Nov. 5, 1957 T. P. FOLEY 2,811,936

REFRIGERATOR CABINET DOOR STOP

Filed Oct. 12, 1954

FIG. 1

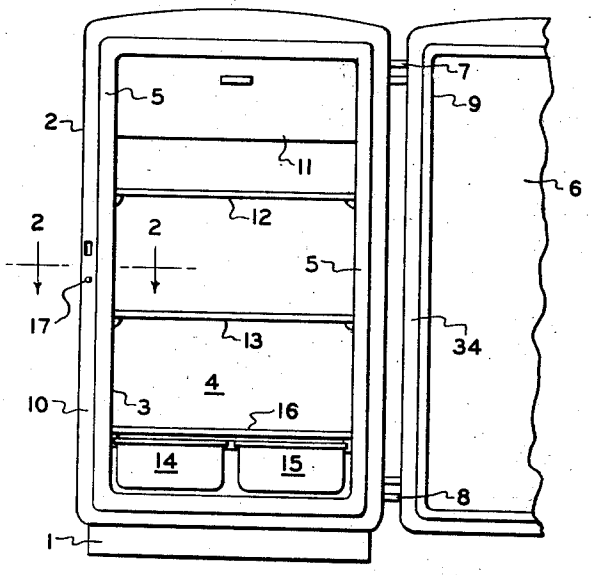


FIG. 4

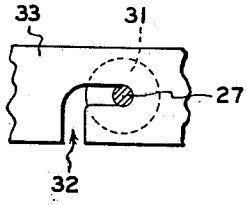


FIG. 3

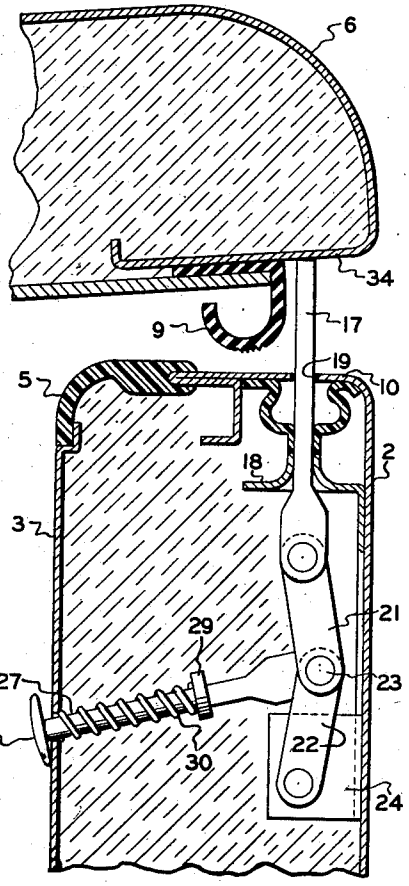
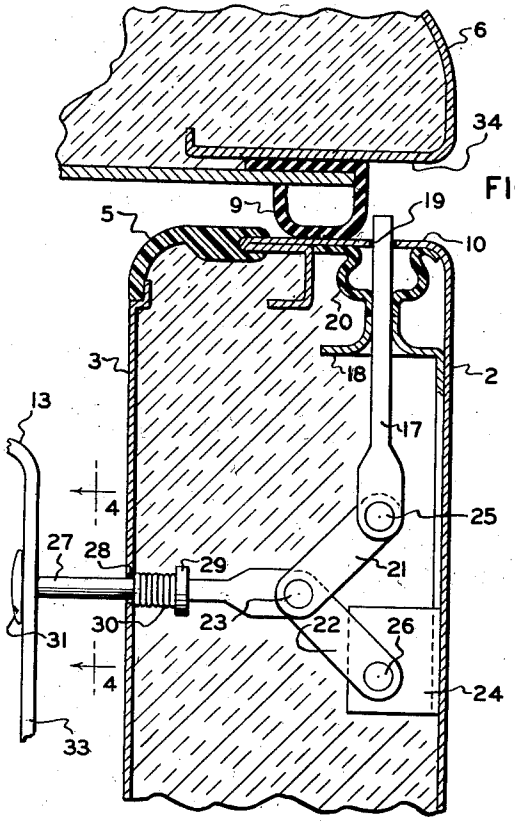


FIG. 2



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2,811,936

Patented Nov. 5, 1957

2,811,936

REFRIGERATOR CABINET DOOR STOP

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Application October 12, 1954, Serial No. 461,860

4 Claims. (Cl. 109—63.5)

My invention relates to refrigerator cabinets and more particularly to safety means for preventing a child from being accidentally locked in such cabinets.

It is an object of my invention to provide a new and improved refrigerator cabinet including means whereby it is impossible for a child to be locked inside.

It is another object of my invention to provide new and improved means in a refrigerator cabinet for preventing the door from closing whenever there is a sufficiently large space within the refrigerator to accommodate a child.

A further object of my invention is to provide a new and improved retractable door stop means for use in household refrigerators, which means is forcibly extended to engage the refrigerator door and prevent the closing thereof whenever there is a large enough space in the refrigerator to accommodate a child.

In carrying out my invention I provide a refrigerator cabinet having spaced apart inner and outer walls. The inner wall defines a food storage compartment and access to this compartment is provided by a pivotally mounted door. A shelf is mounted within the compartment so as to divide it into spaces too small to accommodate a child; and by my invention I incorporate in the cabinet means whereby the door can be closed only when the shelf is in place and not when the shelf is removed from the compartment. Since the spaces within the refrigerator are too small to accommodate a child when the shelf is in place and since the door cannot be closed when the shelf is not in place, it is thus impossible for a child to be locked within the refrigerator. The means preventing the door from closing comprise a door stop member which is forcibly moved to an extended position to engage the door whenever the shelf is removed.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention, however, both as to its organization and the method of operation may be best understood by reference to the following description taken in conjunction with the accompanying drawing in which:

Fig. 1 is a front elevational view of a refrigerator cabinet incorporating a preferred embodiment of my new and improved safety means;

Fig. 2 is a fragmentary sectional view taken on the line 2—2 of Fig. 1 with the door closed, and showing the safety means in its retracted position wherein it allows the door to close;

Fig. 3 is a view similar to Fig. 2 but showing the safety means in its extended position wherein it prevents the door from closing; and,

Fig. 4 is a fragmentary view taken on the line 4—4 of Fig. 2 and showing a preferred manner of attaching the operating link of the safety means to the center shelf of the refrigerator.

Referring now to Fig. 1 I have shown therein a household refrigerator 1 having an outer wall or case 2 and a spaced inner wall or liner 3. The liner 3 defines a food storage compartment 4 and suitable insulation (not shown) is provided between the case 2 and the liner 3 to insulate this compartment from the surrounding atmosphere. The walls are formed to provide an access or door opening at the front of the cabinet, and the space between the walls in the area of the door frame is closed by a breaker strip 5 of suitable heat insulating material. For closing the access opening there is provided an insulated door 6 which is mounted on the outer case 2 by means of spaced hinges or pivots 7 and 8. The door when closed is sealed to the door frame by a compressible gasket 9. As is clearly shown in Fig. 2 the compressible gasket 9 contacts an inwardly extending flange 10 of the outer case 2 to provide the seal. The storage compartment is refrigerated or cooled by means of a suitable mechanical refrigeration system (not shown).

In the compartment 4 there are provided a plurality of shelves and receptacles for storing foods. Thus a frozen food chest 11 is mounted in the upper portion of the compartment. A plurality of shelves 12 and 13 are mounted in the middle portion of the compartment, and a pair of vegetable pans 14 and 15 are disposed at the bottom of the compartment. Also, a solid barrier or shelf 16 is positioned over the vegetable pans to prevent a loss of moisture from their contents. In this arrangement it will be noted that the middle shelf 13, which is positioned between the barrier 16 and the upper shelf 12, so divides the space within the compartment 4 that there is no single place therein large enough to accommodate a child. In other words, when shelf 13 is mounted in the compartment, there is no space large enough for a child to crawl into. As a result there is no danger so long as the shelf 13 remains within the refrigerator.

To render the refrigerator 1 completely safe, there are further provided therein means which prevent the door 6 from closing whenever the shelf 13 is removed from the refrigerator. Thus by my invention there is no danger no matter whether the shelf 13 is mounted within the refrigerator or is removed therefrom. This, of course, means that the refrigerator is safe at all times.

My new and improved means whereby the door 6 is prevented from closing when the shelf 13 is removed from the refrigerator may best be seen by reference to Figs. 2 and 3. In my preferred embodiment there shown, the means which prevent the door from closing comprise a door stop member or rod 17. This stop member is movably mounted on the outer case or, more exactly, is slidably mounted between the outer case 2 and the inner liner 3 behind the front flange 10 of the case. The mounting is accomplished by an apertured bracket 18 which is itself attached to the case 2 by any suitable means, as for example by welding. The stop member 17 extends outwardly from the bracket 18 through a suitable aperture 19 in the flange 10 of the outer case and if moved far enough in the outward direction, engages the door 6 to prevent its closing. A preferred mechanism for operating the stop member is described hereinafter. In order to prevent leakage of moisture through the aperture 19 sealing means may be provided. For example, in the illustrated embodiment a flexible sealing member 20 attached to the rod 17 and surrounding the aperture 19 is utilized for that purpose.

In my preferred embodiment the stop member 17 is operated by means of a toggle mechanism comprising a pair of links 21 and 22. The links 21 and 22 are pivoted together at their one ends by a pin 23, and at their other ends they are pivoted respectively to the stop member 17 and a casing flange or bracket 24. Specifically the link 21 is pivoted to the inner end of the stop member by a pin 25 and the link 22 is pivoted to the flange or bracket 24 by a pin 26. The pin 23 joining together the two links forms the knuckle of the toggle and the links themselves

comprise the arms of the toggle. When a force is applied to the pin 23, depending upon its direction, it operates the toggle either to push the rod 17 outwardly through the aperture 19 or else to pull the rod inwardly. In other words a force applied to the knuckle pin 23 causes a movement of the arms 21 and 22 effective to move the stop rod.

By my invention, the force for so moving the stop rod 17 is provided by means of a rod or link 27 which is also pivoted to the knuckle pin 23 of the toggle. This rod 27 extends outwardly from the space between the outer case and the liner into the storage compartment 4, an aperture 28 being provided in the liner 3 for that purpose. Adjacent the pin 23 the rod 27 is provided with an outstanding flange 29 and between this flange and the liner 3 there is positioned a coil spring 30. This spring 30 serves as a biasing means tending to force the rod 27 and thus the toggle mechanism to the right as viewed in Figs. 2 and 3. The rod 27, however, has a large head 31 on its end which protrudes into the storage compartment, and this head limits the allowable movement of the rod.

When the rod 27 is pulled to its left or outward position, as viewed in Fig. 2, it pulls the pivot pin 23 to the left and thus operates the toggle mechanism to withdraw the stop member 17 into the space between the outer case and the liner. In other words, its pulls the stop member 17 to a retracted position. When in this retracted position the stop member 17 does not offer any opposition to the closing of the door 6, or in other words, it does not contact the door 6 in any way so as to prevent its closing. Thus, when the rod 27 is pulled to its outward position shown in Fig. 2, the door may be latched in its closed position by any suitable latching means (not shown). To insure that the rod 27 is held in its outward position only when the shelf 13 is within the refrigerator I have arranged the shelf mounting means so that the rod 27 itself serves as one of the supports for the shelf. The shelf holds the rod outward whenever it is mounted thereon in the compartment 4, but the rod is free to move under the force of spring 30 whenever the shelf is removed from the compartment. Thus as is shown clearly in Fig. 4 a bayonet slot 32 is provided in the side channel 33 of the shelf 13. To support the shelf at its front end the rod 27 is pulled outwardly through the liner 3 and is inserted within this bayonet slot. This engagement between the rod 27 and the slot 32 then serves as a mount for the front corner of the shelf, and the contact between the head 31 of the rod and the back of the channel 33 prevents the rod from moving inwardly into the space between the outer case and the liner. The engagement of the rod 27 in the slot 32 provides the only support for the front corner of the shelf and thus for the shelf to be mounted stably within the refrigerator, the rod 27 is necessarily pulled outwardly from the liner 3. Since this movement of the rod 27 withdraws the stop member 17 to its retracted position, the result is that whenever the shelf 13 is mounted within the refrigerator the stop member is retracted so as to permit the door to close. However, as pointed out above, when the shelf 13 is in place, the various spaces within the refrigerator are too small to accommodate a child so that there is no danger of one of them being locked inside.

When, however, the shelf 13 is removed from the refrigerator, the door stop member 17 is forcibly moved to an outward extended position wherein it prevents the door 6 from closing. This position may be clearly seen in Fig. 3. When the shelf 13 is removed the rod 27 is, of course, disengaged from the slot 32 and thus the spring 30 forces the rod to move inwardly to the right until the head 31 engages the liner 3. This movement of the rod or link 27 actuates the stop member 17 through the toggle formed by links 21 and 22. More specifically, the force applied by the rod 27 to the knuckle 23 of the toggle causes the stop member 17 to move outward through the aperture 19 in the flange 10 of the outer case. By the time the head 31

of rod 27 contacts the liner 3 the member 17 is moved far enough outwardly that it prevents the door from closing. The stop member is moved to an outward or extended position wherein it engages the door 6 so as to stop its closing movement somewhat before the gasket 9 engages the flange 10 of the outer case. The stop member specifically strikes or engages a flange 34 forming the outer edge of the face of the door to effect this result.

As shown, the toggle mechanism moves slightly over-center to the right before its travel is completed, and as a result any force applied to the stop member by the door cannot force the member to move inwardly. Rather the member 17 is locked in its outward position until the link 27 is again pulled outwardly through the aperture 28. Any force applied by the door merely tends to force the toggle to break further to the right, as viewed in Fig. 3, and the contact between the head 31 of the rod 27 and the liner 3 prevents such movement from occurring. With the toggle broken over-center to the right, no component of force can be created by the door to push it over-center to the left and thus it is impossible for the door to push the stop member inwardly. Instead the motion of the door itself is stopped so that it cannot completely close.

The motion of the door is preferably stopped before the latching elements (not shown) of the door and the case come into engagement. But even if the latching members themselves were to come into contact, a child hiding inside the refrigerator still could not be asphyxiated because the door cannot close far enough to seal the gasket 9 to the flange 10. Rather there will always be a gap between the gasket and the case permitting air to move into the refrigerator to allow the child to breathe. For this reason there can be no danger even when the middle shelf 13 is removed from the refrigerator.

When the shelf 13 is placed back in the refrigerator, the stop member 17 may be withdrawn from its extended position merely by grasping the head 31 of the rod 27 and pulling it to the left as viewed in Figs. 2 and 3. The rod 27 by its movement actuates the toggle to withdraw the stop member to its retracted position within the case. The rod 27 is then again engaged with the slot 32 so as to mount the shelf, and thereby the rod is itself held in its outward position. This holds the stop member 17 in its retracted position and thus the stop member does not prevent closing of the door until such time as the shelf 13 is again removed from the refrigerator. The pulling of the rod 27 to its outward position is, however, preferably made relatively difficult to do so as to deter a child from withdrawing the door stop member.

Thus, in summation, it will be seen that by my invention I have provided a refrigerator cabinet in which it is impossible for a child to be locked accidentally. So long as the center shelf remains within the refrigerator, the child cannot even get into the refrigerator, and whenever the center shelf is taken out of the refrigerator the stop means prevent the door from closing.

While, in accordance with the Patent Statutes, I have described what at present is considered to be the preferred embodiment of my invention, it should be obvious to those skilled in the art that various changes and modifications may be made therein without departing from my invention, and I, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true 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 refrigerator cabinet comprising an outer case and an inner liner with said inner liner defining a food storage compartment, a shelf disposed within said compartment, a door mounted on said case and providing access to said compartment, a door stop member movably mounted between said case and said liner and extending outwardly through said case, said stop member being movable between an extended position and a retracted position and being adapted when in said extended posi-

tion to engage said door to prevent the closing thereof, means including a movable link for operating said stop member between said positions, said link extending through said liner into said compartment, means for attaching said link to said shelf thereby normally to maintain said stop member in said retracted position, and biasing means for forcibly moving said link to a second position when said shelf is removed from said compartment, thereby to move said stop member to said extended position and prevent closing of said door until said shelf is replaced within said compartment.

2. A refrigerator cabinet comprising an outer case and an inner liner with said inner liner defining a food storage compartment, a shelf disposed within said compartment, a door mounted on said case and providing access to said compartment, a door stop member movably mounted between said case and said liner and extending outwardly through said case, said stop member being movable between an extended position and a retracted position and being adapted when in said extended position to engage said door to prevent the closing thereof, a toggle for operating said member between said positions, a link attached to the knuckle of said toggle for actuating said toggle, said link extending through said liner into said storage compartment, means for attaching said link to said shelf thereby to position said toggle to maintain said stop member in said retracted position, and biasing means for forcibly moving said link to a different position when said shelf is removed from said compartment, thereby to actuate said toggle to move said stop member to said extended position and prevent closing of said door until said shelf is replaced within said refrigerator.

3. A refrigerator cabinet comprising an outer case and an inner liner with said inner liner defining a food storage compartment, a shelf disposed within said compartment, a door mounted on said case and providing access to said compartment, a door stop member movably mounted between said case and said liner and extending outwardly through said case, said stop member being movable between an extended position and a retracted position and being adapted when in said extended position to engage said door to prevent the closing thereof, means including a movable shelf support for operating said member between said positions, said shelf support extending through said liner into said compartment, means for attaching said shelf support to said shelf thereby to support said shelf and normally to maintain said stop member in said retracted position, and biasing means for moving said shelf support to a second position when said shelf is removed from said compartment, thereby to move said stop member to said extended position and prevent closing of said door until said shelf is replaced within said compartment.

4. A refrigerator cabinet comprising an outer case and an inner liner with said inner liner defining a food storage compartment, a shelf disposed within said compartment, a door mounted on said casing providing access to said compartment, a door stop member movably mounted between said case and said liner and extending outwardly through said case, said stop member being movable between an extended position and a retracted position and being adapted when in said extended position to engage said door to prevent the closing thereof, a toggle for operating said member between said positions, a movable support for mounting one end of said shelf, said support extending through said liner and being attached to the knuckle of said toggle for actuating said toggle, means attaching said support to said shelf for supporting said shelf and for normally maintaining said toggle in a position wherein said door stop member is held in said retracted position, and biasing means for forcibly moving said support to a different position when said shelf is removed from said refrigerator, thereby to actuate said toggle to move said door stop member to said extended position and prevent closing of said door until said shelf is replaced in said refrigerator.

References Cited in the file of this patent

UNITED STATES PATENTS

2,259,389	Metzerott	Oct. 14, 1941
2,639,957	Geller	May 26, 1953