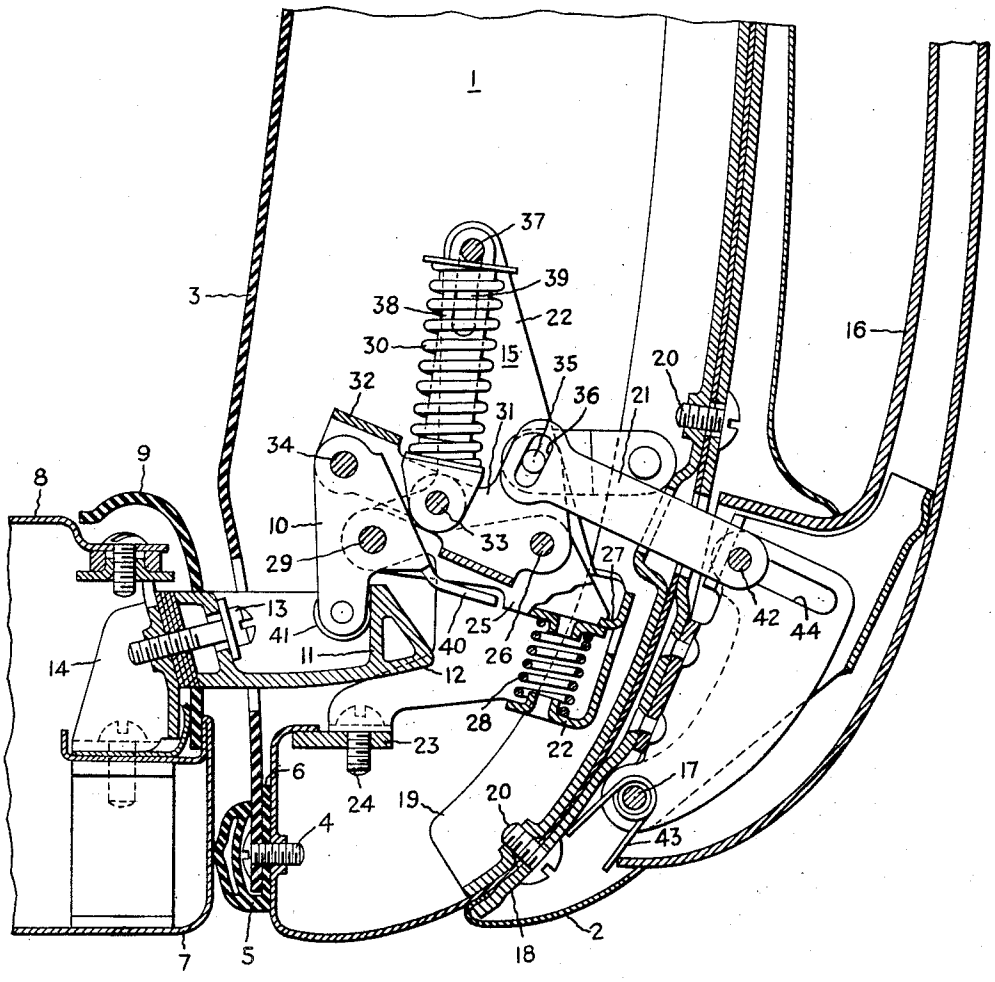
Dec. 15, 1953 F. M. HOGG 2,662,790

DOOR LATCHING MECHANISM

Filed Jan. 1, 1945 2 Sheets-Sheet 1

Fig. 1.



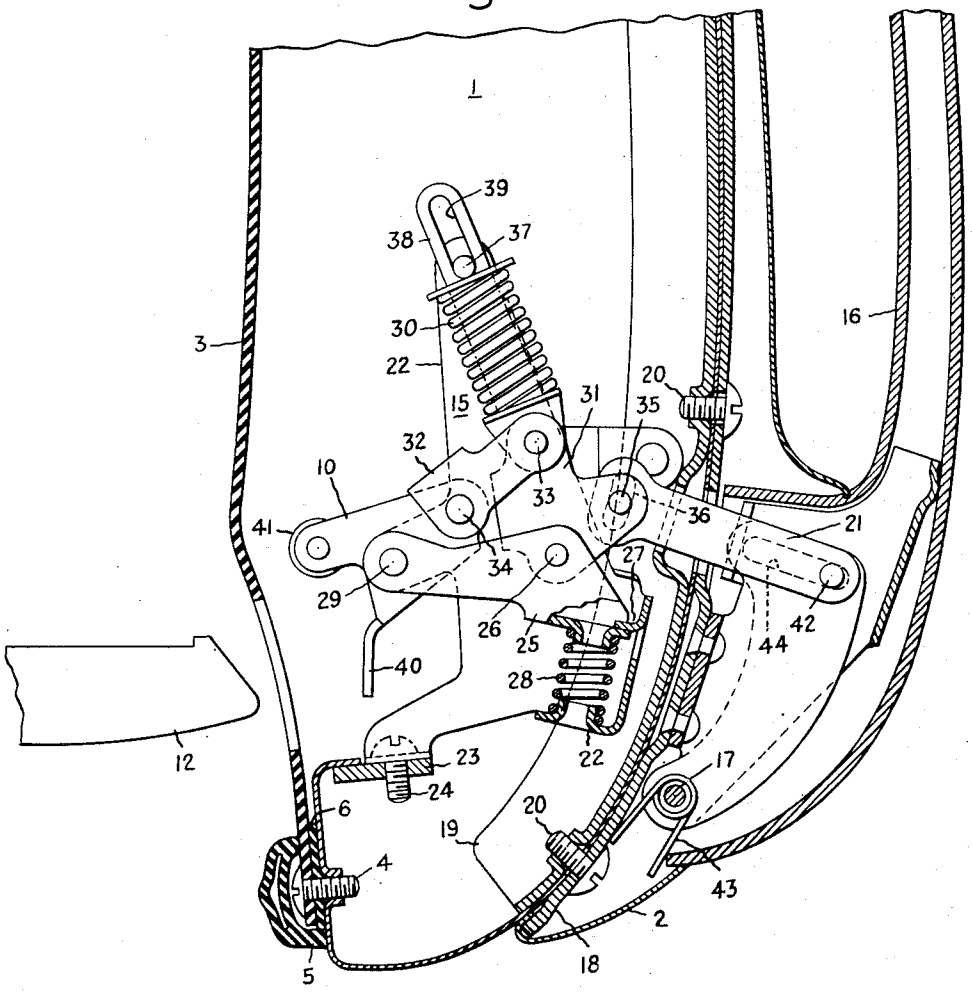

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Fig. 2.




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## DOOR LATCHING MECHANISM

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8 Claims. (Cl. 292—332)

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My invention relates to door latching mechanisms and particularly such mechanisms for latching relatively heavy doors on portable cabinets such as household refrigerator cabinets.

It frequently happens that in portable storage apparatus such as household refrigerators it is necessary to provide a door which is held tightly closed under pressure in order to maintain an adequate seal about the door opening. A gasket of rubber or similar material is commonly provided about the door opening and this gasket is held under pressure when the door is latched in its closed position. In order to secure adequate compression of the gasket it is necessary to provide some arrangement for obtaining pressure during latching and for retaining the pressure after latching. Latching mechanisms having stiff actions which may require slamming of the door are objectionable because of the possibility of jarring and damage to the contents of the cabinet. Other latching devices having trip mechanisms have been provided which may be closed without slamming; however, these mechanisms have not been entirely satisfactory for the purpose of compressing the sealing gasket. Accordingly it is an object of my invention to provide an improved latching mechanism of the trip or triggered type.

It is another object of my invention to provide a door latching mechanism including an improved arrangement for effecting tripping and latching of the mechanism forcibly to close the door without the necessity of exerting external pressure.

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 drawings in which Fig. 1 represents in section a door latching mechanism embodying my invention applied to a refrigerator cabinet and shown in its latched position, and Fig. 2 shows the mechanism of Fig. 1 with the door open and the latch mechanism in its locked out position, the principal moving parts being shown in full rather than in section.

Briefly, the latching mechanism illustrated in the drawings comprises a rotatable latch member mounted on the door and arranged to engage the keeper portion of a strike mounted on the stationary cabinet structure. The rotatable

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latch is arranged to be held in an open or locked out position by a toggle which is held in its broken position by a suitable overcenter spring. A trigger or trip member is provided which is actuated on closing of the door by engagement with the strike. Movement of the trip requires very little force and effects reversed overcenter movement of the toggle spring to throw the toggle into its locked position, and rotate the bolt to engage the keeper portion of the strike and latch the door. The arrangement of the spring and toggle is such that the force of the spring is multiplied on rotating the latch into its locking position and is sufficient to compress the gasket during the locking operation. When the door is closed it is securely locked in position by a locked toggle and normally can be opened only by movement of the latch handle which effects reverse movement of the toggle. A second spring is provided which affords movement of the latch bolt under excessive pressures such as might occur on closing the door when the bolt is in its latched position.

Referring now to the drawing, the latch mechanism in Fig. 1 is mounted within a refrigerator cabinet door 1 at one edge thereof. The door comprises an outer sheet metal wall or shell 2 and an inner wall or liner 3 which may be constructed of heat insulating material. The space between the walls 2 and 3 is filled with suitable heat insulating material (not shown). The walls 2 and 3 are secured together at their adjoining edges by screws 4 which also hold a resilient gasket 5 in position about the door opening, a flanged portion 6 of the gasket being compressed between the walls 2 and 3. The refrigerator cabinet comprises an outer sheet metal wall 7 and an inner liner 8 secured together by suitable spacers (not shown) and having a breaker strip 9 of thermal insulation closing the space between the walls about the door opening. The gasket 5 is compressed between the outer liner 7 and the door 1 when the latching mechanism is in its locked position as shown in Fig. 1. The door is held in its closed position by a rotatable latch bolt 10 which is arranged to engage a keeper portion 11 of a strike 12. The strike 12 is secured by a screw 13 to a bridge or brace 14 rigidly mounted between the walls 7 and 8 of the cabinet. The latch bolt 10 is held in latching position by a latching mechanism 15 mounted in the door and arranged to be unlatched by operation of a handle 16. The handle 16 is pivoted at its lower end at 17. The pivot 17 is mounted on an outer supporting plate 18 which, together with an in-

ner supporting plate 19, is secured to the outer wall 2 of the door by screws 20. Clockwise rotation of the handle 16 about the pivot 17 draws a lost motion link 21 outwardly from the door and unlatches the bolt 10, in a manner to be described later, so that the parts of the mechanism assume their positions as shown in Fig. 2, the door being opened and the handle 16 returned to its original position as permitted by the lost motion connection 21.

The latching mechanism 15 is mounted upon a supporting structure including a plate 22 of generally U-shaped cross section only one side of which is shown in the drawing, it being understood that the several pivots indicated have their axes normal to the two sides of the U. The wall 2 is provided with a reinforcing strip 23 relative thereto, and the plate 22 is secured to the strip 23 by screws 24. The supporting plate 22 is also secured in any suitable manner to the supporting member 19. The supporting structure also includes a member 25 pivoted to the member 22 at 26 and held against a stop 27 by a compression spring 28. The latch bolt 10 is rotatably mounted on the member 25 about a pivot 29 and is arranged to be actuated by a spring 30 through a toggle joint comprising links 31 and 32. The link 31 is rotatably mounted on the supporting structure about the pivot 26, and the two links are pivotally connected at 33, the link 32 being pivotally connected to the latch bolt 10 at 34 eccentrically of pivot 29.

In the position shown in Fig. 1 the toggle comprising links 31 and 32 is held by the pressure of the spring 30 in a position such that the common pivot 33 is in substantial alignment with the pivots 26 and 34. It will readily be understood that since the force of the spring 30 is exerted in a direction transversely of the line of the pivots, the toggle mechanism constitutes a force-multiplying connection such that the force for rotating the latch bolt 10 into its latching position is much greater than the force of the spring 30 against the pivot 33. The toggle is therefore effectively locked in this latching position and if desired the pivot 33 may be arranged to move slightly past the center line through the pivots 26 and 34 so that the toggle is positively locked against reverse movement.

When the handle 16 is rotated in a clockwise direction about the pivot 17, the link 21 is pulled outwardly and carries with it a pin 35 on the link 31 and which fits in a cross slot 36 in the link 21. This outward movement causes the link 31 to rotate in a clockwise direction about the pivot 26. Clockwise rotation of the link 31 compresses the spring 30 between the pivot 33 and a pin 37 about which the spring is pivoted on the support 22. The spring is provided with a longitudinal guide 38 having one end pivoted at 33 and its other end engaging a pin 37 connected between the two sides of the support 22, the guide 38 being provided with a slot 39 permitting longitudinal movement of the guide with respect to the pin 37. It is the link 38 which limits the expansion of the spring 30 and determines the locking position of the toggle. When the pivot 33 passes the common center line between the centers of pivot 26 and pin 37, the link 31 is snapped into and held in the extreme clockwise position illustrated in Fig. 2, the spring 30 acting as an overcenter spring, thereby locking the link in that position. Rotation of the link 31 carries with it the link 32 and thereby rotates the latch bolt 10 about its pivot 29 in a clockwise direction; and in the final position of the link 31 the latch bolt 10 is in its extreme clockwise position where it is retained by the locking out of the link 31, the toggle joint being locked in its broken position.



The latch bolt 10 has formed on it a trip or trigger member 40 which lies in the path of the strike 12 when the mechanism is in its unlatched position shown in Fig. 2. It will be noted that the position of the pivot 33 in Fig. 2 is only slightly past the center line of the pivots 26 and 37 so that only slight movement of the pivot 33 is necessary to push the spring 30 overcenter in the reverse direction. When the door is moved toward its closed position the strike 12 engages the trigger 40 and on slight movement thereof, which requires very little pressure, the latch member 10 is rotated sufficiently to pull the pivot 33 past the center of the pivots 26 and 37 whereupon the spring 30 moves the toggle to its locked position with snap action. During this movement the latch member 10 engages the keeper portion 11 of the strike and continues to rotate and draw the door forcibly into its closed position. A roller 41 is provided on the bolt 10 to minimize friction. It will be noted that since the spring 30 exerts force laterally of the toggle and against the pivot 33 the force of the spring is multiplied during the latching operation. The force exerted by the latch bolt 10 when rotated to its locked position by the toggle is sufficient to compress the gasket 5 about the door opening and secure effective sealing. This force of compression is far in excess of the force necessary to release the trip and effect operation of the latching mechanism.

If it should happen that the trigger 40 is operated when the door is open so that the bolt 10 is in the path of the strike when the door is closed, then the jar or shock which might be produced upon slamming of the door will be taken up by the spring 28. The impact of the roller 41 against the sloping surface of the strike 12 produces rotation of the supporting member 25 about the pivot 26 against the force of the spring 28 as well as against the force of the spring 30. During this rotation the toggle remains in its locked position, and should the door be forced closed the roller 41 will ride down the sloping surface of the strike 12 and engage the keeper portion 11 in a manner similar to that in conventional latches. If when the door is closed an attempt should be made to force or pry it open, the spring 28 again will permit rotation of the support member 25 and prevent damage to the latching mechanism. The spring 28, however, is sufficiently strong so that during all normal operation of the latching mechanism there is no movement between the supporting members 22 and 25.

During the operation of the latching mechanism illustrated, whenever the handle 16 is rotated to unlatch the bolt 10 it engages a pin 42 on the link 21 and draws the link outwardly from the door. When the handle is released it is returned to its normal position by a spring 43, the pin 42 riding in a slot 44 in the handle structure.

It will readily be apparent from the foregoing that I have provided a simple and effective latching mechanism which makes it possible to move a door toward its closed position with relatively little force and yet upon operation of the mechanism the door is drawn into its completely closed

position with sufficient force to compress a sealing gasket.

While I have described a specific embodiment of my invention in connection with a refrigerator cabinet, other arrangements and embodiments will occur to those skilled in the art. I do not therefore desire my invention to be limited to the particular construction illustrated and described, 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 latch bolt pivotally mounted on said structure, a spring guide pivotally mounted on said structure, a spring acting through said guide, a first link pivoted on said structure and cooperating with said guide to provide a snap acting mechanism movable into either of two positions, and a second link for connecting said guide and said bolt for rotating said bolt on movement of said guide between said two positions whereby said bolt is unlatched in one of said positions and latched in the other of said positions, said second link being constructed and arranged to multiply the force of said spring on movement toward said other position for urging said bolt toward its latching position.

2. A door latch comprising a supporting structure, a latch bolt pivotally mounted on said structure, a toggle comprising a first link pivoted on said structure and a second link pivoted on said first link and on said bolt eccentrically of the pivotal axis of said bolt, a spring guide mounted on said structure, a spring acting through said guide, said guide being connected to said toggle for moving said first link to lock said toggle in one position thereof and to break said toggle in its other position, said toggle in its locked position retaining said bolt in its latching position and the force of said spring being multiplied upon movement of said toggle toward its locked position forcibly to effect rotation of said bolt toward its latching position, and means for selectively moving said guide overcenter from either of its positions into the other to latch and unlatch said bolt.

3. A door latch comprising a supporting structure, a latch bolt pivotally mounted on said structure, a toggle comprising a first link pivoted on said structure and a second link pivoted on said first link and on said bolt eccentrically of the pivotal axis of said bolt, a spring mounted on said structure laterally of said toggle and arranged to exert pressure on the pivotal connection between said first and second links, said spring being arranged for movement overcenter with respect to the pivot of said first link on said structure to force said toggle into its locked and broken positions, said toggle in its broken position holding said bolt in its retracted position and said toggle in its locked position locking said bolt in its latching position, the force of said spring being multiplied during movement of said toggle toward its locked position, manually operable means for moving said spring overcenter to unlock said toggle, and tripping means for moving said spring overcenter to lock said toggle.

4. A door latch comprising a supporting structure, a latch bolt member pivotally mounted on said structure, a link member spaced from said bolt member and pivotally mounted on said structure, a link pivotally connected to both said members, eccentrically of their respective pivots on said structure, said link and said link member constituting a toggle for holding said bolt member in latching position when said toggle is locked and for holding said bolt member in its retracted position when said toggle is broken, a spring arranged to move overcenter with respect to the pivot of said link member on said structure for retaining said toggle in either of its positions, manually operable means for moving said toggle out of its locked position and for moving said spring overcenter to effect breaking of said toggle, one of said members having a trigger thereon adapted to engage a strike for moving said spring overcenter to move said toggle from its broken position and to effect latching of said bolt member, said spring being arranged to exert a force laterally of said toggle when in its locked position whereby the force of said spring is multiplied when rotating said bolt member toward its latching position.

5. A door latch comprising a supporting structure including a stationary supporting member and a pivoted supporting member mounted thereon, a latch bolt pivotally mounted on said pivoted member eccentrically of the pivot between said members, a toggle comprising a first link pivoted on said structure and a second link pivoted on said first link and on said bolt eccentrically of the respective pivotal axes of said bolt and said first link, a spring mounted on said stationary member and connected to said toggle for moving said first link to lock said toggle in one position thereof and to break said toggle in its other position, said toggle in its locked position retaining said bolt in its latching position and the force of said spring being multiplied upon movement of said toggle toward its locked position forcibly to effect rotation of said bolt toward its latching position, manually operable means for moving said spring overcenter in one direction to unlock said toggle, tripping means for moving said spring overcenter in the other direction to move said bolt to its latching position and to lock said toggle, means including a second spring for preventing pivotal movement of said pivoted supporting member during normal operation of said latch, said second spring affording relative movement between said supporting members when a predetermined force is applied to said bolt in its latched position.

6. A door latch comprising a supporting structure, a latch bolt pivotally mounted on said structure, a toggle comprising a first link pivoted on said structure and a second link pivoted on said first link and on said bolt eccentrically of the pivotal axis of said bolt, a spring mounted on said structure laterally of said toggle and arranged to exert pressure on the pivotal connection between said first and second links, said spring being arranged for movement overcenter with respect to the pivot of said first link on said structure to force said toggle into its locked and broken positions, said toggle in its broken position holding said bolt in its retracted position and said toggle in its locked position locking said bolt in its latching position, the force of said spring being multiplied during movement of said toggle toward its locked position, manually operable means including a handle and a lost motion connection between said handle and said first link for moving said toggle out of its locked position and for moving said spring overcenter whereby said toggle is driven to its broken position, and tripping means for moving said toggle out of its unlocked position and overcenter to

rotate said bolt and move it into latching position.

7. In a door latch, a latch bolt movable in a plane substantially normal to the door axis and adapted to engage a keeper having a bolt-retaining surface substantially parallel to said axis, a toggle associated with said bolt and arranged to operate by expansion to advance the bolt into interlocking engagement with said keeper with increasingly amplified force as the toggle approaches the fully expanded position, resilient means operatively connected with said toggle for urging the toggle into the expanded position, and means for retracting the toggle against the action of said resilient means to disengage the bolt from the keeper, said bolt, toggle and keeper being constructed and relatively arranged so that the bolt when advanced into said engagement will meet the said retaining surface of the keeper substantially before the bolt has moved into the fully advanced position whereby the said resilient means may be effective through the expanding toggle to draw the door securely to a tightly closed position.

8. A latching mechanism comprising a movable latching member adapted to engage a keeper, a support, a toggle joint having a first link pivotally mounted on said support and provided with an



ear portion and a second link operatively associated with said member, said toggle being movable to extended and retracted positions to move said member into and out of latching position with said keeper respectively, spring means operable to effect actuation of said toggle to its extended position, and manual means for effecting actuation of said toggle to its retracted position, said manual means including a pivotally mounted handle and a connecting rod having one end thereof pivotally connected to said ear portion of said first link and its other end pivotally attached to said handle so that rotation of said handle operates to rotate said first link about its axis and move said toggle to said retracted position.

FRANCIS M. HOGG.

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