July 17, 1951 F. M. HOGG 2,561,201

REFRIGERATOR LATCH

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Fig. 1.

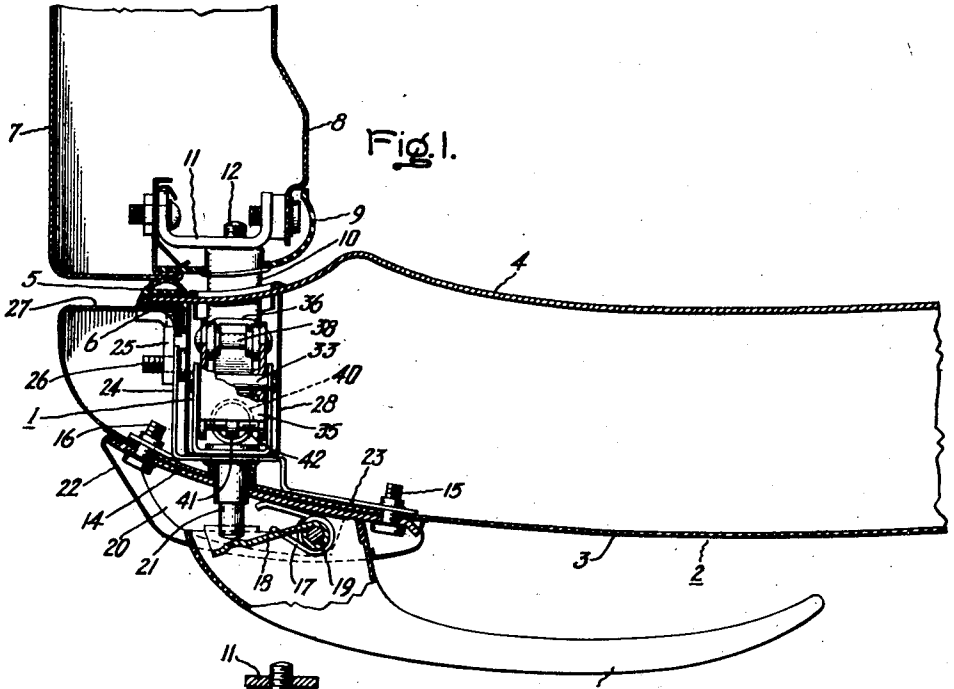


Fig. 2.

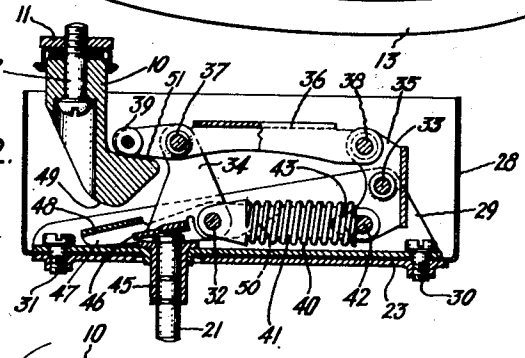
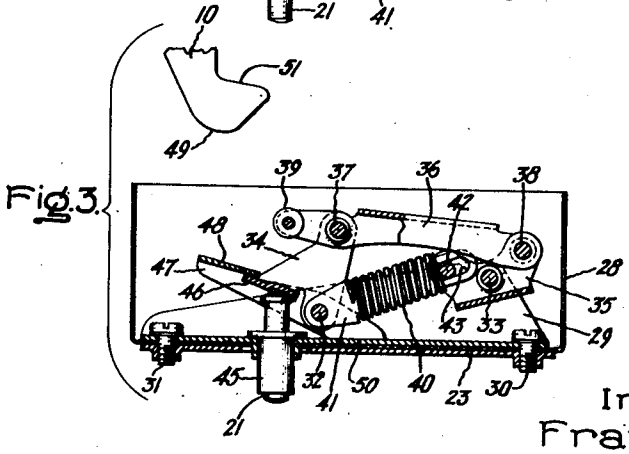


Fig. 3.



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REFRIGERATOR LATCH

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11 Claims. (Cl. 292—332)

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My invention relates to door latches and more particularly to such latches for cabinets such as household refrigerators having relatively heavy doors.

A gasket of rubber or similar resilient material is usually employed on refrigerator doors for sealing purposes. In order to provide an adequate seal, it is desirable to maintain pressure on the gasket. Secondly, it is desirable to avoid the necessity of slamming the refrigerator door to secure sufficient force to effect this seal because of the danger of disturbing the contents of the refrigerator. Both of these requirements may be accomplished with latches which are cocked in the open position and which are automatically tripped by relatively small forces to the latched position when the door is closed.

Accordingly, it is an object of my invention to provide an improved latch of the trip type.

It is another object of my invention to provide a latch including an improved arrangement for maintaining the latch in both its latched and its retracted positions.

Further objects and advantages of my invention will become apparent as the following description proceeds, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

For a better understanding of my invention, reference may be had to the accompanying drawing in which Fig. 1 is a sectional plan view of a door latching mechanism embodying my invention applied to a refrigerator cabinet; Fig. 2 is a vertical sectional view taken along the line 2—2 of Fig. 1; and Fig. 3 is a sectional view similar to Fig. 2 showing the latch in its retracted position.

Briefly, the latching mechanism illustrated in the drawing comprises a latch mounted on the door and arranged to engage a strike mounted on the stationary cabinet structure. The latch bolt is carried by a pair of pivoted links for movement between its latching and its retracted positions. An over-center spring is employed in conjunction with the links for positively holding the latch bolt in either of the above two positions. A trigger or trip member is provided for engaging a strike during the closing movement of the door to move the latch toward its latching position. The latch is constructed so that the latch bolt not only has a generally reciprocating motion substantially parallel to the face of the strike but also a motion in a direction substantially perpendicular to the face of the strike to secure the required gasket pressure.

Referring now to Fig. 1, the latch 1 is mounted within a refrigerator door 2 near the edge thereof. The door 2 comprises an outer wall 3 and an inner wall 4, the space between the outer and the inner walls being filled with suitable heat insulating material (not shown).

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A resilient gasket 5 is provided for sealing the refrigerator cabinet, a flange 6 of the gasket being positioned between the inner and the outer walls of the door. The refrigerator cabinet comprises an outer wall 7 and an inner wall 8, the space between the walls being filled with suitable heat insulating material (not shown). A breaker strip 9 of heat insulating material is provided for closing the space between the inner and outer walls adjacent the door opening of the refrigerator. The gasket 5 is pressed between the door and the outer wall of the cabinet in the closed position of the door.

A strike 10 is mounted on the cabinet for engagement with the latch 1. A mounting bracket 11 is secured between the inner and outer walls of the cabinet, and the strike is supported on the bracket 11 by a screw 12 or any other suitable fastening device. In order to move the latch from its latching position, a handle 13 is provided on the door 2. The handle mechanism includes a base plate 14 which is secured to the outer wall 3 of the refrigerator door by screws 15 and 16 or by other suitable fastening devices. The handle is biased to the position shown in Fig. 1 by a spring 17 which presses against a cross-piece 18 of the handle. The spring 17 is coiled about a pin 19 which is mounted on two outwardly extending lugs, one of which is shown at 20; these lugs are secured to or may be integral with the base plate 14. When the handle is moved outwardly from the refrigerator door the cross-piece 18 of the handle engages a plunger 21 and presses the plunger inwardly to actuate the latching mechanism. An escutcheon 22 is provided for concealing the base of the handle and the plunger and for giving a finished appearance to the front of the door. The escutcheon is hooked under the left edge of the base plate 14 and is snapped under the outwardly extending right edge of the plate 14.

A bracket 23 is provided for mounting the latch securely within the refrigerator door. This bracket is secured to the inner side of the outer wall of the refrigerator door by the screws 15 and 16. An inwardly extending portion 24 of the mounting bracket 23 is secured to a lug 25 by a screw 26 or other suitable fastening means, and the lug is secured by welding or in any other suitable manner to an inwardly extending flange 27 of the outer wall of the refrigerator door. In order to prevent the heat insulating material between the inner and outer walls of the door from working into the moving parts of the latch, an enclosure 28 of heat-insulating material is arranged to substantially surround the latch.

Referring now to Fig. 2, the latch includes a supporting structure or bracket 29 which is of generally U-shaped cross-section. The bracket 29 is secured to the mounting bracket 23 by screws

30 and 31 or by other suitable fastening devices. In order properly to position the moving parts of the latch mechanism two fixed pivot pins 32 and 33 are provided extending between the two sides of the U-shaped supporting bracket 29 and being mounted thereon. A U-shaped link 34 is pivotally mounted for rotation about the pin 32. A second link 35, also U-shaped, is mounted on pin 33 for rotation thereabout. In order to retain the door in its closed position, a latch bolt 36 is carried by the two links 34 and 35 by pins 37 and 38 respectively, which extend between the two sides of the U-shaped links. The latch bolt 36 is of channel shape, and a roller 39 is mounted at one end of the latch bolt in order to facilitate movement of the latch bolt when in contact with the strike 10. The latch bolt is moved forcibly to its latching position and to its retracted position and the bolt is maintained in either of these positions by an over-center spring 40. The over-center spring 40 further provides force for firmly pressing the latch bolt 36 against the face of the strike 10 in order to maintain the gasket 5 under the required sealing pressure. The over-center spring 40 is supported on a connecting link 41 which retains the spring in its movement between its latching and its retracted positions. One end of the connecting link 41 is mounted on the fixed pivot pin 32, and the other end is mounted on a movable pin 42 which extends between the two sides of the U-shaped link 35. This end of the connecting link 41 has an elongated slot 43 for providing the necessary lost motion between the connecting link and the link 35 during the operation of the latch. One end of the over-center spring 40 presses against a shoulder formed on the connecting link 41, and the other end presses against the pin 42.

The plunger 21 is mounted for sliding movement in a tubular conduit 45 which is secured to the supporting structure 29 by welding or in any other suitable manner and extends outwardly through the outer wall of the door, as shown in Fig. 1. The link 34 includes a flat plate portion or cross-piece 46 which is disposed adjacent the inner end of the plunger 21. Movement of the plunger thereby may be utilized to cause a rotational movement of the link 34 for actuating the latch in a manner hereinafter to be described. In order to move the latch from its retracted position there is provided a trigger or trip member 47 having a strike-engaging portion 48 disposed adjacent to a front surface 49 of the strike 10. The strike-engaging portion 48 of the trigger is disposed adjacent the cross-piece 46 of the link 34, so that movement of the trigger may be utilized to effect rotation of the link 34 and operation of the latch. The opposite end of the trigger is formed with a flat surface 50 which is arranged to engage the base of the supporting structure 29 in the retracted position of the latch and thereby limit the movement of the latch under the influence of the over-center spring 40.

The operation of the latch is as follows. The latch is shown in its latching position in Figs. 1 and 2. When it is desired to open the door the handle 13 is moved outwardly from the face of the door causing the cross-piece 18 of the handle to press the plunger inwardly against the cross-piece 46 of the link 34. This causes a clockwise rotation of the link 34 as viewed in Fig. 2, about the pivot pin 32. The rotation of the link 34 causes a movement of the latch bolt 36 upwardly

and to the right because of the engagement of the link 34 with the latch bolt through the pin 37. Since the latch bolt is also in engagement with the link 35 through the pin 38, movement of the link 34 has the additional effect of causing a corresponding clockwise rotation of the link 35. As the movement of the link 35 proceeds, the pin 42 moves the connecting link 41 upwardly toward the position shown in Fig. 3, carrying with it the over-center spring 40. The pin 42 ultimately passes beyond a line extending between the fixed pivot points 32 and 33, allowing the spring 40 to pass over-center, that is, shifting the line of force exerted by the spring to the opposite side of the line extending between the pivot points 32, 33. The over-center movement of the spring 40 results in a rapid clockwise movement of the link 35 completing the movement of the latch bolt 36 to the retracted position shown in Fig. 3. The over-center spring thereafter maintains the latch in the open or retracted position, and the handle may be released and allowed to move back to the position shown in Fig. 1 under the influence of the spring 17 without any effect upon the position of the latch mechanism.

During its clockwise rotation the cross-piece 46 of the link 34 engages the strike-engaging portion 48 of the trigger and moves the trigger in a clockwise direction about the pivot pin 32. As the spring 40 moves over-center to the position shown in Fig. 2, the flat surface 50 of the trigger is moved into engagement with the base of the supporting structure 29 to prevent movement of the latch in the retracted position beyond the position shown in Fig. 3, and the portion 48 of the trigger is positioned for engaging the strike 10 during the closing of the door.

As the door is moved toward its closed position, the portion 48 of the trigger 47 comes into contact with the front surface 49 of the strike 10. Since the portion 48 of the trigger is in engagement with the cross-piece 46 of the link 34, closing pressure on the door causes the link 34 to be moved in a counterclockwise direction from the position shown in Fig. 3. This causes movement of the latch bolt 36 to the left, as viewed in Figs. 2 and 3, and the latch bolt carries with it the link 35, rotating that link in a counterclockwise direction about its pivot point 33. The counterclockwise rotation of the link 35 causes the pin 42 to shift the connecting link 41 downwardly toward the position shown in Fig. 2, the pin 42 moving along the slot 43 in the connecting link. As this movement continues, the pin 42 ultimately passes below a line extending between the fixed pivot points 32 and 33, shifting the spring 40 over center, that is, shifting the line of force exerted by the spring to the opposite side of the line extending between the pivot points 32, 33. The spring 40, in moving over-center, causes a rapid further counterclockwise movement of the link 35. This movement of the link 35 is transmitted to the latch bolt 36 causing a rapid final movement of the latch bolt to the closed position independent to any actuation of the link 34 by the trigger 47. The over-center spring thereby maintains the latch bolt in its latching position and by the force transmitted through the link 35 to the latch bolt, also maintains the proper sealing pressure on the gasket 5.

The maintenance of the proper sealing pressure on the gasket 5 is secured by the particular construction and arrangement of the links 34 and 35. These links are so constructed that the

length of the arm of the link **34** between its fixed pivot point **32** and its connection to the latch bolt at **37** is greater than the length of the arm of the link **35** between its fixed pivot point **33** and its connection to the latch bolt at **38**. By a comparison of Figs. 2 and 3 it can be seen that because of this construction the pin **38** must move through a greater angle than the pin **37**. This results in a substantial decrease in the distance between the pin **38** and a base of the supporting structure **29** in moving from the latching position shown in Fig. 2 to the retracted position shown in Fig. 3. The corresponding movement of the longer arm of the link **34** results in a smaller variation in the vertical distance from the pin **37** to the base of the supporting structure **29**. Further, since the link **34** is arranged so that a line through the points **32** and **37** in the latching position is further to the left of a line through the pin **32** perpendicular to the base of the supporting structure **29** than the line between the points **32** and **37** is to the right of such perpendicular line in the retracted position, the pin **37** is actually slightly farther from the base of the supporting structure in the retracted position than in the latching position of the mechanism. On the other hand, since the link **35** must move through a much greater angle because of its shorter arm, a line through the points **33** and **38** in the retracted position is farther to the right of a line through the pin **33** perpendicular to the base of the supporting structure than the line through the point **33** and **38** is to the left of such perpendicular line in the latching position. Consequently, the pin **38** is closer to the base of the supporting structure in the retracted position than in the latching position. Because of the above-described construction and arrangement of the links **34** and **35**, the latch bolt in the retracted position is inclined upwardly so that the roller or strike-engaging end of the latch bolt is located at a substantially greater distance from the base of the supporting structure **29** in a retracted position shown in Fig. 3 than in the latching position shown in Fig. 2. Thus, as viewed in Figs. 2 and 3, the roller or strike-engaging end of the latch bolt **36** moves downwardly in shifting from the retracted to the latching position and thereby presses against the face **51** of the strike to cause pressure to be applied to the gasket **5**. As a further contributing factor toward securing a proper gasket pressure the link **34** is so arranged on its pivot **32** that, during the final closing movement of the latch, the pin **37** by which the link is connected to the latch bolt is moving downwardly from the high position it occupies when the line through the points **32** and **37** extends in a direction perpendicular to the base of the supporting structure **29**. This assists in imparting a component of motion to the latch bolt **36** in a direction perpendicular to the face **51** of the strike **10** and thereby assists in applying the proper pressure to the gasket **5**. A further factor in securing the proper pressure on the gasket is the construction of the latch engaging face **51** of the strike. This face is inclined downwardly to the right as viewed in Figs. 2 and 3, so that the latch bolt, in moving to the left toward its latching position, must ride up this inclined surface thereby exerting an increasing pressure against the face of the strike.

While I have shown and described a specific form of my invention applied to a refrigerator, I do not desire my invention to be limited to the particular construction shown and I intend by the appended claims to cover all modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A door latch comprising a supporting structure, a pair of spaced links pivotally mounted on said structure, a latch bolt carried by both of said links, an elongated over-center spring having one end disposed at the pivot point of one of said links and the other end engaging the other of said links, and means for actuating said one of said links to move said latch bolt toward its retracted position, said other of said links being actuated through said latch bolt in response to the actuation of said one of said links to shift said other end of said spring to one side of a line extending between the pivot points of said links for moving the line of force of said spring over center with respect to a line extending between said pivot points of said links to retain said latch bolt in its retracted position.

2. A door latch comprising a supporting structure, a pair of spaced links pivotally mounted on said structure, a latch bolt carried by both of said links, an elongated over-center spring having one end disposed at the pivot point of one of said links and the other end engaging the other of said links, means for actuating said one of said links to move said latch bolt toward its retracted position, and means for actuating said one of said links to move said latch bolt toward its latching position, said other of said links being actuated through said latch bolt in response to the actuation of said one of said links to shift said other end of said spring to either side of a line extending between the pivot points of said links for moving the line of force of said spring over center with respect to a line extending between said pivot points of said links to retain said latch bolt in its retracted and its latching positions.

3. A door latch comprising a supporting structure, a pair of spaced links pivotally mounted on said structure, a latch bolt carried by both of said links, means for actuating one of said links to move said latch bolt toward its retracted position, means for moving said latch bolt toward its latching position, and an elongated over-center spring having one end disposed at the pivot point of one of said links and the other end engaging the other of said links, said other of said links being actuated through said latch bolt in response to the actuation of said one of said links to shift said other end of said spring to either side of a line extending between the pivot points of said links for moving the line of force of said spring over center with respect to said line extending through said pivot points of said links to hold said latch bolt in both its retracted and its latching positions.

4. A door latch comprising a supporting structure, a pair of spaced links pivotally mounted on said structure, a latch bolt carried by both of said links, means for actuating one of said links to move said latch bolt toward its retracted position, means for actuating said one of said links to move said latch bolt toward its latching position, and an elongated over-center spring having one end disposed at the pivot point of one of said links and the other end engaging the other of said links, said other of said links being actuated through said latch bolt in response to the actuation of said one of said links to shift said other end of said spring to either side of a line extending between the pivot points of said links for moving the line of force of said spring over center

with respect to a line extending between said pivot points of said links to hold said latch bolt in both its retracted and its latching positions.

5. A door latch comprising a supporting structure, a pair of spaced links pivotally mounted on said structure, a latch bolt carried by both of said links, a connecting link extending between said pair of links, said connecting link having one end mounted at the pivot point of one of said spaced links and having an elongated slot at its other end for providing a lost motion connection with the other of said spaced links, an elongated over-center spring surrounding said connecting link, and means for actuating one of said pair of links to move said latch bolt toward its retracted position, the other of said pair of links being actuated in response to the actuation of said one link to shift said other end of said connecting link relative to the pivot point of said other of said spaced links for moving the line of force of said spring over center with respect to a line extending between said pivot points of said links to retain said latch bolt in its retracted position.

6. A door latch adapted to engage a strike and comprising a supporting structure, a pair of spaced links pivotally mounted on said structure, a latch bolt carried by said links, means for actuating one of said links to move said latch bolt toward its retracted position, a trigger adapted to contact the strike during closing movement of the door for actuating said one of said links to move said latch bolt toward its latching position, an elongated over-center spring having one end disposed at the pivot point of said one of said links and the other end engaging the other of said links, and means for moving said other end of said spring to opposite sides of a line extending through the pivot points of said links to maintain said latch bolt in its retracted and its latching positions.

7. A door latch adapted to engage a strike and comprising a supporting structure, a pair of spaced links pivotally mounted on said structure, a latch bolt carried by both of said links, an elongated over-center spring having one end disposed at the pivot point of one of said links and the other end engaging the other of said links, means for actuating one of said links to move said latch bolt toward its retracted position, movement of said latch bolt by said one of said links being effective to shift the other of said links for moving said other end of said spring to one side of a line extending between the pivot points of said links to maintain said latch bolt in its retracted position, and a trigger adapted to contact the strike during the closing movement of the door for actuating said one of said links to move said bolt toward its latching position, movement of said one of said links being effective to shift said other of said links for moving said other end of said spring to the opposite side of said line extending between said pivot points of said links to actuate said latch bolt forcibly to its latching position.

8. A door latch adapted to engage a strike and comprising a supporting structure, a pair of spaced links pivotally mounted on said structure, a latch bolt carried by said links, means for actuating one of said links to move said latch bolt toward its retracted position, and a trigger adapted to engage the strike for moving said latch bolt from its retracted position toward its latching position, said trigger being moved to

strike-engaging position by said one of said links during the actuation of said one of said links for moving said latch bolt toward its retracted position.

9. A door latch adapted to engage a strike and comprising a supporting structure, a pair of spaced links pivotally mounted on said structure, a latch bolt carried by said links, means for actuating one of said links to move said latch bolt toward its retracted position, and a trigger adapted to engage the strike to move said latch bolt from its retracted position toward its latching position, said trigger including means for engaging said supporting structure to limit the movement of said latch bolt in its retracted position.

10. A door latch adapted to engage a strike for holding a door closed under pressure, said latch comprising a supporting structure, a pair of spaced links pivotally mounted on said structure, a latch bolt carried by said links and having a component of motion along a line generally parallel to the engaging surface of the strike between retracted and latching positions, the length of one of said links between its pivot point and its connection to said latch bolt being greater than the length of the other of said links between its pivot point and its connection to said latch bolt whereby a component of motion in a direction generally perpendicular to the engaging surface of the strike is imparted to said latch bolt to maintain the door closed under pressure, and an over-center spring having one end disposed at the pivot point of one of said links and the other end engaging the other of said links, means for actuating said other of said links to shift said other end of said spring to one side or the other of a line extending between the pivot points of said links for maintaining said latch both in its retracted and its latching positions.

11. A door latch adapted to engage a strike for holding a door closed under pressure, said latch comprising a supporting structure, a pair of spaced links pivotally mounted on said structure, one of said links being disposed adjacent the strike and the other of said links being disposed remote from said strike, and a latch bolt carried by said links and having a portion for engaging the strike, the arm of said adjacent link between its pivot point and its connection to said latch bolt being longer than the arm of said remote link between its pivot point and its connection to said latch bolt whereby during movement of the latch to latching position the end of the latch bolt remote from the strike is raised relative to the end adjacent the strike to press said latch bolt against said strike for maintaining the door closed under pressure.

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