

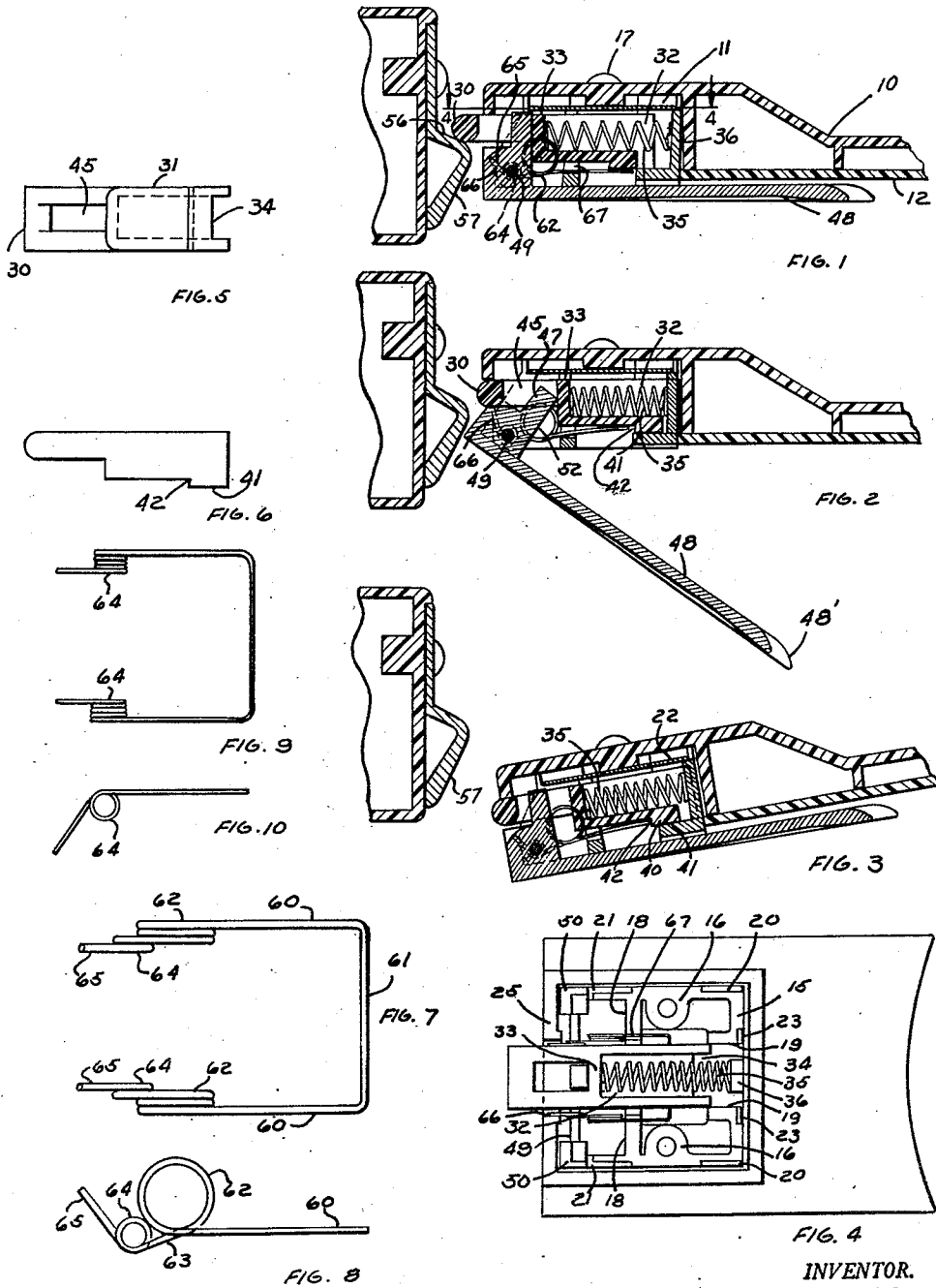
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DOOR LOCK

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DOOR LOCK

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This invention relates to spring door latches and more particularly to a latch of the class which holds the door securely in a closed position and which, upon opening the door, is cocked so that when it is closed it is automatically released to securely hold the door closed.

Under certain conditions it is desirable to provide a door which is held in a closed position by a spring latch and wherein such latch, during the opening, is automatically cocked so that it may be closed with a relatively small effort. Such latches are particularly useful in connection with the doors for closing the openings in refrigerator cabinets.

Although a great many latches have been provided to perform this function they are usually of a relatively large and complicated construction. As a matter of fact, they are so large that in certain places, such as the inner doors of refrigerators, their use is prohibited.

By my present invention I have provided a latch mechanism which embodies a minimum number of operating parts and which may be made relatively small as compared with the prior art and still provides ample holding power for the purpose for which they are intended.

Another disadvantage of the prior latches resides in the fact that the mechanism employed required a door of considerable thickness due to the combinations of complicated springs and levers. The latch of the present invention may be used on relatively thin doors which is particularly desirable when the door happens to be a door closing a freezing locker inside of a refrigerator.

In the drawings:

Fig. 1, is a medial sectional view through a latch mechanism and a portion of a door to which it is attached, and showing a portion of a strike mechanism in position;

Fig. 2, is a similar view showing the position taken by the parts when the door is being opened;

Fig. 3, is a view showing the position the parts take after the door has been opened and the handle released;

Fig. 4, is a view taken from the line 4—4 of Fig. 1;

Fig. 5, is a plan view of the latch removed from the assembly;

Fig. 6, is a side elevational view thereof;

Figs. 7 and 8 are plan and side elevational views of a spring used for operating the same; and

Figs. 9 and 10 are plan and side elevational views of a modified form of a spring for use in a latch of the invention.

Briefly, the latch concludes a housing adapted to be secured to the refrigerator door in which is slidably disposed a bolt or latch and an operating lever which moves the bolt to unlatch the same, together with a spring cocking means for holding the bolt in an open position and operable upon closing the door to release the bolt so that it holds the door closed. The door is illustrated at 10 and is preferably provided with a recess at 11 shaped to receive the latch proper so that the handle may be substantially flush with the surface 12 of the door.

The latch proper includes a rectangular housing 15 which is provided with a pair of bosses 16 into which

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screws 17 may be threaded after passing through openings in the door to hold the housing securely to the door. The housing is preferably made of a die cast metal and therefore may be cored in various manners in the interest of saving material. Functionally, however, it is provided with guideways for the reception of the bolt which comprise bosses 18 spaced from the open edge and bosses 19 at the rear edge, the inner faces of the bosses being in alignment to provide a channel therebetween in which the bolt is slidably disposed. At the rear corners of the housing there are provided rectangular flanges 20, and, at the front, L-shaped flanges 21 for the reception of a keeper plate 22. This plate is seated between the flanges and also abuts the lugs at the rear 23 holding the parts in place and protecting the assembled mechanism from contact with the door.

As previously stated, the bolt is slidable in the guideways described through the open front edge 25. The bolt includes a striker engaging portion 30 and is slidably disposed in the guideways. As viewed in Fig. 1, the upper side of the bolt is provided with a recess 32 of rectangular formation, one end of which is closed by a wall 33 and the other end 34 of which is open.

A helical spring 35 engages with the wall 33 and with an abutment 36 on the rear of the housing and pushes the bolt outwardly. Opposite to the recess 32 the bolt is provided with a boss 40 which rides on a surface 41 of the housing, the forward section of the boss being undercut at 42. This undercut portion extends transversely completely across the boss, as can best be seen in Fig. 5.

Forwardly of the wall 33 the bolt is provided with a rectangular opening 45, the limits of which are defined by the strike engaging portion 30 and the wall 33. This opening is adapted to receive a tongue 47 of the operating lever or handle 48 which is pivotally supported on a pin 49, which pin is journaled in bosses 50 on the outer corners of the housing.

As can be seen from the figures, the spring 35 urges the bolt outward, the limits of the outward movement being determined by the perpendicular surface 52 on the projection 47. When the handle 48 is swung about the pivot 49 the bolt is forced rearwardly against the pressure of the spring 35.

A strike is provided and includes a holding surface 56 and a cam surface 57. In the position shown in Fig. 1, the bolt is engaged with the surface 56 which is inclined at a more acute angle than the surface 57 and since the pressure of the spring 35 upon the bolt is in an outward direction, the angle of this surface is such as to hold the door tightly closed. When it is desired to open the door the handle is grasped by the operating end 48' and rotated to the position shown in Fig. 2, wherein the bolt is retracted by the arm or tongue 47 against the pressure of the spring 35. The bolt may be retracted sufficiently for it to be out of contact with the apex of the strike so that the door may be opened freely without the bolt touching the strike when the handle is in the position shown in Fig. 2.

As previously stated, it is desirable in a device of this character to provide a latch where the bolt is operated by spring means in such a manner that its action, together with the strike, holds the door resiliently closed. Preferably, means should also be supplied whereby, when the door is opened, the bolt is moved to a cocked position where it remains while the door is open, but, is released by engagement with the strike upon closing the door to reinstate the effect of the original spring holding means.

In the present invention, the foregoing is effected by the use of a spring which performs the dual function of moving the handle to a closed position and which operates as a sear in conjunction with the bolt to hold it in the cocked position.

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The spring, as best shown in Figs. 7 and 8, and comprises a U-shaped body having the side arms 60 the ends at one end being connected by a bight 61. The arms 60 each connect to an enlarged helical spring portion 62 comprised of three loops forming the helix and then continues by a short arm 63 to a single loop helix 64, one end of which terminates in a stub arm 65. It will be appreciated that if the stubs 65 are held and the arms 60 moved, that the greatest bending will occur in the larger loop 62 and the less bending in the loop 64 because the loops 62 are more resilient than the smaller loops 64. The loops 64 are disposed about the pivot pin 49 with the arms 65 engaging a slanting surface 66 on the handle 48. The larger loops 62 extend alongside the latch, as can best be seen in Fig. 4, and the bight 61 extends opposite to the latch surface defined by the boss 40 and opposite to the spring recess 42. The walls 18, the inner surfaces of which guide the bolt, are provided with notches 67 in which the arms 60 of the spring engage, the point of engagement being close to the loops 62.

In the closed position, as shown in Fig. 1, the arms 60 bear against the bottoms of the notches 67 in the walls 18 and the helices 64 are disposed around the pivot pin 49 with the arms 65 engaging the abutment on the handle to retain the handle closed. In this position, as can best be seen in Fig. 1, the bight extends under the latch out of contact therewith. At this time the spring 61-65 is merely holding the handle in its closed position. The coil spring 35 is holding the latch in the door holding position against the striker surface 56.

When the handle is moved to the position shown in Fig. 2, the arm 47 of the handle moves the bolt backwards, compressing the spring 35, and the surface 66 on the handle rotates the short stub arm 65 about the pivot 49. This causes the parts 63 to rotate. As previously pointed out, the helices 62 bend easier than the helices 64. Therefore, since the arms 60 are supported by their engagement with abutments 18 there is a pivotal action of the arms 60 at these abutments permitted by the resiliency of the helices 62 of the spring. Therefore, the portion 61 of the spring moves upward against the bottom side 41 of the bolt. Actually this movement would first cause the bight 61 to engage the surface 41, as can be seen from the position it is in, in Fig. 1, and continued movement of the handle would cause the bight 61 of the spring to slide across the surface and finally snap down to the position shown in Fig. 2 opposite to the undercut 42. As previously stated, the latch is now out of engagement with the striker and the door may be opened. Immediately upon release of the handle the spring 35 pushes the bolt outward and the bight 61 engages with the undercut surface 42 of the bolt and holds the bolt against further movement outward. The spring 65 however returns the handle back to the normally closed position, the parts taking the position shown in Fig. 3. The parts are now in the cocked position.

When the door is closed, which would be in a direction towards the cam surface 57 of the strike, this cam surface having a lesser degree of slant than the stop surface 56, relatively small closing pressure upon the door will cause the bolt to be pushed inward against the pressure of the spring 35 and when the door reaches the apex of the strike the inward movement of the bolt is sufficient to cause the undercut portion or sear 42 to release the bight 61 of the spring. The handle being in the position shown in Figs. 1 and 3, the spring 35 now takes over and since the bolt is on the side 56 the door is held securely closed.

If it should be desirable to provide a lock which does not have this cocking feature all that is necessary is to replace the spring shown by a spring having the single helix 64 and without the helices 62, which spring is shown in Fig. 9.

Preferably, the bolt is made of nylon or other suitable plastic material. It will thus be seen that I have provided

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a latch which performs all of the advantages previously described, which is simple and economical to manufacture.

Having thus described my invention and embodiments thereof it will be appreciated that the embodiment described is for the purpose of illustration rather than of limitation, and that numerous and extensive departures may be made therefrom without departing from the spirit or scope of the invention as defined in the appended claims.

I claim:

1. A latch mechanism comprising a bolt, means for slidably holding said bolt and for transferring its holding effort to a door, a handle pivotally connected to the holding means and having a lever arm engageable with said bolt for moving the bolt, spring means engaging the bolt and holding means and moving the bolt outward of the holding means, a second spring means having a portion for engagement with the pivot for the handle and a portion in engagement with the handle for holding the handle resiliently in a closed position, said second spring means having an extension and a portion between the pivot engaging portion and the extension of greater resiliency than the other portions, a second pivot on said bolt holding means for pivotally supporting said extension adjacent the portion of greater resiliency and a spring engaging portion on said bolt for interlocking engagement with said spring extension.

2. A latch mechanism comprising a bolt, means for slidably holding said bolt and for transferring its holding effort to a door, a handle pivotally connected to the holding means and having a lever arm engageable with said bolt for moving the bolt, spring means engaging the bolt and holding means and moving the bolt outward of the holding means, a second spring means having a portion for engagement with the pivot for the handle and a portion in engagement with the handle for holding the handle resiliently in a retracted position, said second spring means having an extension and a portion between the pivot engaging portion and the extension of greater resiliency than the other portions, a second pivot on said bolt holding means for pivotally supporting said extension adjacent the portion of greater resiliency and a spring engaging portion on said bolt for interlocking engagement with said spring extension, said second spring means being formed to normally hold the extension out of contact with the bolt and being bendable about the portion of greater resiliency to tilt the extension into engagement with the bolt, and means for moving the bolt after closing the door to release said second spring means.

3. A latch mechanism for a door comprising a housing, a bolt, said housing being formed with spaced aligned abutments for receiving the bolt slidably therebetween, said bolt being formed with a pocket which is open at one end and a spring disposed in said pocket with one end engaging the bolt and the other end engaging the housing for slidably moving the bolt outwardly of the housing, a strike engaging outer portion on said bolt, a movable operating handle for said bolt, pivot means pivotally connecting the handle to said housing opposite the strike engaging portion of the bolt, said handle having a lever and said bolt being provided with an opening and said lever being disposed in said opening and holding the bolt in the housing against the pressure of said spring and movable to move the bolt inward of the housing, a spring means for holding said lever in a retracted position including a pair of small loop portions disposed on opposite sides of the bolt surrounding said pivot means, said spring means being formed with short arms extending from said loops engaged with said lever at surfaces thereon which provide seats for said short arms, said spring means being formed with portions extending away from said loops in opposite direction to said short arms and having enlarged loops which provide portions of greater resiliency than the small loops disposed alongside said bolt adjacent the small loops and long arms extending from

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said large loops, one pair of said abutments being provided with notches for providing a second pivot for said long arms, said long arms being seated in said notches and extending beyond said abutments opposite to said bolt, said bolt being formed with an undercut shoulder, and said long arms being formed with a connecting bight for engagement with the shoulder, the short arm of said spring means extending from the small loop at an angle relative to the portion connecting the small loop to the large loop of substantially 90° and the long arm extending from the large loop at an angle relative to the connecting portion of less than 180°, said seats for the short arms and for the long arms being positioned so that in the handle retracted position the bight of said spring means is normally out of contact with the bolt, said spring means being bendable at the large loops to pivot the long arms on said second pivot and move the bight into engagement with said undercut shoulder on the bolt, the bolt being movable into engagement with the bight and said bight holding said bolt against further movement by said first-mentioned spring, the bolt being movable to a bight releasing position upon engagement of its outer strike engaging portion with a strike.

4. A latch mechanism for a door comprising a housing, a bolt, said housing being formed with guideways for receiving the bolt slidably therebetween, a spring for said bolt engaging the bolt and the housing for slidably moving the bolt outwardly of the housing, a strike engaging outer portion on said bolt, an operating handle for said bolt, pivot means for connecting the handle pivotally to said housing, said handle having a lever disposed in holding engagement with the bolt against the pressure of said spring, said handle movable to move the bolt inward of the housing, a spring means for holding said lever in a latched closed position including a pair of small loops disposed on said pivot means, said lever being formed with spring engaging surfaces forming seats for said spring means and said spring means being formed with a pair of short arms extending from said small loops engaged with the lever at said surfaces, said spring means being formed with arms extending away from said small loops in opposite direction to said short arms and connected to enlarged loops which provide portions of greater resiliency than the small loops disposed alongside said bolt, means on said housing providing a second pivot for said spring means, said spring means being formed with a pair of long arms seated on said second pivot and extending away from said large loops beyond said guideways opposite to said bolt, said bolt being formed with an undercut shoulder, and said spring means being formed with a bight interconnecting said long arms for engagement with the shoulder, the short arms of said spring means extending from the small loops at an angle relative to the arms connecting the small loops to the large loops of substantially 90°, and the long arms extending from the large loops at an angle relative to the connecting arms of less than 180°, said seats for the short arms and for the long arms being positioned so that in the handle retracted position

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the bight of said spring means is normally out of contact with the bolt, said spring means being bendable at the large loops to pivot the long arms on said second pivot and move the bight into engagement with the bolt, said undercut portion of the bolt being movable into engagement with the bight and said bight holding said bolt against further movement by said first-mentioned spring, the bolt being movable to a bight releasing position upon engagement of its outer strike engaging portion with a strike.

5. A latch mechanism comprising a locking member movable between retracted and extended positions, means resiliently biasing said locking member to its extended position, a manually actuated operating member movable from a first position to a second position to retract said locking member against the urging of said biasing means, and a single spring biasing said operating member to its first position and actuated in response to the manual actuation of said operating member to said second position to engage the retracted locking member and maintain the same retracted, said spring while maintaining the locking member retracted also returning the operating member to its first position when the operating member is manually released.

6. A latch mechanism comprising a housing, a bolt slidable in said housing between retracted and extended positions, first spring means acting between the housing and the bolt to bias the bolt to its extended position, an operating lever pivotally mounted on the housing for movement from a first position in which it extends alongside of the housing to a second position in which it projects out from the housing, said lever having a portion positioned to engage the bolt and retract the bolt against the bias of said first spring means upon movement of the lever from said first position to said second position, and second spring means acting on the lever to bias the lever to said first position, said second spring means having a portion engageable with the bolt which is actuated in response to movement of the lever from said first position to said second position to engage the retracted bolt and maintain the bolt retracted, said first spring means maintaining the retracted bolt in engagement with said portion of the second spring means, and said second means, upon return of the lever from said second position to said first position and movement of the bolt further against the bias of said first spring means, moving out of the path of the bolt to permit the bolt to move to its extended position.

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