Oct. 16, 1956 W. O. BURKE 2,767,007

REFRIGERATOR LATCH

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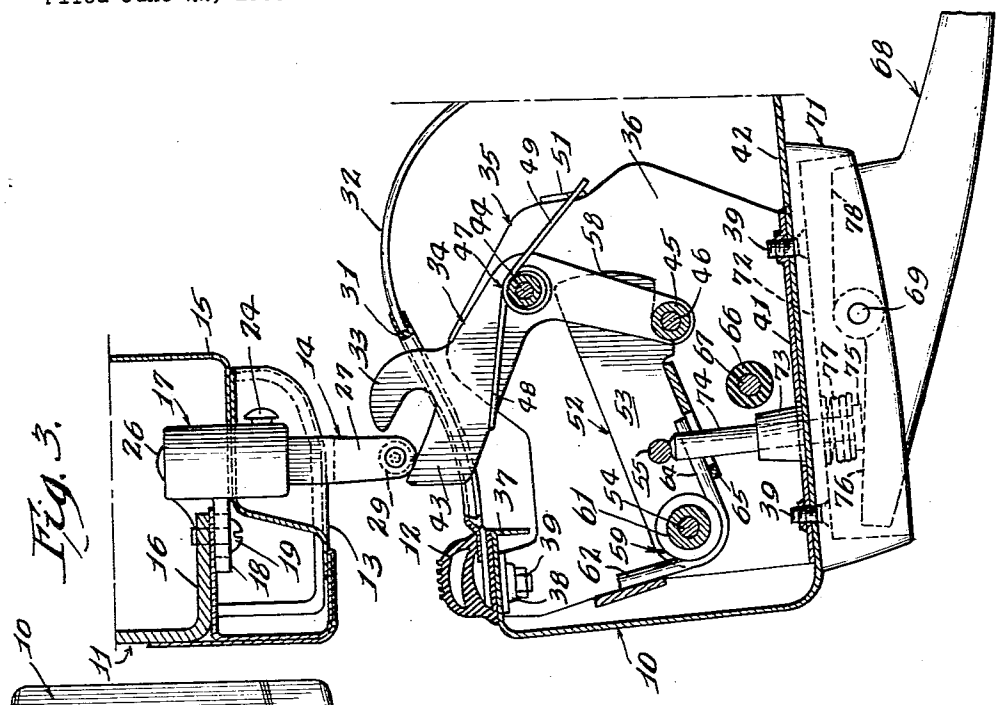

Fig. 3.

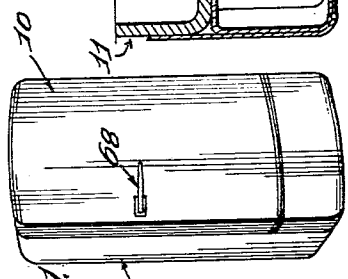

Fig. 1.

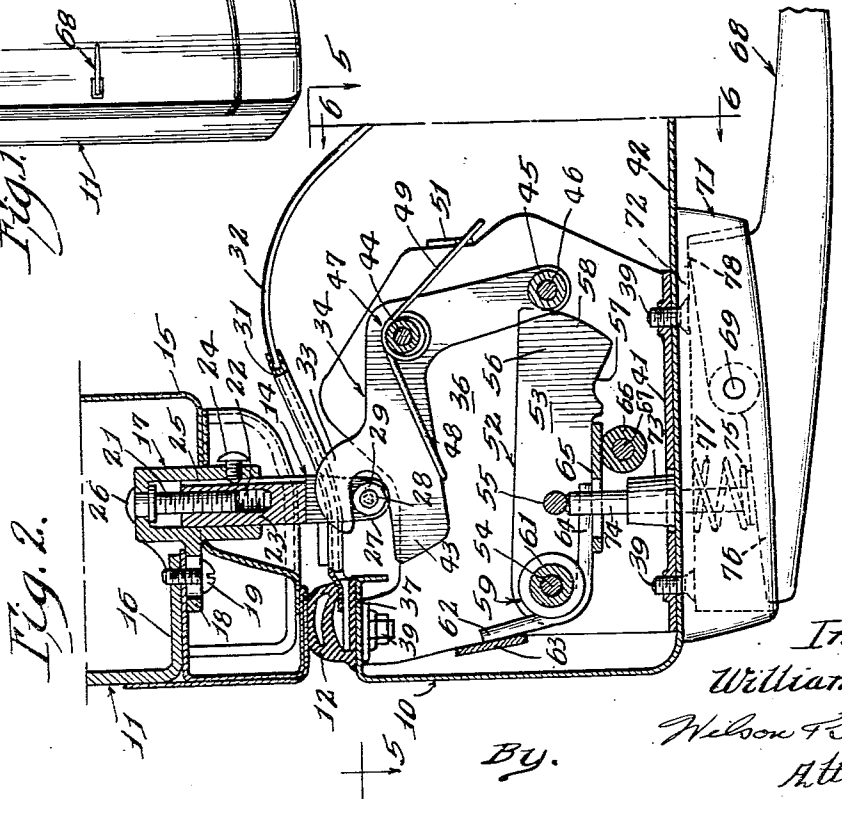

Fig. 2.

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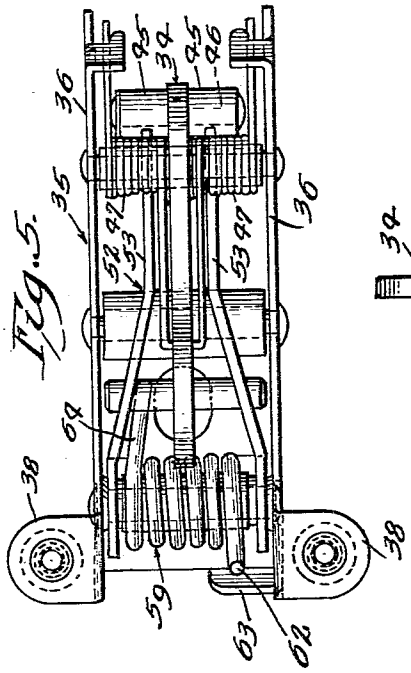

Fig. 5.

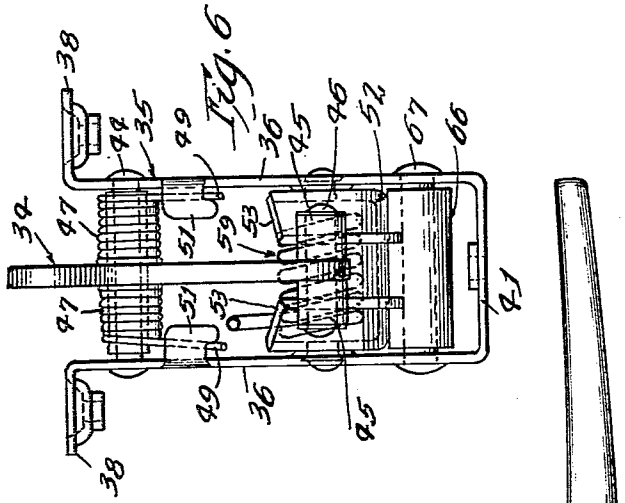

Fig. 6

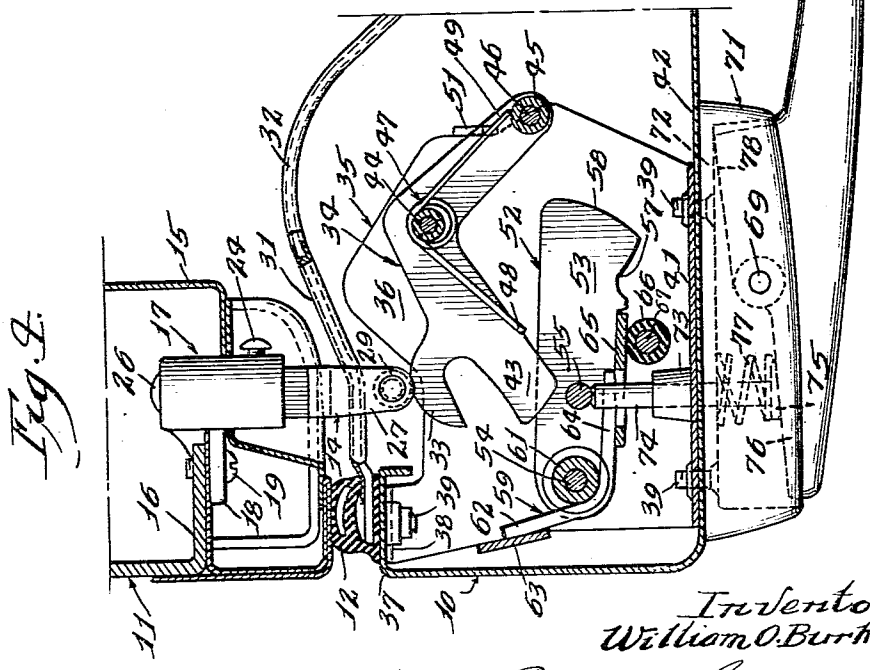

Fig. 8.

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Fig. 8.

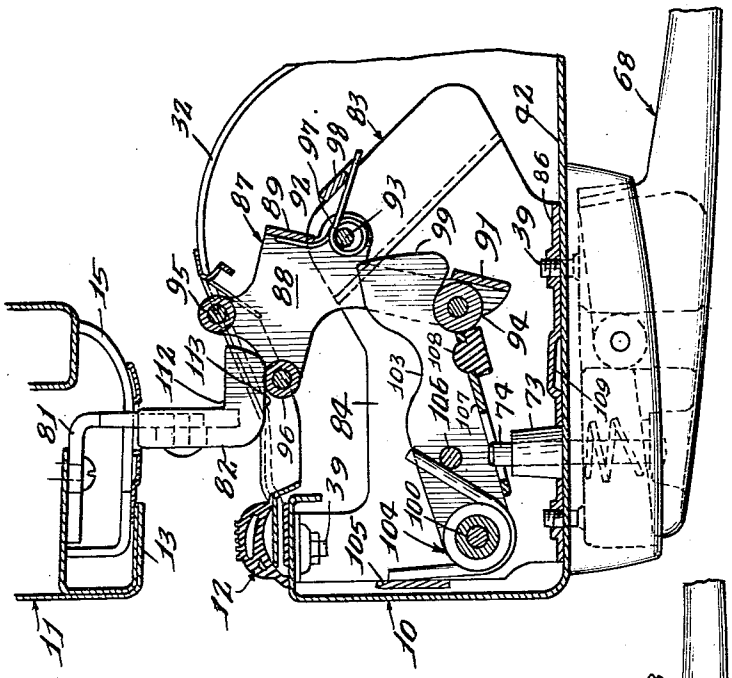
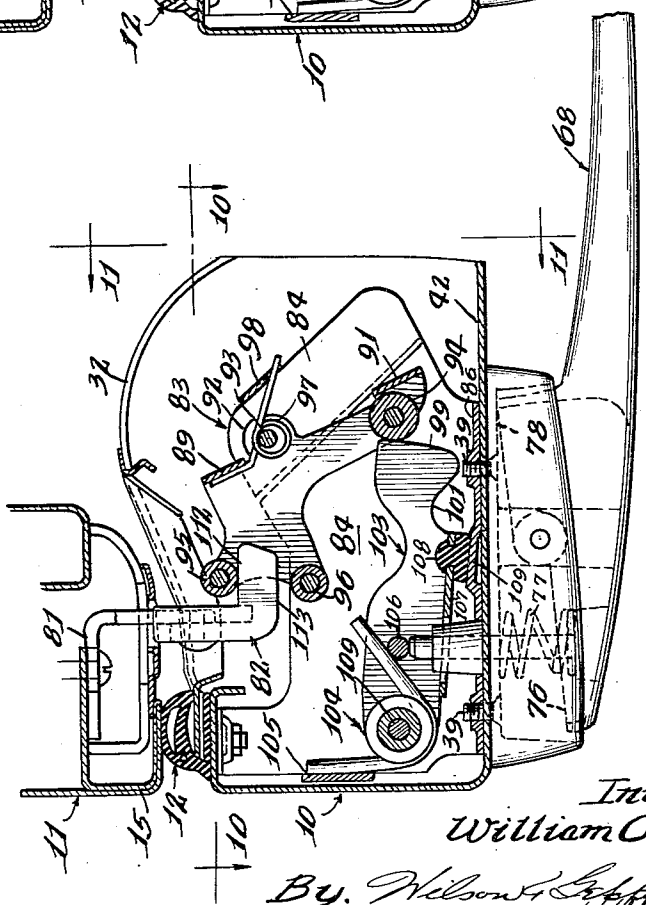


Fig. 7.



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REFRIGERATOR LATCH

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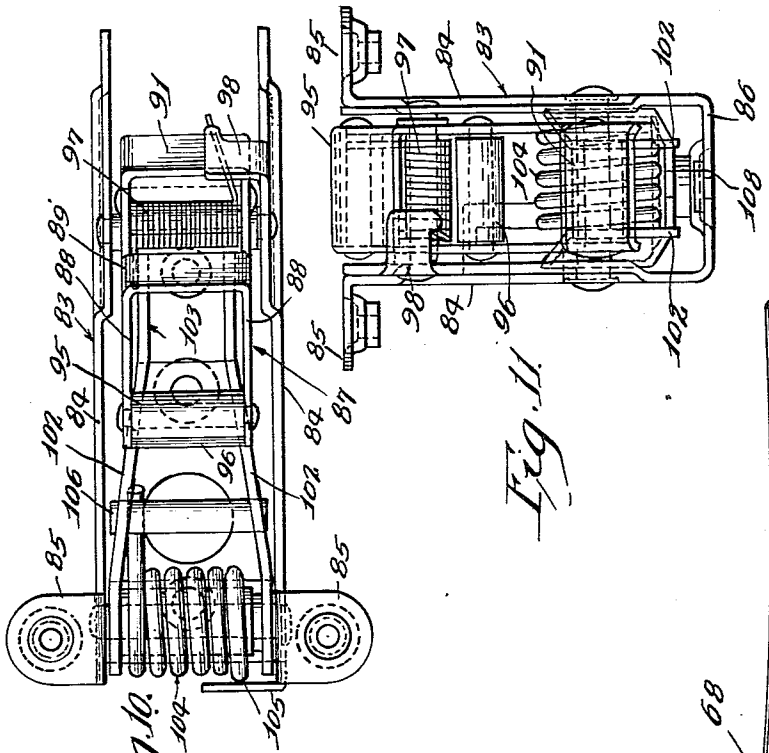

Fig. 10.

Fig. 11.

Fig. 9.

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2,767,007

REFRIGERATOR LATCH

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Application June 22, 1953, Serial No. 363,046

3 Claims. (Cl. 292—216)

The present invention relates to a latch assembly and more particularly to a novel latch construction for the door or closure of a refrigerator cabinet or the like.

Among the objects of the present invention is the provision of a novel latch construction in which the arrangement and assembly of the component parts is such as to permit greater freedom and more latitude in the mounting and adjustment of the latching elements than possible with prior constructions. By means of the present assembly and relationship and the fact that the mounting and positioning of the cooperating parts in their assembly is less critical and free of the narrow limits of adjustment inherent in prior devices of this general type, the present invention provides a distinct improvement over such prior latches not only in simplicity and cost of construction and assembly, but also in its effectiveness and ease of operation.

The present invention further comprehends the provision of a novel latch assembly in which the latch actuating or operating member is provided with a pair of cam surfaces, one of which is so arranged and contoured as to maintain the latch bolt in cocked position until released upon closing the door and the other to retain the latch bolt in latched position until released upon actuation of the handle and opening the door.

Another object of the present invention is the provision in a refrigerator latch of a novel combination of a pivotally mounted latch bolt and a pivotally mounted latch operating cam member each being spring-loaded and so constructed, arranged and combined that the engaging camming surfaces on the latch bolt and latch operating cam member apply a constant closing pressure.

A further object of the present invention is the provision of a novel cam actuating member having camming surfaces maintained in continuous engagement with a part on a latch bolt and in such manner as to most effectively and positively control the operation of the latch bolt.

The present invention further comprehends the provision of a novel latching mechanism employing a minimum number of operating parts, with the latch bolt so mounted that should it become accidentally uncocked when the door is in open position, closing of the door with the latch uncocked merely pivots the latch bolt in a counterclockwise direction without damage, shock or undue strain upon any operating parts.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

In the drawings:

Figure 1 is a perspective view of a refrigerator equipped with the present novel latch assembly.

Fig. 2 is a fragmentary enlarged view in horizontal cross section through the novel keeper assembly and the mounting of the latter in the door or closure, the door being shown closed and the latch mechanism engaged to retain the door in closed position.

Fig. 3 is a fragmentary enlarged view similar to Fig. 2,

except that the keeper assembly is shown in plan and the door or closure moved to partially closed position with the latch mechanism about to be tripped into latching engagement as the door is moved to closed position.

Fig. 4 is a view similar to Fig. 3, but showing the position of the latch mechanism when the same became accidentally tripped while the door or closure was in open position.

Fig. 5 is a view in rear elevation of the latch assembly in the door or closure, the view being taken on the irregular line 5—5 of Fig. 2 and viewed in the direction of the arrows.

Fig. 6 is a view in end elevation of the latch assembly, the view being taken in a plane represented by the line 6—6 of Fig. 2 and in the direction of the arrows.

Fig. 7 is a fragmentary enlarged view in horizontal cross section through an alternate form of latch assembly, the view showing the latch engaged with a modified form of keeper and the door in closed position.

Fig. 8 is a fragmentary enlarged view similar to Fig. 7, but with the door or closure moved to partially closed position in which the latch mechanism is about to be tripped.

Fig. 9 is a view similar to Fig. 8, but showing the latch mechanism in the position it assumes after it had been accidentally tripped while the door was in open position.

Fig. 10 is a view in rear elevation of the alternate latch mechanism, the view being taken on the line 10—10 of Fig. 7 and viewed in the direction of the arrows.

Fig. 11 is a view in end elevation of the alternate latch mechanism, the view being taken in a plane represented by the line 11—11 of Fig. 7 and viewed in the direction of the arrows.

Referring to the disclosure in the drawings and more particularly to the novel illustrative embodiment of the latch construction or assembly shown in Figs. 1 to 6 inclusive, the novel latch assembly there shown is mounted within and adjacent a vertical edge of a door or closure 10 of a refrigerator cabinet 11 or the like, the door or closure being hinged or pivotally mounted at or along its other vertical edge for swinging movement between open and closed position. In order to effectively seal the edge of the door or closure against the adjacent surfaces on the cabinet when in closed position, there is provided a compressible sealing strip or gasket 12 on the door or closure adapted to abut and having sealing contact with the adjacent face 13 of the cabinet 11 which defines or encompasses the usual refrigerating compartment.

A keeper assembly 14 is mounted in the side jamb 15 of the cabinet 11 by means of a supporting bracket 16. This assembly includes a tubular housing 17 having a laterally projecting flange 18 rigidly secured to the supporting bracket 16 by one or more bolts or other suitable securing means 19. This tubular housing carries an adjusting bolt 21 (Fig. 2), its threaded shank being received in the threaded opening 22 of a sleeve-like projection 23 on the inner end of the keeper assembly 14, the projection being telescopically received in the housing 17 for longitudinal adjustment. A set screw 24 adapted to be received in a longitudinal slot 25 in the exterior of the projection 23 is adapted to lock the keeper in its predetermined or adjusted position after such adjustment has been obtained by turning of the slotted head 26 of the adjusting bolt 21 by means of a screw driver or similar tool. The keeper at its outer end is bifurcated or provided with spaced legs 27 adapted to receive and retain therebetween a cross pin 28 on which is rotatably mounted a keeper in the form of a roller 29.

The forward end of the keeper assembly 14 with the roller 29 projects forwardly and beyond the face of

the cabinet 11 and is adapted to enter and be received within an opening defined by a grommet 31 provided in a rear wall 32 of the door or closure 10 for latching engagement with the hooked end 33 of a latch bolt 34, when the door is moved to closed position. As clearly shown in Figs. 2 to 6, inclusive, the latch assembly is mounted in the interior of the door or closure 10 upon a substantially U-shaped housing 35 having each of its opposite side walls 36 rigidly affixed or anchored to an inturned flange 37 on the inner or rear wall 32 of the door or closure 10 by means of an outwardly projecting ear or projection 38 (Figs. 5 and 6) extending from each of the spaced side walls 36 and rigidly connected to the flange 37 by a bolt or other suitable attaching means 39.

The base or connecting wall 41 of the housing is fixed to the interior of the front wall 42 of the door or closure by other bolts or suitable attaching means 39. The latch bolt 34 is formed at its latching end with the hook 33 and a projection 43 defining a relatively deep slot adapted to receive the roller 29 on the keeper assembly 14. This latch bolt is in the form of a bellcrank pivotally mounted in the housing intermediate the side walls 36 thereof upon a pin 44 having its ends anchored in these side walls, and at the other end thereof the bolt is provided with a pair of rollers 45 mounted upon a cross pin 46 carried by the latch bolt, with a roller at each side thereof (Fig. 5). This latch bolt is spring-biased in a clockwise direction as viewed in Figs. 2, 3 and 4, by means of a pair of coil springs 47 mounted upon the pivot pin 44, each spring having one end 48 bearing against the latch bolt beneath the hooked end 33 thereof, and the other end 49 anchored onto an inturned lip or projection 51 on each side wall 36 of the housing 35.

A latch operating cam 52 comprising spaced arms 53 pivotally mounted adjacent one end upon a pivot pin 54 having its ends anchored in the housing 35 and carrying a cross pin 55 intermediate its ends bridging the spaced arms 53 is provided. Each arm 53 adjacent its free end 56 is provided with camming surfaces 57 and 58 adapted to engage the rollers 45 on the latch bolt. A power spring 59 encompasses a roller 61 on the pivot pin 54 with one end 62 of the spring bearing against an inturned flange 63 at one end of the housing 35, and with its other end 64 bearing against a connecting web or base 65 of the bolt operating cam 52 for biasing the latter in a clockwise direction. A resilient stop in the form of a roller 66 carried by a pin 67 bridging the opposite side walls 36 of the housing 35 is disposed beneath the base or connecting wall 65 of the bolt operating cam 52 whereby to eliminate noise when the latter engages therewith (Figs. 2 and 4).

To actuate the latch mechanism and permit opening of the door or closure from its latched or closed position as shown in Fig. 2, there is provided an operating handle 68 pivotally mounted upon a pin 69 anchored in a housing 71 affixed to the exterior of the door or closure by the bolts or securing means 39. Projecting through the base 72 of this housing and slidably mounted and guided in a bushing or sleeve member 73 is a plunger 74 having a head or enlargement 75 bearing against the end 76 of the handle within the housing 71. A coil spring 77 encompasses the plunger 74 and bears at one end against its head or enlargement 75 and at its other end against the base 72 of the housing whereby the handle is spring-biased in a counter-clockwise direction to the position shown in Figs. 2 and 4 in which the shoulder 78 on the handle abuts the base 72 of the housing 71 and thereby limits pivotal movement of the handle in a counter-clockwise direction.

The inner or free end of the plunger 74 is aligned with and adapted to engage the cross pin 55 carried by the spaced arms 53 of the latch operating cam 52, whereby when the handle 68 is moved in a clockwise direction to open the door or closure, it depresses or forces the plunger 74 inwardly to engage the pin 55 and rotate the latch operating cam 52 in a counter-clockwise direction whereby to disengage or remove the cam surfaces 58 on the ends of the arms 53 from the rollers 45 and move these arms against the tension of the power spring 59. Upon disengagement or removal of the cam surfaces 58 from the rollers 45, the springs 47 move the latch bolt 34 in a clockwise direction whereby to withdraw the hooked end 33 of the latch bolt from engagement with the roller 29 and thereby releasing the door. In this position of release, the rollers 45 are moved about the cam surfaces 58 and into a position where these rollers engage in the cam surfaces 57 and the latch bolt is held in cocked position as shown in Fig. 3.

When the door is again moved to closed position, the projection 43 on the latch bolt 34 will first engage the roller 29, causing the latch bolt to pivot in a counter-clockwise direction whereupon the rollers 45 are disengaged from beneath the cam surfaces 57 and ride onto the cam surfaces 58. As the power spring 59 moves the latch operating cam member 52 in a clockwise direction, engagement of the cam surfaces 58 with the rollers 45 causes the latch bolt 34 to continue to rotate about its pivot pin 44 in a counter-clockwise direction to the position shown in Fig. 2, in which the hooked end 33 of the latch bolt is disposed over and bears against the roller 29 seated within the slot or recess defined by the hooked end 33 and the projection 43 of the latch bolt.

Fig. 4 shows what happens when the latch bolt 34 is accidentally or unintentionally tripped from its cocked position when the door is open. When so tripped or uncocked, latching cannot be effected as the rounded upper surface of the hooked end 33, rather than the projection 43, engages or abuts the roller 29 of the keeper when the door is moved toward closed position. Although the latch bolt 34 is spring-biased in a clockwise direction about its pivot 44, except for these springs 47 it is free to be rotated upon contact in a counter-clockwise direction to the position shown in Fig. 4, without shock or damage to the latch mechanism. To then effect latching, all that is necessary to return the latch bolt to cocked position is for the operator to withdraw the free end of the operating handle 68, whereby the plunger 74 is depressed and rotates the latch operating cam member 52 in a counter-clockwise direction, and with the door in open position, the latch bolt 34 will, by reason of the springs 47, rotate to the position shown in Fig. 3 with the rollers 45 riding over the cam surfaces 58 and engaging in the cam surfaces 57 for positioning the latch bolt in cocked position.

Figs. 7 to 11, inclusive, disclose an alternate construction in which an angle bracket 81 is mounted in the side jamb 15 of the cabinet 11, and this angle bracket in turn securely mounts and retains an adjustably mounted strike hook or keeper 82 in its operative position. A housing 83 for mounting the latch assembly is of somewhat different contour from that disclosed in the embodiment shown in Figs. 1 to 6 inclusive, but is also of substantially U-shape with the side walls 84 provided with outwardly projecting ears or extensions 85 (Figs. 10 and 11) and a base or connecting wall 86 whereby this housing is fixed or rigidly secured in the door or closure by bolts or other attaching means 39.

A pivotally mounted latch bolt 87 is provided with spaced side walls 88 and spaced connecting webs or flanges 89 and 91, each side wall having an offset 92 through which projects a pivot pin 93 having its ends anchored in the spaced side walls 84 of the housing 83. Adjacent one end and the connecting web or flange 91, the latch bolt 87 is provided with a roller 94, and at its other end with spaced and offset rollers 95 and 96 for receiving therebetween and having latching engagement with the keeper or strike hook 82. A coil spring 97 having one end en-

gaging the web or projecting flange 89 on the latch bolt and the other end engaging a connecting web 98 on the housing 83, spring-biases this latch bolt in a clockwise direction for latching engagement with the strike hook or keeper 82.

The roller 94 has continuous contact with cam faces 99 and 101 provided on one end of each of a pair of spaced sides or arms 102 of a latch operating cam 103 pivotally mounted at one end upon a cross pin 100. This latch operating cam is spring-biased in a clockwise direction by means of a coil power spring 104 having one end engaging a flange or web 105 on the housing 83 and the other end engaging a cross pin 106 connecting or bridging the spaced sides or arms 102 of the operating cam 103.

The base or connecting wall 107 of the latch operating cam 103 is provided with an opening for receiving the sleeve or bushing 73 and the plunger 74 slidable therein, the latter being controlled or actuated by the handle 68 in the same manner as the embodiment in Figs. 1 to 6 inclusive. A resilient stop or bumper 108 carried by the base 107 is adapted to strike a raised portion 109 in the base 86 of the housing 83 to absorb any shock and eliminate noise in the operation of the latch.

This form of latch assembly operates in a manner similar to that of the embodiment of Figs. 1 to 6 inclusive, except that the latching element comprises the spaced rollers 95 and 96 adapted to receive therebetween the strike hook or keeper 82 on the cabinet. When in closed position (Fig. 7), the inner roller 95 engages the face 112 of the strike hook or keeper 82 and retains the door 10 closed. In this closed position, the roller 94 is in contact with the cam surface or face 99 of the latch operating cam 103.

When the handle 68 is operated and releases the latch bolt 83 to permit opening of the door, the latch bolt is automatically moved to the position shown in Fig. 8, with the roller 94 in the convex cam surface or face 101 whereby the latch bolt is held in cocked position. Then when the door 10 is closed, the roller 96 strikes the outer face 113 of the strike hook 82, causing the latch bolt 83 to pivot or rotate in a counter-clockwise direction about its pivot pin 93, whereupon the roller 94 is removed from the cam surface 101 and the roller 95 is caused to engage the face 112 of the strike hook or keeper 82.

In the event the latch bolt 87 is accidentally uncocked and the door is attempted to be closed as in Fig. 9, the inner roller 95 of the latch bolt strikes or engages the outer face 113 of the strike hook or keeper 82 and the latch bolt pivots to the position shown, all without damage or shock to the latch mechanism. All that is required to cock the latch bolt 87 is for the operator to manipulate the handle 68 to cause the plunger to engage the transverse pin 106 and move the latch operating cam an amount sufficient to permit the spring-biased latch bolt 87 to return to the position shown in Fig. 8.

It is to be noted that the cam surface 57 (Figs. 1 to 6) and the cam surface 101 (Figs. 7 to 11) are each struck on an arc from the axis of the pivot pins 44 and 93, respectively, when the latch operating cams or members 52 and 103 are in cocked position (Figs. 3 and 8). Thus a constant closing pressure is effected so long as the rollers on the latch bolt 34 and the rollers on the latch bolt 87 are in engagement somewhere along these cam surfaces 57 and 101, respectively.

Having thus disclosed the invention, I claim:

1. A refrigerator latch comprising a substantially U-shaped housing mounted in the door of the refrigerator, a latch bolt in the form of a bellcrank pivotally mounted in the housing and provided with a roller at the end of one arm and latching means at the end of the other, means for spring-biasing said latch bolt in one direction, a latch operating member pivotally mounted at one end in the housing and with its other end in contact with the roller on the latch bolt, means for spring-biasing said member in the same direction as the latch bolt, and spaced cam surfaces at said other end of the latch operating member maintained in contact with said roller, one of said cam surfaces providing a depression along one edge of said latch operating member for receiving and retaining the latch bolt in cocked position when the door is opened and the other on the end of said latch operating member for retaining the latch bolt in latched position when the door is closed, said spring-biasing means for said latch bolt and said latch operating member maintaining the roller on said latch bolt in engagement with a cam surface on said latch operating member with these engaging surfaces applying a constant closing pressure to the latch bolt.

2. A latch for a refrigerator door for engaging a keeper on the cabinet and maintaining the door in closed position, comprising a housing mounted in the door and provided with spaced side walls, a latch bolt in the form of a bellcrank pivotally mounted in the side walls of the housing and provided with latching means at the end of one arm and a roller carried at the end of the other arm of said bellcrank, means for spring-biasing said latch bolt away from latching engagement with the keeper, a substantially U-shaped latch operating member having spaced arms pivotally mounted at one end in the side walls of the housing and having spaced camming surfaces at its other end which is free for continuous contact with said roller on the latch bolt, one of said camming surfaces being on the extreme end and the other providing a recess adjacent thereto for receiving the roller, and means for spring-biasing said latch operating member in the same direction as the latch bolt whereby one of the camming surfaces on said member receives the roller to retain the latch bolt in cocked position when the door is opened and the other of said camming surfaces engages the roller to retain the latch bolt in latched engagement with the keeper when the door is closed, said spring-biasing means for said latch bolt and said latch operating member maintaining the roller on said latch bolt in engagement with a cam surface on said latch operating member with these engaging surfaces applying a constant closing pressure to the latch bolt.

3. In a latch construction for a refrigerator door for engaging a keeper on the cabinet when the door is moved to closed position and when the latch is released from the keeper and the door is opened the latch construction is automatically moved to cocked position ready to be tripped, a housing having spaced side walls, a spring-biased latch bolt pivotally mounted intermediate its length between said side walls and spring-biased for rotation in one direction, spaced latching projections on said latch bolt one of which engages the keeper and releases the latch bolt from cocked position after which the other projection is moved into latching engagement with the keeper when the door is closed, a part on the other end of said latch bolt, a spring-loaded latch operating member pivotally mounted at one end in said side walls for rotation in the same direction as the latch bolt and having spaced camming surfaces at its other end for engaging and controlling the pivotal movement of the latch bolt, said camming surfaces including a recess adjacent the other end of the latch operating member for receiving and releasably retaining the latch bolt in cocked position when the door is opened and a camming surface on said other end of the latch operating member for releasably retaining the latch bolt latched onto said keeper when the door is closed.

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