

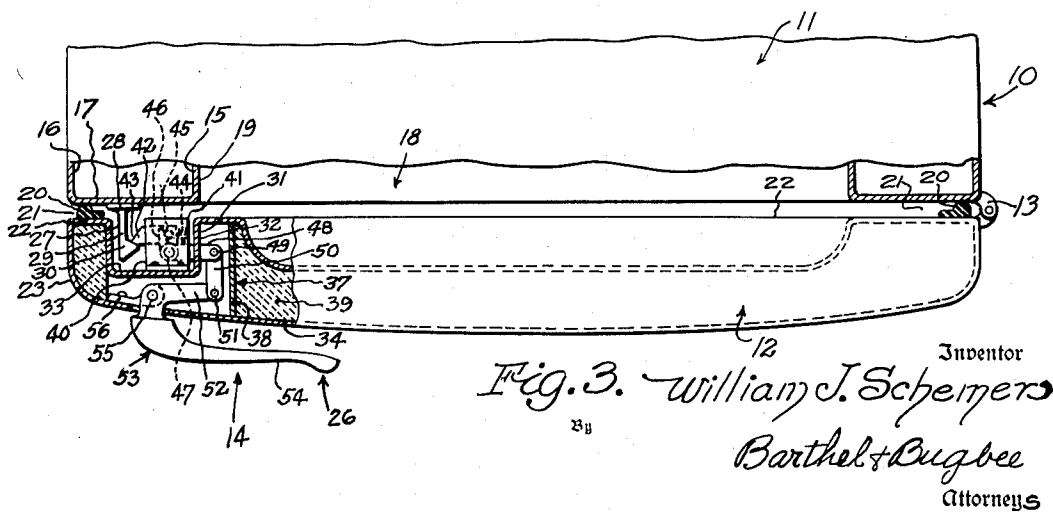
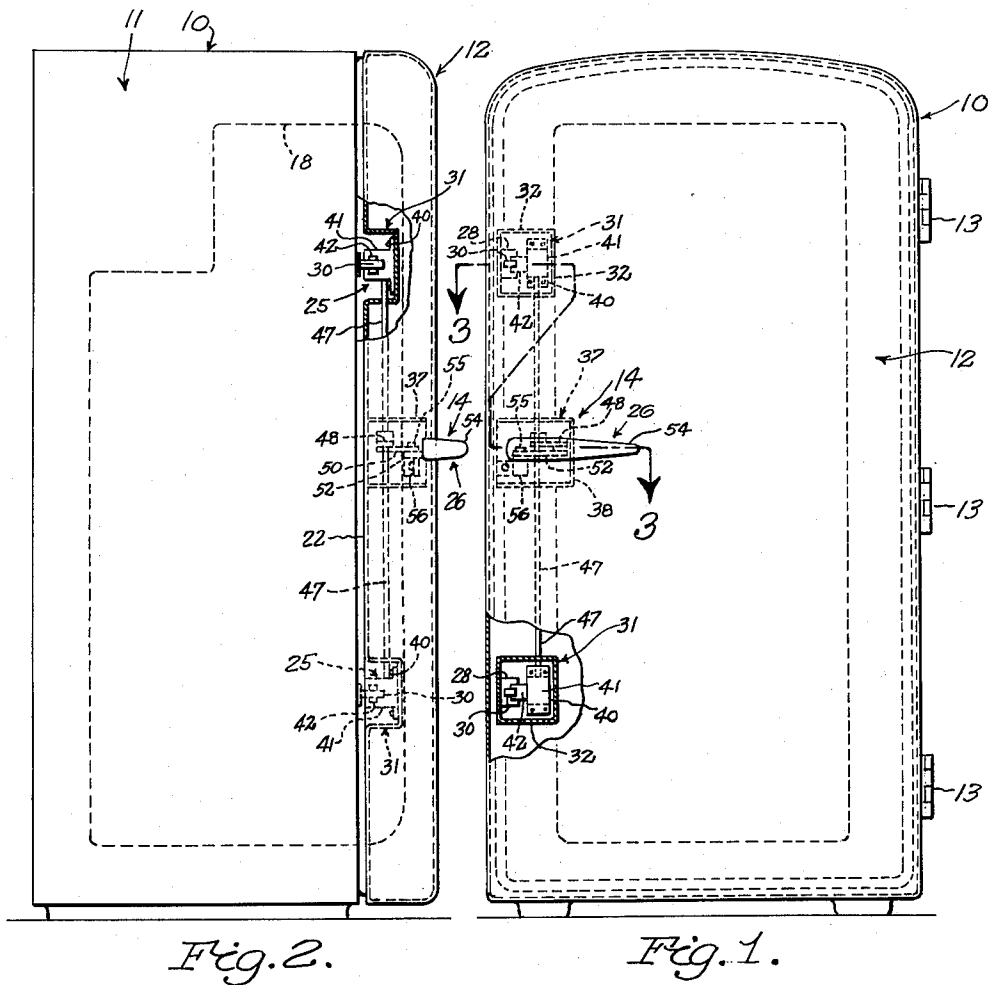
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MULTIPLE LATCH FOR A REFRIGERATOR DOOR

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MULTIPLE LATCH FOR A REFRIGERATOR DOOR

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This invention relates to refrigerators and, in particular, to multiple latches for refrigerator doors.

One object of this invention is to provide a multiple latch for refrigerator doors which will securely hold an elongated refrigerator door in its closed position and prevent passage of air and moisture into or out of the refrigerator.

Another object is to provide a multiple latch for refrigerator doors which will simultaneously hold an elongated refrigerator door firmly closed at widely separated locations along its outer edge, thereby preventing or reducing buckling or warping of the door and consequently eliminating the leakage defects which arise from such buckled or warped doors.

Another object is to provide a multiple latch for refrigerator doors of the foregoing character which provides two or more widely separated latches operated from a single handle, this handle being preferably located remote from the latches in a position which is within easy reach of an adult user but out of the reach of a small child.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawing, wherein:

Figure 1 is a front elevation of a conventional refrigerator equipped with a multiple latch according to one form of the invention, with the door partly broken away to show the latch mechanism more clearly;

Figure 2 is a side elevation of the refrigerator shown in Figure 1, with the door also broken away for the same purpose; and

Figure 3 is a horizontal section on two levels taken along the Z-shaped line 3—3 in Figure 1.

Modern refrigerators, in order to conserve floor space and yet obtain the necessary large capacity, are tall in proportion to their width and therefore require greatly elongated doors. Such long doors are ordinarily equipped with a single latch which holds the door closed at a single location. Such long doors with single latches have hitherto been subject to warping and buckling on the latch edge of the door even though they ordinarily employ three hinges along the opposite edge which hold the hinge edge of the door straight. When such a door warps or buckles, it lets air in and out of the refrigerator, causing the leakage of cold air with a consequent increase in the cost of refrigeration. Moreover, if, as frequently is the case, the refrigerator is equipped with an inside glass door which closes the freezer portion of the refrigerator, this leakage causes sweating on the glass door, building up frost to so great an extent as to prevent proper opening of this door. Such long doors, when buckled or warped, are difficult to patch or straighten, hence correction thereof is difficult.

The present invention provides a multiple latch for such elongated refrigerator doors which securely holds the door against the door opening at widely separated locations along the outer edge of the door, thereby preventing warping or buckling and accordingly preventing

leakage of air into or out of the refrigerator. As a consequence, the above-mentioned defects arising from such door warping or buckling are completely prevented. In particular, the invention provides a pair of widely separated latches operated simultaneously from an intermediate handle. This handle can be placed high enough to be within easy reach of an adult yet out of the reach of a small child.

Referring to the drawings in detail, Figures 1 and 2 show a refrigerator, generally designated 10, having a casing 11 equipped with a vertically-elongated door 12 pivoted thereto at multiple spaced hinges 13 along its inner edge and provided with a multiple latch, generally designated 14 along its outer edge. The refrigerator casing 11 is provided with inner and outer walls 15 and 16 interconnected by a door jamb or front wall 17. The refrigerator casing 11 contains a compartment 18 having an opening 19 closed by the door 11. A gasket 20 of elastic deformable material such as rubber, synthetic rubber or a combination thereof, closes the gap 21 between the inner face 22 of the door 12 and the door jamb 17, for the purpose of preventing or at least minimizing leakage of air and moisture into or out of the compartment 18.

Secured to the door jamb 17 at widely spaced locations along the open edge 23 of the door 12 are two or more latch units, generally designated 25, these being operated by a handle unit, generally designated 26. The latch unit 25 includes a keeper 27 having a base 28 secured to the door jamb 17 and having a post or shank 29 terminating in a bevelled latch hook 30 or its equivalent (Figure 3).

Immediately opposite each of the keepers 27, the door 12 is provided with upper and lower box-like latch compartments 31 (Figure 3) having side walls 32 and a back wall 33. The door 12 has an outer wall 34 which curves around at the edges into engagement with the inner wall 22. Also mounted in the door 12 between the upper and lower latch compartments 31 is a handle compartment 37 housing the handle unit 26 and having side walls 38. The remainder of the door between the outer and inner walls 34 and 22 is ordinarily filled with insulating material 39 to reduce heat conduction through the door 12. The construction of the refrigerator 10 as regards its casing 11 and door 12 is conventional and its details are beyond the scope of the present invention, except for the features related to the present invention.

Bolted, riveted or otherwise secured to the back wall 33 of the recessed portion 32 of the inner wall 22 of the door 12 is the base 40 of a latch bolt housing 41 in which a latch bolt 42 is movably mounted. The latch bolt 42 has a bevelled outer end 43 (Figure 3) which travels into and out of engagement with the bevelled latch hook 30 to latch and unlatch the door 12 relatively to the keeper 27. A compression spring 44 normally urges the bevelled outer end 43 of the bolt 42 into a wedging and latching engagement with the bevelled latch hook 30 of the keeper 27, which thereby urges the inner face 22 of the door 12 and its gasket 20 toward and into sealing engagement with the door jamb 17.

In order to move the bolt 42 in this manner, it is provided with a pin 45 engaged by an arm 46 mounted on a vertical shaft or rod 47. The rod or shaft 47 interconnects the two or more arms 46 of the two or more latch units 25 so that rotation of the shaft 47 simultaneously swings the two or more arms 46 and simultaneously retracts their respective bolts 42.

The rod or shaft 47 passes through the handle unit compartment 37 and in that compartment carries an arm 48 which is pivoted at 49 to one end of a link 50, the opposite end of which is pivoted at 51 to one arm 52 of a bell-crank-shaped handle lever 53, the other arm 54

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of which forms a handle. The handle lever 53 is pivoted at 55 to a handle bracket 56 which is secured to the outer door wall 34 (Figure 3).

In the operation of the invention, to open the door 12 from its closed position shown in Figures 1, 2 and 3, the operator grasps the handle 54 of the handle lever 53 and pulls outward. This action rocks the bell-crank handle lever 53 around its pivot 55 (Figure 3), swinging the arms 52 and 48 outward within the compartment 37 through the intermediate action of the link 50. This action rotates the rod 47 and its arms 46 in a clockwise direction, moving the pins 45 and the latch bolts 42 connected thereto to the right and causing their ends 43 to disengage themselves from the ends 30 of the keepers 27. Since both bolts 42 are released simultaneously from the upper and lower keepers 27, the door 12 is permitted to be swung open by a continued pull upon the handle arm 54.

With the door open, to close and latch the door, the operator merely swings the door shut, whereupon the bolts 42 ride over the ends 30 of their keepers 27 and are returned to latching position by their compression springs 44. In this manner, the door is held firmly closed along its open edge 23 by two bolts 42 and keepers 27 at widely spaced locations not far from the top and bottom edges of the door 12. Accordingly, the latch mechanism 14 effectively prevents or at least minimizes warping of the door and consequently prevents or minimizes the leakage of air or moisture into or out of the refrigerator through gaps which would otherwise be present around the edge of the door.

What I claim is:

1. An anti-warp door-latching mechanism comprising a pair of latch bolt housings secured in longitudinally-spaced relationship to the open edge of the door, a latch bolt reciprocably mounted in each housing, means responsive to the locking reciprocation of said bolt for urging said door into a closing and sealing engagement with the door frame, a resilient element operatively connected to each latch bolt and yieldingly urging said latch bolt in a latching direction, a motion-transmitting bolt-retracting device including a vertically-disposed rotatable rod operatively interconnecting said bolts in simultaneous actuating relationship, and a handle operatively connected to said rod intermediate said bolts.

2. An anti-warp door-latching mechanism comprising a pair of latch bolt housings secured in longitudinally-spaced relationship to the open edge of the door, a latch bolt reciprocably mounted in each housing, means responsive to the locking reciprocation of said bolt for urging said door into a closing and sealing engagement with the

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door frame, a resilient element operatively connected to each latch bolt and yieldingly urging said latch bolt in a latching direction, a motion-transmitting bolt-retracting device including a vertically-disposed rotatable rod operatively interconnecting said bolts in simultaneous actuating relationship, and a handle operatively connected to said rod intermediate said bolts, said device including an arm connected to said rod adjacent each bolt and operatively engageable therewith.

3. An anti-warp door-latching mechanism comprising a pair of latch bolt housings secured in longitudinally-spaced relationship to the open edge of the door, a latch bolt reciprocably mounted in each housing, means responsive to the locking reciprocation of said bolt for urging said door into a closing and sealing engagement with the door frame, a resilient element operatively connected to each latch bolt and yieldingly urging said latch bolt in a latching direction, a motion-transmitting bolt-retracting device including a vertically-disposed rotatable rod operatively interconnecting said bolts in simultaneous actuating relationship, and a handle unit including a bell-crank lever operatively connected to said rod intermediate said bolts.

4. An anti-warp door-latching mechanism comprising a pair of latch bolt housings secured in longitudinally-spaced relationship to the open edge of the door, a latch bolt reciprocably mounted in each housing, means responsive to the locking reciprocation of said bolt for urging said door into a closing and sealing engagement with the door frame, a resilient element operatively connected to each latch bolt and yieldingly urging said latch bolt in a latching direction, a motion-transmitting bolt-retracting device including a vertically-disposed rotatable rod operatively interconnecting said bolts in simultaneous actuating relationship, and a handle unit including a bell-crank lever operatively connected to said rod intermediate said bolts, said device including an arm connected to said rod adjacent each bolt and operatively engageable therewith.

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