Sept. 17, 1963 V. J. RUCK, JR., ETAL 3,103,692

ADJUSTABLE DOOR STOP

Filed Feb. 23, 1962

FIG. 1

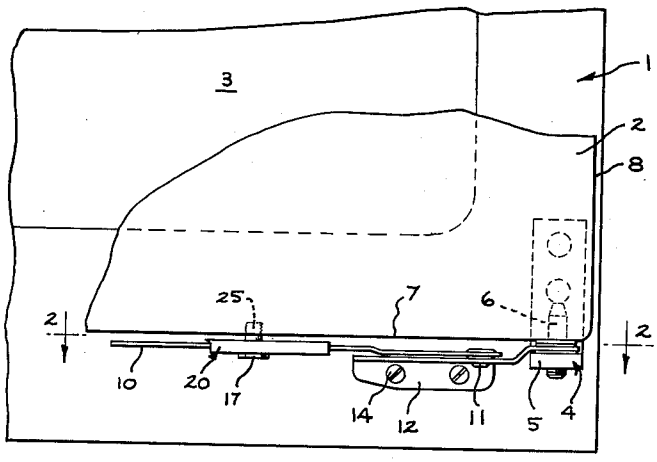


FIG. 2

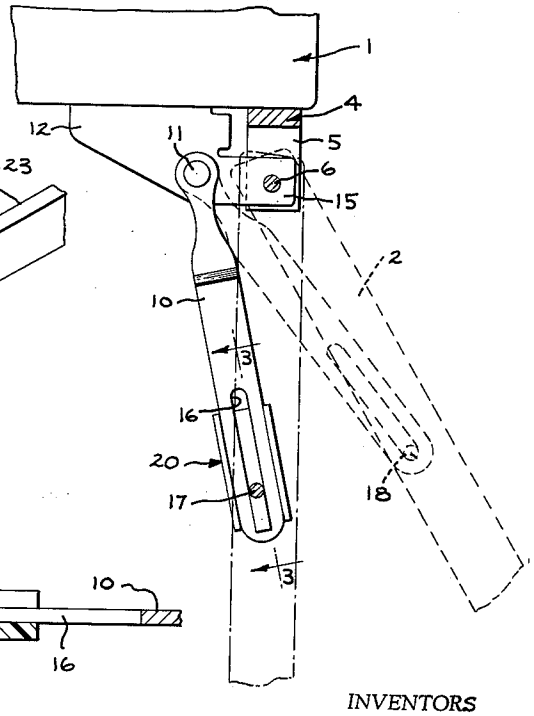
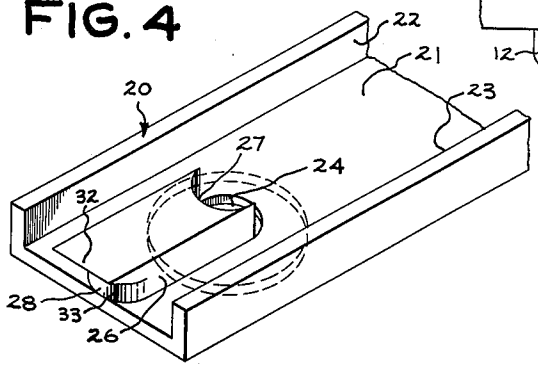


FIG. 4



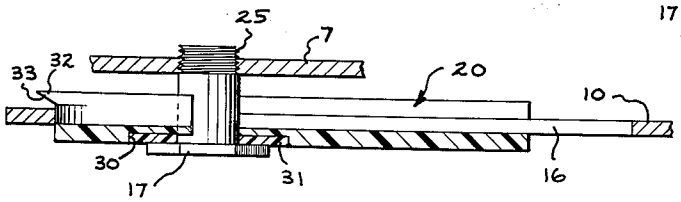


FIG. 3

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ADJUSTABLE DOOR STOP

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The present invention relates to a door stop and is more particularly concerned with means for modifying the action of a door stop to limit the opening movement of a door.

Relatively heavy or large doors such as the refrigerator doors are frequently provided with suitable door stops or door checks for stopping the opening movement of the door. A simple, effective and low cost door stop for limiting the opening movement of a door structure relative to a cabinet structure comprises a slotted arm pivotally connected to one of the structures and a stop pin extending through the slot in the arm and connected to the other structure whereby the door opening travel is stopped by engagement of the pin with the outer end of the slot. Such stops are not adjustable and once they are mounted on the cabinet and door structures, the extent of the opening movement of the door is fixed. In the application of such door stops to refrigerator cabinets and the like, it is common practice to provide for a normal door opening in the neighborhood of about 120° as this provides a comfortable access to the interior of the cabinet. However, in some refrigerator installations as for example when the cabinet is placed in the corner of the kitchen so that opening of the door beyond 90° causes the door to come into contact with an adjacent wall of the kitchen, it is desirable that the door stop limit the opening movement of the door to a point short of that at which the door will conact the adjacent wall.

The present invention has as its primary object the provision of an adapter or limiting means for decreasing the opening movement of the door provided with a door stop of the above type.

Another object of the invention is to provide a refrigerator door stop including means for easily adjusting the extent of the opening movement of the door.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the cliams annexed to and forming a part of this specification.

In carrying out the objects of the present invention, there is provided means adapted to decrease the opening movement of a door hinged along one edge to a cabinet and provided with a door stop mechanism including a pin mounted on the edge of either the door structure or cabinet structure adjacent the hinge edge of the door and a flat arm or bar pivotally mounted on the other structure and having a slot in the free end thereof for receiving the pin and for stopping opening movement of the door by contact of the pin with the outer end of the slot. The adapter of the present invention which is adapted to be mounted on the pin includes a channel-shaped base portion having an opening for mounting the adapter on the pin so that the arm will ride in the channel during opening and closing of the door with the side walls of the channel causing the adapter means to pivot about the pin along with the arm and in alignment therewith. For decreasing the effective length of the slot and thereby decreasing the opening movement of the door, the adapter is provided with a projection extending upwardly from the base portion thereof and arranged to extend into the slot for engagement of one end thereof with the pin and the other end with the outer end of

the slot when the door is opened. This projection which extends into the slot between the pin and the outer end of the slot is of a length sufficient to provide the desired decrease in the opening movement of the door. In accordance with a preferred embodiment of the invention there is also provided on the end of the projection contacting the outer end of the slot a lip adapted to ride over the outer end of the arm to assure that the arm is retained in the channel for positive engagement with the projection as the door is moved to its open position.

For a better understanding of the invention, reference may be had to the accompanying drawing in which:

FIGURE 1 is a partial elevational view of a refrigerator cabinet illustrating the door hinging and door stop arrangement;

FIGURE 2 is a sectional view taken generally along the line 2—2 of FIGURE 1 with the door illustrated in two different open positions;

FIGURE 3 is an enlarged fragmentary detailed view along line 3—3 of FIGURE 2; and

FIGURE 4 is a perspective view of the door stop adapter of the present invention.

Referring to the drawing, there is shown a refrigerator cabinet 1 and a door 2 for closing the access opening to a storage compartment 3. The door 2 is mounted for movement about a vertical axis by means of a hinge 4 at a lower corner of the door 2 and a similar hinge (not shown) at the corresponding upper corner of the door. Each of these hinges essentially comprises a bracket 5 secured to the face of the cabinet which carries a pin 6 extending through a suitable aperture in the door edge 7 whereby the door pivots about the axis of the pin 6 in its movement between a closed and an opened position. With the hinges thus disposed, the door opens and closes along an axis adjacent the vertical door edge 8.

The present invention contemplates that the refrigerators or similar cabinets as manufactured and sold will also include a door stop for limiting the opening movement of the door to a certain maximum as for example about a 120° opening which provides ample room for comfortable access to the interior of the compartment 3. This door stop is of the sliding bar or arm type and comprises an arm 10 pivotally fastened at one end by means of a pivot pin 11 to a bracket 12 which in turn is secured to the face of the cabinet by means of suitable screws 14. For additional support and in order to align the door stop with the hinge structure, the bracket 12 may also include a leg 15 provided with a suitable aperture for mounting thereof on the hinge pin 6.

As is illustrated more clearly in FIGURE 2 of the drawing, the arm 10 is provided with a slot 16 in its free or outer end which is adapted to receive a stop pin 17 threaded into and firmly supported by the lower edge 7 of the door.

The slot 16 is of the length sufficient to accommodate movement of the pin therein from adjacent the inner end of slot when the door is closed and the arm is disposed in substantial alignment with the door edge 7 to its outer end 18 when the door is in its open position and the arm has pivoted outwardly to the dotted position in FIGURE 2. The limiting action of the door stop as thus far described depends upon the relative positions of the pins 6 and 11 and the effective length of the arm 10, that is the distance between the pivot point of this arm as represented by the pin 11 and the outer edge 18 of the slot 16. Normally it is contemplated that these dimensions will be such that the door will open somewhat beyond 90° to a dotted line position in FIGURE 2 before the pin 17 contacts the outer end of the slot 16. The open position of the door is completely satisfactory for most installations of the refrigerator. However, when the

refrigerator is installed for example in the corner of a kitchen, opening of the door significantly beyond a 90° position will cause the door to come into contact with the adjacent kitchen wall. It is therefore desirable that means be provided for limiting the door opening movement under such circumstances and in accordance with the present invention this is accomplished by the provision of a simple adapter 20 which is designed to be mounted on the pin 17 and in cooperation with the arm 10 limit the travel of the pin 17 in the slot 16 to a shorter distance so that for example the door opening movement is stopped at the 90° point.

As is shown particularly in FIGURE 4 of the drawing, this adapter means comprises a base portion 21 and side flanges 22 forming a channel 23 of a width sufficient to receive the lever arm 10. An aperture 24 is provided in the base 21 whereby the adapter 20 can be mounted on the pin 17 carried by the door 2. To facilitate removal of the pin so that this operation can be performed in the field, the pin 17 is preferably provided with a threaded portion 25 which is threaded into the lower edge 7 of the door. In order to mount the adapter on the pin 17, the pin is removed from the door and from cooperative engagement with the slot 16 after which the adapter 20 is placed on the pin with the channel 23 opening upwardly. The arm 10 is then placed within the channel 23 of the adapter and the pin again replaced in its normal position in the lower edge 7 of the door.

When the member 20 is mounted, a projection 26 extending upwardly from the base 21 and into the slot 16 provides means for shortening the effective length of the slot 16 and thereby limit to the desired extent the door opening travel. More specifically, this projection 26 comprises a concave inner edge 27 in alignment with opening 24 and adapted to bear against the pin 17 and a convex outer edge 28 of substantially the same shape as the outer edge 18 of the slot. This edge 28 contacts the slot 18 during opening of the door whereby the effective length of the arm 10 is decreased by the length of the projection 26 so that when the adapter is used the door will stop in for example its 90° position as illustrated in broken lines in FIGURE 2 of the drawing.

In the illustrated embodiment of the invention, the bottom surface of the base portion 21 of the adapter is provided with a circular recess 30 for receiving the nylon washer 31 normally provided on the pin 17 to decrease the frictional engagement of the arm 10 with the head of the pin 17 when the adapter is not used. Preferably there is also provided on the upper edge of the projection 26 an outwardly extending lip 32 having a sloping lower surface portion 33 adapted to ride over the outer end of the arm 10 when the door is moved to its open position with the adapter mounted on the pin 17. The purpose of this lip 32 is to prevent any jiggling of the arm 10 which is generally relatively loosely supported on the pivot pin 11 from causing it to ride or ship upwardly over the adapter 20 and out of the channel 23 to a position in which its first contact would be with the pin 17 rather than the projection 26.

It will be seen that there has been provided an adapter which is of simple and inexpensive construction and which may be quickly installed in the field for decreasing the extent of opening of a door. It also avoids the provision of two or more interchangeable arms 10 having different dimensions to provide for different degrees of door opening and it permits the use of a single or standard door stop on all refrigerator cabinets as manufactured, requiring only the addition of the adapter as required during installation of the cabinet.

While there has been shown and described a specific embodiment of the invention, it is to be understood that it is not limited thereto and it is intended by the appended claims to cover all modifications within the true spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. Means for decreasing the opening movement of a door structure hinged along one edge to a cabinet structure and provided with a door stop mechanism including a pin mounted on an edge of said one of said structures adjacent said hinged edge and a substantially flat arm pivotably mounted on the other of said structures and having a longitudinal slot therein for receiving said pin and for stopping opening movement of said door by contact of said pin with the outer end of said slot, said means comprising a member having a flat base portion for engaging one surface of said arm, said base portion having an opening for mounting said member on said pin and side flanges for engaging the side edges of said arm to maintain said member in alignment with said arm during movement of said arm relative to said pin, a projection on said base portion for extending into said slot for engagement of one end thereof with said outer end of said slot when said member is mounted on said pin, said one end of said projection being spaced from said opening a distance sufficient to provide the desired decrease in the opening movement of said door.

2. Means for decreasing the opening movement of a door hinged along one edge to a cabinet and provided with a door stop mechanism including a pin mounted on an edge of said door adjacent said hinged edge and a flat arm pivotably mounted on said cabinet and having a longitudinal slot therein for receiving said pin and for stopping opening movement of said door by contact of said pin with the outer end of said slot, said means comprising a member having a flat base portion for engaging the bottom surface of said arm, said base portion having an opening for mounting said member on said pin and side flanges for engaging the side edges of said arm to maintain said member in alignment with said arm during pivotal movement of said arm about said pin, a projection on said base portion adapted to extend into said slot for engament of one end thereof with said outer end of said slot when said member is mounted on said pin, said one end of said projection being spaced from said opening a distance sufficient to provide the desired decrease in the opening movement of said door, and a lip on said one end of said projection for riding over the free end of said arm to assure engagement of said arm with said projection when said door is opened.

3. Means for decreasing the opening movement of a door structure hinged along one edge to a cabinet structure and provided with a door stop mechanism including a pin mounted on an edge of said one of said structures adjacent said hinged edge and a substantially flat arm pivotably mounted on the other of said structures and having a longitudinal slot therein for receiving said pin and for stopping opening movement of said door by contact of said pin with the outer end of said slot, said means comprising a channel-shaped member for receiving said arm and having an opening in the base thereof for mounting said member on said pin, and a projection on said base portion for extending into said slot for engagement of one end thereof with said outer end of said slot.

4. Means for decreasing the opening movement of a door hinged along one edge to a cabinet and provided with a door stop mechanism including a pin mounted on an edge of said door adjacent said hinged edge and a flat arm pivotably mounted on said cabinet and having a longitudinal slot therein for receiving said pin and for stopping opening movement of said door by contact of said pin with the outer end of said slot, said means comprising a channel-shaped member adapted to receive a portion of said arm member having a flat base portion and an opening for mounting said member on said pin and a projection on said base portion adapted to extend into said slot for engagement of one end thereof with said outer end of said slot and the other end with said

pin, and a lip on said one end of said projection for riding over the free end of said arm to assure engagement of said arm with said projection when said door is opened.

5. Means for regulating the opening movement of a door structure hinged along one edge to a cabinet structure comprising a door stop mechanism including a pin mounted on an edge of said one of said structures adjacent said hinged edge and a substantially flat arm pivotably mounted on the other of said structures and having a longitudinal slot therein for receiving said pin, and a removable adapter means comprising a member having a flat base portion engaging one surface of said arm, said base portion having an opening for mounting said member on said pin and said flanges for engaging the side edges of said arm to maintain said member in alignment with said arm during movement of said arm relative to said pin, a projection on said base portion extending into said slot for engagement of one end thereof with said outer end of said slot, said one end of said projection being spaced from said opening a distance sufficient to provide a first degree of opening movement of said door, removal of said adapter permitting a greater opening movement of said door by contact of said pin with the outer end of said slot.

6. A door stop mechanism including a pin adapted to be mounted on an edge of a door adjacent the hinged edge thereof and a flat arm adapted to be pivotably

mounted on a cabinet and having a longitudinal slot therein for receiving said pin and for stopping opening movement of said door by contact of said pin with the outer end of said slot, and means for decreasing opening movement of said door comprising a member having a flat base portion for engaging the bottom surface of said arm, said base portion having an opening for mounting said member on said pin and side flanges for engaging the side edges of said arm to maintain said member in alignment with said arm during pivotal movement of said arm about said pin, a projection on said base portion adapted to extend into said slot for engagement of one end thereof with said outer end of said slot when said member is mounted on said pin, said one end of said projection being spaced from said opening a distance sufficient to provide the desired decrease in the opening movement of said door.

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