

Jan. 7, 1958

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2,819,138

DOOR LATCH

Filed June 21, 1956

2 Sheets-Sheet 1

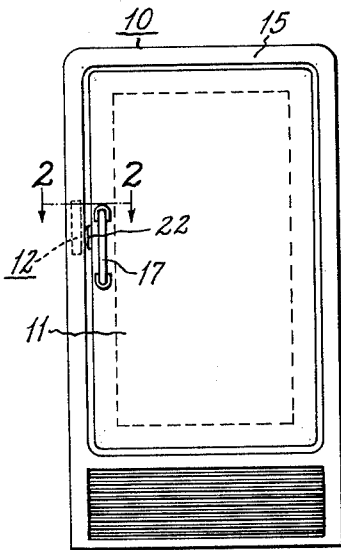


Fig. 1.

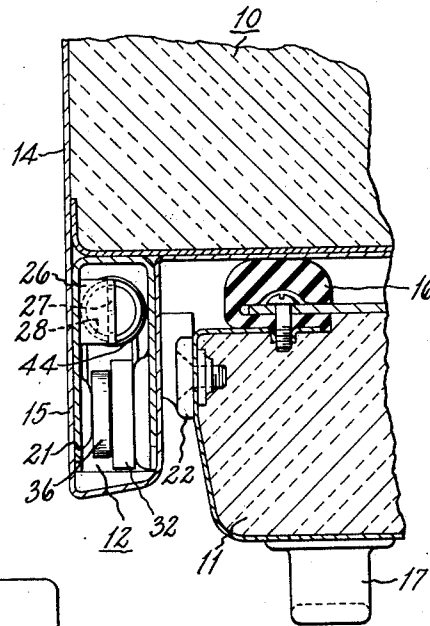


Fig. 2.

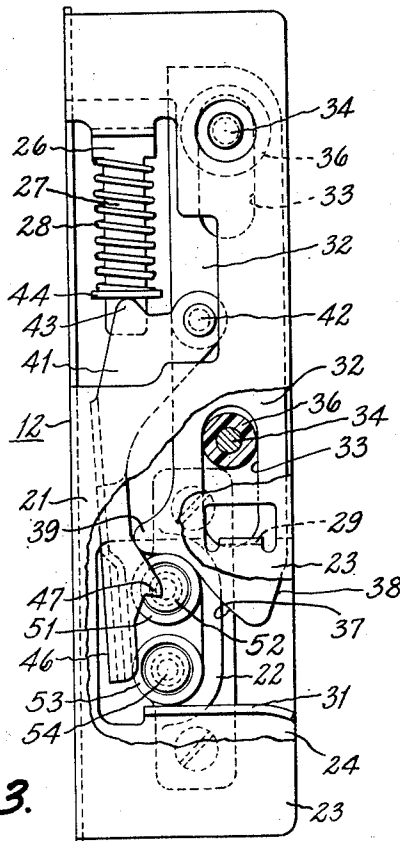


Fig. 3.

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2 Sheets-Sheet 2

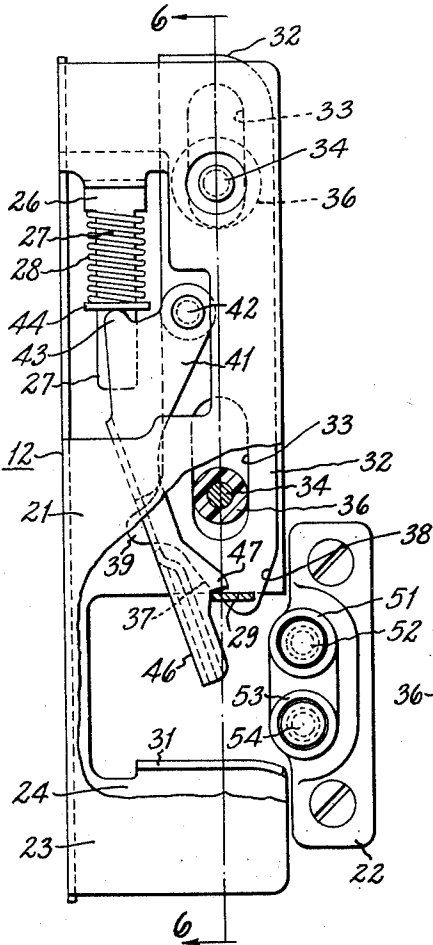


Fig. 4.

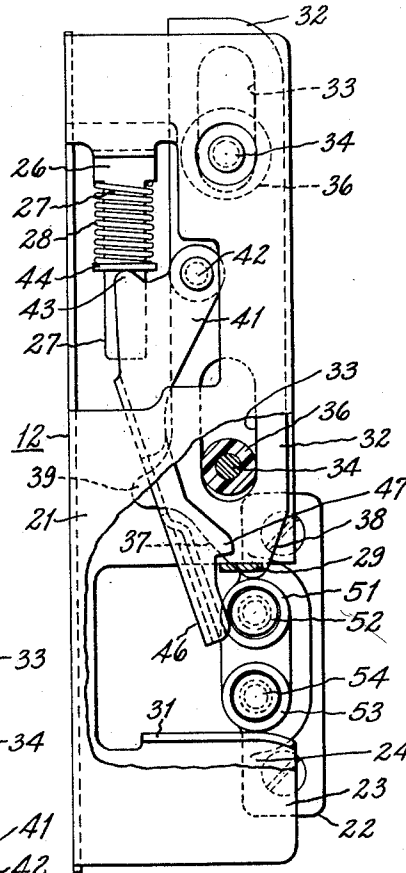


Fig. 5.

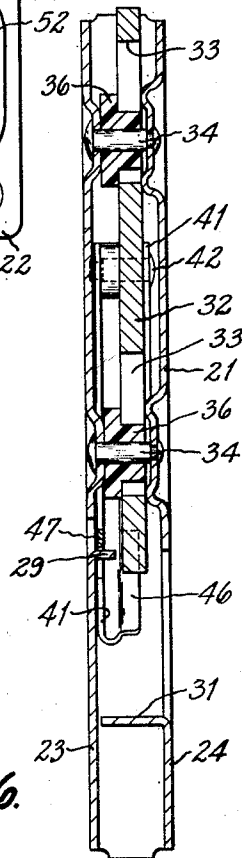


Fig. 6.

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1

2,819,138

DOOR LATCH

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10 Claims. (Cl. 312—214)

This invention relates to door latches and particularly to a latch for the door of a refrigerator cabinet.

In the past, latch mechanisms for refrigerator cabinet doors usually included a manually movable latch handle which would trip the latch mechanism or open jaws thereof to release a keeper or striker for unlatching the door from the cabinet to permit same to be swung open. Such latch handles were rather long and would project outwardly of a refrigerator cabinet door such a distance as to hamper a housewife passing back and forth in front of the cabinet while working in a kitchen. In addition movable refrigerator cabinet door latch handles required a housewife to exert force thereto not only in a direction to open the door but usually also in another direction so as to pivot the handle about its mounting. I therefore contemplate the provision of a latch on a refrigerator devoid of a manually operated lever handle which will overcome objections ordinarily inherent in latches having such a door releasing handle.

An object of my invention is to provide an improved mechanical latch for a refrigerator cabinet door which will firmly secure the door in closed position and yet permit the door to be released from the cabinet and swung open by merely exerting a slight pulling force on the door.

Another object of my invention is to provide a latch for a refrigerator cabinet door which is durable in construction, reliable in operation and can be assembled substantially of stamped sheet metal parts that are economical to manufacture.

A further object of my invention is to provide a latch for a refrigerator cabinet member which requires a minimum of effort to latch the door member thereon closed and which thereafter biases or wedges the door member toward the cabinet member to insure sealing contact thereof with a gasket located between the members so as to prevent heat loss at the door opening.

A still further and more specific object of my invention is to pivotally mount a cocking and tripping lever on a sliding bolt type latch mechanism so as to be slidable with the bolt and to utilize a striker or striker roller on a door upon initially entering the mechanism for sliding the bolt into a further retracted position from its normal cocked position to release the lever thereon from a stop on the latch casing whereby the striker does not have to break the frictional contact between the lever and its stop during the final closing movement of the door to thus enable the door to be swung into a fully latched position with greater ease.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 shows a refrigerator cabinet having my improved latch mechanism embodied therein;

Figure 2 is an enlarged fragmentary sectional view

2

taken on the line 2—2 of Figure 1 showing the refrigerator cabinet door held closed by my latch mechanism;

Figure 3 shows my latch mechanism removed from the refrigerator cabinet and door with portions of the latch casing broken away to indicate the position of parts of the latch when the door is fully closed;

Figure 4 is a view similar to Figure 3 indicating the refrigerator cabinet door open and the latch mechanism in a cocked position;

Figure 5 is a view similar to Figures 3 and 4 indicating the striker carried by the door beginning to enter the latch casing on the refrigerator cabinet with the latch bolt retracted and a locking projection on the tripping lever moved off its stop; and

Figure 6 is a sectional view taken on the line 6—6 of Figure 4 showing the slidable mounting of the latch bolt.

Referring to the drawings, for a better understanding of the descriptions which follow and for illustrating my invention, I show in Figure 1 thereof a refrigerator cabinet member 10 of the type having a plurality of insulated walls forming a food storage compartment therein provided with a front access opening normally closed by a horizontally swingable hingedly mounted door member 11 with the location of my improved latch mechanism generally represented in dotted lines by the numeral 12. Walls of cabinet member 10 include an outer metal shell 14 reversely bent to provide a forwardly directed relatively thin peripheral wall extension 15 (see Figure 2) in which the latch casing of my mechanism is located. The door member 11 is disposed in the recess at the front of cabinet member 10, formed by the wall extension 15, and is provided with any suitable or conventional resiliently compressible gasket 16 which engages the door jamb to seal the food compartment in the cabinet member against heat loss. Door 11 is provided with a handle 17 stationarily mounted thereon and utilized for swinging the door open or closed. The latch mechanism 12 associated with cabinet member 10 and door member 11, to substantially frictionally maintain door 11 closed, comprises a narrow vertically elongated substantially U-shaped sheet metal latch casing 21 bolted or welded in place within the hollow wall extension 15 of the cabinet. The latch mechanism also comprises a striker mounting plate 22 bolted or otherwise suitably secured to a side edge of the door member 11.

Referring now to Figure 3 it will be noted that latch casing 21 is provided with various cut-away and bent portions for purposes to be hereinafter described and that the space between the legs 23 and 24 of casing 21 provides the same, at least at one point therealong, with a reentry opening for receiving a latch striker. Both legs 23 and 24 of casing 21 have a part thereof bent inwardly as at 26 to provide contiguously extending parts 27 providing a mounting finger for a compression spring 28. A portion of leg 23 is slit and bent inwardly of casing 21 to provide an integral stop 29 thereon for a trip lever to be presently described and which stop is of particular interest with respect to my present invention. Leg 24 of U-shaped latch casing 21 has a cut-away portion which is also bent inwardly of the casing to form a horizontal ledge 31 therein. Both legs 23 and 24 of casing 21 have circular recessed portions therein which reduce the frictional engagement of a sliding latch bolt contained in the casing. This latch bolt 32 is a heavy piece of elongated metal provided with a pair of elongated openings 33. A pin or stud 34 has its ends disposed in holes provided in the recessed portions of legs 23 and 24 of casing 21 and riveted over to form mountings upon which molded plastic or the like bushings 36 are located. These bushings 36 are shouldered and each includes a small diametered round surface receiving and providing bearings for the

walls of elongated openings 33 in bolt 32 and a larger diametered round surface forming means for spacing the bolt 32 from the leg 23 of casing 21. The one or lower end of bolt 32 is substantially wedge or V-shaped and extends a short distance into the reentry opening of casing 21 so as to dispose an end portion of the bolt in the path of movement of a striker into the casing. The shape of the end or nose of sliding bolt 32 provides the same with oppositely inclined surfaces 37 and 38 respectively. A lobe 39 is provided on the slidable latch bolt 32 and the purpose of the inclined surfaces 37 and 38 as well as that of lobe 39 will become apparent hereinafter. The sliding bolt 32 has legs of a yoke portion on locking and tripping lever 41 pivotally mounted thereon by a pin 42. A spacer washer may be located over pivot pin 42 intermediate one of the legs of lever 41 and the wall 23 of casing 21. A part 43 of each leg of lever 41 bears against a spring retainer or washer 44 fitted over the finger extension 27 on casing 21. The end of lever 41, remote from its pivotal mounting 42, projects into the reentry opening of the latch casing 21 and is disposed in the path of movement of a striker into the casing. The one edge of the portion of lever 41 providing the end 46 thereof is bent to curve same and increase its structural strength. Lever 41 has a pawl or projection 47 thereon intermediate its end 46 and its pivoted mounting 42 which is biased toward and caused to abut against the stop 29 on casing 21 by compression spring 28. Engagement of projection 47 on lever 41 with stop 29 maintains, by virtue of the lever being pivotally mounted on and slidable with bolt 32, the bolt in a predetermined retracted or locked position with a small portion of the inclined surface 38 on the lower end of bolt 32 disposed in the path of a striker of the latch mechanism adapted to enter the casing through its reentry opening.

The mounting plate 22 on door member 11 has a molded plastic or the like roller striker 51 rotatably secured thereto by a pin or stud 52. Another molded plastic roller 53 rotatably secured upon plate 22, by a pin or stud 54, is rigidly mounted with respect to the roller striker 51 and serves as means for engaging and moving or rolling along the ledge 31 formed on latch casing 21. This means or roller 53 guides the roller striker 51 into proper position for operating upon the bolt 32 and lever 41 of the latch mechanism. The engagement and bearing against ledge 31 of roller 53 properly aligns striker roller 51 with the end of bolt 32 extending a short distance into the reentry opening of casing 21 and also prevents sagging of the door 11 relative to cabinet 10. While I have disclosed the compression spring 28 for biasing projection 47 on lever 41 it may be feasible in some instances, by properly balancing lever 41 on bolt 32 that the weight of this vertically disposed bolt alone could serve as the biasing means, to eliminate the use of spring 28. It is to be understood that while I prefer to mount the casing 21 containing the latch bolt 32 and tripping or locking lever 41 on the cabinet 10 and to carry the roller striker 51 on door 11 it is within the realm of my invention to reverse these elements of the latching mechanism.

It will be noted by reference to Figure 3 of the drawings, wherein the location of the various elements of the latch mechanism depict the door 11 being held in closed position, that the inclined surface 37 on the nose of bolt 32 has moved into the reentry opening of casing 21 behind the roller striker 51 and that either this striker or roller 53 may now bear against the end 46 of lever 41. Spring 28 is biasing the bolt 32 against the roller striker 51 and the inclined surface 37 on bolt 32 tends to wedge the door 11 closed. The lobe 39 is bearing against roller striker 51 and holds the nose end of bolt 32 in a predetermined position on the inclined bolt surface 37 and the shape and size of the roller striker 51 is such as to enable the door 11 to be swung open with ease and without manipulating a hand operated latch bolt releasing lever 75

by merely exerting a slight pull on the stationary door handle 17 in a direction away from cabinet 10. When the door begins to open striker roller 51 cams, by virtue of the inclined surface 37, bolt 32 upwardly into a retracted position, with respect to the reentry opening of casing 21, and at the same time the spring 28 swings lever 41 about its pivotal mounting 42 to cause the pawl or projection 47, on lever 41, to be moved into vertical alignment with the stop 29. The lever 41 has a cut-away portion which receives lobe 39 to clear same and permit the pawl 47 to move into abutting engagement with stop 29. As the striker roller 51 disengages bolt 32 in moving out of casing 21 both the bolt and lever 41 move downwardly, under the compressive force applied thereto by spring 28, and the pawl or projection 47 engages or abuts against the stop 29 to thereby automatically lock the bolt in a retracted or cocked position (see Figure 4). Now when door 11 is moved toward closed position my invention aids in closing the door with ease. In Figure 5 of the drawings I show the roller striker 51 beginning to move into the latch housing or casing 21 and it will be noted that this striker has moved upon the inclined surface 38 on bolt 32 to the tip of the nose or V-shaped end thereof. This has raised the bolt 32 upwardly or into a further retracted position with respect to the reentry opening in casing 21 and consequently has also or simultaneously raised lever 41, carried by the bolt, to disengage the pawl or projection 47 from stop 29. Projection 47 while being disengaged from stop 29 at this time, is still in vertical alignment therewith and should the door 11 now be reopened, instead of being fully closed, relative to cabinet 10 no harm can be done because movement of striker 51 away from the bolt 32 will cause spring 28 to push the projection back against stop 29 to again lock the bolt in a cocked position. Thus the disengagement of projection 47 away from stop 29, without moving or shifting the same out of alignment with the stop, plays an important part in the proper functioning or operation of the latch mechanism to ease the final closing of door 11 against cabinet 10. However if door 11 is continued to be pushed into closed position then the striker roller 51 will ride inwardly of casing 21 past the tip or nose of bolt 32 to engage the end 46 of lever 41 whereupon this lever will be swung about its pivotal mounting 42 to shift the pawl or projection 47 out of vertical alignment with stop 29. Thereupon spring 28 will bias the lobe 39 against and also the inclined surface 37 behind striker 51 to maintain the door 11 closed as depicted in Figure 3 of the drawings. Thus when striker roller 51 engages the end 46 of lever 41 it has already been relieved of the necessity of breaking the frictional contact or lock between projection 47 and stop 29 and the door 11 can swing with ease into fully closed position against cabinet 10.

From the foregoing it should be apparent that while I have provided an improved sliding latch mechanism which permits a door to be opened by exerting a small pushing force thereto I have also greatly eased the final latching movement of the door. By virtue of breaking the interlock between the locking projection on the tripping lever and its stop as the striker initially enters the latch casing my invention permits the momentum of the door when swung toward the cabinet to carry same into a fully latched position thereagainst without the necessity of applying a final push to the door to latch it closed. The combination of a circular or roller striker with a wedge or V-shaped nose end of a sliding latch bolt plays an important part in permitting the door to be opened and closed with little effort on the part of the user of a refrigerator cabinet and also provides for the automatic cocking of the latch bolt in a retracted position when the door is opened. My improved latch mechanism is operable at all times without manually actuating a movable door releasing handle lever and its operation is smooth and quiet.

While the form of embodiment of the invention as

5

herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. In combination, a cabinet member having a door member hingedly mounted thereon for closing an aperture therein, a latch for securing said door member closed, said latch comprising a casing on one of said members and a striker carried by the other of said members, said casing having a reentry opening for said striker, said striker being movable into said casing through the opening therein, a slidable bolt within said casing adapted to be engaged by said striker, a locking lever within said casing pivotally mounted on and slidable with said bolt, said lever having a projection thereon aligned with and abutting against a stop on said casing to lock said bolt in a retracted position relative to said opening, an end of said lever remote from said pivotal mounting thereof being disposed in the path of movement of said striker into said casing, a part of said bolt also being in the path of movement of said striker into said casing, a single compression spring interposed between said lever and a part of said casing for sliding said bolt and said lever thereon and for also biasing said projection against said stop, said striker engaging said part of said bolt upon initially entering said opening to simultaneously slide the bolt against the compressive force of said single spring into a further retracted position and forming the sole means to disengage said lever projection from said stop without moving the projection out of alignment therewith, and said striker engaging said end of said lever as it continues to be moved into said casing for thereafter swinging the lever about said pivotal mounting and for shifting the projection thereon out of alignment with said stop whereby to render said spring effective to slide said bolt behind and into engagement with said striker for holding the same in said casing.

2. The combination defined by claim 1 wherein the casing is mounted on the cabinet member and the striker is carried by the door member.

3. The combination defined by claim 1 wherein a means rigidly mounted on the other of the members with respect to the striker thereon engages and moves therewith along a ledge provided on the latch casing adjacent the reentry opening therein to guide the striker into a proper bolt and lever operating position.

4. In combination, a cabinet member having a door member hingedly mounted thereon for closing an aperture therein, a latch for securing said door member closed, said latch comprising a casing on one of said members and a roller striker carried by the other of said members, said casing having a reentry opening for said roller striker, said roller striker being movable into said casing through the opening therein, a slidable bolt within said casing having a substantially V-shaped end providing oppositely inclined surfaces thereon adapted to be engaged by said roller striker, a locking lever within said casing pivotally mounted on and slidable with said bolt, said lever having a projection thereon aligned with and abutting against a stationary stop provided on said casing to lock said bolt in a retracted position with respect to said reentry opening, an end of said lever remote from said pivotal mounting thereof and beyond said projection thereon being extended into said reentry opening in the path of movement of said roller striker into said casing, a single spring interposed between said lever and a part of said casing for sliding said bolt and said lever thereon and for also biasing said projection against said stop, said roller striker engaging one of the inclined surfaces on the end of said bolt upon initially entering said opening to simultaneously slide the bolt against the force of said single spring into a further retracted position and forming the sole means to disengage said lever projection from said stationary stop without moving the projection out of alignment therewith, and said roller striker engaging said end of said lever

6

as it continues to be moved into said casing for thereafter swinging the lever about said pivotal mounting and for shifting the projection thereon out of alignment with said stop whereby to render said spring effective to slide the other of the inclined surfaces on the V-shaped end of said bolt behind said roller striker for holding the same in said casing.

5. The combination defined by claim 4 wherein the casing is mounted on the cabinet member and the roller striker is carried by the door member.

6. The combination defined by claim 5 wherein a roller rigidly mounted on the door member with respect to the roller striker thereon engages and rolls along a ledge provided on the latch casing adjacent the reentry opening therein to guide the roller striker into a proper bolt and lever operating position.

7. In combination, a cabinet member having a door member hingedly mounted thereon for closing an aperture therein, a latch for securing said door member closed, said latch comprising a casing on one of said members and a roller striker carried by the other of said members, said casing having a reentry opening for said roller striker, said roller striker being movable into said casing through the opening therein, a slidable bolt within said casing having a substantially V-shaped end providing oppositely inclined surfaces thereon adapted to be engaged by said roller striker, a locking lever within said casing pivotally mounted on and slidable with said bolt, said lever having a projection thereon aligned with and abutting against a stationary stop provided on said casing to lock said bolt in a retracted position with respect to said reentry opening, an end of said lever remote from said pivotal mounting thereof and beyond said projection thereon being extended into said reentry opening in the path of movement of said roller striker into said casing, a single spring interposed between said lever and a part of said casing for sliding said bolt and said lever thereon and for also biasing said projection against said stop, said roller striker engaging one of the inclined surfaces on the end of said bolt upon initially entering said opening to simultaneously slide the bolt against the force of said single spring into a further retracted position and forming the sole means to disengage said lever projection from said stationary stop without moving the projection out of alignment therewith, said roller striker engaging said end of said lever as it continues to be moved into said casing for thereafter swinging the lever about said pivotal mounting and for shifting the projection thereon out of alignment with said stop whereby to render said spring effective to slide the other of the inclined surfaces on the V-shaped end of said bolt behind said roller striker for holding the same in said casing, and the inclination of said other surface on the end of said bolt being such as to cause said roller striker to retract said bolt solely in response to a slight pulling force on said door member without beforehand separately actuating said bolt for reabutting the projection on said lever against said stop.

8. The combination defined by claim 7 wherein the casing is mounted on the cabinet member and the roller striker is carried by the door member.

9. The combination defined by claim 8 wherein a roller rigidly mounted on the door member with respect to the roller striker thereon engages and rolls along a ledge provided on the latch casing adjacent the reentry opening therein to guide the roller striker into a proper bolt and lever operating position.

10. In combination, a refrigerator cabinet member having a plurality of insulated walls forming the top, bottom, upright sides and back of an open front food storage compartment therein, said cabinet member also having hollow substantially U-shaped wall portions directed forwardly of the insulated walls thereof with the base of the U spaced from the front of said cabinet walls, a side of said hollow wall portions being sub-

stantially flush with the outer surface of walls of said cabinet member and the other side of said hollow wall portions extending along said compartment front opening in spaced relation thereto whereby to form a recess in the front face of said cabinet member having a door jamb adjacent to and extending around the compartment opening, a single insulated door member for said compartment opening hingedly mounted on said cabinet member with at least a part thereof disposed in said recess, a latch for said door member, said latch including a substantially U-shaped casing within and concealed by a vertical part of said hollow wall portions, said U-shaped latch casing having the base of the U thereof secured to the front of an insulated wall of said cabinet member with its open side facing the base of said vertical part of said U-shaped hollow wall portions to position the legs of said U-shaped casing in parallel relationship with the legs of said vertical part of said U-shaped hollow wall portions, said base of the U of said vertical part of the U-shaped hollow wall portions being provided with a latch striker reentry opening registering with the open side of said U-shaped latch casing, said latch also including a striker stationarily mounted on said door member and projecting laterally

from a vertical side thereof toward said vertical part of said U-shaped hollow wall portions, a resilient gasket on one of said members extending around said compartment opening and cooperating with said door jamb to seal the food storage compartment when said door member is closed, and said striker being immovable with respect to said door member and swingable therewith, when the door member is swung into closed position, through said reentry opening into latching engagement with said movable latch mechanism.

References Cited in the file of this patent

UNITED STATES PATENTS

1,372,923	Anderson	Mar. 29, 1921
1,411,059	Moore	Mar. 28, 1922
2,101,465	Beers	Dec. 7, 1937
2,153,851	Swedman	Apr. 11, 1939
2,259,136	Hogg	Oct. 14, 1941
2,460,469	Rifkin	Feb. 1, 1949
2,692,809	Kesling	Oct. 26, 1954
2,698,197	Jacobson	Dec. 28, 1954

FOREIGN PATENTS

441,159	Great Britain	Jan. 14, 1936
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