March 12, 1940. H. MORLEY ET AL 2,193,488

REFRIGERATOR CONSTRUCTION

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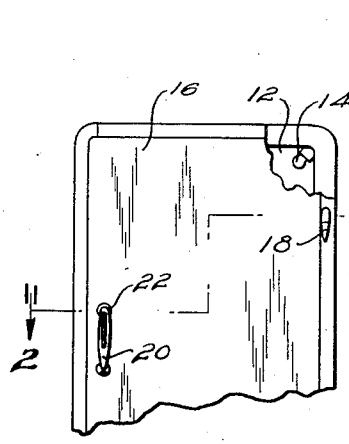


Fig. 1.

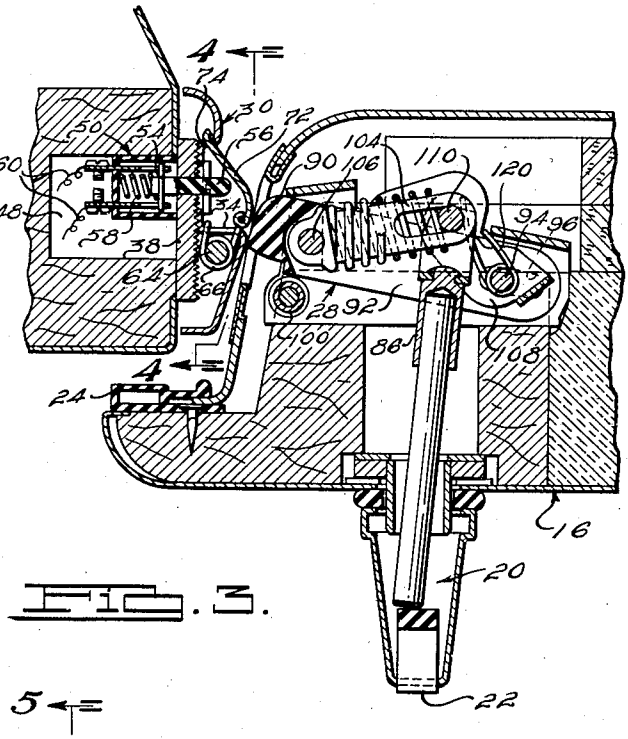


Fig. 3.

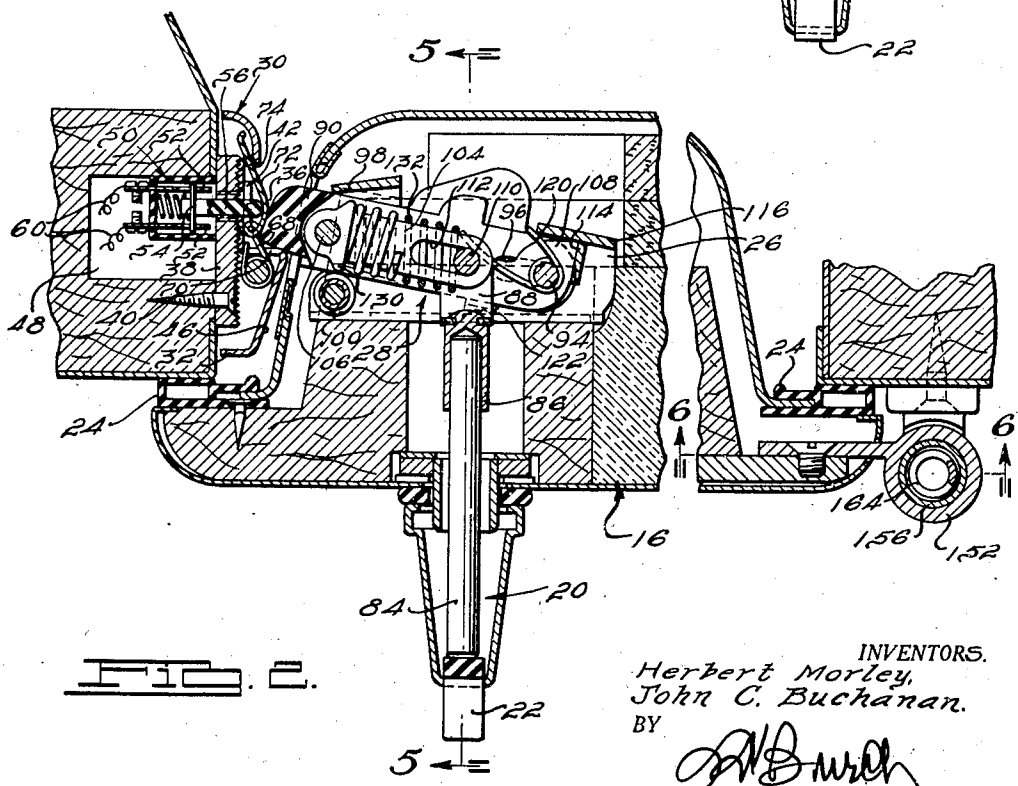


Fig. 2.

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Fig. 4.

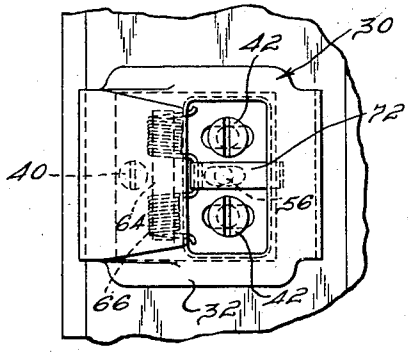


Fig. 5.

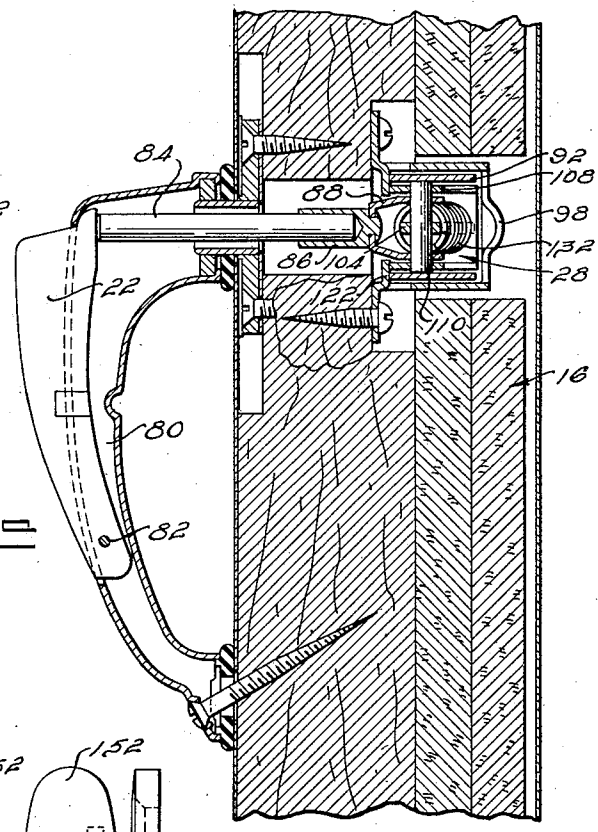
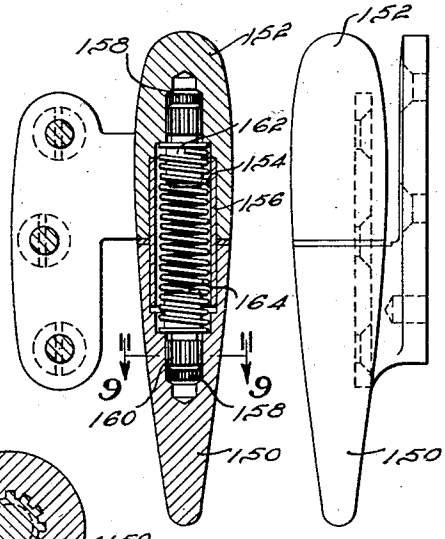


Fig. 6.



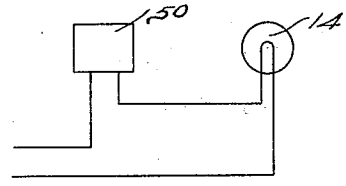


Fig. 8.

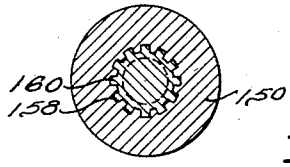


Fig. 7.

Fig. 9.

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UNITED STATES PATENT OFFICE

2,193,488

REFRIGERATOR CONSTRUCTION

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Application May 8, 1935, Serial No. 20,450

10 Claims. (Cl. 200—55)

This invention relates to refrigerator construction and has particular reference to the construction and arrangement of certain parts of a refrigerator cabinet so as to make the same more efficient and convenient for use and to reduce the cost of constructing and assembling thereof.

A principal object of the invention is to provide an improved latching mechanism for securing the door of the food storage compartment of a refrigerator cabinet in closed position and a novel method and apparatus for effecting the release of the latch mechanism and for opening the door of the food storage compartment.

Another object of the invention is to provide an improved type of hinge mounting for refrigerator cabinet doors whereby the parts may be easily assembled and the effecting of the opening of the refrigerator cabinet door is expedited.

Another object of the invention is to provide a novel arrangement of the switch controlling the supply of electric current to the light which illuminates the interior of the food storage compartment.

Another object of the invention is to provide a novel and highly efficient form of striker plate and keeper structure.

In the embodiment of the invention selected for purposes of illustration, there is secured to a refrigerator cabinet adjacent the opening leading to the food storage compartment a keeper which is adapted to receive a spring-pressed latch carried by the door for closing the opening to the food storage compartment. Means are provided for tripping the latch, and a novel form of spring hinge has been provided for moving the door ajar after the latch has been tripped and there has been provided in connection with the keeper a means operable for preventing the latch from reengaging said keeper after the latch has been tripped. This means, in addition to facilitating the opening of the door, has also been utilized for the purpose of operating a switch which controls the supply of electric current to the light within the food storage compartment so that when the door of the food storage compartment is open, current is supplied to the light within the food compartment for the purpose of illuminating the same.

For a better understanding of the invention, reference may be had to the following specification taken in conjunction with the accompanying drawings of which there are two sheets and in which:

Fig. 1 is an elevational view, partly broken away, to illustrate the application of the invention to a refrigerator cabinet;

Fig. 2 is a horizontal sectional view taken along the lines 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a view similar to Fig. 2 but illustrating the parts in a different position;

Fig. 4 is an elevational view of the striker plate and the keeper, taken on the line 4—4 in Fig. 3;

Fig. 5 is a vertical sectional view of the latch mechanism taken in a plane on the lines 5—5 of Fig. 2;

Fig. 6 is a vertical sectional view through the hinge taken in a plane on the line 6—6 of Fig. 2;

Fig. 7 is a side elevational view of the hinge illustrated in Fig. 6;

Fig. 8 is a diagrammatic illustration of the circuit in which the light within the food storage compartment is included; and

Fig. 9 is a sectional view of the parts of one of the members of the hinge, along the line 9—9 of Fig. 6.

In Fig. 1 there is illustrated in front elevation a portion of a refrigerator cabinet having a food storage compartment 12, an electric light 14 therein for illuminating the food storage compartment when the door 16 is open, hinges 18 upon which the door 16 is pivotally mounted, and a door handle 20 which is provided for swinging the door upon its hinges and also carries an operating member 22 for releasing the latch bolt from engagement with its keeper so that the door 16 may be opened.

The door 16 is provided with a gasket 24 for sealing around the opening leading to the food storage compartment when the door is closed. The door 16 carries a housing 26 for a latch mechanism 28 which is cooperable with a keeper 30, secured to the cabinet adjacent the opening leading to the food storage compartment 12.

Keeper 30 comprises a plate 32 formed as by stamping to provide a shoulder 34 and a recess 36. The portion of the plate 32 on the side opposite the recess 36 is serrated and is adapted thereby to be supported upon a similarly serrated plate 38 secured such as by a plurality of screws 40 to the framework of the refrigerator cabinet. A pair of stud bolts 42 threadedly secured to the plate 38 and passing through suitable apertures in the plate 32 are adapted to retain the same in position and to provide an adjustable mounting for the plate 32. The plate 32 is provided with a cam surface 46 forwardly of the shoulder 34 to provide a striker for the latch bolt.

Within the wall of the refrigerator cabinet

and below the plate 38 there is provided a recess 48 which is adapted to receive a switch mechanism 50 for controlling the circuit supplying current to the electric light 14. The switch 50 is provided with a pair of fixed contacts 52 adapted to be connected for closing the circuit by a movable contact 54 carried by a slidable pin 56 which is urged in a direction to close the circuit by a spring 58. The pin 56 extends through an opening in the plate 38 and within the recess 36 provided in the face of the plate 32. When the refrigerator door 16 is in closed position, the switch will be in the position illustrated in Fig. 2, wherein the circuit indicated by leads 60 will be opened. When the refrigerator door is in an open position, such as that illustrated in Fig. 3, the spring 58 will operate the switch to close the circuit for the light 14.

Beneath the plate 32 and forwardly of the shoulder 34, there is provided a pin 64 about which is disposed a torsion spring 66, the ends of which are adapted to lie against that portion of the plate 32 at the bottom of the recess 36 for preventing rotation of the spring. The spring 66 is provided with a central portion 68 which extends rearwardly through an opening 70 in the shoulder 34 and which portion 68 is adapted to pivotally support one end of a tongue or member 72, the other end of which member 72 is slidably received within an opening 74 provided in the rear of plate 32.

It will be observed that the member 72 overlies the end of the pin 56 which, because of the spring 58, will follow the member 72. Spring 66 urges or biases member 72 into the position illustrated in Fig. 3 where it is adapted to cover the shoulder 34 so as to prevent the reengagement of the latch bolt therewith after the latch bolt has been tripped.

The latching mechanism and release means therefor comprise a housing 26, mounted within a recess in the door 16 adapted for housing the operating parts, and a hand grip 80 provided with an actuating member 22. The hand grip 80 is shaped to provide a portion adapted to be grasped by a hand, and the ends of which are suitably secured to the exterior surface of the door 16. The operating member 22 is disposed within a recess in the hand grip 80 and at one end is pivoted at 82 and at the other end is engageable with one end of a pin 84, the other end of which pin extends into a pocket 86 fixed to the central portion of a yoke 88.

A latch bolt 90, adapted to engage the shoulder 34 of the keeper for the purpose of securing the door 16 in position to close the door opening leading to the food storage compartment, is carried by a pair of members 92 at one end thereof and extends at such an angle as to be spring pressed to open the door. The members 92 are mounted for reciprocatory movement within the housing 26 which at the end thereof away from the bolt 90 is provided with a fixed pin 94 extending transversely thereof and through slotted openings 96 in the ends of the members 92. A portion 98 of the housing 26 and a roller bearing 100 carried by the housing 26 are adapted to guide the other end of the members 92 and the latch bolt 90.

For opposing movement of the bolt 90 by a force applied to the same, there is provided a toggle mechanism which comprises a link 104 pivoted to the bolt 90 at 106, a link 108 pivoted to the fixed pin 94 and which link 108 at its other end is provided with a pin 110 which extends through a slot 112 in the link 104 and to which pin 110 is secured the yoke member 88. The link 108 comprises a bifurcated member having a connecting portion 114 which is adapted to engage a portion 116 of the housing 26 to act as a stop for limiting the rotation of the link 108 about the pivot pin 94. A torsional spring 120 coiled around fixed pin 94 has one end thereof engaging portion 116 of the housing 26 and the other end thereof engaging pin 110 for biasing the parts into the position illustrated in Fig. 2. A pair of ears 122 formed on the housing 26 are also provided as a stop for limiting the movement of the links 108 in a counter-clockwise direction, looking at Fig. 2. When the parts are in the position illustrated in Fig. 2, the pin 110 carried by the links 108 is slightly off the center line between the pins 106 and 94, the direction of offset being toward the hand grip 20. Operation of the member 22 to move the pin from the position illustrated in Fig. 2 to the position illustrated in Fig. 3 is adapted to break the toggle mechanism against the force of the spring 120. Breaking of the toggle operates to shorten the distance between fixed pin 94 and pin 106 carried by the bolt 90 which operates to trip the bolt 90 or release the same from engagement with the shoulder 34 of the keeper.

The member 22 is adapted to be operated by a slight movement imparted thereto. The spring 120 which opposes the movement of the member 22 operates to snap the parts back to the position illustrated in Fig. 2.

About the link 104 and between shoulders 130 thereon and pin 110, there is disposed a coil spring 132 which opposes movement of the bolt 90 by a force imparted thereto. The coil spring 132 is slightly compressed by the initial breaking movement of the toggle so that when pin 110 passes the center line between the pins 106 and 94, the coil spring 132 may expand very slightly to facilitate the release of the latch bolt. It will be appreciated that the coil spring 132 offers practically no resistance to the release of the latch bolt by a force imparted to the member 22. The coil spring 132 is, however, adapted to oppose with a considerable force movement of the latch bolt 90 by a force imparted thereto. This force is utilized to wedge the door tightly closed, as the face of the bolt engageable with the shoulder 34 of the keeper is slightly cammed. After the door has been opened and is being moved to a closed position, the slot 112 will permit the bolt 90 to be moved against the force of the spring 132 when the bolt 90 engages the cam or beveled portion 46 of the plate 32, and the spring 132 will operate to wedge the door tightly closed after the bolt 90 has passed the shoulder 34 of the plate 32.

When the bolt 90 is released by operation of the member 22, the spring 66 operates to move the tongue or member 72 to the position illustrated in Fig. 3 to prevent the reengagement of the bolt 90 with the shoulder 34. The member 72, in effect, covers the shoulder 34 to prevent the engagement of the bolt 90 therewith so that as the spring 120 reflexes and tends to return the toggle to its normal position, the bolt 90 will merely strike the member 72 or the surface 46 and tend to cause the door to swing open since the force of spring 120 operates through the toggle along bolt 90 against plate 72, one component of which will act horizontally towards the center of the box tending to open the door. As the latch bolt is adapted to be released by simple movement imparted to the member 22 and without grasping the hand grip 80, it is essential that once the latch bolt has been tripped it cannot reengage the shoulder 34 of the plate 32.

The spring 66 biasing the member 72 to the position illustrated in Fig. 3, is not, however, strong enough to prevent the bolt 90 from reengaging the shoulder 34 when the door is returned to closed position, as the spring 66 is much lighter than the spring 132.

To further expedite the opening of the door 16 and prevent the reengagement of the latch bolt 90 with the keeper, the door 16 is pivotally supported on one edge thereof by a plurality of hinges 18 which are provided with springs for biasing the door ajar. The hinges comprise a pair of members 150 and 152, member 152 being suitably secured to the door 16 and member 150 being suitably secured to the walls of the refrigerator cabinet. Each of the hinge members is provided with a recess 154 in which there is disposed a portion of a bearing sleeve 156 for securing the members of the hinge relative to each other. A portion of each of the hinge members is splined at 158 within each of the recesses. A member 160 is complementarily splined to cooperate with the splined portions 158 and is disposed within each of the recesses. Each of the members 160 is provided with a clutching surface 162 which is adapted to be engaged by a portion of a clutch spring 164 which is telescopically disposed with respect to the sleeve 156 and about the clutching surfaces 162 of the members 160. The clutch spring 164 is not positively connected to either of the members 162, but is adapted to frictionally engage the clutching surfaces thereof upon relative rotation therebetween in one direction.

For instance, when the hinge is assembled, the member 150 is affixed to the cabinet and the member 152 is affixed to the door. Relative rotation of the members in a direction to close the door 16 will tend to wind up the clutch spring 164, as the ends thereof will frictionally engage the clutching surface 162. When the latch bolt 90 is released, the tension under which the spring has been placed by a closing of the door will bias the door ajar.

As the spring 164 is not positively connected to any of the parts of the hinge, the hinge may be assembled without particular regard to the relative location of the members 150 and 152.

It thus will be seen that when the latch has been tripped by operation of the member 22, the spring hinge will bias the door ajar which will tend to prevent reengagement of the latch with the keeper. The member 72, under the force of spring 66, also will prevent the reengagement of the latch bolt 90 with the keeper and also will tend to assist in moving the door 16 to an open position. It also may be observed that the switch for controlling the supply of electric current to the light 14 will be closed as a result of opening the door by operation of the member 22, so that when the door 16 is open, the interior of the food storage compartment of the refrigerator cabinet will be illuminated.

In Fig. 8 there is illustrated diagrammatically a sketch of the circuit of the light 14 and the switch 54 controlling the same.

While the invention has been described with some detail, it is to be understood that the description is for the purposes of illustration only and is not definitive of the limits of the inventive idea. The right is reserved to make such changes in the details of construction and arrangement of parts as will fall within the purview of the attached claims.

We claim:

1. In a device of the class described, a keeper, a spring-pressed latch engageable in normal position with said keeper, means for tripping said latch, and means associated with said keeper and operable after said latch has been tripped for preventing reengagement of the latch and keeper until the latch has been returned to its normal position.

2. In a device of the class described, a keeper element, a latch element engageable with said keeper element, one of said elements being biased into operative position with respect to the other element, means for tripping the latch element, and means associated with one of said elements for preventing said biased element from reassuming its operative position after the latch has been tripped until after said latch element has cleared said keeper element and reassumed its operative position.

3. In a device of the class described, a keeper having a shoulder thereon, a spring-pressed member for covering said shoulder, a latch for depressing said spring-pressed member and simultaneously engaging said shoulder, spring means for urging said latch into said keeper with a large and small force, and means for tripping said latch urging means from a large force to a small force, said latch being operable to depress said spring-pressed member when moved by said large force but inoperable to depress said spring-pressed member when moved by said small force.

4. In a device of the class described, a keeper having a shoulder thereon, a spring-pressed member for covering said shoulder, a latch for depressing said spring-pressed member and simultaneously engaging said shoulder, means for retracting the latch from keeper engaging position, means for urging said latch bolt into keeper engaging position, and means for rendering said last-mentioned means inoperative to engage said latch bolt with said keeper until after said latch bolt has cleared said keeper.

5. In a device of the class described, a keeper, a spring-pressed latch bolt engageable with said keeper, means for tripping said latch bolt, and spring means operable after said latch bolt has been tripped to force the latch bolt and keeper apart, said means comprising a part of said keeper and operable for preventing said latch bolt from reengaging said keeper after said latch bolt has been tripped and until said latch bolt clears said keeper and again assumes a latching position.

6. In a latch structure, a keeper, a spring-pressed latch bolt engageable with said keeper, means operable by an impulse imparted thereto for tripping said latch bolt, and said keeper being provided with means for preventing said latch bolt from reengaging said keeper after said latch bolt has been tripped and until said latch bolt has cleared said keeper and again assumed a latching position.

7. In a device of the class described, a keeper, a latch bolt urged into keeper-engaging position, and means comprising a part of said keeper operable against said latch bolt for preventing said latch bolt from reengaging said keeper after said latch bolt has been tripped and until said latch bolt has cleared said keeper and again assumed a latching position.

8. A latch bolt adapted to be urged into keeper-engaging position with two pressures, a keeper for receiving said latch bolt comprising a plate provided with a shoulder which said latch bolt is adapted to engage, means for tripping said

latch bolt to reduce the pressure with which said bolt is urged into said keeper, and means for rendering said shoulder inoperative to engage said latch bolt after the pressure of said bolt has been reduced by said tripping means and until said latch bolt has cleared said keeper and reassumed a position to be urged into said keeper with its full pressure.

9. In a device of the class described, a resiliently disposed latch bolt, a keeper for receiving said latch bolt, said keeper comprising a plate provided with a shoulder with which said latch bolt is engageable, means for releasing said latch bolt from engagement with said shoulder, and a spring-pressed member carried by said keeper and adapted to be moved into position adjacent said shoulder and strong enough for preventing said latch bolt from reenegaging said shoulder after said latch bolt has been released therefrom and until said latch bolt has cleared said keeper and reassumed a latching position.

10. In a device of the type described, a keeper element, a toggle mounted latch bolt cooperable with said keeper element, a spring mounted member on said keeper element adapted to prevent said latch bolt from engaging said keeper element, and means for breaking the toggle mounting of said latch bolt, said spring mounted member on said keeper being strong enough to prevent engagement of said latch bolt with said keeper element when said toggle member is broken but not strong enough to prevent engagement of said latch bolt with said keeper element when said toggle is not broken.

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