Jan. 31, 1961 W. B. HERMAN 2,969,999

DOOR LATCH

Filed May 28, 1956 2 Sheets-Sheet 1

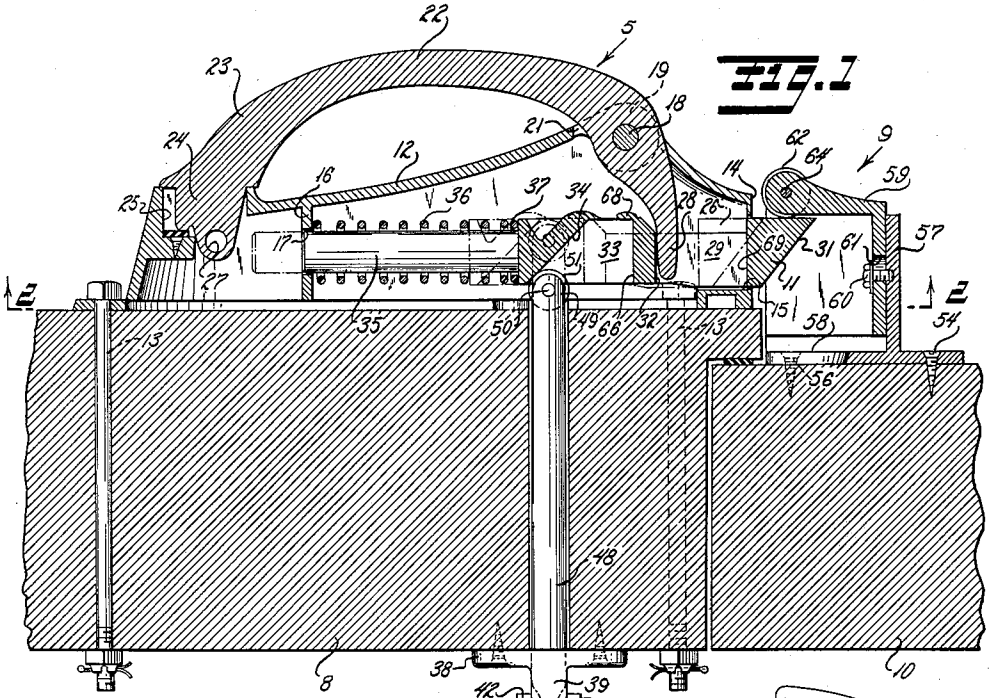


Fig. 1

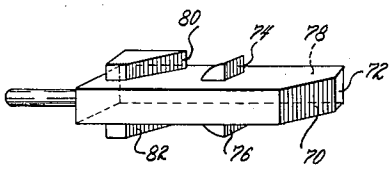


Fig. 4

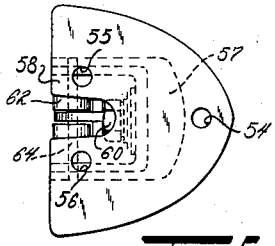


Fig. 5

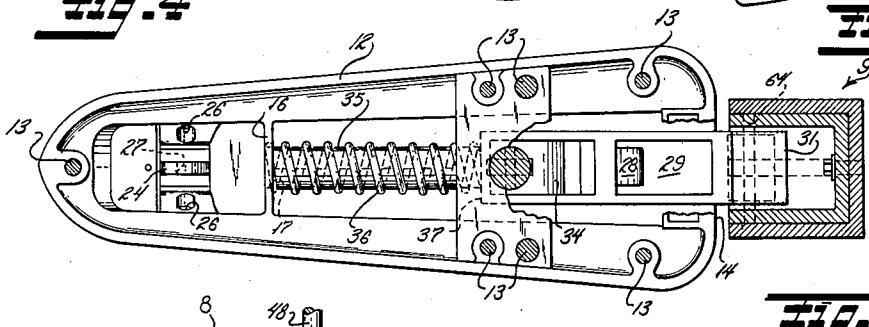


Fig. 2

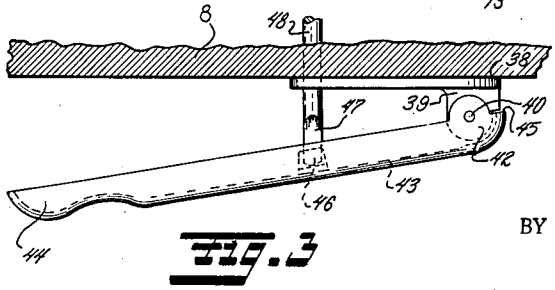


Fig. 3

INVENTOR
WILLIAM B. HERMAN

BY Strauch, Nolan & Diggins
ATTORNEYS

Jan. 31, 1961 W. B. HERMAN 2,969,999

DOOR LATCH

Filed May 28, 1956 2 Sheets-Sheet 2

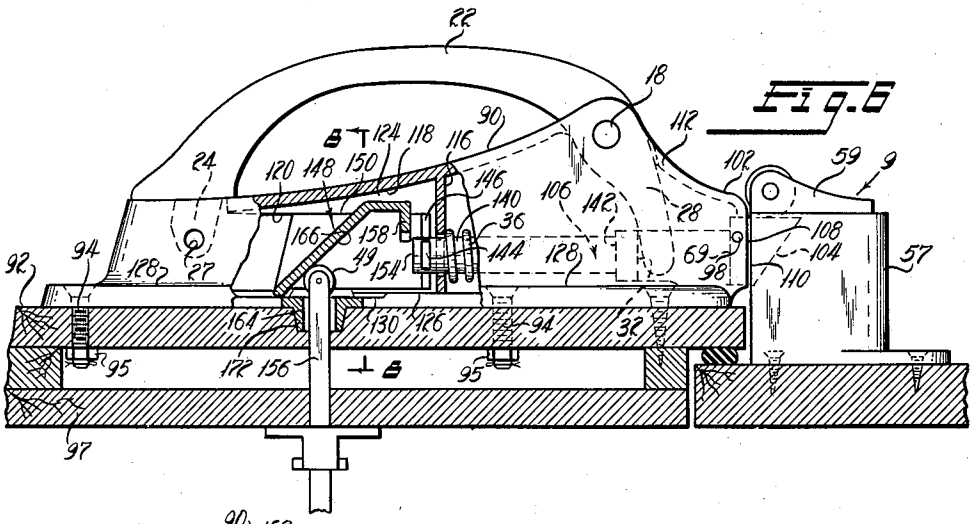


Fig. 6

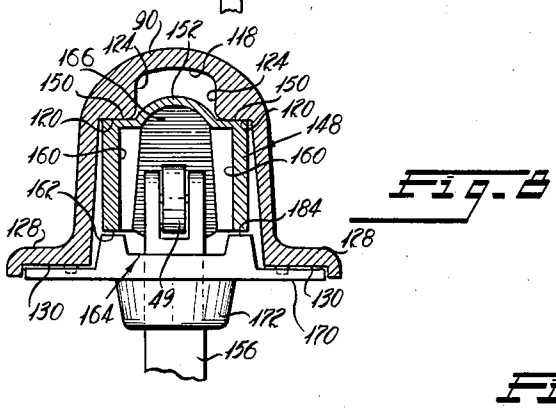


Fig. 8

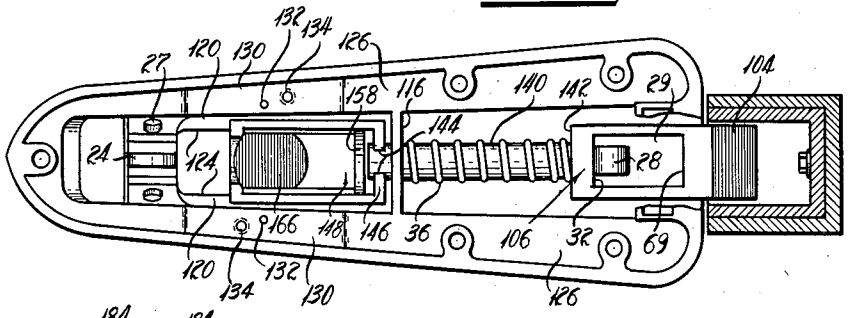


Fig. 7

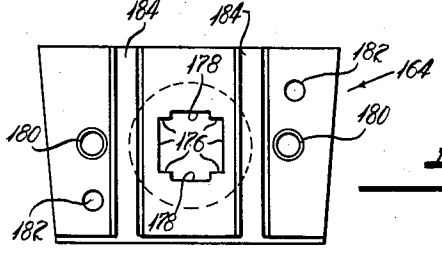


Fig. 9

INVENTOR
WILLIAM B. HERMAN

BY Strauch, Nolan & Neale

ATTORNEYS

United States Patent Office 2,969,999 Patented Jan. 31, 1961

2,969,999

DOOR LATCH

William B. Herman, Fullerton, Pa., assignor to The Dent Hardware Company, Fullerton, Pa., a corporation of Pennsylvania

Filed May 28, 1956, Ser. No. 587,534

18 Claims. (Cl. 292—92)

This invention relates to door locks and more particularly to a lock specifically adapted for use on heavy doors of substantial thickness as used in cold storage chambers and other enclosures where access is controlled to prevent unauthorized removal of stored material.

The present application is a continuation-in-part of my copending application Serial No. 418,299, filed March 24, 1954, now abandoned, for refrigerator fastener or latch.

In walk-in-type refrigerators as well as other enclosures where thick walls and particularly thick doors are required, special heavy-duty types of door latches are in use. It is highly desirable that the door latches be actuated from outside the enclosure by a pulling action which opens the heavy door and by a pushing movement from the inside of the enclosure which also opens the door, even though the outside door handle is locked. It is additionally required in hospitals where drugs are stored and in research laboratories where radio-active material is used to provide a door lock of this type which is burglar proof at least to the extent that any unauthorized entry can be promptly detected. Thus the latch and keeper housings must be rugged and secured against removal from door and door jamb respectively when the door is closed and the latch locked.

It is a principal object of the present invention to provide a door latch extremely simple in operation and construction which provides all of the above described features at relatively low cost.

Another object of this invention is to provide a walk-in refrigerator door lock of simple inexpensive construction that may be opened from the inside by means operating directly on the bolt element even though locked against access from the outside.

A further object of this invention is to provide a lock having a slidably mounted bolt with two independently operating means to provide the same retractile movement to the bolt.

Still another object is to provide a lock of the type described so constructed that a spring biased bolt cannot be retracted by a pen knife or other small tools and wherein the bolt housing and keeper are non-removable from the outer surface of the enclosure when the door is closed and locked.

A further object of this invention is to provide a novel two piece latch bolt which simplifies assembly and manufacture of the lock and is adapted through simple novelly related abutment surfaces thereon to provide a latch bolt that may be readily retracted from the inside of the door even though the operating handle on the outside of the door is locked.

Another important object of this invention resides in the provision of a novel keeper immovable from the door jamb when the door is closed with the bolt in locked position, and which in combination with the bolt housing provides a burglar proof lock.

A further object of this invention resides in providing a keeper bracket adjustably but non-rotatably mounted in the keeper housing.

These and other objects of the invention will become more fully apparent from the following detailed description read in reference to the appended claims and the accompanying drawings wherein:

Figure 1 is a sectional view through a door lock made in accordance with one embodiment of the present invention and mounted in assembled relation on a walk-in-refrigerator door;

Figure 2 is a rear elevational view of the door lock of Figure 1 and a sectional view through the keeper;

Figure 3 is a side elevational view on a reduced scale illustrating the inside door handle and its mounting plate;

Figure 4 is a pictorial view illustrating a modified latch element made in accordance with the principles of this invention;

Figure 5 is a rear elevational view of the novel keeper in accordance with my invention;

Figure 6 is a partial sectional view through a second and preferred embodiment of door lock made in accordance with my invention and mounted in assembled relation on a door;

Figure 7 is a rear elevational view of the door lock of Figure 6, except with the bearing plate removed, and a sectional view through the keeper;

Figure 8 is a view along line 8—8 of Figure 6; and

Figure 9 is a view of a bearing plate used in the embodiment of the invention shown in Figures 6 and 7.

Referring to Figure 1, the refrigerator lock 5 of the present invention is disclosed mounted upon a door 8 of a walk-in-refrigerator and includes a keeper 9 mounted in position on door jamb 10 for cooperation with the latch element or bolt 11 of the refrigerator door lock 5.

Door lock 5 of the present invention comprises a housing 12 of generally elongated hollow form adapted to be mounted on the outside of the door 8 by bolt assemblies 13 which preferably include castellated nuts held in position by cotter pins or the like to prevent removal of the lock when the door is closed. Housing 12 at the end adjacent keeper 9 has an end wall 14 having an opening 15 therein for slidably receiving one end of the novel latch element 11 of the present invention and adjacent its other end is provided with a transversely extending wall 16 suitably apertured at 17 to slidably receive and guide the opposite end portion of latch element 11. As clearly seen in Figure 1, housing 12 adjacent the keeper end is provided with a transversely extending pivot pin 18 supported in generally circular bosses or ears 19 depending from the top wall of housing 12 at opposite sides of an opening 21 in the top wall provided to receive the mounting portion of an outside latch operating handle 22 pivoted on pin 18. Pivot pin 18 is knurled and has a force fit to be frictionally held in ears 19. Handle 22 is preferably curved from end to end and the end opposite the portion pivoted on pin 18 is provided with an enlarged head section 23 on the outside of a right angularly extending locking rib 24. Rib 24 extends inwardly of housing 12 through a second opening 25 provided in the top wall of housing 12. Opening 25 at opposite sides of rib 24 is provided with transversely aligned openings 26 shown in Figure 2 and a similar aligned opening 27 is provided in rib 24. These

aligned openings 26 and 27 provide passages adapted to receive the locking staple of an ordinary padlock in well known manner.

Handle 22 at the portion mounted on pin 18 is provided with an arm 28 extending inwardly from pin 18 toward the rear face of the housing 12 and lies in an axially extending slot 29 formed in latch element 11 in axially spaced relation from the nose 31 of latch element 11. As clearly seen in Figure 1, the end of slot 29 remote from nose end 31 is formed by an abutment surface 32 normally engaged by arm 28 when the latch element 11 is in its "home" position in keeper 9. Latch element 11 adjacent the end of slot 29 formed by abutment surface 32 is provided with a second axially extending slot 33, the end of which remote from abutment surface 32 is formed as an inclined cam surface 34 generally paralleling the inclined surface of nose portion 31 for a purpose to be presently pointed out.

Beyond slot 33, latch element 11 is reduced in diameter to provide cylindrical extension 35 which is slidably received in the opening 17 of wall 16. In order to normally retain latch element 11 in its projected latching position, a coil expansion spring 36 is mounted in encircling relation to extension 35 of the latch element with its ends respectively abutting wall 16 and shoulder 37 formed by the junction of cylindrical extension 35 with the square body portion of latch element 11. The extension 35 together with the forward or nose portion of latch element 11 guides the latch element in its axial movement between latched and unlatched position. While any desired means may be provided to prevent latch element 11 from rotating in housing 6, the present invention preferably accomplishes this by making the nose portion and the main body portion of the latch element of square cross-section to fit in opening 15 which is also square.

In order that the refrigerator lock of the present invention may be operated from the inner side of the refrigerator door 8 the present invention contemplates a mounting plate 38 adapted to be mounted on the inside of the refrigerator door opposite inclined cam surface 34 of latch 11 and to provide a mounting projection 39 for supporting a pivot pin 40. The opposite ends of pin 40 extend into spaced ears 41 and 42 on handle 43 which fit on opposite sides of projection 39. Handle 43 extends from pivot pin 40 generally along the inside of door 8 and ends in an enlarged hand engaging portion 44 as clearly shown in Figure 3.

The inside of handle 43 is generally hollow and at the end adjacent pivot pin 40 a flat surface 45 is formed thereon to abut against a mating surface extending from mounting plate 38 so as to limit movement of handle 43 in one direction around pin 40 as shown in Figure 3.

Spaced intermediate the ends of handle 43 is a U-shaped projection 46. Fitting between the leg portions of the U-shaped projection 46 is a flattened end portion 47 of a latch operating plunger or rod 48. Rod 48 extends through aligned apertures in mounting plate 38 and door 8 and has a pair of spaced ears 49 on the end extending into the latch opening 33. Mounted between the spaced ears 49 is pin 50 about which a cylindrically shaped roller 51 is rotatably mounted for engaging cam surface 34. In order to prevent rod 48 from rotating about its axis, flattened end portion 47 of rod 48 is made only slightly narrower than the space between the opposed inner surfaces of U-shaped portion 46 on inside door handle 43.

Another feature of my invention is the keeper 9 and the novel means by which it is fastened to door jamb 10 by screws 54, 55 and 56, as shown in Figures 1 and 5. Screw holes 55 and 56 are located on a flange 58 which extends inwardly from the outside of the keeper housing 57. The flange 58, as well as the entire keeper 9 is adapted to be mounted on the outside surface of the door jamb, with the axis of the holes 55 and 56 being perpendicular to the axis of the latch 11 when the door is closed. The keeper 9 according to my invention includes a keeper bracket 59 removably secured to keeper housing 57 by cap screw 60 which fits through an elongated slot 61 in bracket 59 and into a tapped hole in housing 57. Bracket 59 may have as a striker surface one or more rollers 62 mounted for rotation on pin 64 supported in the outer edges of the bracket.

To mount the keeper housing 57 on the door, the keeper bracket 59 is removed by removing cap screw 60. Screws 54, 55 and 56 may then be put in place. Then with the door opened and the latch out of the way the keeper bracket 59 is secured in position by cap screw 60. The axis of cap screw 60 is parallel to the axis of the latch or bolt when door 8 is closed. Slot 61 in keeper bracket 59 has its major axis horizontal for a vertically hinged door to permit adjustment in a direction perpendicular to the surface of the door frame 10 of the closed position of the door. The mating surfaces between the keeper bracket 59 and the keeper housing 58 may have grooves and projections that fit in one another which extend normal to the major axis of the slot to prevent the bracket 59 from sliding with respect to the housing 58 during ordinary operation of the door.

In operation, the latch is retracted so that the door may be opened from the outside of the refrigerator by pulling on handle 22. Handle 22 pivots about pivot pin 18 thereby forcing arm 28 against abutment surface 32 and causing latch 11 to move against the bias of spring 36. The inside handle 43 is in a free condition when the latch 11 is retracted by the outside handle 22 due to slot 33 since there is no restraining force biasing the inside handle from one position to another. Roller 51 on rod 48 does not affect movement of the latch in this case because it extends into slot 33 which is sufficiently long so that end surface 66 of slot 33 does not contact roller 51 or rod 48 when the latch is retracted as shown in the dash and dot line position.

To open the door from the inside of the refrigerator, handle 43 may be pushed toward the door by pressing against hand engaging portion 44. The handle 43 then pivots about pivot pin 40 with U-shaped projection 46 pushing rod 48 toward inclined cam surface 34. Since rod 48 is mounted for axial movement only, the latch 11 is retracted by roller 51 rolling along the inclined cam surface 34. The slope of the inclined cam surface must have a component parallel to the axis of the latch 11 at least as great as the axial movement required to release the latch from the keeper. This condition can be realized by making cam surface 34 substantially parallel to nose portion 31. Surface 68 projects along the outer edge of the latch adjacent the end of inclined cam surface 34 to prevent roller 51 from traveling beyond the end of cam surface 34.

The slot 29 into which arm 28 extends must be made sufficiently long so that end surface 69 in its retracted position as shown in dotted lines does not contact arm 28 of handle 22 when the latch is retracted. The retraction of the latch by the inside handle 43, therefore, may be effected regardless of whether or not handle 22 is locked to housing 12.

It is obvious that the principles of this invention could be embodied in many other forms. Figure 4 for example shows a modification of a latch which could be incorporated in a lock of this type utilizing the principles of this invention. The nose portion of the latch may be a curved surface instead of a planar surface as shown in Figure 1 and, if desired, may contain a small portion 72 perpendicular to the axis of the latch. The abutment surfaces 74 and 76 may extend outwardly from the body of the latch to cooperate with a two pronged arm which functions in a manner similar to arm 28 in Figure 1 to retract the latch. An alternative arrangement may provide a single surface such as surface 74 on an outer back surface 78 of the latch to cooperate with a single arm shorter than the one shown at 28 in Figure 1. The in-

clined cam surfaces 80 and 82 may also project outwardly from one or more surfaces of the latch and the rod 48 of Figure 1 could be modified accordingly to cooperate with these surfaces. The outwardly projecting surfaces as illustrated at 74, 76, 80 or 82 could be used to retract the latch from one side of the door and the slot as shown in the preferred embodiment in Figures 1–3 used to retract the latch of the other side of the door. In such an event it is possible to eliminate the longitudinal spacing along the axis of the latch of the two abutting surfaces which independently retract the latch where desired.

Referring now to Figure 6, there is illustrated a further and widely preferred embodiment of my invention which utilizes the keeper 9 as shown in Figures 1, 2 and 5 but which has a slightly modified and greatly improved latch assembly. In this embodiment, latch housing 90 is substantially the same as housing 12 except for the elements specifically discussed below and is shown non-removably secured to outer surface 92 of the door by bolts 94 having nuts 95 arranged to be non-removable from the outer door face 92. In actual practice, latch housing 90 is frequently fastened to the door before complete fabrication of the door as a further precautionary measure taken to prevent unauthorized removal of the latch housing.

The nose portion 102 of housing 90 through which the keeper end 104 of bolt 106 passes has forward end edges 108 which are shaped so as to be as closely positioned to opposed edges 110 on keeper housing 57 and keeper bracket 59 as possible without cousing interference with opening and shutting of the door. Nose portion 104 on bolt 106 extends into keeper 9 so that the entire sloping surface 104 is made inaccessible to a thin knife or similar tool by edges 110 on the keeper assembly thereby obviating one means by which prior bolts have been retracted to permit unauthoribed entry without visible damage to the door lock.

Though pin 18 can be removed even after assembly, handle 22 in either of the described embodiments cannot be removed from the housing when a lock staple is present in aperture 27 of the handle and housing because of the shape of arm 28 and covering portion 112 of housing 90. Thus when handle 22 is locked and the door closed neither latch housing 90 nor keeper 9 can be removed from the door or door jamb respectively. The walls of housing 90 are made of cast metal having a thickness of at least a quarter inch to completely enclose the bolt or latch element 106 to assure there is no access to the bolt. Unauthorized entrance is thus completely prevented unless time is taken to break the parts and thus leave visible evidence.

The interior of housing 90 differs from that shown in Figure 1 in that the transverse partition 116 is at a position approximately centrally located in the interior recess of the housing. In the region between partition 116 and head 24 of handle 22, there is provided on interior surface 118 of the housing parallel spaced guide surfaces 120. Surfaces 120 are formed as shoulders in the cast housing walls with side walls 124 blending into surface 118 as best shown in Figure 8. On lower surface 126 (see Figures 6 and 7) of flange 128 extending along each side of housing 90, there is provided elongated bosses 130 formed with positioning projection knobs 132 and blind holes 134 tapped for receiving suitable screw fasteners, not shown.

The latch element or bolt 106 adjacent nose end 104 is substantially as described in the embodiment shown in Figures 1–3 and contains the same rectangular opening 29 having abutment surface 32 and end surface 69. Behind abutment surface 32 is a section 140 having a reduced diameter thereby providing a shoulder 142 near abutment surface 32. The rearward end of round section 140 extends through an aperture in housing partition 116 and is formed with a pair of parallel grooves 144 for receiving complementary spaced end members 146 on a separate tail piece 148 forming part of the bolt. Helical spring 36 is compressed between partition 116 and shoulder 142 to bias the bolt to its illustrated position.

Tail piece 148, shown in Figures 6, 7 and 8 is formed with upper bearing surfaces 150, best shown in Figures 6 and 8, which during operation slide along guide surfaces 120 on housing 90. Centrally located between surfaces 150 a raised section 152 is provided near end surface 154 on section 140 of the bolt to permit roller 49 on push rod 156 to move toward surface 118 a distance adequate to fully retract the bolt. Partition 158 extends between side walls 160 to prevent excessive retractile displacement of bolt 106 by push rod 156 and to strengthen the tail piece at the position adjacent end members 146. End surfaces 162 on side walls 160 are adapted for sliding movement along bearing plate 164 discussed below.

Between side walls 160, tail piece 148 near its rearward end is provided with an inclined cam surface 166 along which roller 49 contacts during movement of push rod 156 while imparting retracting movement to the bolt. Bearing surfaces 150 on opposite sides of tail piece 148 are quite large thereby distributing the force applied to push rod 156 over a large area to give the latch a long life before replacement of parts is required. Since spaced end members 146 on the tail piece are free to slide in grooves 144 on bolt 106 in the direction of movement of push rod 156, none of the force applied by push rod 156 normal to the direction of movement of the bolt causes wear in the nose portion 102 of the housing or on partition 116. It should be noted that tail piece 148 during retractile movement does not interfere with handle 22 even when locked. Moreover, cam surface 166 and push rod 156 are positioned sufficiently far from the door jamb to eliminate all interference between the inside door handle and the door jamb. With the relatively close location of the push rod to the door edge as shown in the embodiment in Figures 1 through 3, interference resulted in some installations and special hardware for left and right hand opening doors was required which is obviated by the arrangement of parts of the embodiment shown in Figures 6 through 9.

A further feature found to be highly desirable is the use of bearing plate 164 (see Figures 6, 8 and 9) on the open side of the recessed housing interior. Bearing plate 164 is formed with a flat surface 170 on one side and preferably contains a centrally projecting boss 172 which extends into the door face along the hole provided for push rod 156. Boss 172 is provided with a double rectangular through opening best shown in Figure 9 with surfaces 176 guiding the rectangular push rod 156 axially and preventing axial rotation of the push rod and malfunction of roller 49 on cam surface 166. Surfaces 178 are recessed to permit roller 49 to be inserted through bearing plate 164 after its assembly on housing 90.

Bearing plate 164 is provided with tapered apertures 180 which receive projection knobs 132 on boss 130 of the housing. Suitable fastening means, such as flat headed screws not shown, extend through apertures 182 in the bearing plate into threaded apertures 134 in the housing. A pair of spaced flat topped ridges 184 are provided on opposite sides of the aperture through boss 172 along which surfaces 162 on tail piece 148 are adapted to slide to loosely hold the tail piece in the housing.

Another advantage of the improved latch shown in Figures 6 through 9 is the ease of assembly in large quantities. The preferred method of assembly is to place helical spring 36 in approximate position and insert the reduced diameter section 140 of the bolt through the aperture at nose portion 102 of the housing and the spring. The bolt is pushed against the bias of spring 36 to any position where tail piece 148 can be dropped into connected position thereby assuring, when

the pressure on bolt 106 is released, expansion of spring 36 will resiliently hold the two part bolt from falling out of position by abutment of end members 146 of the tail piece against partition 116. Final assembly of handle 22 on the housing can be made at a later time, whereas in the embodiment disclosed in Figures 1 through 3, the bolt had to be placed into and manually held in position against the bias of spring 36 while jockeying handle 22 into position for assembly of pin 18.

Bearing plate 164 is next preferably secured into position on boss 130 prior to assembly of handle 22. To insert arm 28 of handle 22 in opening 29, latch 106 is forced against the bias of spring 36 approximately an eighth inch thereby spacing tail piece 148 from partion 116. This results in easy removal of tail piece 148 from housing 90 in the absence of bearing plate 164. Pin 18 is then positioned through housing 90 and handle 22 with arm 28 then controlling the keeper engaging position of the bolt.

In operation, handle 22 pivots about pin 18 to retract nose portion 104 of the bolt from keeper 9. The door is hinged to be opened outwardly by the same pulling movement required for retracting the bolt. Retraction of bolt 106 causes tail piece 148 to slide rearwardly and push rod 156 is unaffected.

To retract the bolt from the interior side of the door, a pushing force is applied to push rod 156 as by means of handle 43 shown in Figure 3. Push rod 156 is guided for axial movement through the door forcing roller 49 to engage sloping cam surface 166 of tail piece 148. Push rod 156 is guided by bearing plate 164 and more specifically by surfaces 176 of the aperture in boss 172 thereby reducing wear on the opening surrounding push rod 156 through the door. The axial force along push rod 156 acts on bearings surfaces 120 of housing and 150 of the tail piece and only an axial movement is transmitted to the forward section of the bolt.

The retractile movement of the bolt is thus the same irerspective of which handle is used and the inside handle can be used regardless of whether the outside handle is locked. Complex and expensive mechanisms interiorly of housing 90 are avoided as large tolerances may be used on all parts of the latch mechanism.

As a further feature the nose portion of housing 90 is provided with a through aperture 98 which is positioned so that a nail or similar rigid rod may be inserted to hold bolt 106 in a retracted position. This is particularly useful when continuous opening and closing of the door is required and it is desired to eliminate the necessity of retracting the bolt each time the door is opened.

There is thus provided by the present invention a door lock for large walk-in type doors such for example as used on walk-in-refrigerators in which the bolt is retracted from either side of the door by the same movement necessary for actual opening of the door and which is burglar proof from the outside when locked yet which can be opened from the inside even though locked. The structure involved is relatively simple and the complicated mechanisms are avoided thus providing a lock inexpensive to manufacture and assemble.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Patent is:

1. In a door latch including a housing adapted to be mounted on one side of a door and enclosing a bolt mounted for sliding movement in a direction substantially parallel to said one side of the door, said bolt having a first portion adjacent the keeper end of the bolt and an inclined surface on a second portion remote from keeper end of said bolt, spring means mounted between said housing and said bolt to bias said bolt in a door locking position, a pull handle mounted on said housing engaging said first portion of said bolt for imparting retractile movement thereto and for providing an opening force for said door, and means adapted to be mounted on the other side of said door including a push rod mounted for axial sliding movement through said door at an angle in the range of 90° with the direction of retractile movement of said bolt and having one end in an abutting relation with said inclined surface whereby a pushing force on said push rod from said other side of the door provides an opening force for said door and causes axial movement of said push rod against said inclined surface for imparting retractile movement to said bolt, said first portion of said bolt and said handle being so interconnected as to permit independent retractile movement of said bolt by said push rod even when said handle is locked in its non-opened position.

2. The door latch defined in claim 1 wherein the bolt is constructed of one integral part.

3. The door latch as defined in claim 1 wherein said spring means comprises a helical spring in axial alignment with the axis of said bolt and compressed between said first portion of said bolt and said housing, and said second portion of said bolt is axially positioned beyond said spring from the keeper end of said bolt.

4. In a door latch having a housing adapted to be mounted on one face of a door, fastening means nonremovable from said one face for securing said housing to said one face, a spring biased bolt mounted in said housing for sliding movement substantially parallel to said one face, bolt engaging means mounted for movement on said housing to impart retractile sliding movement to said bolt, means for locking said bolt engaging means to said housing, a recess in the side of the bolt facing said one face of the door, said recess having as one end surface a cam surface angularly inclined with respect to the longitudinal axis of said bolt and extending in the direction of the longitudinal axis of the bolt a distance at least as great as the displacement of said bolt during retractile sliding movement thereof, means adapted to be mounted on the face opposite said one face of the door including a rigid bolt actuating member mounted for sliding movement through said door in a direction substantially normal to the direction of sliding movement of said bolt and having one end abutting said cam surface and so formed as to provide a low friction connection whereby pushing movement of said rigid member toward said cam surface imparts direct retractile sliding movement to said bolt independently of movement of said bolt engaging means.

5. In a door lock having a housing adapted to be mounted on one face of the door, a spring biased bolt mounted in said housing for sliding movement substantially parallel to said one face, bolt releasing means mounted for movement on said housing to impart retractile sliding movement to said bolt, means for locking said bolt releasing means against movement on said housing, said bolt having a recess facing said one face of the door and formed with a cam surface angularly inclined with respect to the longitudinal axis of said bolt and extending in the direction of the longitudinal axis of the bolt a distance at least as great as the displacement of said bolt during retractile sliding movement thereof, a bolt retracting mechanism adapted to be mounted on the face opposite said one face of the door and including a handle mounted for movement about a pivot axis having body engaging means at one end remote from said axis and a rigid bolt actuating member mounted for axial movement through said door toward said cam surface in a direction substantially normal to the direc-

tion of the sliding movement of said bolt, said bolt actuating member having a roller secured to its end opposing said cam surface for rolling movement along said cam surface whereby pushing movement of said rigid bolt actuating member imparts retractile sliding movement to the bolt independently of said bolt releasing means.

6. A door lock as defined in claim 5 wherein said rigid bolt actuating member and said handle are formed with complementary surfaces preventing rotation of said latch and roller about the longitudinal axis of said rigid latch actuating member.

7. A door latch comprising in combination a housing having a base adapted to be secured to the outswinging side of a door, a bolt mounted for retractile movement in said housing, a pull handle exteriorly of said housing and associated with said bolt for imparting retractile movement to said bolt and an opening force to the door upon receiving a pulling force and so arranged as to permit independent retractile movement of said bolt, spring means mounted between said housing and said bolt for normally biasing said bolt to a keeper engaging position, an inclined surface on said bolt having a component of displacement in the direction of retractile movement of said bolt at least equal to the displacement required to release the bolt from the keeper, a push rod adapted to be mounted for axial movement through said door in a direction angularly related to the direction of movement of said bolt and having an end surface abuttingly cooperating with said inclined surface for imparting retractile movement to said bolt upon actuation and permitting independent retractile movement of said bolt by said pull handle, and body engaging means adjacent the other end of said push rod for receiving a pushing motion to actuate said push rod and to open said door.

8. The door latch as defined in claim 7 wherein said end surface on the push rod comprises a roller journalled on said push rod for engaging said inclined surface.

9. The door latch as defined in claim 7 together with a bearing plate secured to the base of said housing for guiding said bolt in its movement and having an aperture through which the push rod extends.

10. The door latch as defined in claim 9 wherein the bearing plate is removably replaceably secured to the housing base.

11. In a refrigerator door latch having an exteriorly closed housing adapted to be mounted on one face of a door and having a recessed interior opening toward said one face with a bolt aperture at one end, a cross partition generally centrally located in said recessed interior with a second bolt aperture paralleling the bolt aperture of said one end, a bolt in said recessed interior and mounted for sliding movement in said apertures and containing a shoulder spaced from said partition in the direction of said housing aperture, a helical spring positioned around said bolt between said partition and said shoulder, a bolt tail piece removably connected to said bolt on the other side of said partition and having a bearing surface abutting against said housing to guide said tail piece for relative sliding movement in the direction of retractile movement of said bolt, said tail piece containing an inclined surface effective to provide a cam surface for imparting retractile movement to said bolt by a force applied perpendicularly to the direction of retractile movement of said bolt.

12. The door latch as defined in claim 11 wherein one end of the bolt extends through said partition aperture and is grooved on opposite sides, and said tail piece has inwardly extending flanges fitting in said grooves for connecting said tail piece to said bolt.

13. The door latch as defined in claim 11 together with an apertured bearing plate secured to said housing to provide a cover for said interior recess in the area of said tailpiece and retain the tailpiece in operative position after assembly.

14. The door latch as defined in claim 13 wherein the retracting force is applied to said inclined surface by a push rod mounted for axial movement through the aperture in said bearing plate.

15. The door latch as defined in claim 14 wherein the push rod and the aperture in said bearing plate have complimentary non-circular cross sections to prevent rotation of the push rod.

16. In a walk-in-refrigerator type door latch having a latch housing securable, when locked, against removal from the exterior of the door and including a pull handle for actuating the latch bolt from the exterior side of said door and a push rod for actuating said latch bolt from the interior side of said door, a latch bolt assembly and mounting comprising a hollow open sided housing having an end face apertured to receive and pass the nose end of the bolt from said housing to a position to engage a mating keeper, a cross-partition depending from said internal housing wall and spaced away from said end face along the longitudinal axis of said latch bolt and provided with an aperture to receive and pass the other end of said bolt, and guide formations on said internal housing wall beyond said cross-partition; a latch bolt tailpiece removably connected to the other end of said latch bolt and guided for movement in said guide formations; and a coil expansion spring surrounding a position of said latch bolt extending from said partition toward said housing end face with one end abutting said partition and the other end abutting a portion of said latch bolt to retain said bolt and said tail piece in said housing prior to final assembly of said pull handle and in normal operation to bias said latch bolt to its keeper engaging position; an abutment surface on said latch bolt cooperating with said pull handle so as to overcome said spring bias and effect retractile movement of said latch bolt and tailpiece upon pulling movement of said pull handle; and a push rod receiving recess in said tailpiece including a cam surface formed by a wall of said tailpiece sloping inwardly from the periphery of said tailpiece in a direction toward said other latch bolt end for cooperating with said push rod to overcome said spring bias and effect retractile movement of latch bolt and tailpiece independently of said pull handle.

17. The latch bolt assembly and mounting of claim 16 wherein the open side of said housing adjacent said guide formations is provided with laterally spaced, elongated bosses and a bearing plate spanning the space between said bosses is removably secured to said bosses to provide a tailpiece retainer and slide surface and a push rod support adjacent said cam surface.

18. In a door latch including a housing adapted to be mounted on one side of a door and enclosing a bolt mounted for sliding movement in a direction substantially parallel to said one side of the door, said bolt comprising successively a first portion adjacent the keeper end of the bolt, a reduced diameter section and an inclined surface on a second portion remote from the keeper end of said bolt and removably secured to the reduced diameter section, spring means on said reduced diameter section mounted between said housing and said bolt to bias said bolt in a door locking position, a handle mounted on said housing engaging said first portion of said bolt for imparting retractile movement thereto, and means adapted to be mounted on the other side of said door including a push rod mounted for axial sliding movement through said door at an angle in the range of 90° with the direction of retractile movement of said bolt and having one end in an abutting relation with said inclined surface whereby a pushing force on said push rod from said other side of the door causes axial movement of said push rod against said inclined

surface for imparting independent retractile movement to said bolt.

References Cited in the file of this patent

UNITED STATES PATENTS

305,294	Corn	Sept. 16, 1884
361,922	Brabson	Apr. 26, 1887
659,887	Crouch	Oct. 16, 1900
1,004,690	Russell	Oct. 3, 1911
1,115,005	Mortenson	Oct. 27, 1914
1,215,649	Gruber	Feb. 13, 1917
1,368,711	Foley	Feb. 15, 1921
2,007,854	Grill	July 9, 1935
2,019,408	Grill	Oct. 29, 1935
2,074,979	Brantingson	Mar. 23, 1937
2,103,989	Machinist	Dec. 28, 1937
2,174,987	Lickteig	Oct. 3, 1939
2,201,444	Marsh	May 21, 1940
2,415,587	Groeger	Feb. 11, 1947
2,655,395	Groeger	Oct. 13, 1953
2,680,638	Groeger	June 8, 1954

FOREIGN PATENTS

175,957	Switzerland	July 1, 1935