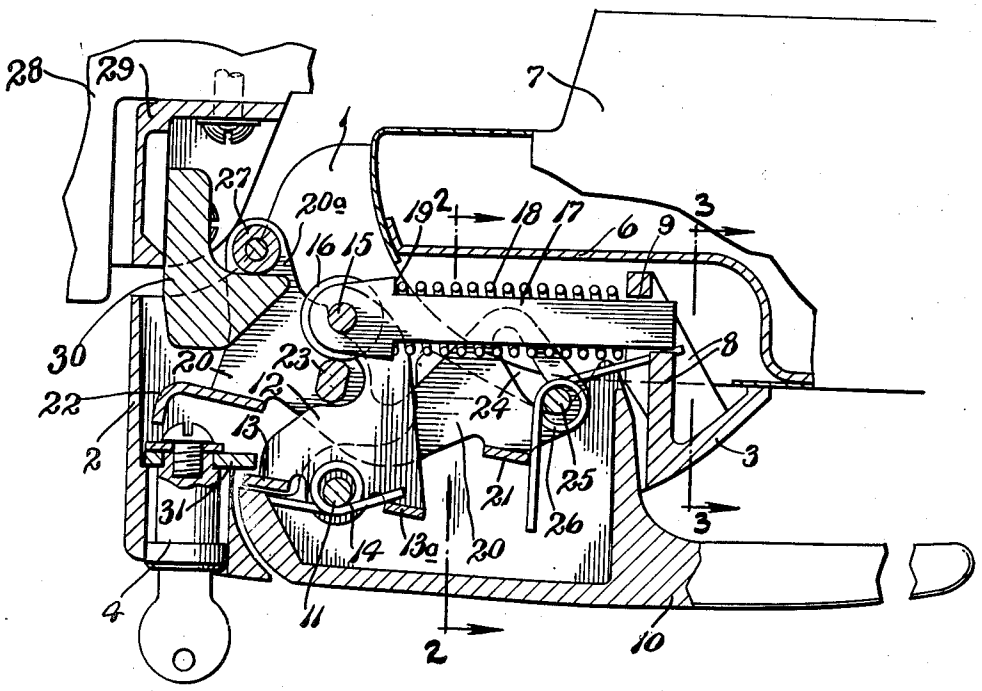
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LATCH

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2 Sheets-Sheet 1

FIG. 1.



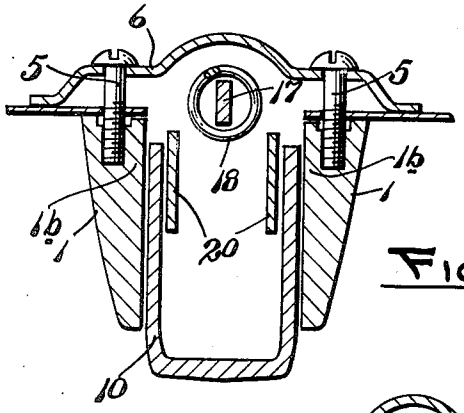




FIG. 2.

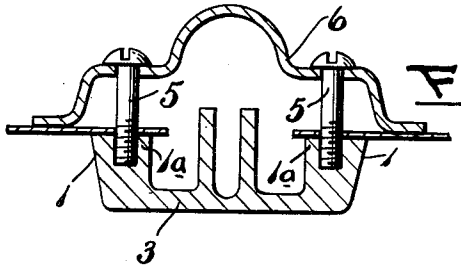



FIG. 3.

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FIG. 4.

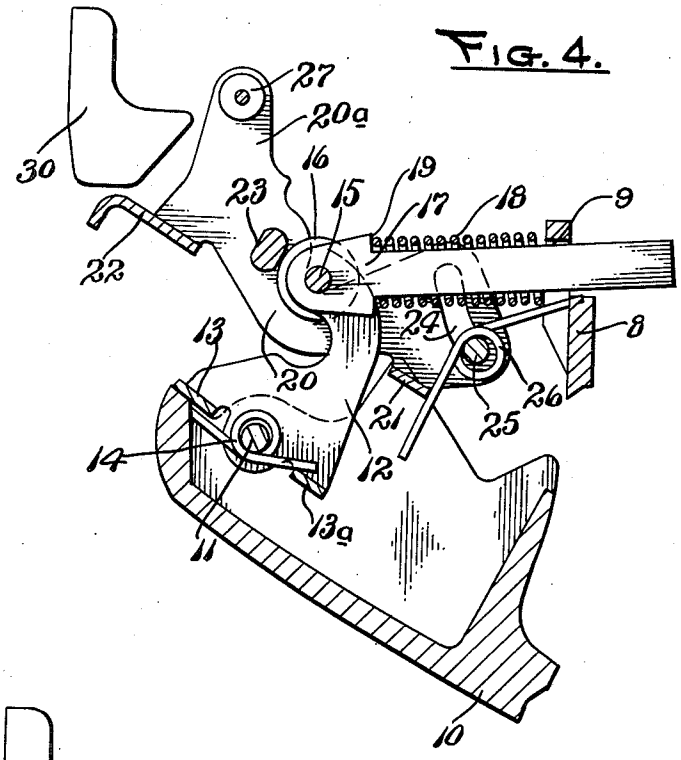
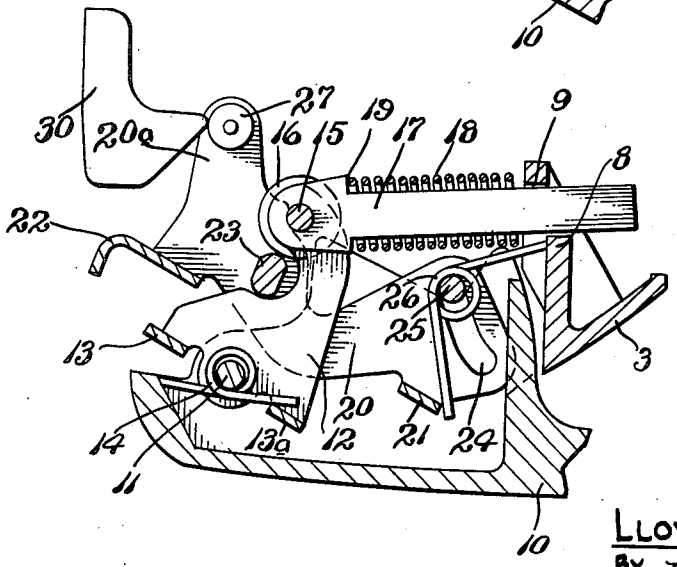



FIG. 5.




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# UNITED STATES PATENT OFFICE

2,679,422

## LATCH

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Application September 6, 1949, Serial No. 114,104

6 Claims. (Cl. 292—332)

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The present invention relates to a latch construction which, in the use for which it has been designed, is applied to the swinging door of a relatively heavy or commercial type refrigerator. The latch which I have invented is spring actuated and is mounted on the refrigerator door. The latch is opened by outward pull on the door handle which compresses a spring. The latch is moved to a cocked position and held in such position upon opening of the door; upon closing the door, the latch is automatically tripped into interlocking engagement with a stationary keeper mounted on the refrigerator housing. The tripping action frees the latch so that the latch bolt forming a part thereof engages the keeper and snugly and securely draw the door into a closed position with respect to the refrigerator compartment.

With my invention, novel structure is provided for transmitting the force of the latch spring used and controlling it by means of a pin against which rollers pushed by the spring engage, the pin having a rounded edge and a flat side, the rollers passing from such rounded edge to the flat side when the door is opened and returning from the flat side to the rounded edge when the latch is tripped on closing the door. A relatively simple, very compact and exceptionally practical latch structure for the purpose for which it is used is provided, the action of the spring through such rollers against said flat sided pin carried by the latch bolt serving to hold the door in snugly closed position to preclude the entrance of the heat from the outside to the interior of the refrigerator, but with the manual operation of the latch on opening the door rendered relatively easy though a spring of considerable strength is compressed during such operation.

An understanding of the invention may be had from the following description, taken in connection with the accompanying drawings, in which,

Fig. 1 is a horizontal section through the latch showing it in closed position engaging with a keeper,

Figs. 2 and 3 are transverse vertical sections, substantially on the planes of line 2—2 and 3—3 respectively of Fig. 1.

Fig. 4 is a fragmentary section, similar to Fig. 1, illustrating the position of the latch when the door is opened and in which position it normally remains until the door is closed, and

Fig. 5 is a section similar to Fig. 4, showing the position of the parts and the action which takes place under a condition in which the latch, after the door is opened, does not remain in its

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cocked position for tripping, but is in the position which it has when the door is closed, the latch however automatically engaging with the keeper and riding thereagainst to operative position to hold the door closed.

Like reference characters refer to like parts in the different figures of the drawings.

In the construction illustrated, a housing of metal is mounted within a recess formed on the outside of the door casing 7. The housing has two spaced apart generally parallel sides 1 integrally connected, at what may be termed the outer end of the housing, by an end 2 and also integrally connected at its outer side adjacent its other end by a top section 3. The major portion of the top or outer side is open, one end of the handle extending into said opening. Beyond the handle of the latch there is further a section of the top in which a lock, such as indicated at 4, may be installed for locking the latch against operation to open the door, such lock being desirable in large or commercial refrigerators. The sides 1 of the housing at the inner side thereof are thickened and provided with bosses 1a and 1b which are interiorly bored and threaded to receive screws 5. For securing the latch at the outer side and adjacent the free vertical edge of a door 7, the door structure includes a relatively heavy member 6 made from flat metal through which the screws 5 pass and against which the heads of the screws engage as shown in Figs. 2 and 3. The housing also has an integrally cast flange or guide member 8 located between the sides 1, extending inwardly from the outer or top section 3 of the housing and which at its inner end has a guide opening 9, the purpose of which will be later described.

The handle 10 is pivotally connected adjacent one end thereof to the housing by means of a transverse pin 11 extending through and located between the sides 1 of such housing. An actuating member is mounted for turning or rocking movement on the pin 11. The pivoted end portion of the handle 10 is recessed so that that portion of the handle which fits into the opening at the outer side or top of the housing in itself provides a housing for part of the latch mechanism in the space in the channel cross section of the handle at its pivotal end portion (Fig. 2). The actuating member is made from sheet metal having two spaced parallel sides 12 between the outer edges of which integral spaced connecting sections 13 and 13a extend. A torsion spring 14 around the pin 11 has one arm bearing on the adjacent end of the handle 10 and the other

upon the inner part 13*a*. The adjacent end of the handle is adapted to bear against the ledge 13 of the actuating member to turn it clockwise (Fig. 4) in operating the latch to disengage from the keeper by an outward pull on the free end of the handle. Upon release of the handle spring 14 returns it to inner position, generally parallel to the face of the door on which it is installed.

Between the inner end of the two sides 12 of the actuating member a pin 15 extends on which rollers 16 are carried. The rollers 16, two in number, are spaced from each other and between them a flat bar 17 is located through which the pin 15 passes. A heavy coiled compression spring 18, positioned about bar 17, has one end thereof bearing against a shoulder 19 made by widening the bar adjacent the end where it is connected with the pin 15, and has the other end thereof bearing against the guide post 8 in which the guide opening 9 is formed and through which the free end of the bar 17 slidably passes.

The latch bolt is also made from a single plate of flat metal and has two spaced parallel sides 20 of somewhat irregular form as shown which, at their outer side edges and adjacent their inner ends are connected by an integral cross section 21 and at their outer sides and at their outer ends by trip cross section 22 also integral with the sides. A pin 23 which has opposed flat sides and rounded ends is permanently connected to and extends between the sides 20 of the bolt. Adjacent its inner end the sides of the bolt 20 are provided with an arc shaped slot 24 as shown. A pin 25 passes through said slots and is secured at its ends to the sides 1 of the housing. A torsion spring 26 is disposed about the pin 25 between the sides 20 of the bolt, one arm of the spring bears against the section 21 and the other arm thereof bears against the guide post 8. Such spring is of less strength than the spring 18 and acts to hold the pin 23 at all times against the roller 16. Arms 20*a* extend inwardly from the outer end of the sides 20 of the bolt and has disposed therebetween a roller 27 which is mounted on a rod secured at its ends to said arms.

The roller 27 is adapted to engage with a keeper mounted on the refrigerator casing adjacent one side of the door opening when the door is closed. Mounted on the refrigerator compartment 28 is the keeper structure which includes a fixed support 29 and an adjustable keeper head 30, mounted thereon for relative inward and outward adjustment. The keeper head 30 is secured in a position of adjustment so that the roller 27 of the latch bolt will positively bear against the inner side of the keeper head, when the door is in closed position, due to the influence of the spring 18 transmitted through the rollers 16 to the rounded edge of the latch bolt pin 23. The keeper head as shown in Figs. 1, 4, and 5 is formed with an inclined outer edge against which, should the latch be in uncocked position when the door is open, the roller will engage and through a cam action swing the bolt about pin 25 until the bolt passes by the nose of the keeper (Fig. 5) and the roller 27 thereupon comes into interlocking relation with inner side of said keeper head.

When the door is closed and the latch bolt engaged by the keeper, as in Fig. 1, the bolt is moved by rollers 16 bearing, against the inner rounded edge of the pin 23 and by the heavy force of the spring 18, to the position shown in which the slots 24 are positioned with reference to the fixed pin 25 so that such pin is at the outer ends of said slots. Because of the shape of the slots 24 at their outer ends, any attempted movement of the bolt with reference to the pin 25 is prevented. Also, in such position, the handle 10 moved by the spring 14 is in close proximity to and adjacent the ledge and the lock 4 may be key-operated to swing the holding member 31 on the lock into a position in the path of movement of the ledge 13 so that the handle cannot be operated to release the door. By turning the lock to a different position, such ledge 13 is released and when pressed upon by the adjacent end of the handle 10, on swinging the free end of the handle outwardly, the actuating member is turned about the pivot 11 in a clockwise direction thereupon compressing the spring 18. The rollers 16 follow the round end of the pin 23 until they pass by such end and said pin 23 and the bolt connected with it so as to enable them to swing about the axis of the pin 25 under the influence of the torsion spring 26. This moves the roller 27 away from the keeper head 30 and the bolt is disengaged therefrom (Fig. 4). The pressure of rollers 16 against the flat sides of the pin 23, due to the spring 18, is transmitted in a direction slightly inside of the axis of the pivot 15 and thereby serves to hold the latch bolt in its cocked position. It remains in such position unless, through accident or inadvertence, the latch may be tripped.

The door being free for opening movement may now be opened by continuation of the outward pull on the handle with the latch bolt held in cocked position ready to be tripped when the door is closed. On closing the door the tripping ledge 22 between the sides of the outer end of the latch bolt is moved to strike against the outer end of the keeper head 30 with a consequent counterclockwise movement of the bolt about pin 25. With a movement of the latch bolt from the position in Fig. 4 to that shown in Fig. 1, the roller 27 comes into contact with the inner side of the keeper head and presses strongly thereagainst.

If the latch is tripped, while the door is open and the parts are substantially in the position as seen in Fig. 1, upon subsequent closing of the door the roller 27 bears against the inclined outer edge of the keeper head 30. Under such conditions the bolt forces the bar 17 to the right further compressing the spring 18 and at the same time the bolt is turned in a clockwise direction substantially about pin 25 and the slots 24 traverse the pin 25 until the slots move to a position such that the pin 25 is at the inner ends of the slots opposite to the position of such pin in said slots as seen in Figs. 1 and 4. This permits the bolt 27 to follow the inclined outer edge or side of the keeper head until the nose of the keeper head is reached and is passed by said roller 27, whereupon the roller 27 moves into the position shown in Fig. 1 with an automatic latching on the door in closed position.

The structure described is exceptionally compact and sturdy and of ample strength for the severe service to which it is put on the heavy doors of large or commercial type refrigerators. The inward movement of the handle 10 caused by spring 14 when the handle is released after an outward pull thereon is stopped when the handle at its inner side comes against the pin 25. The action of the rollers 16 on the rounded end and flattened side of the pin 23 is a cam action which facilitates release of the latch, there

being ample leverage for compressing the spring 18 when said latch is released without the exertion of undue force upon the handle and with the spring 26 automatically moving the latch bolt so as to maintain contact between pin 23 and such rollers 16. The multiplication of the strength of the spring 18 by the rollers following the rounded end of the pin 23 when the door reaches its closed position insures that the usual sealing gasket between the door and the casing of the refrigerator is held under very heavy pressure with a subsequent substantially perfect seal against heat transmission from the outside to the inside of the refrigerator.

The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. A latch structure comprising, a housing having spaced sides, a closed outer end, and a top having an opening therein, said housing being open at its inner side, a pin mounted on and extending between the sides of the housing adjacent the end thereof opposite the closed end of the housing, a latch bolt having spaced apart parallel sides connected at their outer edges adjacent both ends by integral cross members, said sides of the latch bolt adjacent the end thereof farthest from the closed end of the housing having slots therein through which the pin passes, a second pin carried by the latch bolt intermediate the ends thereof and between the sides of the bolt, said second pin having a curved inner edge and a flat side, a third pin extending between the sides of the housing outwardly of said second pin, a handle pivotally mounted at one end on said third pin and extending into the opening in the top of the housing, an actuating member having spaced sides located between the sides of the latch bolt, said sides of the actuating member being connected at their outer ends by integral cross members, one at each side of the third pin, said third pin passing through the outer ends of the sides of the actuating member for pivotally mounting said member, a fourth pin extended through and mounted on and located between the inner ends of said actuating member, rollers on said fourth pin bearing against the said second pin carried by said latch bolt, a bar through one end portion of which said fourth pin passes, said bar extending away therefrom and said housing having an inwardly extending guide post through which the free end of the bar slidably passes, spring means acting on the bar to force it in a direction to move said rollers toward the pin carried by the latch bolt, and a torsion spring around the first mentioned pin having one end bearing against the adjacent connected cross member between the sides of the latch bolt and the other end against said post.



2. A structure as defined in claim 1, said handle at its pivoted end portion being recessed at its inner side, the outer end portion of said actuating member and the latch bolt at its pivotally mounted end extending partly into said recess, said sides of the latch bolt having arms extending inwardly from the free end of the latch bolt, and a locking roller mounted on and between said arms near their free ends.

3. A structure as defined in claim 1, and a torsion spring around said third pin on which the actuating member and handle are pivotally mounted, having one end bearing against the handle and the other against the actuating member.

4. A latch structure comprising a housing, a handle pivotally mounted within said housing, said handle having a box-like construction extending into said housing and having a portion thereof protruding from said housing, a latch bolt pivotally mounted within said housing, a transversely extending protuberance formed on said latch bolt, an actuating member pivotally mounted within said housing for movement about the pivotal axis of said handle and engageable with said handle, an elongated element slidably mounted on said housing and having a portion thereof pivotally connected to said actuating member, and means for biasing said elongated element in a longitudinal direction whereby said actuating member bears against said protuberance.

5. The latch structure defined in claim 4 wherein the protuberance formed on the latch bolt is provided with a substantially flat actuating member-engaging peripheral portion and an arcuate actuating member-engaging peripheral portion, said latch bolt assuming an open unlatched position when said actuating member engages the substantially flat peripheral portion of said protuberance.

6. The latch structure defined in claim 4 wherein a roller encompasses the pivotal connection between said actuating member and elongated element; said roller being in continuous bearing relation with respect to the protuberance formed on said latch bolt.

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