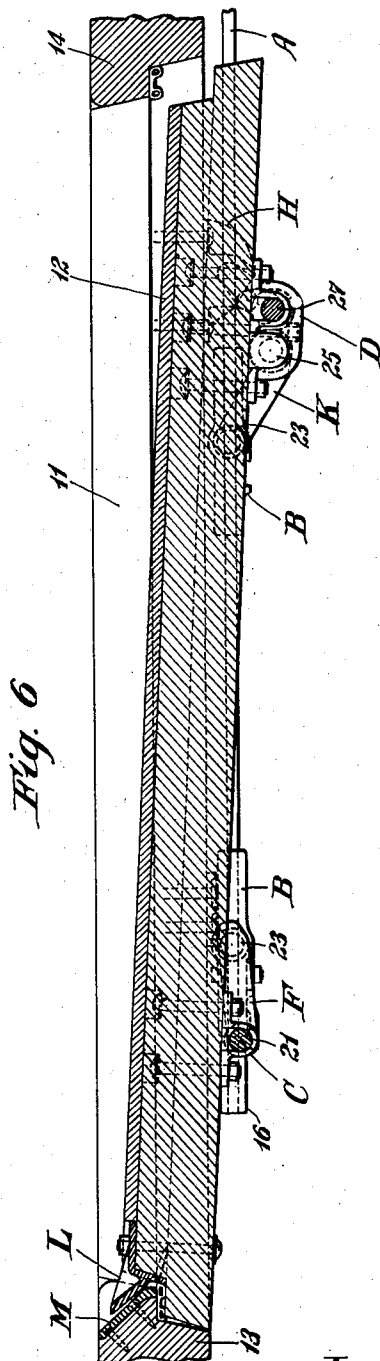
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2,160,844

REFRIGERATOR CAR DOOR

Filed Jan. 17, 1938

5 Sheets-Sheet 4



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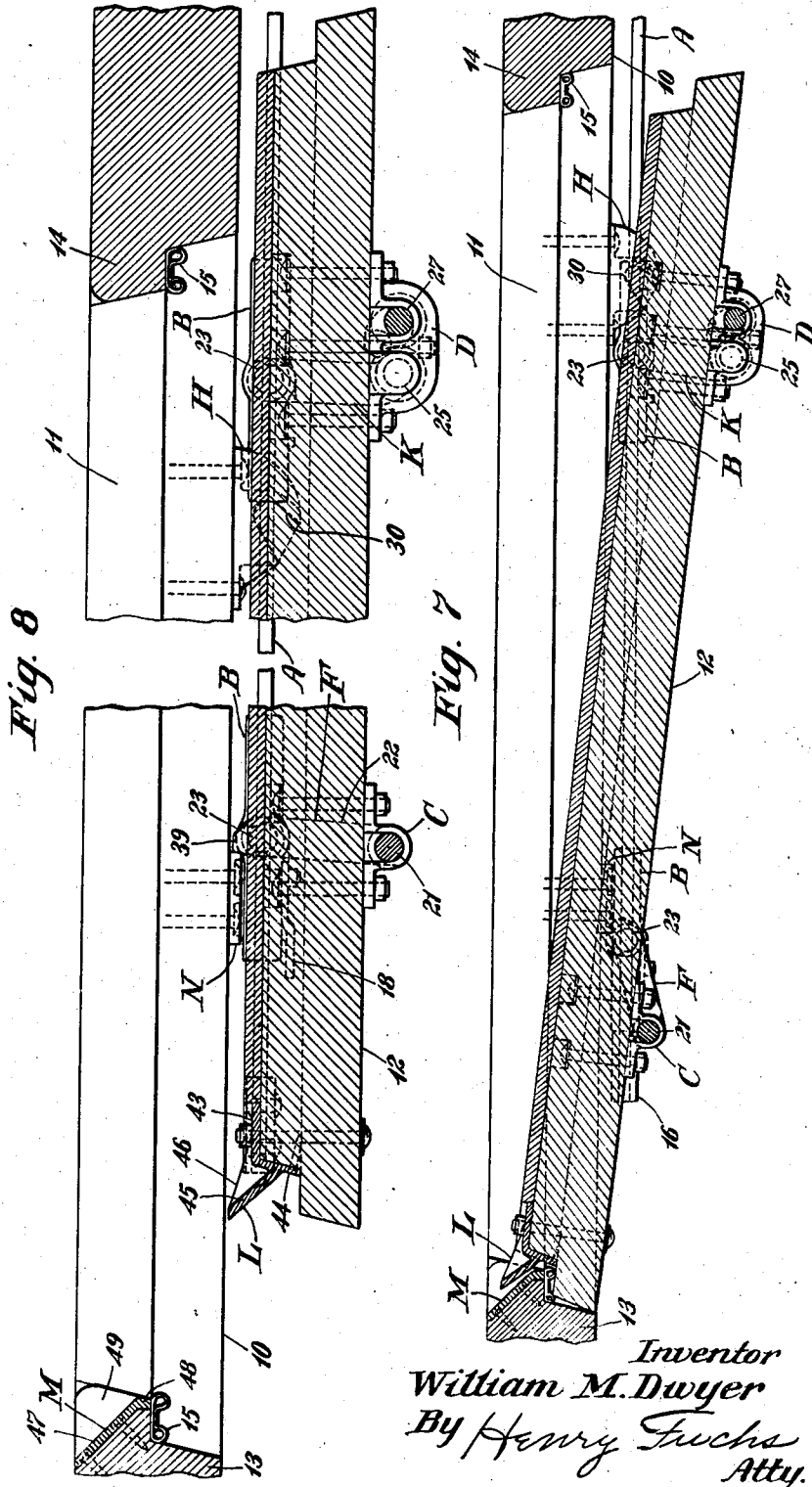
W. M. DWYER

2,160,844

REFRIGERATOR CAR DOOR

Filed Jan. 17, 1938

5 Sheets-Sheet 5



UNITED STATES PATENT OFFICE

2,160,844

REFRIGERATOR CAR DOOR

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Application January 17, 1938, Serial No. 185,305

14 Claims. (Cl. 20—23)

This invention relates to improvements in refrigerator car doors and more particularly to doors of the sliding type.

One object of the invention is to provide a door construction for refrigerator cars comprising a sliding door member for closing the door opening having means associated therewith for supporting the door, wherein the leading end of the door is automatically moved into the door opening through sliding movement of the door.

Another object of the invention is to provide in a door construction as specified in the preceding paragraph manually operated crank members connected to the door and the supporting means for moving the rear end of the door into the opening after the leading end has been guided into said opening.

A still further object of the invention is to provide in a sliding door construction of the character described interengageable separable hinge means on the car and leading end of the door, automatically operated means for moving the front end of the door into the door opening while the same is being slid into position into registration with the door opening and engaging the hinge means of the door with the cooperating hinge means on the car, and manually operated means for moving the rear end of the door into the door opening and swinging the same on the hinge means to force the door tightly closed.

Yet another object of the invention is to provide in connection with a door structure as specified in the preceding paragraph manually operated means for positively forcing the leading end of the door out of the door opening after the rear end thereof has been forced out of said opening.

A more specific object of the invention is to provide a sliding door structure for refrigerator cars comprising sliding carriers mounted on the car wall; rotary crank arm swingingly mounted on the opposite ends of the door and carriers for supporting the door and guiding the same into the door opening; projecting lugs on the leading end of the door cooperating with cam means on the door and forming with the latter separable hinge means on which the door is swung toward and away from the door opening; cooperating cam elements on the car and one of the supporting crank arms at the leading end of the door to swing said arms in one direction as the door is slid to closed position to move the front end of the door into the door opening and engage the lugs with the cam means to

hinge the front end of the door for swinging movement; manually controlled means for positively swinging the last named crank arms in a reverse direction to disengage the lugs from the cam means and move the front end of the door out of the door opening; a manually actuated rotary operating bar at the rear end of the door for swinging the crank arms at said end in reverse directions to move the same toward and away from the door opening to partly closed and partly open positions; and keeper engaging crank means on said door engageable with keepers on the car for respectively forcing said door tightly closed from said partly closed position and prying the same partly open during rotation of said bar in said reverse directions.

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 broken elevational view of one of the side walls of a refrigerator car and the sliding door for closing the usual door opening, illustrating my improvements in connection therewith. Figure 2 is a broken elevational view of the side wall and sliding door illustrated in Figure 1, showing the door slid to fully open position. Figure 3 is a rear elevational view of a portion of the door structure shown in Figure 1, on an enlarged scale, illustrating in detail one set of separable cooperating hinge actuating cam members. Figure 4 is a horizontal sectional view, on an enlarged scale, corresponding substantially to the line 4—4 of Figure 2. Figure 5 is a broken horizontal sectional view, on an enlarged scale, corresponding substantially to the line 5—5 of Figure 1. Figure 6 is a horizontal sectional view, similar to Figure 5, on a slightly reduced scale, showing the door in partly open position. Figure 7 is a view similar to Figure 6, showing the door opened to a greater extent than shown in Figure 6. Figure 8 is a view similar to Figure 5 showing the door disposed in front of the door opening in the position assumed when withdrawn from within said opening. Figure 9 is an enlarged horizontal sectional view, corresponding substantially to the line 9—9 of Figure 1.

In said drawings, 10 indicates the side wall of the car which is provided with the usual door opening 11 closed by a single sliding door 12. The door 12 is slidable lengthwise of the car and is displaceable laterally to either move the door into or withdraw the same from the door opening 11. The frame of the door opening may be of any

well-known construction, and is provided with the usual door jams 13 and 14 at the front and rear ends of said opening. As shown, the cooperating engaging faces of the door and walls of the door opening are stepped and beveled in a well-known manner and the usual insulating packing material, indicated by 15, is employed to seal the joint between the door and the walls of the door opening.

My improvements comprise broadly top and bottom tracks A—A; carriers B—B cooperating with the bottom track; a pair of top and bottom journal brackets C—C on the front end portion of the door; a pair of top and bottom combined bearing brackets and housings D—D on the rear end portion of the door; an operating bar E at the front end of the door; supporting crank members F—F on the bar E and connected to the front carrier B and the top track A; a locking bar G journaled in the brackets D—D and having keeper engaging crank members thereon; top and bottom keepers H—H on the car wall above and below the door opening engageable by said crank members; top and bottom supporting crank members K—K journaled in the brackets D—D geared to the bar G and swingingly connected at their outer ends to the rear carrier B and the upper track A; two sets of cooperating cam members L—M and L—M on the door and frame of the door opening; a combined stop and cam plate N on the car wall below the door opening; an operating lever P on the bar E; an operating lever R on the bar G; a combined bearing and locking bracket S bracing the bar E between its ends; a bearing bracket T bracing the bar G between its ends; and a latch member W for the lever R.

The tracks A—A are arranged respectively above and below the door opening, extend lengthwise of the car, and are fixed to the side wall in any well-known manner. The top track A is preferably of inverted trough-shaped form in cross section having the opening thereof directed downwardly, and the lower track A is in the form of a rail or bar. The structure of the tracks A—A is well known in this art, and therefore no further detailed description thereof is needed. Adjacent the front end of the door opening, each track is provided with a stop block 16 of well-known design. These stop blocks serve to limit sliding movement of the door 12 as the door is moved in front of the door opening 11.

The carriers B—B are in the form of slides supported on the lower track by the usual anti-friction rollers which ride on the track and are suitably journaled in the carriers. The front carrier B supports a locking dog 18 adapted to lock the carrier in the position shown in Figure 2, the track A being provided with a lateral stop projection 19 with which the tooth 20 of the dog 18 is adapted to engage. As shown in Figures 1 and 2, the dog 18 is pivotally supported on the front carrier B being swingingly mounted on a laterally extending pivot pin 41 at the outer side of said carrier. This pivot is located inwardly of the tooth 20 of the dog. The dog is extended outwardly beyond the tooth and has a hook 121 at the outer end thereof whereby it may be manipulated to disengage the tooth thereof from the stop projection 19. When the door is pushed open, the tooth of the dog cams over the stop projection 19 and engages in back of the same, as clearly shown in Figure 2.

The operating bar E is vertically disposed and

mounted inwardly of the front or leading end of the door, as clearly shown in Figures 1 and 2, and has the supporting crank members F—F at the top and bottom ends thereof. The crank members F—F are in the form of end members riveted or otherwise secured to the top and bottom ends of said bar. Each crank member F has a vertically disposed shaftlike section 21 journaled in the corresponding bearing bracket C. The shaftlike portions 21—21 of the top and bottom crank members F—F thus support the bar E for rotary movement.

At the outer end of the shaftlike section 21 of each crank member F a radially extending arm 22 is provided which has a crank pin 23 at the outer end, the crank pin of the bottom crank member being journaled in the front carrier B to provide for swinging movement of the crank member with respect to said carrier. The crank member F at the top of the bar E has a roller 24 journaled on the crank pin 23 thereof, the roller being guided in the troughlike way of the upper track A. As will be evident, the front end of the door 12 is thus swingingly supported on the tracks by the crank members F—F and guided into the door opening by said crank members in their swinging movement.

The supporting crank members K—K which are arranged at the rear end of the door to swingingly support and guide the same are similar to the crank members F—F, except as hereinafter pointed out. Each crank member K has a radial arm provided with a crank pin at the outer end thereof similar to the arm 22 and the crank pin 23 of the crank member F, and also indicated respectively by 22 and 23. The crank pin 23 of the top crank member K is also provided with a roller 24 which is guided in the trough of the top track A. The crank pin 23 of the bottom crank member K is journaled in the rear carrier B. At the inner end of the crank arm 22, each crank member K is provided with a cylindrical, vertically disposed shaft section 25, which is suitably journaled in the corresponding bearing housing D. As will be evident, the top and bottom crank members K—K swingingly support and guide the rear end portion of the door 12.

The operating bar G is vertically disposed and mounted on the door inwardly of the rear end thereof. The bar G has end members 26—26 secured to the top and bottom thereof. Each end member 26 comprises a cylindrical shaftlike section 27 having a radially extending, relatively short crank arm 28 at the outer end thereof, said crank arm being provided with a cylindrical pin 29 at its end, which pin is engageable with the corresponding keeper H. The cylindrical shaftlike sections 27—27 are journaled in bearing openings in the brackets D—D laterally offset with respect to the bearings of the shaftlike sections 25—25 of the crank members K—K, as shown in Figure 1. The shaftlike sections 27—27 thus support the bar G for rotation on a vertical axis. Each shaftlike section 27 is suitably geared to the shaftlike section 25 of the corresponding supporting crank member K to transmit intermittent motion to the latter so that rotation of the bar G is intermittently transmitted. The arrangement is such that when the bar G is rotated in either direction the crank members K—K remain idle while the keeper engaging crank members of the bar G are cooperating with the keepers H—H, and are actuated when the keeper engaging crank members are

out of engagement with the keepers. In other words, the intermittent drive is so designed that rotary movements of the crank members K—K and the keeper engaging crank members of the bar G are synchronized in such a manner that, in opening the door, the keeper engaging members first free the door from the door opening, and movement of the rear end of the door out of said door opening is completed by actuation of the crank members K—K, and that in closing the door the same is moved inwardly toward the door opening by the crank members K—K until the keeper engaging members are engaged with the keepers, and is then forced tightly closed by the keeper engaging members cooperating with the keepers. The particular form of drive gearing employed for this synchronizing action of the crank members K—K and the keeper engaging members of the bar G may be of any well-known design and forms a part of the present invention only insofar as it cooperates with the other elements of the door opening and closing mechanism, and is preferably of the specific form shown in Serial No. 139,911, filed April 30, 1937, by William A. Heitner. This drive gearing is of the form shown in Figure 9. As shown in said figure, interengaging gear elements 50 and 51 are fixed to the shaft section 25 of the crank member K and the end member 26 of the operating bar G, respectively. The gear element 51 is provided with a set of interrupted teeth and an outwardly curved guide portion 53 for a purpose hereinafter described. As shown, there are three teeth in the set. Two of these teeth, as indicated by 54—54, are of the usual type employed in spur gears. The third tooth, which is indicated by 55, is slightly bent away from the adjacent tooth 54 at its outer end, thus forming, in effect, a hook-shaped tooth member. The curved guide portion 53 of the gear element 51 is of smaller radius near the tooth 55 than at a distance remote from said tooth and terminates in a relatively sharply curved portion adjacent said tooth, as indicated at 56, thereby forming a relatively deep recess 57. The curved portion 56 forms a cam member which cooperates with one of the teeth of the cooperating gear element 50. The opposite end of the curved guide portion 53 terminates short of the end tooth 54, thus providing a recess 58 adjacent said tooth.

The gear element 50 is provided with a set of interrupted teeth adapted to mesh with the interrupted teeth of the gear element 51. The interrupted set of teeth of the gear element 50 preferably comprises three teeth 59—59—59 of the usual type employed in spur gears and a partial tooth 60. Adjacent the partial tooth 60, the gear element 50 is provided with an inwardly curved seat 61 which merges with the partial tooth 60 and is arranged to cooperate with the outwardly curved guide portion 53 and the cam member 56 of the cooperating gear element 51. The contour of the curve of the wall of the seat 61 is such that this curved wall constantly registers with the cooperating guide portion 53 and the cam member 56 during relative movement of the gear elements 51 and 50 while the teeth of the gears are not operative. These contours of the surfaces 53, 56, and 60 provide for the required differential movement between the keeper and engaging bar G and the cooperating crank member K, as the door is being moved inwardly or outwardly of the door opening while the keeper engaging crank end of the bar G is

in operative engagement with the keeper H and is being engaged with or disengaged from the keeper.

In the closed position of the door, as shown in Figures 1, 5, and 9, the keeper engaging crank end 29 of the bar G is tightly wedged into the keeper H and the curved guide portion 53 of the gear 51 is in cooperative engagement with the seat 60 of the adjacent gear element 50.

The keepers H—H with which the keeper engaging members of the bar G cooperate are of well-known design, being in the form of castings fixed to the car wall above and below the door opening 11 and having camways or slots 30—30 therein, with which the crank pins 29—29 of the keeper engaging members engage.

The operating lever R serves as means for effecting rotation of the bar G and is pivoted thereto, as indicated at 40, so that the lever may be either dropped to pendant position parallel to the bar G or raised to horizontal position at right angles to said bar.

The latch member W is of the type commonly employed to lock the operating handle of a locking bar in horizontal position, and, as shown in Figure 1, serves to lock the lever R in such a manner as to prevent rotation of the bar G, thereby locking the door tightly closed. This latch is adapted to receive the usual car seal, as is well known in this art.

The bearing bracket T, which braces the bar G between its ends, is fixed to the door and is in the form of a strap in which said bar is freely rotatable.

The operating lever P serves as means for effecting rotation of the bar E and is pivoted thereto, as indicated at 31, so that the lever may be dropped to pendant position, as shown in Figures 1 and 2, or raised to horizontal position at right angles to the bar E. As shown most clearly in Figure 2, the lever P is provided with a hand grip portion 32 at the outer end thereof which is laterally offset with respect to the main body portion of said lever.

The bearing bracket S is secured to the door and braces the bar E between the ends thereof and forms a bearing for said bar. The bracket S, as most clearly shown in Figure 4, is in the form of a casting having lugs 33—33 at opposite sides thereof by which it is fixed to the door, securing bolts extending through these lugs and the door being preferably employed for this purpose. The casting S has an enlarged, outwardly projecting portion between the ends thereof provided with a vertical bearing opening 34. The bearing opening 34 is of partly cylindrical shape and of a diameter to rotatably accommodate the rectangular cross sectional bar E. At the forward side of the casting, the opening 34 is restricted by an inwardly projecting portion having flat stop faces 36 and 37 at right angles to each other to limit rotation of the bar E. The stop faces 36 and 37 are so spaced with respect to the circumference of the cylindrical opening 34 that rotation of the bar E is limited to 90°. At the outer side, the bearing bracket casting S is provided with a projecting locking lug 38 in back of which the shank of the handle lever P is adapted to engage when said lever is dropped to its pendant position and the bar E is in the position shown in Figure 4. As will be evident, when the handle lever P is engaged in back of the lug 38, as shown in Figure 4, the bar E is held against rotation in both directions, the lug 38 preventing rotation in one direction and rota-

tion in a reverse direction being prevented by shouldered engagement of the bar E with the stop face 36 of the bracket S.

The combined stop and cam plate N is in the form of a casting and is fixed to the wall of the car immediately below the door opening, as most clearly shown in Figures 1, 5, and 8. A radially projecting cam lug 39 is provided on the lower crank member F and, in effect, forms an extension of the arm 22 of said crank member outwardly beyond the crank pin 23 of said arm. The lug 39 is of the shape most clearly shown in Figure 5 and is positioned to engage the cam plate N when the door is being slid along the tracks toward its closed position. After the lug 39 becomes engaged with the cam plate N further sliding movement of the door in closing direction causes the lug to fulcrum on the cam plate, thereby effecting rotation of the lower crank member F and rotation of the bar E and the upper crank member F in unison therewith.

The cam members L—L are two in number, as shown in Figure 1, and are secured to the door 12 at the front or left hand end thereof. The cam members L cooperate with the cam members M, which are fixed to the door jamb 13. Although two sets of cam members are shown in the drawings, it will be evident that a greater or lesser number may be employed as conditions require.

As shown in Figures 3, 5, 6, 7, and 8, each cam member L is in the form of a casting secured to the inner side of the door adjacent the front end thereof. The member L includes a base portion comprising two flanges 43 and 44 at an angle to each other and respectively overlying the rear face of the door and the adjacent beveled face of the end edge of said door. The member L further includes an inwardly curved cam portion 45 which forms a continuation of the flange 43 and projects outwardly beyond the flange 44 and the rear portion of the front edge of the door 12. The flange 43 and the cam portion 45 are suitably reinforced by top and bottom ribs or webs 46—46, as clearly shown in Figure 3.

Each cam member M is in the form of a plate of the vertical cross section shown in Figures 5, 6, 7, and 8, having a substantially flat section 47 at an inclination to the plane of the car wall, and a lip 48 overhanging the side face of the jamb 13. As shown in Figures 5, 6, 7, and 8, the door jamb 13 is suitably recessed, as indicated at 49, to accommodate the cam member M. The cam member M is fixed in said recess by means of screws or other suitable securing elements engaged through the section 47 and extending into the door jamb.

The operation of my improved door mechanism is as follows: Assuming the door to be closed, as shown in Figures 1 and 5 with the lever P in pendant position and the lever R of the bar G locked and sealed by the latch means W, the lever R after being unlocked by disengaging the latch means W therefrom is swung from left to right through an arc of 180°, thereby imparting rotation to the same extent to the bar G and the keeper engaging crank arms 28—28. The crank pins 29—29 being engaged within the cam slots 30—30 of the keepers H—H, rotation of the crank arms effects cramping action in said slots, thereby prying the rear end of the door out of the door opening with great force, swinging the door from the position shown in Figures 1 and 5 to that shown in Figure 7. In thus being moved, the door swings about its front edge by rocking sliding movement of the cam members L—L of

the door on the fixed cam members M—M on the door jamb, the cam members L and M of each set acting as separable hinge members. During operation of the keeper engaging crank members in moving the door from the position shown in Figure 5 to that shown in Figure 6, the operating bar is rotated through an angle of slightly more than 90°. As will be evident, upon reference to Figure 6, when the door has been thus far opened, the crank pins 29—29 of the bar G are so positioned that they clear the ends of the outer walls of the slots 30—30 of the keepers H—H to permit further outward movement of the rear end of the door. Upon further continued rotation of the bar, the teeth of the gears 50 and 51 come into mesh, thus rendering the intermittent gearing operative to rotate the crank members K—K, thereby swinging these members on their pivotal connections with the rear carrier B and the top track A, and effecting further outward movement of the rear end of the door from the position shown in Figure 6 to that shown in Figure 7. When the door reaches the position shown in Figure 7, the bar G has completed its rotation of 180° and the door is disposed at an angle to the car wall, with the cam members L and L still overhanging and engaged with the cam members M and M.

To further open the door and completely withdraw the same from the door opening, the operating bar E is rotated. To actuate the bar E, the handle lever P is first raised to horizontal position and then swung from left to right, as viewed in Figure 1. Rotation of this bar effects rotation of the crank members F—F thereof, thereby moving the door from the position shown in Figure 7 to that shown in Figure 8. Rotation of the bar E is limited to 90°, said rotation being positively stopped when this limit is reached by engagement of the side face of the bar with the shoulder 36 of the bracket S, as shown in Figure 4. The handle lever P is then dropped to pendant position into engagement with the lug 38 of the bracket S, thereby locking the bar E against rotation in either direction. As shown in Figure 8, the door is entirely clear of the side wall of the car and may be slid to the right, as shown in Figure 1. The operator then pushes the door from the position shown in Figure 1 to that shown in Figure 2 to completely clear the door opening. When the door reaches the position shown in Figure 2, the gravity actuated latch dog 18 locks the door against accidental sliding movement by engagement of the tooth 20 with the stop projection 19 of the lower track A.

In closing the door, the operator slides the same in front of the door opening until the cam lug 39 on the arm 22 of the lower crank member F comes into engagement with the cam plate N. The lever P is then swung outwardly out of engagement with the locking lug 38 of the bracket S to free the bar E for rotation. The door 12 is then pushed further toward its closed position, thereby causing the cam lug 39 to fulcrum on the end of the plate N as hereinbefore described, effecting swinging movement of the crank arms F—F to move the door to the position shown in Figure 7. The combined sliding and inward swinging movement of the door effects interengagement of the cam members L and M to form hinge means for the front end of the door on which it may swing. The bar G is now operated to rotate the crank members K—K through the connecting intermittent drive gearing, thereby swinging these crank members with respect to

the tracks A—A, the bar being rotated in a direction reverse to the direction of rotation thereof during opening movements of the door. The rear end of the door is thus swung inwardly from the position shown in Figure 7 to that shown in Figure 6, bringing the keeper engaging crank pins 29—29 of the bar G into registration with the entrances to the slots 30—30 of the keepers H—H. When the parts have reached the position shown in Figure 6, the intermittent driving connection between the bar G and the crank members permits idling of the crank members K—K while further rotation of the bar G effects rotation of the keeper engaging crank members of said bar with the crank pins 29—29 of these members engaged in the slots 30—30 of the keepers H—H to cam the door inwardly from the position shown in Figure 6 to the position shown in Figures 1 and 5. The door is thus forced tightly closed. The operating handle lever R is then latched and sealed by the locking member W to lock the door in closed position.

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 door construction for refrigerator cars having a wall member provided with a door opening, the combination with a door adapted to close said opening; of guide means on said car extending lengthwise of the same; a rotary operating bar on said door; means actuated by said bar when rotated in one direction for moving said door out of the door opening; and means automatically actuated by sliding movement of the door along said guide means for rotating said bar in a reverse direction for forcing said door into the door opening.

2. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a sliding door adapted to close said opening; of manually actuated means for moving the door laterally out of the door opening; and means rendered operative by sliding closing movement of said door for actuating said manually actuated means for forcing the door laterally into the door opening.

3. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a sliding door adapted to close said opening; of a manually operated member carried by the door for moving said door laterally out of the door opening; and cam means actuated through sliding movement of the door in closing direction for actuating said member for moving the door into said opening.

4. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a sliding door adapted to close said opening; of cooperating separable cam acting hinge members on said car and one end of the door; arms for swingingly supporting the corresponding end of the door; and means engaged by said arms during sliding closing movement of the door for actuating said arms to move said end of the door into the door opening and wedging said cam acting members together.

5. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a sliding door adapted to close said opening; of cooperating separable

cam acting hinge members on said car and one end of the door; manually operated door supporting crank members rotatably mounted on the corresponding end of the door for moving said end of the door out of the door opening; fixed means on the car engageable by means on one of said crank members, by sliding movement of the door to closed position, for actuating said crank members to move said end of the door into the door opening and wedging said cam acting members together; and manually actuated means at the other end of the door for either moving said last named end into the door opening and wedging the door tightly closed or prying said last named end free of and withdrawing the same from said opening.

6. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a door adapted to close said opening; of separable cooperating hinge means on the car and one end of the door; crank arms for supporting and guiding said door for lateral movement toward and away from the door opening; means slidable lengthwise of the door on which said crank arms are supported for swinging movement; fixed cam means on the car; and cooperating cam means on one of said supporting crank arms engageable with said fixed cam means during sliding movement of said door for swinging said last named arm to move the door into said door opening and engage the separable parts of said hinge means with each other.

7. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a door adapted to close said opening; of cooperating separable hinge members on the leading end of the door and the car wall; tracks extending lengthwise of the car; carriers slidable on said tracks; top and bottom crank arms rotatably mounted on the door having their outer ends swingingly supported on said carriers; a rotary bar fixed to the inner ends of said crank arms and rotatable with said arms; a block fixed on the car; a lug on one of said crank arms, engageable with the block in sliding movement of said door to rotate said crank arms and bar and move the leading end of the door into the door opening and interengage said separable hinge members; and means for forcing the other end of the door into said door opening.

8. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a door for closing said opening; of a rotary operating bar mounted on one end of the door; crank arms projecting from opposite ends of said bar; means slidable lengthwise of the car on which the outer ends of said crank arms are journaled for swinging movement; a radial lug on said bar; a fixed projection on the car engageable by said lug in sliding movement of the door for rotating said bar and thereby swinging said arms to move the door laterally into said door opening; and hinge members comprising elements on the car and door respectively, said elements being separable and interengaged with each other by movement of said door into the opening to form complete hinge members to swingingly support the door on the car wall.

9. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a door adapted to close said opening; of cam projections at one end of the door; cooperating fixed cam members on the car in back of which said cam projections are engageable; a vertically disposed rotary operat-

- ing bar on said end of the door; crank arms on said bar; slidable supporting means on the car in which the outer ends of said arms are rotatably journaled; a fixed lug on the car; a cam finger on said bar engageable with said lug to effect rotation of said bar in one direction when the door is slid to closed position; and an operating handle lever on said bar for rotating the same in reverse direction.
- 10 10. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a door adapted to close said opening; of a pair of vertically disposed rotary operating bars at opposite ends of the door, one of said bars having keeper engaging means at the top and bottom ends thereof; fixed keepers on the car wall with which said means is engageable to force the door tightly closed and pry the same partly open; top and bottom crank members journaled on said door at opposite ends thereof, the crank members at one end of the door being fixed to one of said operating bars; gear means operatively connecting the crank members at the other end of the door to the other operating bar; and sliding carriers on which the outer ends of said crank members are journaled.
11. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a door adapted to close said opening; of crank arms at opposite ends of the door for swinging and guiding said door into the door opening; operating means at each end of the door for rotating the corresponding crank arms, one of said means including a vertically disposed rotary operating bar fixed to the crank arms which are located at one end of the door, and the other of said means including a vertically disposed rotary operating bar having keeper engaging crank members at opposite ends thereof, and intermittently acting power transmitting gear means operatively connecting the last named bar to the corresponding crank arms; and fixed keepers on the car wall with which said keeper engaging crank members cooperate.
12. In a door construction for refrigerator cars

having a wall member provided with a door opening, the combination with a sliding door adapted to close said opening; of guides on said car extending lengthwise of the same and on which said door is slidable toward and away from the door opening; latch means for holding said door open; means actuated in one direction by sliding movement of the door for forcing the leading end of the door into the door opening; and manually operated means for actuating said first named means for moving said end of the door out of the door opening.

13. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a door adapted to close said opening; of movable means at opposite ends of the door for supporting and guiding the door for movement lengthwise of the car and laterally toward and away from the door opening; cooperating cam members on one end of the door and on the inner side of the car wall at said door opening; keeper means on the car; and a cam acting rotary locking bar on the other end of the door, said locking bar being geared to the movable means at the corresponding end of the door for actuating said movable means, said locking bar cooperating with the keepers for either forcing the door tightly closed and wedging said cam means together or prying the door partly open and move said cam means apart.

14. In a door construction for refrigerator cars having a wall member provided with a door opening, the combination with a sliding door for closing said opening; of means for guiding said door laterally into the door opening while said door is slid along said guide means; and hinge means at one end of the door comprising cooperable separable hinge elements respectively on said door and the inner side of the door jamb, said hinge elements including interengageable cam plates inclined with respect to the length of the door, one of said cam plates presenting a flat face and the other a slightly curved face.

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