Aug. 28, 1951 S. B. HASELTINE 2,565,657

COMBINED LATCH AND ACTUATING MEANS FOR SUPPORTING CRANK MEMBERS OF SLIDING DOORS

Filed July 5, 1947 3 Sheets-Sheet 1

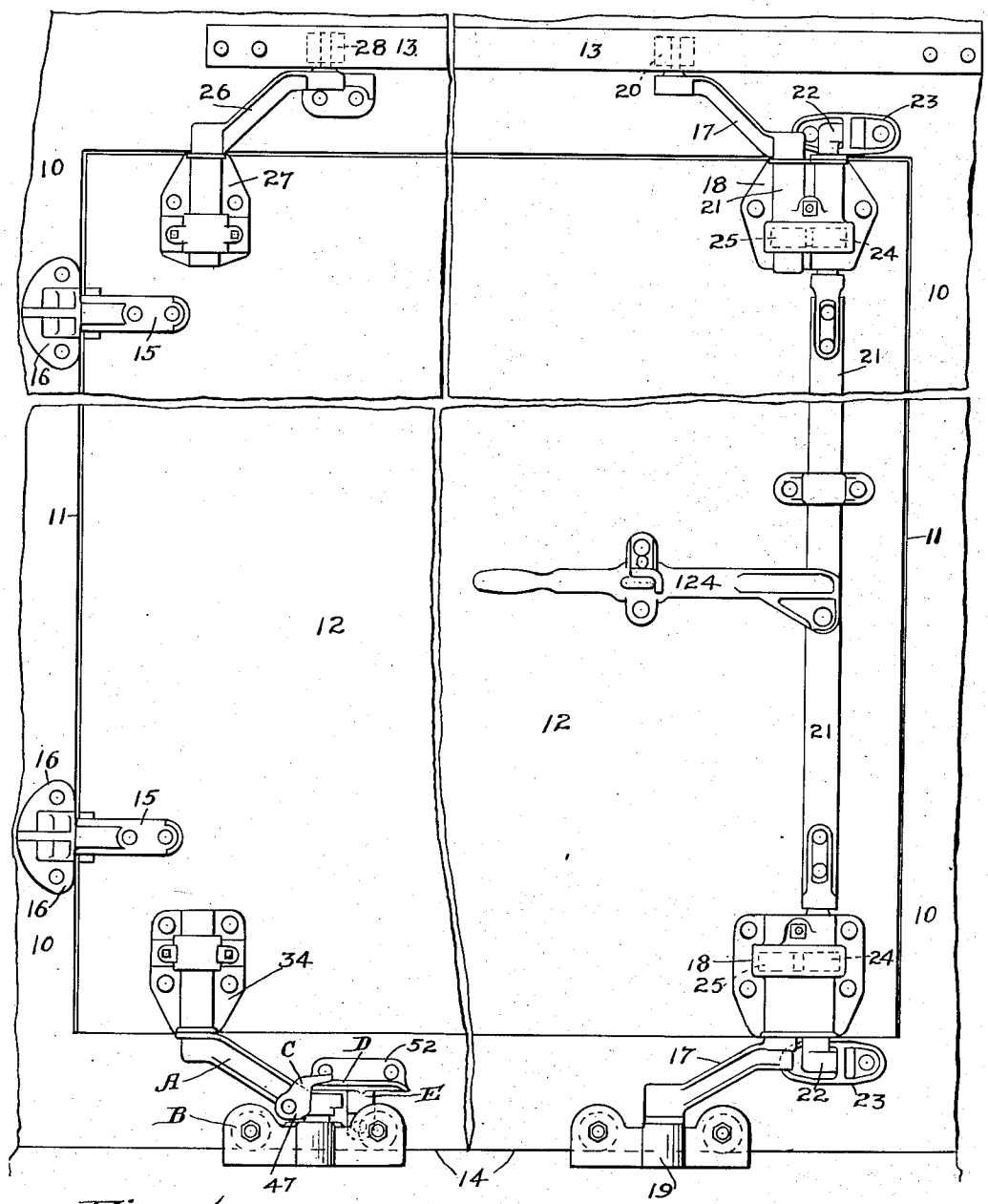

Fig. 1

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Filed July 5, 1947 3 Sheets-Sheet 2

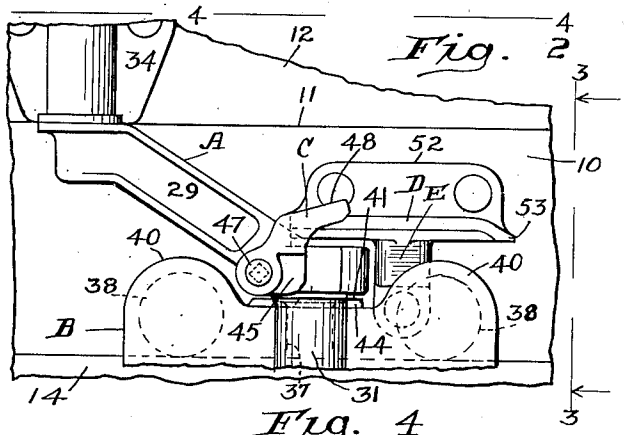


Fig. 2

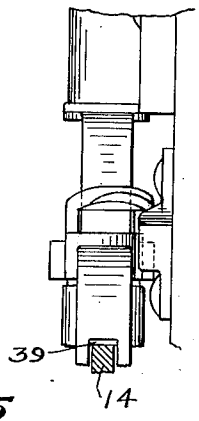


Fig. 3

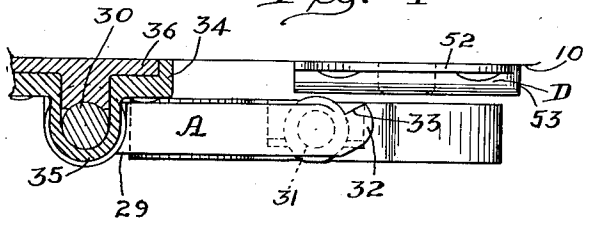


Fig. 4

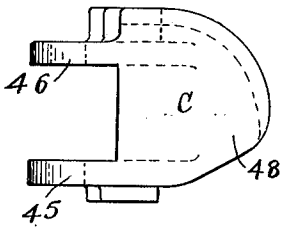


Fig. 5

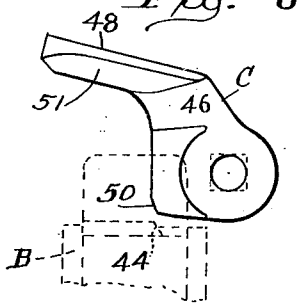


Fig. 8

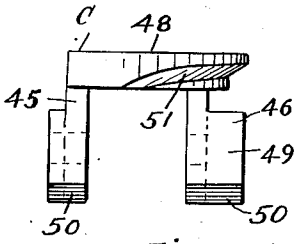


Fig. 6

Fig. 7

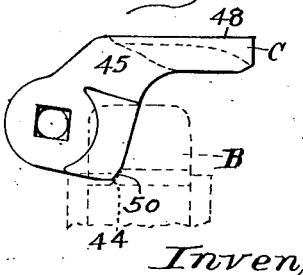


Fig. 9

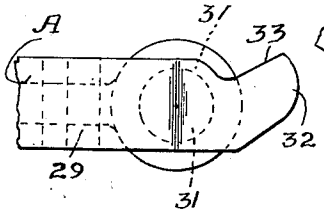
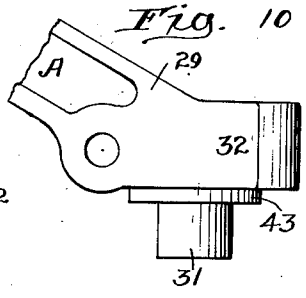


Fig. 10



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Filed July 5, 1947 3 Sheets-Sheet 3

Fig. 11

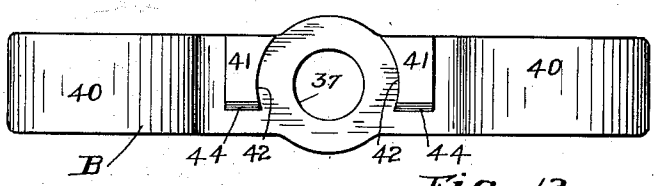


Fig. 12

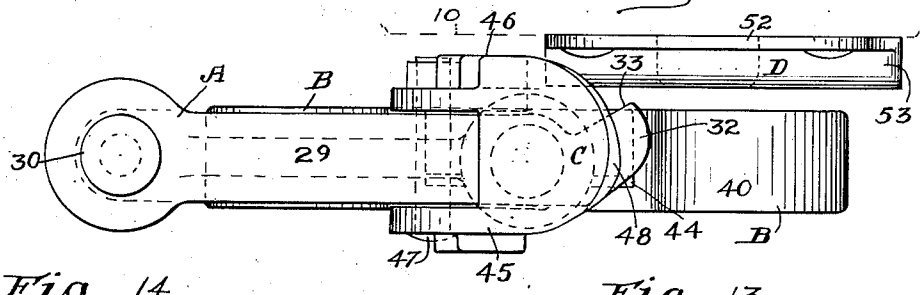


Fig. 14

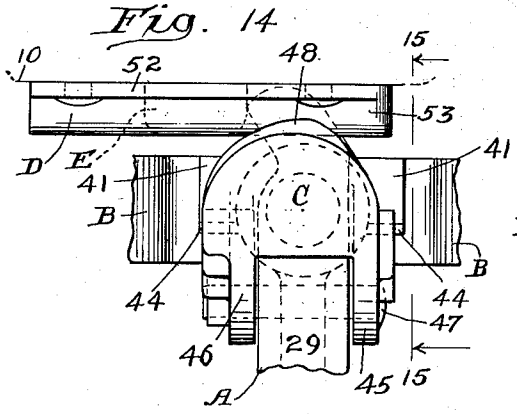


Fig. 13

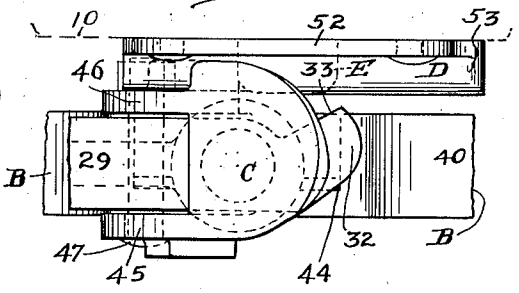
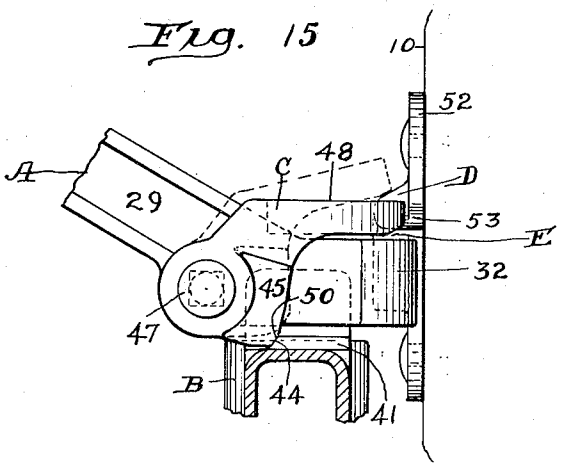


Fig. 15



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COMBINED LATCH AND ACTUATING MEANS FOR SUPPORTING CRANK MEMBERS OF SLIDING DOORS

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Application July 5, 1947, Serial No. 759,162

5 Claims. (Cl. 20—23)

1

This invention relates to improvements in combined latch and actuating means for throwout crank arms of sliding doors for railway cars.

One object of the invention is to provide an automatic latch means for locking the throwout crank members or arms of sliding doors in extended condition to maintain the doors in spaced relation to the wall of the car and position the same for sliding movement along the car wall, wherein the latch means is actuated through sliding movement of the door to throw it into and out of latching position.

A further object of the invention is to provide an automatic latch means, as set forth in the preceding paragraph, having mechanism combined therewith for initiating movement of the door out of the door opening.

Other objects of the invention will more clearly appear from the description and claims hereinafter following.

In the accompanying drawings forming a part of this specification, Figure 1 is an elevational view of a portion of the side wall of a railway car provided with a door opening, closed by a sliding door, illustrating my improvements in connection therewith. Figure 2 is an elevational view, on an enlarged scale, of the mechanism at the lower left hand corner portion of the door shown in Figure 1. Figure 3 is a broken, vertical sectional view, corresponding substantially to the line 3—3 of Figure 2. Figure 4 is a horizontal sectional view, corresponding substantially to the line 4—4 of Figure 2 with the latch member omitted. Figure 5 is a top plan view of the pivoted latch member of my improved mechanism. Figure 6 is an elevational view of the latch member shown in Figure 5, looking from right to left in said figure. Figure 7 is a front elevational view of the latch member shown in Figure 2, illustrating the same in locking position, the cooperating sliding carrier for the door supporting crank member being indicated in dotted lines. Figure 8 is a rear elevational view of the latch member shown in Figure 7, illustrating the same in raised or unlocked position, the cooperating sliding carrier being indicated in dotted lines. Figure 9 is a top plan view of the inner end portion of the door supporting crank member or arm of my improved mechanism. Figure 10 is an elevational view looking upwardly in Figure 9. Figure 11 is a top plan view of the sliding carrier for the door supporting crank member or arm of my improved mechanism. Figure 12 is a view, similar to Figure 4, on a still further enlarged scale, the supporting bearing bracket for the door supporting crank member being omitted and the side wall of the car being indicated by a dotted line. Figure 13 is a view, similar to Figure 12, partly broken away, and showing the parts in different positions, the same being shown in the positions assumed when the door has been slid a short distance to the right or in opening direction. Figure 14 is a view, similar to Figure 12, showing the parts in the positions assumed when the door has been slid to the right beyond the position shown in Figure 13. Figure 15 is a vertical sectional view, corresponding substantially to the line 15—15 of Figure 14, illustrating the locked position of the latch member in full lines and the unlocked position of the same in dotted lines.

2

In said drawings, 10 indicates the side wall of a car, which is provided with a door opening 11, closed by a single sliding door 12. The door 12 is slidable along the top and bottom tracks 13 and 14. At the forward or left hand end, as seen in Figure 1, the door is provided with the usual projecting cam lugs 15—15 which are engageable with keepers 16—16 for camming the forward end of the door closed. The rear or right hand end of the door is supported by top and bottom swinging crank members 17—17 of the usual well-known design, the same being swingingly supported at their inner ends on the door 12 by bearing brackets 18—18 and swingingly connected at their outer ends to the top and bottom tracks 13 and 14, the crank member or arm 17 at the lower side of the door having its outer end journaled in a carrier 19 of well-known design, which is slidable on the lower track, and the top crank member or arm 17 having its outer end journaled in a roller 20, which is guided in the upper track, which is of channel-shaped cross section. The rear end of the door is movable inwardly and outwardly of the door opening, being provided with manually actuated operating means for positively swinging the crank arms 17—17. This operating means is well known in this art, and includes a rotary bar 21 journaled at its upper and lower ends in top and bottom bearing brackets 18—18 and having keeper engaging cam members 22—22 at its extremities, which are engageable with keepers 23—23 to force the rear end of the door tightly closed or to pry the same open, and interrupted interengaging gears 24 and 25, indicated in dotted lines in Figure 1, on the bar 21 and the crank members 17—17 to produce swinging movement of these crank members through an angle of approximately 90 degrees during rotation of the operating bar 21 through an angle of approximately 180 degrees. The bar 21 is

rotated by the usual lever 124, which is pivotally connected to the same so that it may be dropped to pendant position when the door has been moved laterally out of the door opening. The front or left hand end of the door 12, as seen in Figure 1, is provided with an upper crank arm 26 of well-known design, journaled at its inner end in a supporting bracket 27, fixed to the door, and having a roller 28 at its outer end similar to the roller 20 of the upper crank arm 17 and also slidably guided in the channel-shaped upper track 13.

In carrying out my invention, I provide broadly a lower supporting crank member or arm A at the front end of the door, which is vertically aligned with the corresponding upper crank member or arm, a carrier B slidable on the lower track 14, a pivoted latch member C, a fixed cam track D cooperating with the latch member C, and a depending cam lug E on the track D for effecting in and out movement of the crank member A.

The door supporting crank member A comprises an arm 29 of the general shape shown in Figures 1 and 2, a cylindrical shaft portion 30 upstanding from one end of the arm, that is, the outer end, and a depending cylindrical bearing projection 31 at the other or inner end of the arm. The end of the arm 29, which carries the bearing projection 31, is provided with an outwardly projecting finger or lug 32, which has a flat face 33 on the inner side, which face is radial to the axis of rotation of the bearing projection 31. The shaft portion 30 is rotatably journaled in a bearing bracket 34, secured to the door at the lower left hand corner portion thereof. The bearing bracket 34 is of well-known design, being of two piece construction, comprising front and back plates 35 and 36. The depending bearing projection 31 is journaled in a bearing opening 37 provided in the carrier B, the latter being in the form of a block having the usual rollers 38—38 which travel on the track 14, the block being slotted at its underneath side, as indicated at 39, to accommodate the upper portion of the track.

The blocklike carrier B has raised sections 40—40 at opposite ends thereof in which the rollers 38—38 are accommodated. The depression between the raised sections 40—40 accommodates the arm 29 of the crank member A for swinging movement on its bearing projection, which, as hereinbefore pointed out, is journaled in the bearing opening 37 of the carrier. At the opposite sides of the bearing opening 37, upstanding, transverse stop lugs 41—41 are provided, which extend partly across the carrier, as shown most clearly in Figures 11 and 15, these lugs being cut out on their inner sides to provide arcuate bearing seats 42—42 at opposite sides of the opening 37 in which an enlarged cylindrical boss portion 43 at the upper end of the bearing projection 31 of the crank member A is seated for turning movement. The outer end edges of the lugs 41—41 are preferably beveled off, as indicated at 44—44.

The latch member C is pivotally supported on the arm 29 of the crank member A at a point inwardly of the end which carries the bearing projection 31, being provided with a forked section, comprising laterally spaced wings 45 and 46 embracing the arm at opposite sides and connected to the arm by a pivot pin or bolt 47 extending through said wings and arm. The forked section of the latch member depends from a platelike portion 48 which overhangs that portion of the arm 29 which carries the projection 31. The lower sections of the wings 45 and 46 are laterally outwardly thickened, as shown in Figure 6, the wing 46 being considerably thicker than the wing 45. The wing 46 presents a relatively wide, flat, inner end face 49, adapted to cooperate with the cam lug E, as hereinafter described. The lower inner corners of the wings 45 and 46 are beveled off to provide flat stop faces 50—50, adapted to engage with the beveled end edges 44—44 of the stop lugs 41—41 of the carrier B to limit rotation of the crank member A when the same reaches a position at right angles to the car wall. The plate portion 48 of the latch member C is preferably of the outline shown in Figure 5 and is beveled off at the underneath side along its outer edge, as indicated at 51, thus providing a bladelike edge structure adapted to ride on the cam track D.

The cam track D extends lengthwise of the car, being formed on a casting 52 secured to the wall 10 of the car below the door opening 11 at a point inwardly or rearwardly of the front end of said door opening, as seen in Figure 1. The track D is in the form of a laterally projecting, horizontal flange on the casting 52 extending lengthwise of the same and having a downwardly inclined section 53 at its rear end. The casting 52 also carries the cam lug E, which depends from the track portion D thereof and is disposed at a point substantially midway between the ends of the track. The cam lug E lies in the path of movement of the lug 32 of the arm 29 of the crank member A and also in the path of movement of the wing 46 of the latch member C.

The parts are proportioned so that, when the door is in the closed position shown in Figure 1, they occupy the positions shown in Figures 2, 3, 4, and 12, that is, the plate 48 of the latch member C is resting on the cam track D, thus holding the latch in raised position, as shown in Figures 1, 2, and 3, and the arm 29 of the crank member is disposed parallel to the wall of the car, in other words, it is at dead center with respect to the force exerted by the pull of the door in being moved to the right, as seen in Figure 1.

The operation of my improved mechanism is as follows: Assuming that the door 12 is closed, the attendant follows the usual procedure in forcing the door out of the door opening by rotating the bar 21 by means of the operating handle lever 124, and then manually sliding the door along the tracks away from the door opening. During the first stage of this operation, as the bar 21 is being rotated and the rear end of the door is being forced outwardly by the cam members 22—22 and the swinging crank members 17—17, sliding movement of the door to the right, as seen in Figure 1, is initiated, and this movement to the right is continued during the second stage of manually sliding the door. As the door is thus travelling to the right, the inner end edge face 49 of the wing 46 of the latch member C comes into engagement with the cam lug E, as shown in Figure 13, and rides over said lug, thus effecting forcible swinging movement of the arm 29 of the crank member A from the dead center position shown in Figures 2, 4, 12, and 13 toward the right angular position shown in Figure 14. This swinging movement of the arm 29 to the position at right angles to the car wall, as shown in Figure 14, brings the door into

parallelism with the car wall. At the same time, the plate 48 of the latch member C rides off of the track D, permitting the member C to drop to the locking position shown in Figures 7 and 15 with the flat faces 50—50 of the wings 45 and 46 in shouldered engagement with the stop lugs 41—41 of the carrier B, thereby positively holding the arm 29 in its right angular position with respect to the car wall during travel of the door to its completely open position beyond the door opening 11. The door is thus held entirely free of the car wall while it is being slid open, thus preventing the door from dragging on the car wall and marring of the door and wall.

In closing the door, the usual procedure is followed of manually sliding the door to partly closed position and then forcing the same tightly shut by operation of the rotary bar 21. As the door is travelling toward the closed position shown in Figure 1, the plate 48 of the latch member C rides up on the track D, raising the latch member to its disengaged position, as shown in full lines in Figures 8 and 14 and in dotted lines in Figure 15, thereby freeing the arm 29 for rotary movement. After the latch has been thus unlocked and during further travel of the door towards closed position, the lug 32 comes into engagement with and rides over the cam lug E, thereby positively effecting swinging movement of the arm 29 toward the position shown in Figures 1, 2, 4 and 12 and forcing the front end of the door into the door opening.

I claim:

1. In a door construction for a container having a wall provided with a door opening, the combination with a door adapted to close said opening; of guide means on the container extending lengthwise of the same; a carrier slidable lengthwise on said guide means; a crank member for supporting said door on said carrier, said crank member being swingable in reverse directions to move said door laterally into and out of the door opening; a latch member on said crank member, said latch member being connected to said crank member for rotation in unison therewith, said latch member having an abutment shoulder; a cam lug on said container wall in the path of movement of said abutment shoulder and engageable thereby during sliding movement of the door for swinging said latch member and connected crank member outwardly; and fixed stop means on said carrier with which said latch member is engageable for locking the crank member against rotation when the door has been moved laterally out of the door opening.

2. In a door construction for a container having a wall provided with a door opening, the combination with a door adapted to close said opening; of guide means on the container extending lengthwise of the same; a carrier slidable lengthwise on said guide means; a crank member for supporting said door on said carrier, said crank member being swingable in reverse directions to move said door laterally into and out of the door opening; a latch member on said crank member, said latch member being connected to said crank member for rotation in unison therewith, said latch member having an abutment shoulder; a cam lug on said container wall in the path of movement of said abutment shoulder and engageable thereby during sliding movement of the door for swinging said latch member and connected crank member outwardly: fixed stop means on said carrier with which said latch member is engageable for locking the crank

member against rotation when the door has been moved laterally out of the door opening; and cam means on said wall cooperating with said latch member during sliding movement of the door to closed position for lifting said latch member out of engagemetn with respect to said fixed stop means to permit free swinging movement of said crank member inwardly toward said wall.

3. In a door construction for a container having a wall provided with a door opening, the combination with a door adapted to close said opening; of guide means on the container extending lengthwise of the same; a carrier slidable lengthwise on said guide means; a crank member for supporting said door on said carrier, said crank member being swingable in reverse directions to move said door laterally into and out of the door opening; a latch member on said crank member being connected to said crank member for rotation in unison therewith, said latch member having an abutment shoulder; a cam lug on said container wall in the path of movement of said abutment shoulder and engageable thereby during sliding movement of the door for swinging said latch member and connected crank member outwardly; fixed stop means on said carrier with which said latch member is engageable for locking the crank member against rotation when the door has been moved laterally out of the door opening; a projection on said latch member; and a fixed cam track on said container wall in the path of movement of said projection and on which said projection rides during sliding movement of the door for lifting the latch member out of engagement with said fixed stop means.

4. In a door construction for a container having a wall provided with a door opening, the combination with a door adapted to close said opening; of guide means on the container wall extending lengthwise of the same; a carrier slidable lengthwise of said guide means; a swinging crank arm journaled at its inner end on said carrier and journaled at its outer end on the door; a gravity actuated latch member pivoted on said arm for swinging movement on a horizontal axis by means of a pin fixed to said arm; laterally outwardly facing stop shoulders on said carrier with which said latch member is engageable to hold said arm at right angles to the container wall; a projection on said latch member; and a fixed cam track on said container wall, in the path of movement of said projection when said arm is at right angles to said wall, over which said projection rides when the door is slid in closing direction, thereby lifting said latch clear of said stop shoulders to permit free swinging movement of said arm inwardly toward the wall of the container.

5. In a door construction for a container having a wall provided with a door opening, the combination with a door adapted to close said opening; of guide means on the container wall extending lengthwise of the same; a carrier slidable lengthwise on said guide means; a swinging crank arm journaled at its inner end on said carrier and journaled at its outer end on the door; a gravity actuated latch member pivoted on said arm for swinging movement on a horizontal axis by means of a pin fixed to said arm; laterally outwardly facing stop shoulders on said carrier with which said latch member is engageable to hold said arm at right angles to the container wall; a projection on said latch member; a fixed cam track on said container wall, in the

path of movement of said projection when said arm is at right angles to said wall, over which said projection rides when the door is slid in closing direction, thereby lifting said latch clear of said stop shoulders to permit free swinging movement of said arm inwardly toward the wall of the container; and a cam lug on said container in the path of movement of said latch member when said arm is in position parallel to the container wall, said cam lug being engageable by said latch member when the door is slid in opening direction for swinging said arm outwardly.

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