June 29, 1948. L. L. ANDERSON 2,444,180

LATCH

Filed May 28, 1945

2 Sheets-Sheet 1

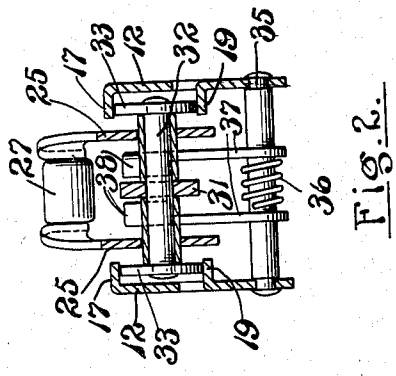


Fig. 2.

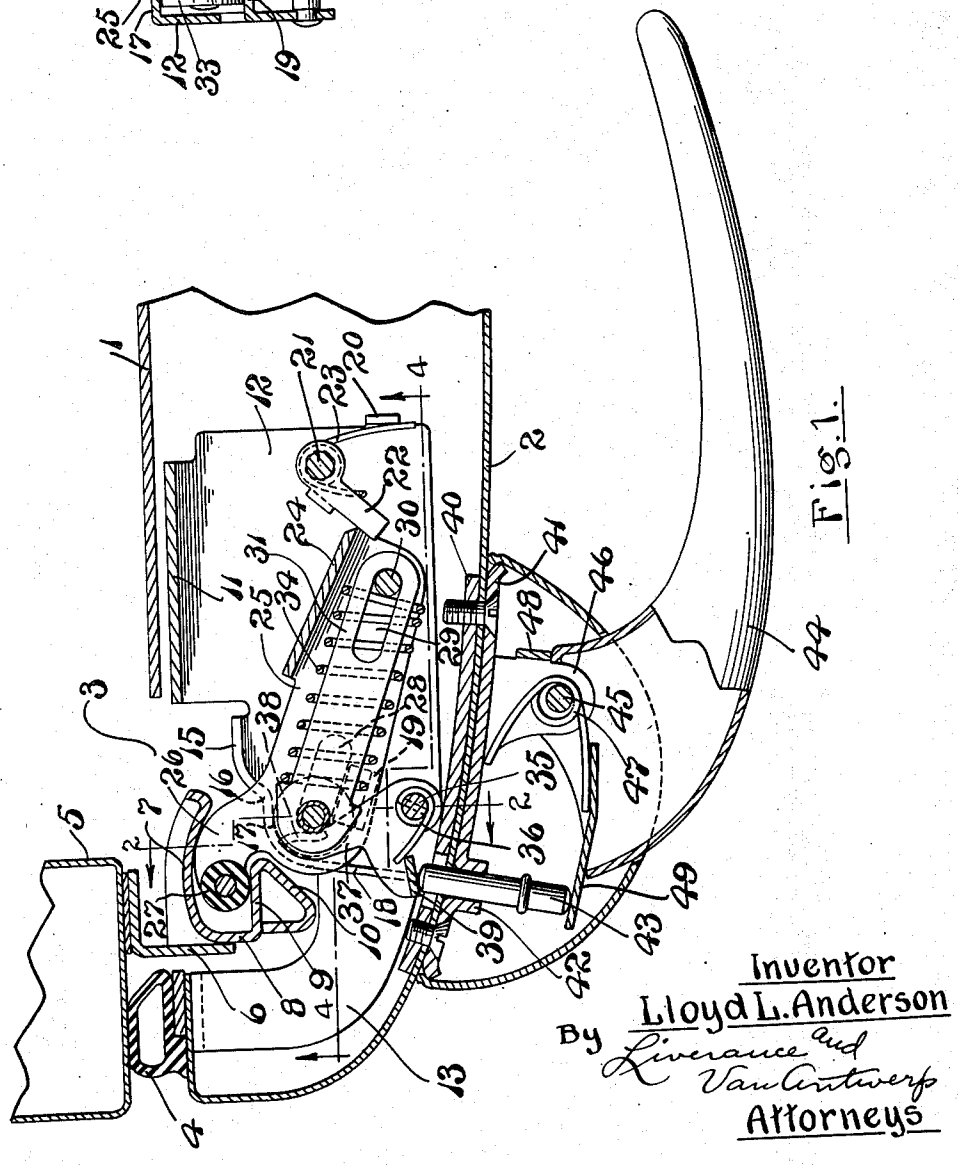


Fig. 1.

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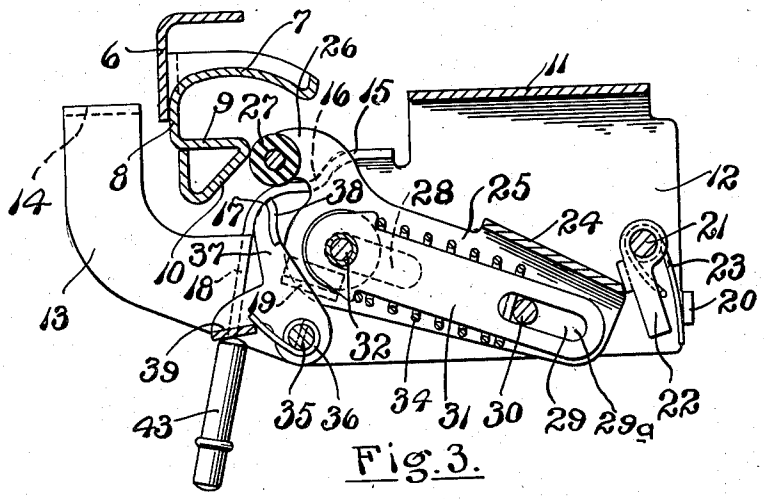



Fig. 3.

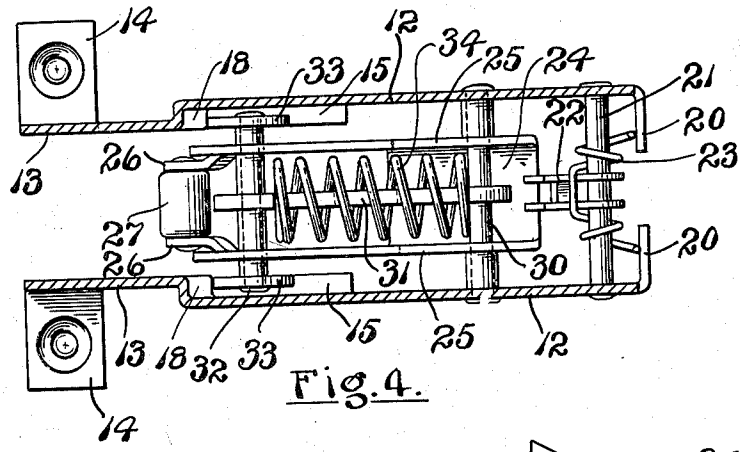



Fig. 4.

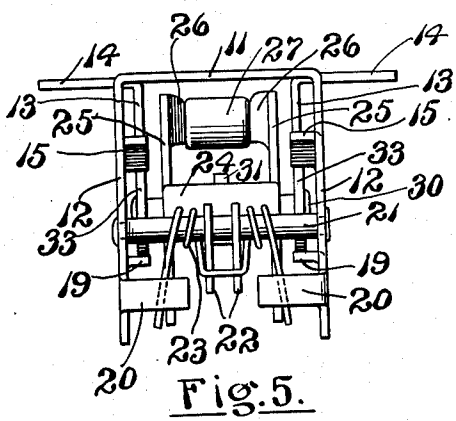



Fig. 5.

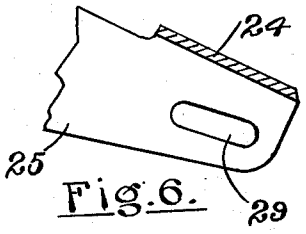



Fig. 6.

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# UNITED STATES PATENT OFFICE

2,444,180

## LATCH

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Application May 28, 1945, Serial No. 596,165

9 Claims. (Cl. 292—332)

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I have heretofore filed applications for patent, one of which has Ser. No. 547,374 for Refrigerator latch mechanism filed July 31, 1944, now Patent No. 2,440,162, dated April 20, 1948. The construction disclosed in said application provides for the effective closing and tight sealing of a refrigerator door better than heretofore accomplished, and with a closing of the door by a light pressure and an accomplishment of more effectively overcoming the gasket resistance to door closing, which gasket is compressed and its resistance progressively increased as the door approaches and finally reaches its closed position.

Such latch structure and other modifications which have been filed attaining the same end, is normally held in a cocked position when the door is open, being tripped upon closing the door for the latch bolt, which is pivotally mounted, to engage with the keeper on the refrigerator casing. However, if the latch should become tripped with the door open and through inadvertence an attempt made to close the door, the latch bolt strikes against the outer side of the keeper and does not close the door, the latch bolt having to be moved by a handle operation to the cocked position before the door can be closed.

The present invention has for its object and purpose a simple yet effective remedy for the condition described. In the present invention if the latch bolt is inadvertently or otherwise released from its cocked position when the door is open, on closing the door the latch bolt will be automatically retracted to pass by the keeper and engage with it at the inner side, the door thus being readily closed under such conditions, and there is no liability of damage to the bolt or the keeper as might occur upon an attempted closure of the door out of cocked position in the latch of my application above identified. Furthermore in the present latch construction all of the advantages accruing from the latch structure of such identified application are retained.

An understanding of the invention may be had from the following description taken in connection with the accompanying drawings in which,

Fig. 1 is a fragmentary horizontal section through a door and associated door casing, with the latch and keeper mounted respectively thereon, illustrating the latch of this invention when it is in a closed position engaging with the keeper.

Fig. 2 is a transverse section through the latch substantially on the plane of line 2—2 of Fig. 1 in the direction indicated.

Fig. 3 is a longitudinal section through the latch showing the position occupied by the parts when, from an uncocked position with the door open, the latch has engaged the keeper and has been retracted to pass around the nose portion of the keeper to the inner side thereof.

Fig. 4 is a longitudinal transverse section through the latch substantially on the plane of line 4—4 of Fig. 1 looking in the direction indicated.

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Fig. 5 is an inner end elevation of the latch, and

Fig. 6 is a fragmentary longitudinal section through the pivotally and slidably mounted end portion of the latch bolt.

Like reference characters refer to like parts in the different figures of the drawings.

The present invention is disclosed as embodied in the structure of latch illustrated in my prior filed application above identified. The latch bolt and the support therefor is concealed within the hinged door of the refrigerator adjacent its free vertical edge, said door having an inner side 1 and an outer side 2 with an opening or passage 3 at the inner side into which the keeper mounted on the door casing enters in its engagement with the latch bolt. The usual gasket 4 of rubber or like cushioning material is mounted adjacent the edges of the door at its inner side to press against the adjacent face portions of the refrigerator casing when the door is closed (Fig. 1).

The door casing 5 at the proper position has a keeper mounted thereon including an angle mounting bracket 6, one leg secured to the casing and the other extending outwardly therefrom, and to said outwardly extending leg the keeper proper is secured, having an inner strike 7 of a somewhat arcuate shape as shown in Fig. 1, from which a flange 8 extends outwardly and is bent at right angles to make a shelf 9 spaced from the strike portions 7 and substantially parallel to the face of the casing 5. The shelf 9 is continued and bent to extend at an angle of substantially 45° outwardly therefrom, providing a cam section 10, and is then bent back for its end to engage against the shelf 9.

The latch structure which is housed and concealed within the door includes a support housing of flat metal, having a connecting web 11 between two spaced apart sides 12 which, near the outer edge of the door, are continued in spaced arms 13 and extending to the inner sides of the door and secured thereto by means of screws or other suitable fastenings passing through oppositely extending ears 14 at the ends of said arms 13 (Fig. 4). Opposite the opening 3 at the inner side 1 of the door the sides 12 of said support are provided with flanges extending inwardly toward each other and shaped each with the curved section 15, a reverse bend 16, and a second curved section 17, the flanges being continued in tangential sections 18 from the curved sections 17. This is structure identical with that disclosed in my prior filed application and is used for the same purposes. Each side 12 at a distance outwardly from the flange sections 16 and 17 has a short inwardly extending shelf 19 struck

therefrom, the shelves on the two sides 12 lying in the same plane (Fig. 2). At the inner ends of the sides 12 integral fingers 20 are turned toward each other (Fig. 5). Inwardly of said fingers a rod 21 extends between and is secured at its ends to said sides 12 of the support. An arm 22 is pivotally mounted at one end on the rod and is normally actuated by a spring 23 around rod 21 engaging with arm 22 and the fingers 20, the action of the spring being to tend to turn the arm in a clockwise direction (Fig. 1).

The latch bolt disposed between the sides 12 of the support is also of sheet metal and of a similar channel-like form, having an inner web 24 from which integral spaced sides 25 are bent outwardly parallel to each other, each at its outer end being continued in arms 26 pressed toward each other (Fig. 4) between which is a keeper engaging roller 27. Said sides 25 of the latch bolt near their outer ends are each provided with a longitudinal slot 28 and near their inner ends with an alined longitudinal slot 29. A rod 30 extends through the slots 29 and at its ends is securely connected with the sides 12 of the bolt support previously described.

A flat bar 31 is located lengthwise of and between the sides 25 of the bolt, at its inner end having a slot 29a (Fig. 3) through which the rod 30 passes. At its outer end, or what may be termed its free end, a rod or shaft 32 passes through the bar and through the slots 28 in the sides 25 of the latch bolt, at each end reaching nearly to the opposite sides 12 of the bolt support, carrying at each end a roller 33 adapted to ride at the inner sides of the ledges 19 (Fig. 2) and bear against the flanges 15 and 17 and pass around the connecting bends 16 between them. The bar 31 at its outer or free end has shoulders against which one end of a coil spring 34 through which the bar passes bears, the other end thereof bearing against the pin 30. The arm 22 actuated by the spring 23 normally bears against the rear end of the web 24 as shown in Fig. 1.

A rod 35 extends between the sides 12 of the support outwardly of the ledges 19, associated with which is a spring 36 having an arm to engage with a bell crank 37. The bell crank is formed from sheet metal and has two spaced apart sides (see Fig. 2) which extend at the outer side of the rod 32, and are provided with shoes 38 at their free ends to bear against the sleeves through which the rod passes, as shown in Fig. 2. The two sides of the bell crank are connected by a cross connecting portion 39 (Fig. 1), the spring 36 engaging thereagainst and normally turning the bell crank in a counterclockwise direction.

At the inner side of the outer member 2 of the door a plate 40 is located. Directly opposite on the outer side of said door part 2 a second plate 41 is located, the two plates being connected by suitable screws as shown. The outer plate 41 is provided with an outwardly pressed sleeve guide 42 for the passage of a cylindrical pin 43, the inner end of which bears against the ledge at 39. The pin is pressed inwardly by a manual operation of handle 44 mounted on a pivot pin 45 which is carried by a supporting bracket having sides 46 either integral with or connected to the plate 41. The handle is normally held by a light spring 47 in the position shown in Fig. 1, in which position it is stopped by the stops shown at 48 extending between the bracket arms 46. The handle has a ledge 49 extending to and bearing against the outer end of pin 43.



Normally, when the door is open, the rollers 33 are pressed by the spring 34 against the flanges 15, the latch under such condition being cocked ready for tripping upon a striking of the free end portion of the latch bolt against the strike 7 when the door is closed. Under such normal actuation of the latch, the latch bolt turns only about the axis of the pin 30 and has no longitudinal or sliding movement with respect to it. In opening the door, on pulling outwardly on the handle 44, the inner longitudinal movement given to the pin 43 turns the bell crank 37 in a clockwise direction, retracting the bar 31 against the spring 34 and moving the rollers 33, thereby permitting a swinging of the latch bolt 25 about pin 30 in a clockwise direction and a simultaneous opening of the door. The roller 27 in such swinging movements and accompanying the opening of the door moves to the right (Fig. 1) beyond the ledge 9 against which it has been pressed. It is also evident that in closing the door, tripping the bolt swings it in a counter-clockwise direction about the pin 30 and the rollers 33 follow around the bend 16 into engagement with the curved flange sections 17 with a wedging action progressively increasing in force occurring as the rollers traverse from the point of the bend 16 to their eventual seating against the curved flanges 17, so that the pressure force against the gasket 4 is increased overcoming increased resistance of the gasket against compression as the door more and more approaches its completely closed position. Such operation and action of the latch bolt and the desirable results coming therefrom are fully described in my prior application.

When, as occurs at times, the latch bolt becomes uncocked with the door in open position and the rollers have disengaged from the flanges 15 and come into engagement with the flanges 17, upon closing the door the roller 27 strikes and rides against the inclined cam 10. A component of the force is directed laterally moving the entire latch bolt assembly longitudinally upon the rods 30 and 32 until the roller 27 may pass around the nose of the keeper to within the ledge or shelf 9. In Fig. 3, a position of the parts is shown immediately before the roller 27 has thus reached the inner side of the ledge 9. The arm 22 is swung counter-clockwise by the longitudinal movement of the latch bolt to the position shown in Fig. 3. And as soon as the roller 27 passes within the inner side of said ledge 9, the bolt is spring returned to its normal position and engages with the keeper as in Fig. 1.

The construction described is practical and operative, having all of the advantages of tight closure of the door without needing to use an unduly strong spring with the latch, and further providing for automatic closure of the door whether or not the latch is in cocked or uncocked position. The latch is economical to produce, simple, practical and durable in construction and upon test has proved very satisfactory in all respects.

The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. A latch structure comprising a housing having spaced apart sides connected at one edge by a cross web, a latch bolt pivotally and slidably mounted on and located between the sides of the housing, spring means including a bar pivotally and slidably mounted on the same pivot as the latch bolt, said latch bolt and bar having slid-

ible connections for relative longitudinal movement of one with respect to the other, means carried by said bar and cooperating means on said housing whereby when the latch bolt is swung about said pivot it is held in a cocked retracted position in one position thereof, and in another position is swung about said pivot and said bar moved longitudinally relatively to the latch bolt, and a spring actuated member acting upon said latch bolt for normally holding it in extended position but yieldable to permit longitudinal movement of said latch bolt, as and for the purposes specified.

2. In a latch structure, a housing having parallel spaced sides, a latch bolt located between the sides of said housing and a pivot rod carried by the housing, said latch bolt being slotted toward its inner end the rod passing therethrough whereby the latch bolt may be pivotally moved about the pivot or moved longitudinally thereon, the opposite end of the latch bolt having a keeper engaging element thereon, a spring actuated movable member bearing against the inner end of the latch bolt for normally holding it in a position in which said rod passes through said slot at its inner end, a spring actuated slotted bar carried by said latch bolt, said bar being similarly slotted for the passage of said rod therethrough, spring means bearing against said rod and acting on said bar tending to move the bar in the same direction as the latch bolt is moved by the first mentioned spring means, cooperating means carried by said bar and by said housing whereby the spring means actuating the bar is compressed and the latch bolt is held in a cocked position when swung in one direction about the axis of said rod and is released when the latch bolt is swung away from said cocked position, said latch bolt and bar having means providing relative longitudinal movement of one with respect to the other, and said latch bolt being longitudinally movable against said spring actuated member upon pressure against said keeper engaging element exerted in the direction of the length of the latch bolt.

3. A latch structure comprising, a housing having spaced apart sides connected at one edge by a transverse web, the edges of said housing sides being continued beyond the web outwardly thereof as straight flanges for a short distance and then curved and extending at an angle away from said web a short distance and then reversely curved and extending in the arc of a circle, a rod located between the sides of the housing toward the inner ends thereof, a latch bolt having spaced apart sides connected at one side by a transverse web, each side of said latch bolt having two spaced apart alined slots, said rod extending through the innermost of said slots, a keeper engaging element at the free outer end of the latch bolt, a bar having a longitudinal slot at its inner end through which said rod passes, a second rod passing through said bar at its opposite free end and through the outer slots in the sides of the bolt, rollers mounted on said second rod bearing against the flanges on the sides of said housing, a coiled compression spring located around said bar and bearing at one end against the first mentioned rod, and engaging at its opposite end with said bar, an arm pivotally mounted on and located between the sides of the housing



back of the inner end of the latch bolt, and spring means actuating said arm to press against the inner end of the latch bolt.

4. A latch structure as defined in claim 3, combined with manually operable means movable into engagement with said second mentioned rod for moving the bar against the spring means acting thereon longitudinally to retract, and move it from the second mentioned curved portions of said flanges into engagement with the first portions thereof and about the axis of the first mentioned rod.

5. A pivotally and slidably mounted latch bolt, said latch bolt having a free end, a support on which said latch bolt is pivotally and slidably mounted, yielding means holding the latch bolt against sliding movement in one position in which it may turn about its pivot, cooperating means carried by the latch bolt and said support for releasably holding the latch bolt in a cocked position, said latch bolt in said cocked position being adapted to strike against a fixed member to move the latch bolt from cocked position and to bring the free end of the latch bolt into connection with a keeper, said latch bolt when in uncocked position and disengaged from the keeper being slidably movable in the direction of its length.

6. A latch structure comprising a casing, a latch bolt mounted for both sliding and pivotal movement on said casing and having a swinging end, spring means for sliding said latch bolt to extended position, a cam shaped track on said casing, a spring actuated member slidably connected to said latch bolt near its swinging end, a cam follower on said spring actuated member engageable with said cam shaped track, said track being shaped to guide said spring pressed member to swing said latch bolt in latching direction.

7. The elements of claim 6 in which said track also has a contour to retain said spring thrust member in position to hold said latch bolt in cocked position.

8. A latch structure comprising a casing, a pivot rod on said casing, a latch bolt having a longitudinal slot in its inner end to receive said rod whereby said latch bolt is both pivotally and slidably mounted, a bar longitudinally slidably connected with said latch bolt near its forward end and having a longitudinal slot near its inner end to receive said pivot rod, a cam track on said casing, a cam follower at the forward end of said bar and a spring acting to thrust said cam follower against said cam track.

9. The elements of claim 8 combined with spring means independent of said first spring acting to thrust said latch bolt outwardly and manual means for retracting said bar against action of said first spring.

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