Sept. 1, 1964 R. J. OLANDER 3,147,031

CLOSURE FASTENER

Filed Dec. 23, 1960 2 Sheets-Sheet 1

Fig. 1

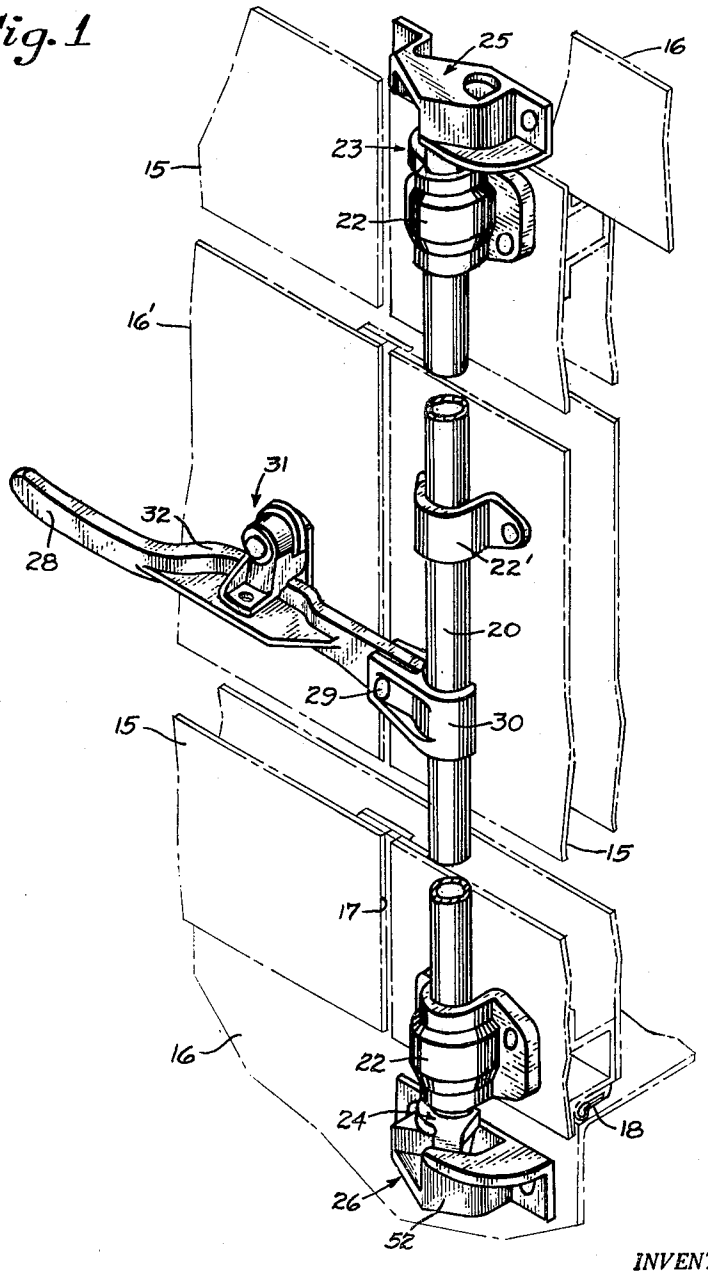


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FIG. 2.

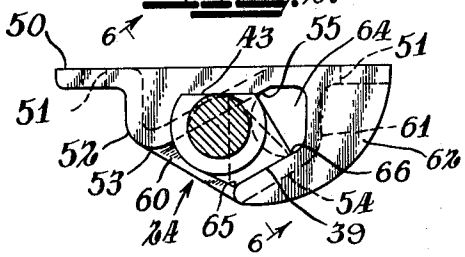



FIG. 3.

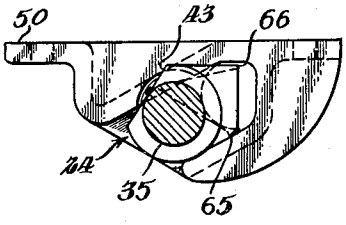



FIG. 4.

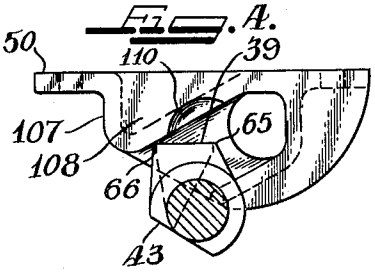



FIG. 5.

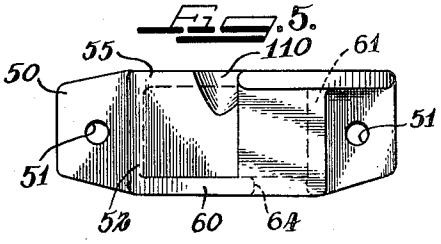



FIG. 6.

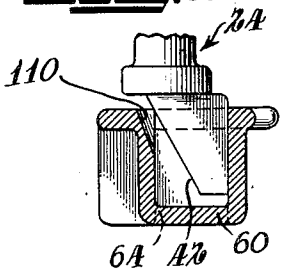



FIG. 7.

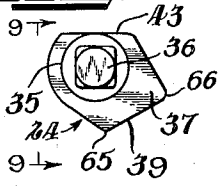
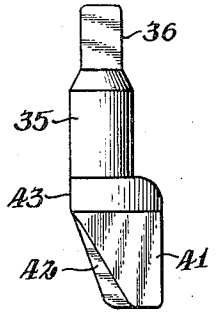



FIG. 9.



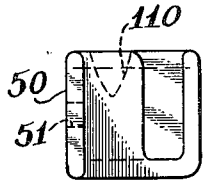




FIG. 11.

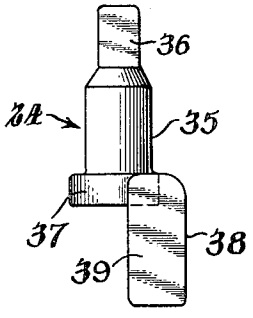



FIG. 8.

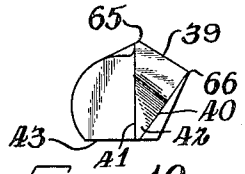



FIG. 10.

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# CLOSURE FASTENER

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3 Claims. (Cl. 292—340)

This invention relates to improvements in closure fasteners and has to do particularly with a novel keeper of a closure fastener of the type especially adapted for maintaining a relatively large, heavy closure in tightly closed position against a frame or other member with which the closure is adapted to co-operate.

The keeper of the closure fastener of the present invention is especially suitable for maintaining in closed position a hinged door of the type such as is commonly used on refrigerator cars or trucks, wherein it is desired that the door be held tightly against the frame or wall to which the door is hinged, and, accordingly, is shown and described in connection with such use, but it will be understood that it is not limited to such use and may be employed in connection with other closures.

Closure fasteners are known wherein a manually actuated rotary operating member is mounted on the door, which member includes keeper-engaging elements on opposite ends thereof co-operating with keepers fixed to the door frame above and below the door. In such constructions the keeper-engaging member is formed as a crank having an offset finger adapted to enter an inclined guideway or slot in the corresponding keeper upon closing movement of the door and to be rotated into locked position, the offset finger of the crank being provided with a flat locking surface adapted to have flat, bearing engagement with a wall of the keeper when the door is closed and the keeper-engaging member is in locked position, to prevent unintended movement of the keeper-engaging member out of door-closed position and to positively hold the door tightly in closed position.

Prior designs of the keeper-engaging members, sometimes called "cam ends," have employed crank arms of right-angle construction co-operating with the keepers, the slots of which keepers are formed with opposed parallel sides or walls of the same depth and spacing. During the closing movement of such construction, the crank arm is in camming engagement with the front wall of the slot while entering the slot and being rotated into locked position, and the door is forced tightly against its frame, compressing any packing or sealing material which may be between the door and frame. Thus, maximum pressure is applied to the keeper. During the period of reverse action, that is, while the crank arm is being withdrawn from the slot and the door is being released from its tightly closed position, the finger ordinarily will engage the front wall of the slot but in some cases may engage the rear wall, whereupon the pressure is relatively less than the closing pressure.

The right-angle construction of the crank arm is necessary to provide clearance between the crank-arm shoulder and the adjacent portions of the keeper during the aforesaid movements. Because of such right-angle construction, it is necessary to make the crank arm and cam strong enough to prevent breakage during the period of maximum pressure application, thus requiring certain minimum dimensions of the crank arm and keeper. Large crank arms and keepers are objectionable because of their size and weight and also because of the cost of such large and heavy members.

An object of the present invention is to provide a new and improved keeper for a closure fastener of the type embodying a keeper adapted to be attached to the wall on which the closure is mounted for locking engagement with a crank arm of a keeper engaging member adapted



to be mounted on the closure for rotation into and out of locking engagement with the keeper.

Another object is to provide a new and improved keeper for a closure fastener of the other foregoing type wherein the keeper and keeper-engaging member are so constructed that the fastener has increased strength over the corresponding member of prior fasteners of the same general type without any increase in over-all size of the keeper.

A further object is to provide a closure fastener of the foregoing type, having a keeper of relatively high strength and rigidity and which, at the same time, is relatively light and has an over-all size no greater than conventional keepers of this same general type and is of such shape that it can be readily and inexpensively manufactured.

Other objects and advantages of the invention will appear from the following description taken in connection with the appended drawings, wherein:

FIGURE 1 is a perspective view of a door fastener including a keeper constructed in accordance with the present invention and showing the door fastener in position on a door frame and door, a portion only of each of which is shown;

FIG. 2 is a view of a horizontal section taken through the door fastener of FIG. 1, just above the bottom keeper, the associated cam end being shown in its door-locking position.

FIG. 3 is a view similar to FIG. 2, only showing the cam end rotated out of door-locking position but still in the slot of the bottom keeper;

FIG. 4 is a view similar to FIG. 2, only showing the cam end in its position just leaving, or just entering, the bottom keeper;

FIG. 5 is a front elevational view of the bottom keeper;

FIG. 6 is a view of a section taken along line 6—6 of FIG. 2;

FIG. 7 is a top plan view of the bottom cam end;

FIG. 8 is an elevational view of the bottom cam end;

FIG. 9 is an elevational view of the bottom cam and taken along section line 9—9 of FIG. 7;

FIG. 10 is a bottom view of the bottom cam end shown in FIG. 7; and

FIG. 11 is a side elevational view of the keeper as viewed from the left of FIG. 5.

In the illustrative embodiment a door **15** is hingedly mounted by suitable means (not shown) on a wall or door frame **16** for swinging movement into and out of position closing an opening **17** in the frame **16**. In the embodiment shown the door is hinged at its right-hand side. Where the door is used in connection with a refrigerator structure, suitable packing means **18** preferably is provided which is compressed between the frame and the door when the latter is in closed and locked position.

Referring particularly now to FIG. 1, the closure fastener comprises generally an operating bar or shaft **20** rotatably mounted on the door **15** by bearing strips or guide plates **22** secured to the door and an intermediate guide **22'** also secured to the door, a pair of top and bottom keeper-engaging members or cam ends **23, 24** secured to the ends of the operating bar **20** and co-operating respectively with top and bottom keepers **25, 26** secured to the door frame **16** with which the door co-operates. Secured to the operating bar **20** intermediate the bearing strips **22** is an operating handle **28** which is pivotally connected at **29** to a lever mount **30** suitably attached to the operating bar **20**. A seal plate assembly **31** is attached to the door frame **16'** in position to receive an offset locking portion **32** of the operating handle **28** and hold it in door-locking position.

It will be understood that the top and bottom cam ends are formed as mirror images of each other, as are the

top and bottom keepers. Accordingly, only one (the bottom) cam end and its associated keeper will be described in detail, it being understood that the construction and operation of the top cam end and associated keeper are similar, except that such top members are mirror images of the corresponding bottom members and operate correspondingly.

The bottom cam end **24** (see especially FIGS. 7–10) includes a stem or shank **35** having a reduced upper end **36** preferably of square cross section adapted to be secured to an end of the operating bar or shaft **20**. The latter is preferably formed from seamless steel pipe, and the reduced end **36** is inserted in the end of the pipe and secured thereto as by welding.

The bottom cam end **24** has a flange **37** formed integrally with the lower end of the stem **35**, and a locking or cam finger **38** extends downwardly from the flange in parallel and offset relation to the stem **35**.

The locking finger **38** has a flat locking face or surface **39** which extends parallel to the axis of the stem **35** and throughout the entire length and width of the locking finger **38**, which face provides maximum bearing contact with the co-operating surface of the keeper, when the cam end is in locking position as hereinafter explained. The cam finger **38** is so formed that the portion (which may be designated as the base portion) adjacent the flange **37**, is of greater cross-sectional area than the portion (which may be designated as the free end portion) remote from the flange **37**. To this end the finger is of tapered form being larger at its base than at its free end. In order to provide maximum strength and a locking surface of maximum area with a minimum weight of the finger and at the same time to provide clearance for movement into and out of the keeper as hereinafter explained, the finger is given the form shown.

The finger is of generally triangular form at its base and has, in addition to the locking face **39**, side surfaces **40** and **41** which converge inwardly from the locking face **39**. The above-mentioned taper of the finger is provided by a fourth surface **42** of triangular form located on the opposite side of the finger from the locking surface **39** and inclined downwardly and toward the free end of the finger. The surface of the finger at the free end is of trapezoidal form and the finger at its free end is of sufficient cross-sectional area to provide the desired strength and rigidity.

The flange **37** is provided with a flat or face **43** for the purpose of aiding in alignment of the cam ends during assembly with the operating bar as hereinafter explained.

The bottom keeper **26** includes a base portion or mounting flange **50** formed with openings **51** (see FIG. 2) therein adapted to receive rivets or bolts (not shown) for securing the keeper **26** to the door frame **16**. Integral with the base **50** is a body portion **52** (see FIGS. 1 and 5) which has an inner or rear wall **53** and an outer or front wall **54** parallel to the inner wall and defining therewith a slot or guideway **55** having an open top and an open outer end adapted to receive the cam end **24** in a manner hereinafter described. The front and rear walls **54** and **53** are of equal height and spacing, except at a limited portion of the rear wall, as hereinafter explained.

An end wall **107** extends from the mounting flange to the outer edge of the inner wall **53**, and a top or reinforcing wall **108** is integral with the mounting flange **50**, the end wall **107**, and the inner wall **53**. The walls **53**, **54** are inclined to the base portion **50**, preferably at an angle of about 30°, in order to permit entry of the cam finger **38** and the wall **54** provides locking engagement between the cam end and the keeper **26** when the cam end is in locking position in the slot thereby to maintain the door or other closure member in locked position against the frame. The inclined parallel walls **53**, **54** provide means for forcing the door closed when the cam end is moved into the slot and rotated in one direction and for camming the door to open position when the cam end is in the slot and rotated in the opposite direction, as hereinafter explained.

In order to accommodate the enlarged base end of the locking finger, such as the finger **38** shown in FIGS. 1 to 9 and to permit rotary movement thereof in the slot **55**, the face of the inner wall **53** is provided with a generally conical recess or indentation **110** disposed in the upper portion of the rear wall approximately midway between the inner and outer ends of the wall face and of such dimension and location as to permit the cam end to be rotated and slid within the slot during its movement into and out of locking position.

A bottom wall **60** is provided which is integral with the lower edges of the front and rear walls **54**, **53** and an inner end wall **61** is formed integrally with the front wall **54** and the base **50**, thus providing a rigid structure wherein the front and rear walls **53** and **54** are rigidly maintained in spaced relation. The structure is further rigidified by the provision of a web **62** formed integrally with the upper edge of the outer wall **54**, the end wall **61**, and the base **50**.

An opening **64** preferably is provided in the inner portion of the bottom wall **60** in order to permit the discharge of snow, ice, or water which may accumulate in the slot upon exposure of the keeper to the weather during use, so that the slot is not clogged and movement of the cam end into and out of the slot is not obstructed.

All of the portions of the keeper preferably are formed of substantially uniform thickness. Because of the provision of the various rigidifying portions as, for example, the end wall **61**, and the web **62**, the keeper has maximum strength and rigidity with minimum size and weight.

Both the keeper-engaging member and the keeper are of such form that they may be readily and inexpensively made by casting from suitable metal. Because of its strength and relative cheapness, I prefer to use steel, although other materials may be used. Preferably the locking surface of the cam end is smoothed and evened, as by grinding.

The flats or faces **43** on the upper and lower cam ends respectively are utilized to align the cam ends when assembled with the operating bar or shaft **20**. Such assembly may be conveniently effected by placing the cam ends on a flat surface with the flats or faces **43** lying on such surface and with the cam ends in alignment and opposed relation and spaced apart a distance slightly greater than the length of the operating bar **20**. The operating bar is then placed in position to receive the cam ends, and the latter are inserted in the two ends of the operating bar and welded thereto.

In the operation of the closure fastener of my invention the door **15** is swung toward closed position by manipulating the handle **28**, the cam ends **23**, **24** being thereby moved into position to enter the slots **55** in the respective keepers **25**, **26**, such as shown in FIG. 4. In this connection it will be understood that the slot in each keeper is of greater wall-to-wall width than the maximum transverse dimension of the portion of the finger which enters the slot so as to permit movement of the finger within the slot. The operating bar is then rotated (by manipulating the handle **28**) in an appropriate direction (clockwise, as viewed in FIG. 4, thereby causing each finger to be rotated and moved into the slot into the position shown in FIG. 3. Still further rotation of the operating handle causes the edge **65** of the finger to engage the face of the outer wall **54** and exert a camming action thereagainst which draws the door inwardly against the frame.

The inclination of the conical surface **110** relative to the face of the rear wall **54** corresponds generally with the inclination of the face **42** of the cam end to provide clearance, so that the cam finger can move along the slot **55** without interference.

Continued rotation of the operating bar rocks the finger further until the locking surface **39** is moved into locked

position flat against the inner face of the outer wall **54**, as illustrated in FIG. 2, the edge **65** having been rotated beyond the line which is perpendicular to the inner face of wall **54** and which extends through the center of rotation of the cam end **24**. When the keeper-engaging member is in its locked position, as illustrated in FIG. 2, with the locking face **39** against the inner face of the wall **54**, the door is held tightly against the frame, and any packing or sealing members (such as the member **18**) which are provided between the door and frame are tightly compressed, so that the door is held in tightly sealed condition. Moreover, the flat face-to-face engagement between the keeper-engaging members and the keeper prevents creeping of such members along the guide slot of the keeper.

After the door has been moved into closed position and the keeper-engaging members moved to locked position, the handle **28** may be engaged with the seal plate **31** in the usual manner in order to retain the handle in locked position.

The door is opened by releasing the handle **28** from the seal plate **31** and then manipulating the handle **28** to rock the operating bar **20** in the appropriate direction (counterclockwise, as viewed in FIG. 2). During such movement the cam end is rocked and rotated outwardly from the position shown in FIG. 2, through the position shown in FIG. 3, to the position of FIG. 4, whereafter the finger moves out of the slot **55**. Ordinarily, and especially where there are sealing or packing members between the door and door frame, the door is urged outwardly against the cam fingers. Thus, during the opening movement of the cam ends the fingers bear against the front wall of the keeper and rock and slide in a direction reverse to that during the closing movement. However, in certain cases, as where the door sticks to the door frame or packing, or where the hinges operate with difficulty, as where they are rusty, it may be necessary that a camming action be exerted between the keeper and the finger edge **66**.

It will be seen from the foregoing that the present invention provides a novel closure fastener construction wherein the cam end has increased strength over prior cam ends by reason of the fact that the finger of the cam end of the present invention has an enlarged section at its base end adjacent the flange, thus strengthening the cam end at the portion where the greatest stress occurs and breakage is most likely. On the other hand, the tapered construction of the finger provides a finger of normal cross-sectional size, at its outer end portion, so that the slot need not be any larger than in prior art devices. The formation of the slot with the portion of the inner wall being located at a greater distance from the outer wall than the remaining portion of the slot, accommodates the enlarged base end of the finger, so that the finger can rotate and slide freely in the slot.

The cam finger is of such form that the flat locking or bearing surface extends throughout the entire width and length of the finger, providing maximum bearing effect and resistance to wear. The edge of the finger, which engages the outer wall of the slot and against which a maximum bearing force is exerted, extends throughout the entire length of the finger and thus provides a cam edge of full length. On the other hand, since the edge of the finger which engages the inner wall of the keeper is engaged only during opening action and the pressure is lower, the inner wall, even though of reduced height or recessed at a portion thereof, provides sufficient bearing against the edge of the cam finger, and it is not necessary that such bearing extend throughout the entire length of the finger.

The forming of the finger with a larger cross-sectional area at the base end provides a finger of increased rigidity which insures that the locking or pressure contact surface of the finger is maintained parallel to the axis of rotation of the cam end. This stability also reduces the tendency of any distortion occurring in the keeper.

The keeper is of relatively light, thin, wall construction, but, by reason of the wall arrangement which provides rigidity for the several portions of the keeper, and particularly the walls defining the slot, the slot-defining walls are maintained rigidly in predetermined, fixed positions, and there is no distortion of the keeper during use and, particularly during the locking movement of the keeper-engaging member or while the latter is in locked position.

The keeper is of such shape that it can be formed readily and inexpensively by a casting operation, and no machining operations are required. Likewise, the keeper-engaging member can be formed by simple and inexpensive casting operation without any machine operations, although, as stated above, it may be preferable in some cases to smooth off the locking face, as by grinding.

I claim:

1. A keeper for a closure fastening mechanism comprising a body and a flange for attachment to a wall adjacent to an opening in said wall to be closed by a closure member, said body including spaced, opposed, generally parallel vertical side walls defining there between a guideway slot having an open end for receiving slidably and rotatably therein a keeper-engaging member, each of said side walls having a top edge surface and inner and outer ends, one of said side walls having a vertically extending recess adjacent its top edge surface and intermediate its inner and outer end.

2. A keeper as claimed in claim 1 wherein said recess is conical.

3. A keeper for a closure fastening mechanism comprising a body and a vertical mounting flange extending outwardly in at least two directions from said body for attachment to a wall adjacent to an opening in said wall to be closed by a closure member, said body including spaced, opposed generally parallel vertical side walls and a bottom wall joining said side walls at their bottom edges, and having an opening therein said side walls defining a guideway slot inclined relatively to said flange, each of said side walls having a top edge surface, and inner and outer ends, said top edge surfaces being coplanar, one of said side walls having an upwardly opening, vertically extending recess adjacent its top edge surface and intermediate its inner and outer ends.

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