Oct. 12, 1943. D. C. E. LEONARD 2,331,403

DOOR FASTENER

Filed June 24, 1941

FIG. 1.

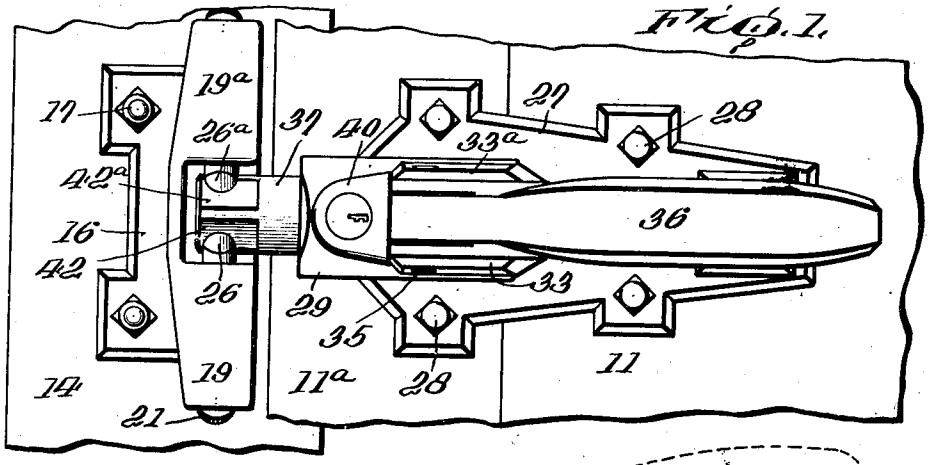


FIG. 2.

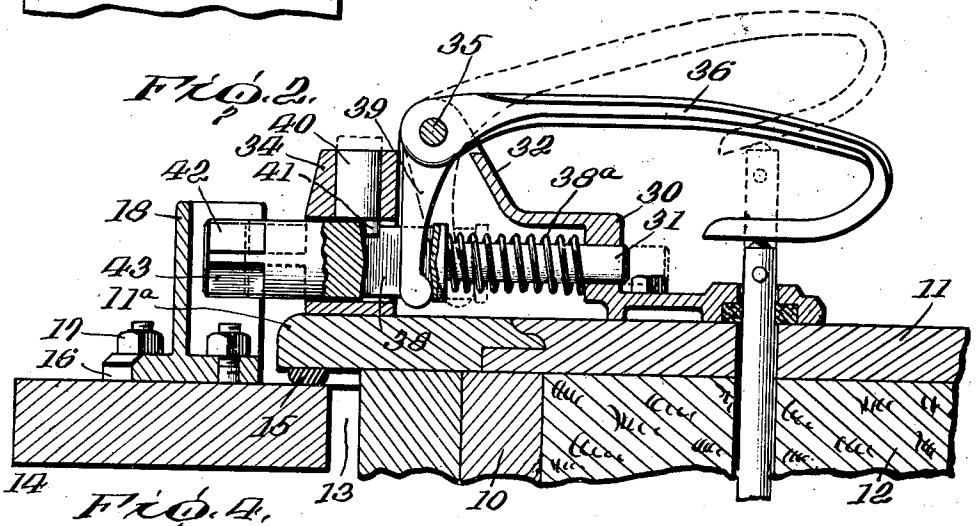


FIG. 4.

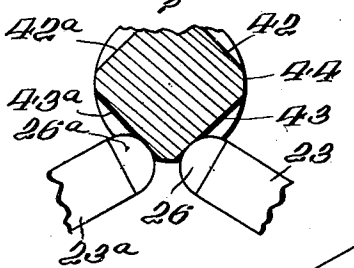


FIG. 3.

FIG. 5.

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DOOR FASTENER

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2 Claims. (Cl. 292—340)

The present invention relates to new and useful improvements in closure fasteners, and more particularly to improvements in a fastener for hinged doors.

The invention generally contemplates the provision of a hingedly mounted door adapted to be conveniently employed for controlling an opening to a chamber which is to be maintained at a temperature different from normal atmospheric temperatures such as, a cold storage or refrigerator chamber, a heated chamber, or even a chamber which is to be maintained at a moderate variation in pressure. Similarly, the door of the present invention is well adapted for use as a sound-proof door for closing and sealing rooms or spaces in which intense noises must be suppressed or dampened, such as in test rooms where airplane engines are run at high speeds for several hours. Of course, the door may find employment in the general field of acoustics requiring some sound control. The door may be of any suitable type, such as an infitting or overlapping door, for closing the opening in the door frame, and there may be provided suitable sealing strips or gaskets which are adapted to be compressed between the door frame and the door so that a tight seal is established when the door is closed. The door is hingedly mounted on the door frame for swinging movement and although the door may be employed in various installations, the invention is particularly concerned with the provision of a fastener for use with refrigerator and sound controlling doors. With this type of door, there are generally provided cooperating bolt and keeper devices which operate as a latch to secure the door in a closed position.

An object of the present invention is to provide a door fastener wherein the door is positively maintained in a closed position by automatic engagement between a latch bolt and a keeper which is yieldable to permit the bolt to pass thereby only during closing of the door whereby opening of the door can only be effected by disengaging the bolt from the keeper while the door is closed.

Another object of the invention is to provide a door fastener of the above type wherein the keeper is yieldably mounted for sliding movement and is disposed so as to yield and permit the bolt to pass thereby during closing of the door but to prevent passage of the bolt thereby in the opposite direction so that opening of the door can only be effected by disengaging the bolt from the keeper while the door is closed.

A further object of the invention is to provide a door fastener of the above type wherein the bolt and keeper are constructed and arranged so that the bolt contacts with the end of the keeper and passes thereby during closing of the door and so that the bolt contacts with the side of the keeper when the door is closed whereby to positively prevent opening of the door until the bolt and keeper are completely disengaged while the door is closed.

A still further object of the invention is to provide a door fastener of the above type wherein the keeper is spring-pressed outwardly into engagement with the adjacent surface of the bolt when the door is closed so as to compensate for minor variations in the degree to which the door is spaced from the door frame whereby to maintain a tight seal as the sealing gasket becomes unduly compressed or worn.

The above and other objects of the invention will in part be obvious and will be hereinafter more fully pointed out.

In the accompanying drawing:

Figure 1 is a fragmentary front elevation showing the fastener with the door in a closed position.

Figure 2 is a longitudinal side sectional view of Figure 1.

Figure 3 is an end view of Figure 1, partly in section, and showing one of the keeper elements.

Figure 4 is an enlarged fragmentary detail view showing the relative positions of the bolt and keeper during initial contact as the door is closed.

Figure 5 is a view similar to Figure 4, but showing two relative positions of the bolt and keeper when the door is closed, the full lines showing relative positions of the bolt and keeper when the gasket becomes worn or compressed.

Referring more in detail to the accompanying drawing, the door is illustrated as being of the refrigerator or acoustical type having a body wall 10 and a front wall 11 within which suitable insulation 12 is disposed. The body portion of the door is adapted to fit within a door opening 13 which is defined by a door frame 14. The edges of the door are extended to provide a flange portion 11*a* which overlies the door frame and a gasket 15 is disposed between the door frame and the flange 11*a* for the purpose of effectively sealing the chamber. The door is preferably mounted for swinging movement by means of hinges (not shown).

The door frame carries a bracket member adjacent the free edge of the door and this bracket

member includes a base portion 16 which is secured to the door frame by bolts 17 or the like. The bracket member includes an upstanding wall portion 18 which is provided with housing members 19, 19a disposed between the edge of the door and the wall portion 18. The adjacent inner ends of the housing members are spaced from one another so as to permit a bolt to pass thereby and are identical in construction so that the housing member 19 will be described with reference to Figure 3. This housing member includes an aperture 20 the central axis of which is inclined with respect to the door frame and extends upwardly toward the opposite housing member 19a. The lower end of the aperture 20 in the housing is internally threaded to receive any suitable type of adjusting plug 21 and the opposite end of the aperture is reduced so as to provide an internal shoulder portion 22. A keeper element 23 fits within the reduced portion of the aperture and has an enlarged base or plug portion 24 snugly fitting within the aperture 20 and capable of axial movement therein. A coil spring 25 is disposed within the aperture 20 between the plug 21 and the base portion 24 and thus normally forces the keeper 23 outwardly toward a limit position with the base portion 24 abutting against the shoulder 22 as a stop. The exposed end 26 of the keeper 23 is rounded and a similar keeper 23a is mounted for sliding movement in the housing 19a and the exposed end 26a thereof is also rounded. Both keepers are thus slidable toward and away from one another along intersecting axes which are disposed at substantially 30 degrees with respect to the plane of the door frame 14, and the tension of the springs acting on both keepers may be adjusted by the adjusting plugs 21, 21a.

The door carries a latch mechanism which is disposed adjacent the edge thereof for cooperation with the keeper elements 23, 23a. The latch mechanism includes a supporting base 27 which is secured to the door by bolts 28 or the like, and this base 27 is provided with outwardly extending spaced bearings 29, 30 which are apertured to receive and permit reciprocation of a latch bolt 31. Between the bearings 29, 30, there is provided an enclosed chamber which is defined by a wall portion 32, side walls 33, 33a and a front block portion 34. The side walls 33, 33a carry a pivot pin 35 on which a hand operating lever 36 is mounted.

The bolt 31 is provided with an enlarged portion 37 at the outer end thereof and a coil spring 38a is disposed between the bearing 30 and the inner end of the enlarged portion 37 so as to normally force the bolt outwardly toward the door frame. The enlarged portion of the bolt is provided with a recess 38 which extends substantially at right angles to the plane of the door and the handle lever 36 is provided with a lever arm 39 extending into the chamber and disposed within the recess 38. Outward movement of the handle member 36 to the dotted line position shown in Figure 2, will effect retraction of the bolt. The block portion 34 may be apertured to receive a shiftable key cylinder lock 40 which is provided with a locking lug 41 adapted to extend within the recess 38 in the bolt so as to lock the bolt in its extended or locking position. The lock 40 may be elevated to the dotted line position shown in Figure 2 when it is desired to retract the bolt 31 completely out of engagement with the keeper elements 23, 23a in order to permit opening of the door.

The exposed end of the enlarged portion 37 of the bolt is shaped so as to provide a pair of angularly related faces 42, 42a at the outside of the bolt and a pair of angularly related faces 43, 43a at the inner side of the bolt. These faces as shown are joined by rounded edges 44. The outer inclined faces 42, 42a are disposed at a slight angle with respect to the longitudinal axes of the keepers. As illustrated, the faces 42, 42a are disposed at an angle of approximately 45 degrees with respect to the plane of the door and door frame and thus at an angle of approximately 15 degrees with respect to the longitudinal axes of the keepers. The faces 43, 43a as shown are disposed at substantially right angles to the axes of the keepers, or at least at a substantial angle thereto, as shown in Fig. 4.

Assuming the door to be open and the bolt extended by the spring 38a, closing of the door will bring the faces 43, 43a on the bolt into engagement with the rounded ends 26, 26a on the keepers which are normally slightly spaced from each other, as shown in Figure 4. Thus, the faces 43, 43a act with a resultant component of force tending to shift the keepers axially and downwardly against the action of the springs 25. After the end of the bolt has passed the keepers, the springs 25 will force the keepers outwardly to the position shown in Figure 3 or the dotted line position shown in Figure 5. The sides of the keepers are thus in engagement with the faces 42, 42a so that the resultant component of force is exerted substantially across or laterally of the axes of the keepers so that the keepers are forced against the wall of the housing members. Outward movement of the door is thus positively prevented since the application of opening force to the door will not result in movement of the keeper against action of the springs 25. The keepers thus yield to permit the bolt to pass thereby during closing of the door but the keepers cooperate with the bolt to provide a positive stop preventing opening of the door. In order to open the door, the handle lever 26 may be shifted so that the arm 39 will effect withdrawal or retraction of the bolt to the dotted line position shown in Figure 2. When this position has been reached, the end of the bolt is out of engagement with the keepers so that the door may be opened.

As the gasket 15 becomes worn or substantially compressed between the door flange 11a and the door frame 14, the door will more nearly approach the door frame. In order to compensate for this further inward movement of the door and maintain a tight seal around the door, the edges of the keepers can engage the faces 42, 42a at various points under the action of the springs 25. As shown by the full line position of Figure 5, the bolt has been moved inwardly from the dotted line position due to compression or wearing of the gasket and the keepers engage the faces 42, 42a near the upper edge of the bolt. Thus, the door is always maintained in a tightly closed position without "play" as the gasket becomes worn or substantially compressed.

From the foregoing description, it will be seen that the present invention provides a highly efficient door fastener wherein the spring-pressed keeper elements are mounted on the door frame for sliding movement with the axes of the keeper elements inclined outwardly with respect to the door frame and toward one another. The bolt is adapted to pass between the free ends of the keeper elements during closing of the

door. The working end of the bolt is shaped so that, during closing of the door, the surfaces contacting the rounded free ends of the keeper elements will be disposed at substantially right angles to the longitudinal axes thereof so as to force the keeper elements inwardly against the action of the springs. The bolt is further shaped so that, after the door is closed, additional surfaces will be presented to the sides of the keeper elements and substantially parallel thereto so as to exert a transverse component of force against the keeper elements. Thus, the door can be easily closed but is positively prevented from being opened unless the bolt is slidably withdrawn from engagement with the keeper elements.

While one form of the invention has been shown for purposes of illustration, it is to be clearly understood that various changes in the details of construction and arrangement of parts may be made without departing from the scope of the invention as set forth in the appended claims.

I claim:

1. A keeper device for a door fastener having a longitudinally slidable latch bolt the holding end of which is provided with a pair of angularly related faces at the inner side of the bolt and a pair of angularly related faces at the outer side of the bolt intersecting in a plane centrally of the latch bolt, said keeper device comprising a housing, a pair of keepers mounted for movement in the housing along intersecting axes extending at acute angles to the door and door frame, spring means for moving the keepers outwardly and stop means for limiting the outward movement thereof, said keepers having their outer ends disposed adjacent each other so that the inner pair of faces of the latch bolt contacting therewith will retract said keepers and pass therebetween to latched position, said keepers moving outward along the outer pair of faces of the latch bolt to retain said door in latched position.

2. A keeper device for a door fastener having a longitudinally slidable latch bolt the holding end of which is provided with a pair of angularly related faces at the inner side of the bolt and a pair of angularly related faces at the outer side of the bolt intersecting in a plane centrally of the latch bolt, said keeper device comprising a housing, a pair of keepers mounted for movement in the housing along intersecting axes extending at acute angles to the door and door frame, spring means for moving the keepers outwardly and stop means for limiting the outward movement thereof, said keepers having their outer ends disposed adjacent each other so that the inner pair of faces of the latch bolt contacting therewith will retract said keepers and pass therebetween to latched position, said keepers moving outward along the outer pair of faces of the latch bolt to retain said door in latched position, the axes of the keepers being slightly inclined to their respective cooperating outer faces of the latch bolt.

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