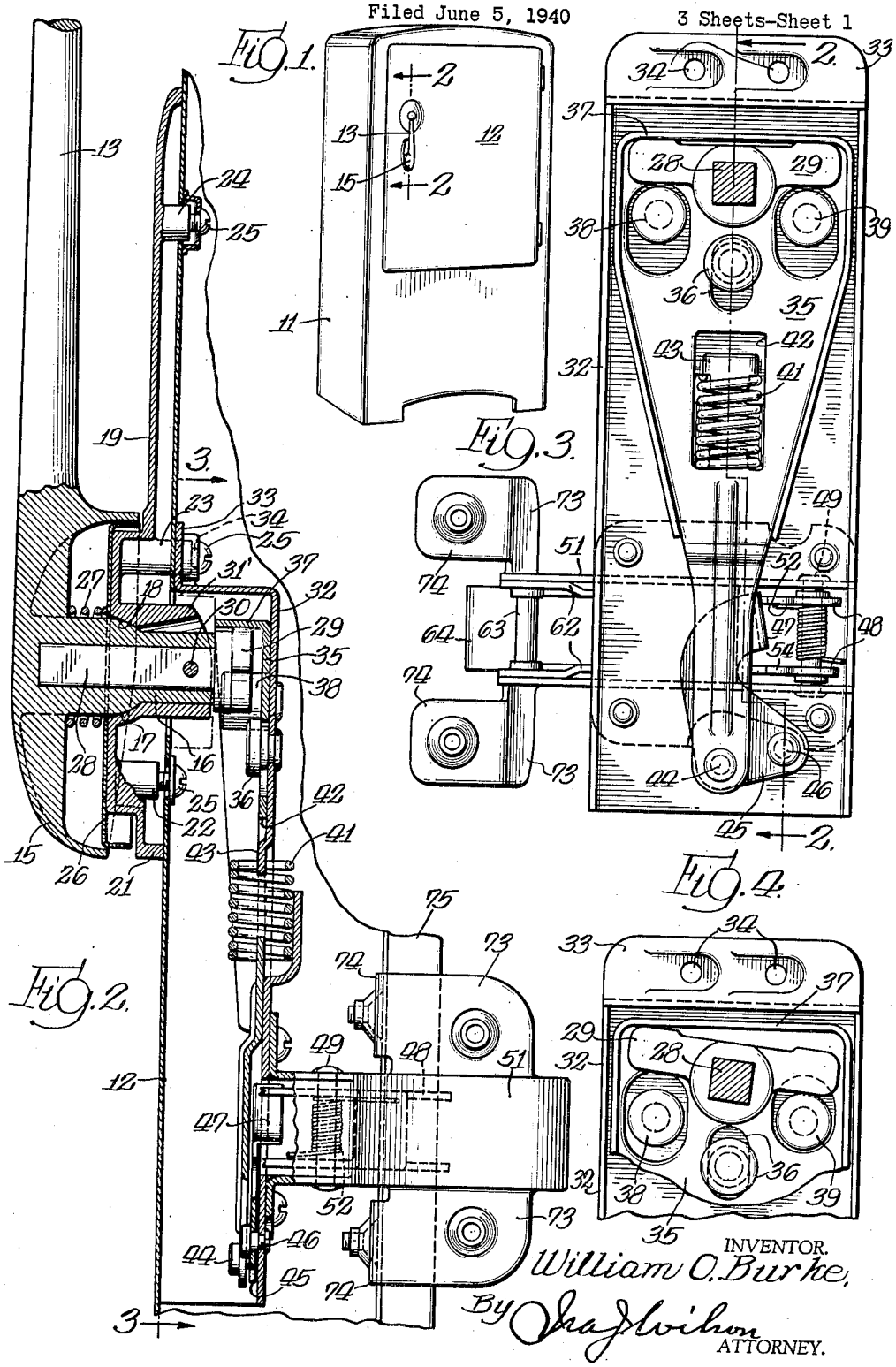
Nov. 9, 1943. W. O. BURKE 2,334,065

REFRIGERATOR LATCH

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REFRIGERATOR LATCH

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Fig. 6.

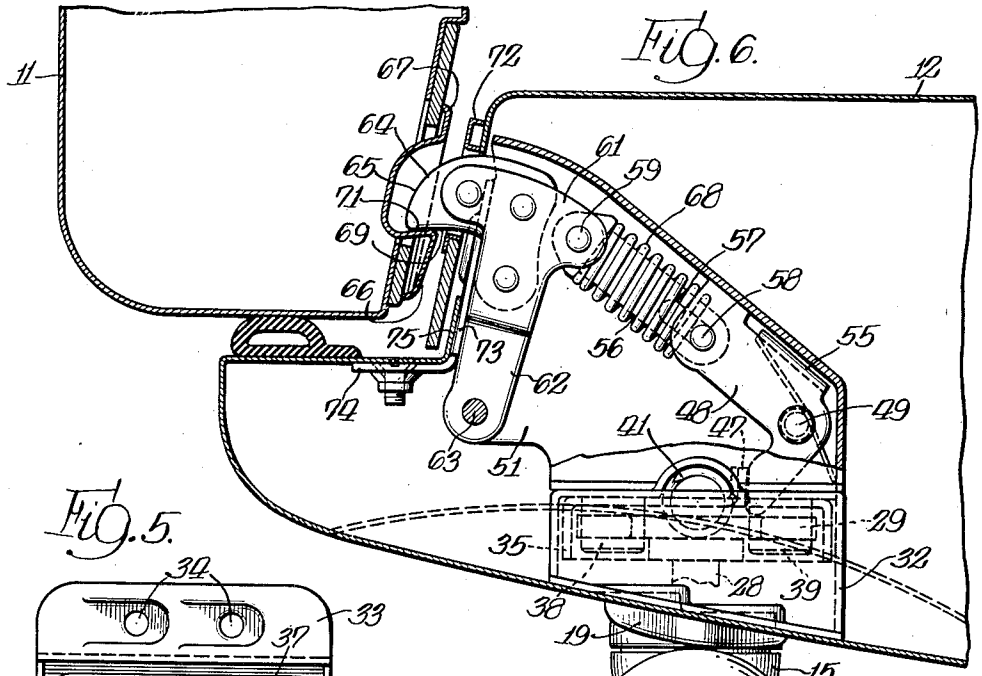
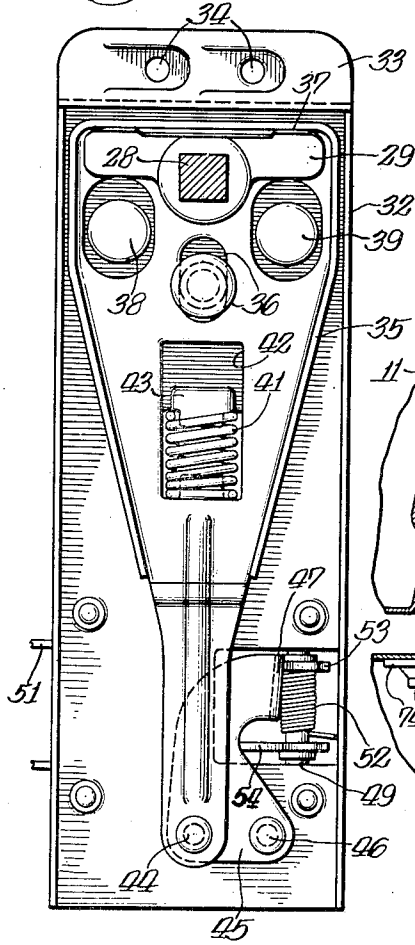


Fig. 5.



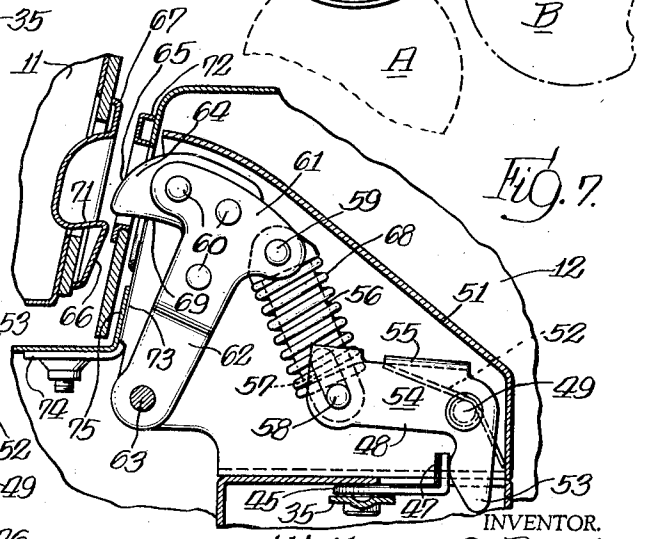


Fig. 7.

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Fig. 9.

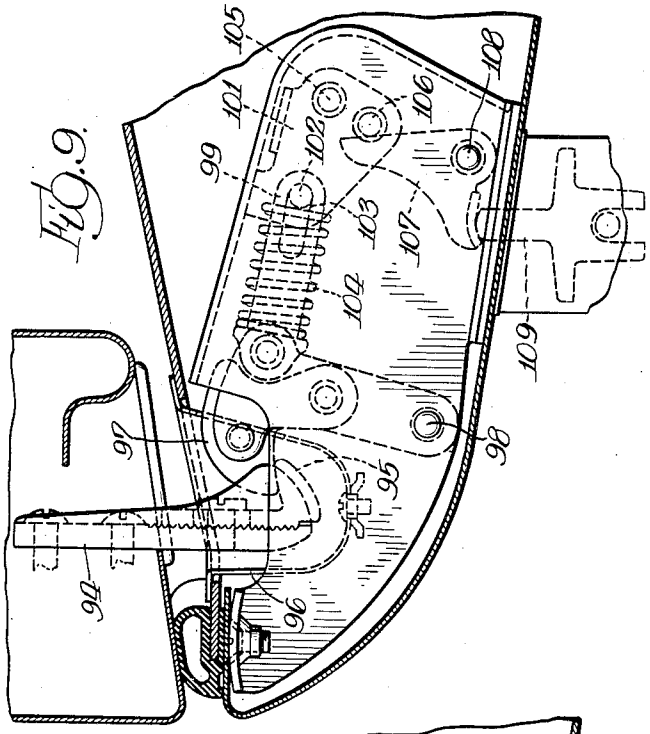
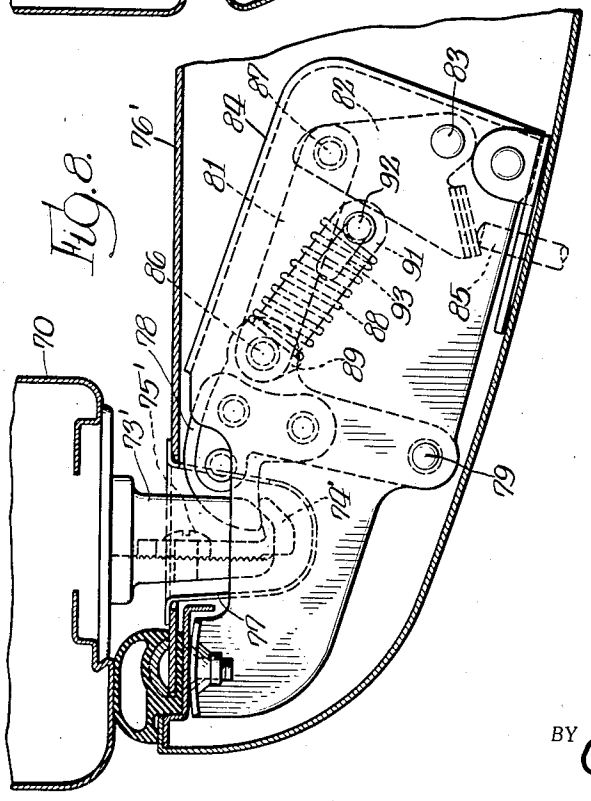


Fig. 8.



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2,334,065

REFRIGERATOR LATCH

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Application June 5, 1940, Serial No. 338,873

11 Claims. (Cl. 292—122)

This invention relates in general to door latches and is exemplified in the present instance as embodied in a latch particularly adapted for use on refrigerator doors. The principles of my invention, however, may be utilized in latches of different designs adapted for a variety of uses.

One of the advantageous features of my latch, particularly when used as a refrigerator latch, resides in the fact that when the door is closed the latch will not only secure the door against accidental opening, as the result of pressure on the inside of the door, but will also tend to draw the door into a more snugly closed position so as to obviate air leakage past the sealing strip around the door.

Where a single latch is employed on a refrigerator door, such latch usually, in order to be most effective, must be located approximately midway between the top and bottom of the door. This position of the latch, however, locates the handle, if aligned with the latch, too low for convenient manipulation.

Another purpose of my present invention, therefore, is to provide a latch in which the operating handle will be located considerably above the latch bolt and will be of such length as to be conveniently operable even should the user be carrying dishes or utensils in her hands.

Another purpose is to provide a latch, the operating handle of which is universally mounted so that when pulled outwardly or moved laterally in either direction, such handle movement will release the latch bolt and permit the door to open.

Another purpose of the invention is to provide a latch which will permit the latch bolt to be thrust inwardly upon engagement with the strike in closing the door but without transmitting said latch movement to the handle which is at all times, when not being manipulated, yieldably retained in normal position irrespective of movements of the latch bolt.

The accompanying drawings illustrate a preferred embodiment of my invention, and also certain structural modifications.

Referring to the drawings,

Fig. 1 is a perspective view of a refrigerator cabinet showing the location of my latch handle on the door thereof;

Fig. 2 is a vertical sectional view on the line 2—2 of Figs. 1 and 3;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2 with the latch bolt in projected position;

Fig. 4 is a fragmentary view showing the actuation of the slide produced by lateral movement of the handle;

Fig. 5 is a view similar to Fig. 3 showing the slide as actuated by an outward pull upon the handle;

Fig. 6 is a sectional view of the latch showing the bolt in projected position;

Fig. 7 is a similar view showing the latch bolt in retracted position;

Fig. 8 is a view similar to Figs. 6 and 7 illustrating a modified form of latch; and

Fig. 9 is a similar view of a further modification.

Referring to the drawings more in detail, the refrigerator cabinet illustrated in Fig. 1 is designated by reference character 11, the door thereof by 12, and the exposed latch handle for operating the latch by reference character 13.

The handle is formed at its base to provide a dished head having a central, inwardly extending stud or projection 16 providing an annular curved shoulder 17 seated for universal movement in a socket 18 formed in an escutcheon plate 19. This plate is provided with a peripheral, inwardly extending flange 21 adapted to seat against the outer face of the door 12 and with tapped studs 22, 23 and 24 adapted to receive fastening screws 25 by which the escutcheon is fixedly mounted on the door.

A dished plate 26 overlying the socket carrying portion of the escutcheon serves to close the space between the escutcheon and the handle base flange and also overlies the outer end of the socket 18 so as to prevent the spring 27 interposed between this plate and the handle head from entering or becoming caught in the socket when the handle is tilted. This spring exerting an outward thrust on the handle head yieldingly holds the head and handle in the normal position illustrated in Fig. 2 and restores the handle to such normal position after each actuation or manipulation thereof.

The handle head projection 16 is provided with a preferably rectangular bore adapted to receive the shank 28 of a bar 29 projecting in opposite directions from the shank at the inner end of the projection 16. A locking pin 30 extending through the projection 16 and the shank 28 rigidly connects the bar with the handle head and contact of the bar with the inner end of the escutcheon extension 31' in which the socket 18 is formed retains the handle in assembled relation with the escutcheon against the force of spring 27 normally tending to separate them.

A channel-shaped housing 32 is provided at its

upper end with a flange 33 having openings 34 fitting over studs 23 and secured in position by the cooperating screws 25. Within the housing is disposed a channel-shaped reciprocatory slide 35 which is slidably secured to the housing by a slot and rivet connection 36 (Figs. 3, 4 and 5). The operating bar 29 is disposed contiguous to the upper end wall 37 of this slide and in proximity to a pair of studs 38 and 39 carried by the housing. The slide is slotted to accommodate these studs and permits its reciprocatory movements. A coiled spring 41 disposed in a slot 42 of the slide 35 and interposed between the lower end of this slot and an upturned lug 43 formed in the housing 32 urges the slide downwardly viewing Fig. 3 to engage its end wall 37 with the bar 29.

An outward pull exerted upon the handle 13 will cause the handle head to pivot in its socket 18, thereby moving the bar 29 upwardly carrying with it the slide 35 into the position illustrated in Fig. 5. The corresponding position of the handle is shown in Fig. 6 in dotted lines indicated by A. Should the handle be swung laterally, for instance, to the right viewing Figs. 1 and 6, the bar 29 will be swung about its point of contact with the stud 39, thereby causing the other end of the bar to move the slide 35 upwardly into the position shown in Fig. 4. This movement of the bar 29 is accompanied by a rise in elevation of the inner end portion of the shank 28 which causes the end of the handle to travel away from the face of the door as it is moved laterally so that when the slide 37 has been moved to the position shown in Fig. 4, the handle will assume the dotted line position indicated by B in Fig. 6. This rise in elevation of the end of the shank 28 will be apparent from a comparison of Figs. 3 and 4, the latter clearly showing the inner end of the shank raised relative to the stationary studs 38 and 39. Should the handle be swung to the left instead of to the right, the stud 38 will serve as the fulcrum for lever 29, and the parts will assume the reverse position with the handle end disposed at the left of its normal position and outwardly therefrom the same amount as indicated by position B of Fig. 6.

The lower end of the slide 35 is pivotally connected at 44 with a bell crank lever 45 fulcrumed at 46 upon the slide housing 32. The free end of this lever is flanged as indicated at 47, Figs. 3 and 7, and opposed to an arm 53 of a bell crank lever 48 fulcrumed at 49 between the walls of a latch housing 51 projecting laterally from the inner wall of the slide housing 32. Movement of the bell crank lever 45 by the slide 35 from the normal position of Fig. 3 to the unlatching position of Figs. 4 or 5 will cause bell crank lever 48 to be moved by lever 45 from the position indicated in Fig. 6 to that shown in Fig. 7. A coiled spring 52 urges bell crank lever 48 into the normal or latching position shown in Fig. 6. The arm 54 of bell crank lever 48 is of channel shape comprising two side walls joined by the channel bottom 55.

A link 56 is slidably connected to the longer end of the bell crank lever 48 by a transversely extending pin 58 extending through a slot 57 in the link. The opposite end of the link is pivoted at 59 to the head 61 of an L-shaped latch member comprising the arm 62 pivoted at 63 between the walls of the housing 51 and a latch bolt 64, preferably of Bakelite or similar composition, fixedly mounted between the side walls of the head 61 and secured by rivets or the like 60. The end 65 of the latch bolt is rounded to ride against the inclined face 66 of the strike 67 and thereby force the latch bolt inwardly into the casing against the force of spring 68 when the door is swung to closed position. The holding face 69 of the latch bolt is inclined or undercut to cooperate with the inclined face 71 of the strike socket so as to securely hold the door against accidental opening. A bolt escutcheon 72 surrounds the opening in the casing 51 through which the latch bolt projects.

The side walls of the latch mechanism housing 51 are provided at their ends adjacent the latch bolt with laterally projecting flanges 73, the outer ends of which are bent at right angles to provide flanges 74. These flanges are secured by bolts or screws to the frame 75 of the door thereby, together with the fastening for the slide housing 32, securely and rigidly attaching the entire assembly to the door on which it is mounted.

A latch mounted in the manner disclosed is so located on the door that the latch bolt is disposed substantially midway between the top and bottom of the door, and the handle which is mounted some distance above the latch bolt extends upwardly from its mounting to be disposed in a conveniently accessible position to the user. When it is desired to open the door, the handle is manipulated either by pulling outwardly upon it or by pushing or pulling the same laterally in either direction. The knob 76, with which the upper end of the handle is equipped, is shown in its normal position in Fig. 6 in full lines, and in two operative positions in dotted lines. When moved from normal to any of the operative positions, the bar 29 moves the slide 35 longitudinally in the manner previously described from the position shown in Fig. 3 to that shown in Figs. 4 and 5, and swinging bell crank lever 45 from the position shown in Fig. 3 to that shown in Fig. 5, thereby swinging bell crank lever 48 from the position shown in Fig. 6 to that shown in Fig. 7. This movement of bell crank lever 48 retracts the latch bolt 64 from locking position, illustrated in Fig. 6, to the released position, shown in Fig. 7, thereby permitting the door to swing open. When handle 13 is released, the parts are all respectively restored to their normal position by the springs 27, 41 and 52.

When the door is swung to closed position, the curved face 65 of latch bolt 64 rides over the inclined face 66 of the strike, thereby swinging the latch bolt about its pivot 63 in a clockwise direction viewing Fig. 6 against the force of spring 68. The bell crank lever 48 and all of the connections between it and the handle 13 remain stationary during this inward movement of the latch bolt against the spring 68. In other words, the link 56 simply slides longitudinally on the pin 58 by reason of the slot 57 in the link through which the pin projects. When the latch bolt is past the edge of the inclined face 66, it is projected outwardly by the spring 68 into the recess of the strike, as illustrated in Fig. 6, thereby latching the door in closed position.

It will be noted that the cooperating locking faces 69 and 71 of the latch bolt and the strike recess, respectively, are inclined with respect to the opposed faces of the door and jamb and that the latch bolt travels in an arc about the pivot point 63 so that the farther the latch bolt is projected into the strike recess by the spring 68 the tighter the door will be pulled against the jamb.

Any slight movement of the door as the result of jarring or as the result of pressure upon either the inside or outside of the door will tend to cause the bolt to be projected still farther into the strike recess to force the door into more snug relation with its jamb and thereby insure against air leakage around the door.

In Fig. 8 I have illustrated a modified form of latch particularly adapted for use with refrigerator doors which overlie the front edges of the cabinet side walls and provide a door opening equal in width to the distance between the side walls. On this figure, 70 indicates one of the side walls of a refrigerator cabinet, the shell only being shown with the insulation between the shell inner and outer walls omitted. The front face of this wall is equipped with a strike base 73' upon which a strike 74' is adjustably mounted and held in adjusted position by one or more screws 75'.

The door indicated generally by reference character 76' is provided with a cup-shaped element 77 adapted to receive the strike. The latch bolt 78 is pivotally supported at 79 and connected by a link 81 with a rocker arm 82 pivoted at 83 between the side walls of the latch mechanism housing 84. A plunger 85 operable by a pivoted handle or other operating mechanism (not shown) is adapted to swing the rocker in a clockwise direction to withdraw the latch bolt from engagement with the strike. It will be observed that in this instance the link 81 is directly pivoted at 86 to the latch bolt and at 87 to the rocker 82 without any lost motion connection. The latch bolt is urged into the projected latching position shown on the drawing by an expansion spring 88 interposed between the head 89 of a link 91 and a stationary pin 92 extending through a slot 93 of the link 91. Upon retraction of the latch bolt either by actuation of the rocker 82, or by engagement of the bolt with the cam surface of the strike 74' upon closing the door, the link 91 slides upon the pin 92 permitting the spring 88 to be compressed. The normal position of the parts with the latch bolt projected is shown on the drawing.

Fig. 9 illustrates another modification of structure in which the strike base 94 extends into the side wall of the cabinet and carries an adjustable strike 95 adapted to enter a cup-shaped member 96 when the door is in closed position, as illustrated. In this instance, the bolt 97 is pivoted at 98 and connected by a link 99 with the bell crank member 101 through the intermediary of a pin 102 and a slot 103 in the link. An expansion spring 104 is interposed between the pin 102 and the head of the link.

The bell crank member 101 is fulcrumed at 105 and carries a roller 106 interposed in the path of a second bell crank 107 fulcrumed at 108 and positioned in the path of a reciprocatory plunger 109 which may be projected inwardly by manipulation of any suitably mounted handle or other operating device (not shown).

In this instance, actuation of the bell crank 107 will rock bell crank 101 in a counterclockwise direction similarly to the operation of bell crank 48 previously explained in connection with Figs. 6 and 7. It will be noted also that the latch bolt in Figs. 8 and 9 is, in each instance, pivotally mounted to swing in an arc and is so shaped that any disturbance of the door will cause the latch bolt under the influence of its projecting spring to draw the door more closely into sealing engagement with the opposed wall of the cabinet.

The structural details illustrated and described may obviously be varied within considerable limits without exceeding the scope of the invention as defined in the following claims.

I claim:

1. In a refrigerator latch, the combination of an elongated slide housing adapted to be mounted in vertical position upon the inner face of a door wall, a reciprocatory slide member disposed within said housing, a handle adapted to be disposed upon the outer face of the door and provided with a projection extending through the door wall into said housing, a socket fixed to the door wall and in which said projection is mounted for universal movement, an arm carried by said projection in operative relation to said slide, a latch mechanism housing carried by said slide housing near the lower end thereof and remote from said operating arm, a bell crank lever operable by said slide, a latch bolt pivotally mounted in said latch mechanism housing, a spring normally urging said latch bolt into projected position, and mechanism interposed between said latch bolt and said bell crank lever whereby said latch bolt is retracted upon manipulation of said handle.

2. In a refrigerator latch mechanism, the combination of a socket adapted to be mounted upon a door wall, a handle having a head provided with a projection mounted for universal movement within said socket and extending therethrough, an arm carried by said projection, a spring for yieldingly retaining said handle in normal position, a slide housing adapted to be mounted upon the inside of the door wall, a reciprocatory slide mounted in said housing with the upper end thereof in cooperative relation with said arm, a bell crank lever connected with the lower end of said slide, a latch mechanism housing projecting from said slide housing in proximity to said bell crank lever, a latch bolt pivotally mounted in said latch mechanism housing, a spring urging said latch bolt into projected position, and mechanism between said latch bolt and said bell crank lever whereby said latch bolt is retracted upon manipulation of said handle.

3. In a latch mechanism, the combination of a housing adapted to be mounted upon the inner face of a door wall, a pivotally mounted latch bolt mounted within said housing, a spring for projecting the holding end of said latch bolt outwardly of said housing into cooperative relation with a strike to latch the door in closed position, a bell crank lever in said housing, a link connecting said bolt with said lever, a second bell crank lever mounted to operate said first lever, a slide connected to said second lever to operate the same, an arm for actuating said slide, and a handle carrying said arm, said handle being mounted for rotative and tilting movements to retract said latch bolt through the cooperative action of said slide, bell crank levers and link.

4. In a latch mechanism, the combination of a slide housing adapted to be mounted on a door, a latch mechanism housing secured to said slide housing, latch mechanism within said housing comprising a pivotally mounted latch bolt, a bell crank lever, a link connecting said bolt and lever and a spring for projecting said bolt, a reciprocatory slide in said slide housing, a bell crank lever operable thereby to actuate said first

mentioned bell crank lever, an arm for actuating said slide, and a universally mounted handle to which said arm is connected.

5. In a latch mechanism, the combination of a stationarily mounted semispherical socket, a handle provided with a projection extending through an opening in said socket and having a semispherical shoulder seated in the socket so as to permit universal movement of the handle, an operating arm carried by said projection, a slide operable by said arm upon either rotating or tilting movement of the handle, fixed fulcrum means engageable by an end of said operating arm constraining said arm and its projection to move about said fulcrum upon rotation of said handle, the opening in the socket through which the projection extends being enlarged at one portion thereof to permit movement of the projection therein laterally when said handle is either rotated or tilted, a bell crank lever connected to said slide to be operated thereby, a second bell crank lever mounted to be operated by said first bell crank lever, a pivotally mounted latch bolt, a link connecting said bolt with said second bell crank lever, and a spring for yieldably projecting said latch bolt.

6. In a latch mechanism, the combination of a dished socket adapted to be mounted upon a door, a handle provided with an extension projecting loosely through an opening in the socket and including an arcuate shoulder seated in said socket for universal movement so as to permit universal movement of the handle relatively to the socket, an operating arm carried by the projection, a fixed fulcrum member located at a point near one end of said operating arm, a reciprocatory slide, a spring for maintaining said slide in proximity to said arm, a bolt, and means including a bell crank lever for transmitting movement from said slide to said bolt, said arm being movable in an arc about the center of the socket upon tilting movement of the handle and being rotatable about said fixed fulcrum point near said one end of said operating arm upon rotative movement of said handle, to actuate said slide.

7. In a latch mechanism, the combination of a bolt, a longitudinally movable slide, means disposed between said slide and bolt for actuating said bolt upon longitudinal movement of said slide, a socket adapted to be mounted on a door, a handle provided with a projection extending through said socket and including a shoulder seated in said socket so as to permit universal movement of said handle, a pair of fixed studs mounted in spaced relation, and an arm mounted intermediate its ends on the inner end of said projection between said slide and said studs whereby the slide is actuated by both tilting and rotating movements of said handle in the socket.

8. In a latch mechanism, the combination of a bolt, a longitudinally movable slide, connections through which said bolt is actuated upon movement of the slide, a supporting structure including a parti-spherical socket, the walls of the socket being formed to provide a hollow extension projecting from the bottom of the socket, a handle having a parti-spherical portion seated in said socket and a projection into said socket extension, a pair of stationary studs, and an operating bar mounted on said handle projection and positioned between a portion of the slide and said studs whereby movement of the handle in any direction in said socket is transmitted to said slide.

9. In a latch mechanism, the combination of a retractable bolt, a housing, a longitudinally movable slide carried by said housing, means for retracting said bolt upon longitudinal movement of said slide, and means for effecting longitudinal movement of said slide including a supporting structure comprising a parti-spherical socket having an opening therethrough, a handle provided with a projection extending through said opening and having a parti-spherical portion seated in said socket, a fixed stud carried by said housing and offset from the axis of said projection, and an operating member carried by said projection and interposed between said stud and a portion of said slide, said operating member being arranged to fulcrum upon said stud upon rotative movement of the handle to thereby impart sliding movement to the slide.

10. In a latch mechanism, the combination of a bolt, a slide, operative connections between said bolt and slide, a supporting structure providing a parti-spherical socket and a hollow extension therefrom, a pair of fixedly mounted studs, a handle having a projection extending through said socket and provided with a parti-spherical seating portion seated in said socket, an operating bar mounted intermediate its ends on said handle projection, said bar being positioned between a portion of said slide and said studs, and a spring interposed between said supporting structure and said handle for restoring the handle to normal position.

11. A latch operating means comprising a supporting structure, said supporting structure having a parti-spherical socket and a shank-receiving opening communicating with said socket, a slide supported for rectilinear sliding movement on said supporting structure and having laterally extending flange means at one end thereof, said flange means being disposed to one side of the axis of said shank-receiving opening, a spring disposed upon the opposite side of the axis of said shank-receiving opening arranged to normally urge said flange means in a direction toward said axis, a handle having a parti-spherical end fitting in said socket and a shank projecting from said end of said handle and extending loosely through said shank-receiving opening to permit universal movements of said handle, and an operating arm secured to the inner end of said shank and having slide engaging portions arranged to engage said flange means on the side thereof nearest the axis of said shank-receiving opening, whereby said slide is operated to effect movement of said flange means in a direction farther away from the axis of said shank-receiving opening against the resistance offered by said spring upon either a rotary or tilting movement of said handle.

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