Sept. 22, 1959 E. P. BOWER ET AL 2,905,497

THUMB-OPERATED LATCH ACTUATOR

Filed July 23, 1956 2 Sheets-Sheet 1

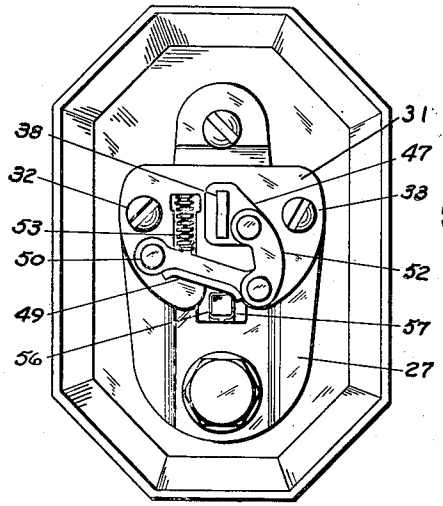


FIG 1

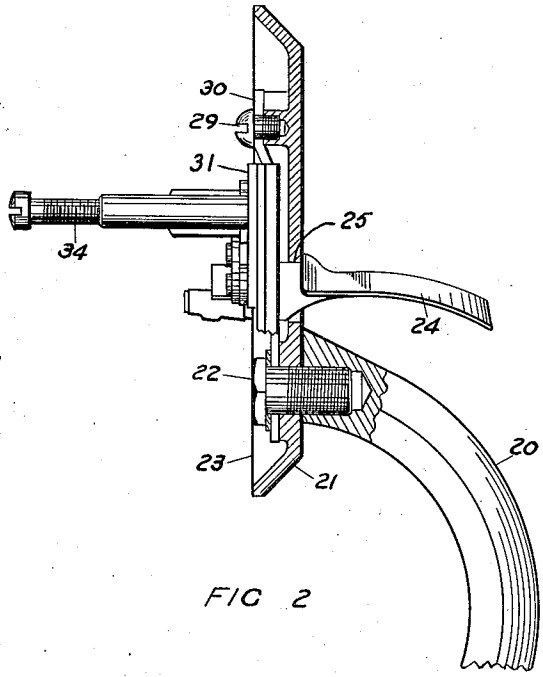


FIG 2

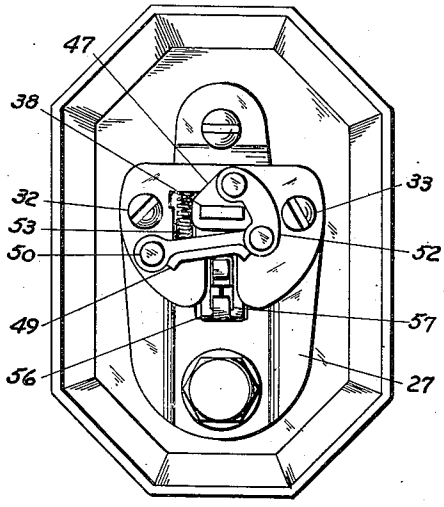


FIG 3

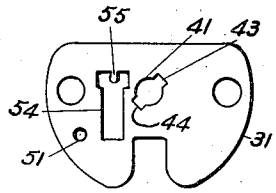


FIG 4

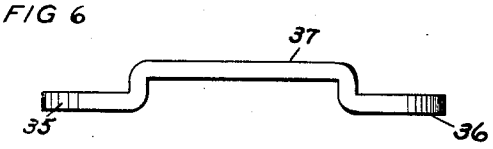
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FIG 6



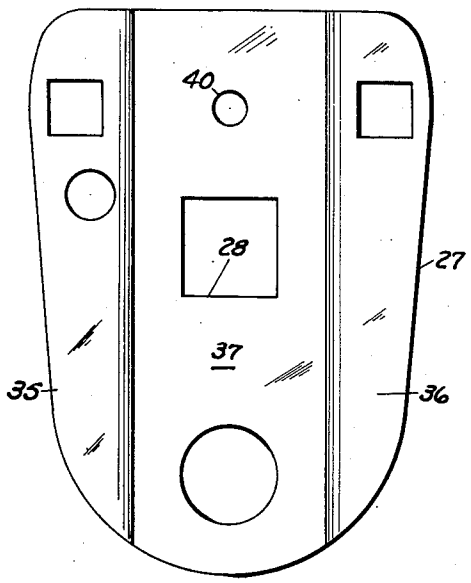


FIG 5

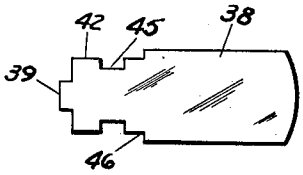


FIG 7

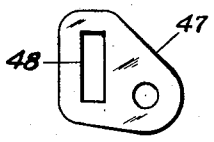


FIG 8

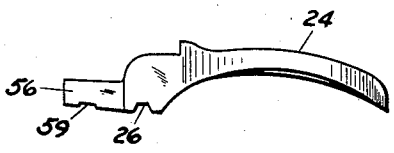


FIG 9

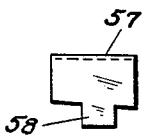


FIG 10

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THUMB-OPERATED LATCH ACTUATOR

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Application July 23, 1956, Serial No. 599,495

4 Claims. (Cl. 292—336.3)

This invention provides a thumb-operated latch actuator for the conversion of the movement of a thumb piece to the rotary motion necessary to operate the conventional roll-back bolt mechanism. There are many desirable features in the old-style fixed-grip door latch, not the least of which is the solid handle which gives a much better holding point than does a knob. The somewhat antique appearance of the thumb latch is also in considerable demand. The design of this type of latch is complicated by the problem of the efficient conversion of the vertical motion of the thumb piece to the rotary motion required to operate the usual tubular roll-back latch mechanism. Cost factors do not permit the use of the watchmaker's art in the manufacture of door hardware, and the ever-present requirement of economy eliminates many mechanically sound solutions to the problem.

This invention provides an actuator for converting the thumb piece movement into the necessary rotary movement through a mechanism having both sufficiency and simplicity. The components are designed for ease of fabrication or assembly and present no unusual problems in mass production. In the preferred form of the invention, a mounting plate provides pivotal support for two radius arms arranged on parallel axes of rotation. These arms are connected by a link, and force applied by the thumb piece in a generally tangential direction against one of the arms causes rotation of the other arm. The thumb piece itself is supported at the edge of an opening in the plate, which acts as a fulcrum. Preferably, the inner end of the thumb piece is inserted in an opening in the escutcheon, and the engagement of the fulcrum on the plate (by a lateral movement of the plate with respect to the escutcheon) locks the thumb piece in place. Securing of mounting screws of the actuator assembly fixes the components in operating position.

The several features of this invention will be analyzed in detail through a discussion of the particular embodiments illustrated in the accompanying drawings. In the drawings:

Figure 1 presents a view on a vertical plane of the inside of a thumb-operated latch actuator.

Figure 2 presents a sectional elevation of the thumb-operated latch actuator shown in Figure 1. Figures 1 and 2 correspond to the normal position of the mechanism, and are in projection.

Figure 3 presents a view similar to that of Figure 1, but showing the device in the actuated position, as would occur when opening a door.

Figure 4 presents a view of the inner plate of the actuator assembly.

Figures 5 and 6 present views of the outer plate (or base plate) of the actuator assembly, these figures being in projection.

Figure 7 presents a view of the rotary coupling member which transfers torque to the tubular latch mechanism.

Figure 8 presents a view of the radius arm which drives the coupling member.

Figure 9 presents a view in side elevation of the thumb piece.

Figure 10 illustrates a wear-shield preferably associated with the inner end of the thumb piece.

Referring first to the actuator assembly shown in Figures 1 through 10, inclusive, a fixed handle **20** is solidly secured to the escutcheon **21** with the bolt **22**. The entire assembly is normally fixed with respect to a door by conventional fastenings (not shown), the surface of the door corresponding to the surface **23** of the escutcheon. The inner end of a thumb piece **24** is received in an opening **25** in the escutcheon, and the notch **26** (see Figure 9) is engaged by the base plate **27** at the bottom edge of the opening **28**. In the assembly of the device, the inner end of the thumb piece **24** is inserted through the opening **25** and then through the opening **28** prior to the securing of the bolt **22** and the screw **29**. A clip **30** is held against the escutcheon by the screw **29**, and bears against the upper portion of the actuator assembly to stabilize its position about the bolt **22**. At the insertion of the inner end of the thumb piece **24**, the assembly is in a position somewhat lower than that illustrated in Figure 2 with respect to the escutcheon, and the lateral shifting of it with respect to the escutcheon into the position shown, coupled with the assembly of the bolt **22** and the screw **29**, serves to lock the thumb piece **24** in position. The opening **25** permits a sufficient freedom of movement for the thumb piece to rock about its fulcrum through a sufficient sector to operate the device. It should also be noted that the height dimension of the cutout **28** is sufficient to accommodate the lateral shifting or engaging described above, and allow for the disengagement of the notch **26**.

An inner plate **31** (see Figure 4) is fixed with respect to the base plate **27** by a pair of studs indicated at **32** and **33**, the inner ends of which are tubular and are threaded to receive screws as shown at **34** in Figure 2. These screws, and the studs with which they engage, are primarily for the purpose of establishing the relative position of the actuator assembly with respect to the latch mechanism. The side portions **35** and **36** of the base plate **27** are displaced from the level of the central portion **37**, which results in establishing a spaced relationship between the central portion of the plate **31** and the central portion of the base plate **27**.

The member which is responsible for the transfer of torque from the actuator to the bolt mechanism is the rotary coupling member **38** illustrated in Figure 7. This member is elongated in cross section, and its end projection **39** is received within the hole **40** in the base plate in rotary bearing engagement. The keyhole-shaped opening **41** in the inner plate **31** receives the portion **42** through the widest portion of the opening **41**, and after the rotation of the member **38** from a position in which the portion **42** is opposite the extensions **43** and **44**, the portion of reduced diameter **45** will be locked in engagement with the plate **31**, the thickness of material of the plate being received within the notch at this point.

A section **46** of intermediate width on the rotary actuating member receives the thickness of material of the radius arm **47** at the opening **48**. The insertion of the coupling member **38** through the opening **41** is preceded by the engagement of the radius arm **47**, and the rotation of the coupling member out of registry with the extensions **43** and **44** secures the assembly of the radius arm and coupling member in position.

Another radius arm, identified as **49** in Figure 1, is pivotally mounted on the inner plates **31** on the pin **50** received within the hole **51**. A link **52** connects the

outer ends of the radius arms 38 and 49, with the result that upward movement of the central portion of the radius arm 49 is converted into rotary movement of the coupling member 38. A spring 53 is received within the cutout 54 on the plate 31, the upper end of the spring being located by the tab 55. A similar tab is formed on the upper edge of the radius arm 49, and the spring 53 serves to continually urge the radius arm 49 down onto the inner end 56 of the thumb piece. Preferably, a wear-shield 57 is fitted over the end 56. Tabs as shown at 58 (refer to Figure 10) are bent on assembly into engagement with the groove 59 in the under portion of the inner end 56 of the thumb piece.

It is important to note the fact that the elongated cross section of the coupling member 38 is positioned approximately perpendicularly to the radius arm 49 when the unit is in the normal position. Actuation of the thumb piece 24 results in a rotation of the coupling member to approximately 90 degrees, which also corresponds with the uppermost position of the radius arm 49. In the interest of compactness, the rotation of the elongated cross section into parallelism with the radius arm when the two are in the closest relationship to each other makes possible the minimum over-all dimension. Prior to the insertion of the inner end 56 of the thumb piece, it is possible to rotate the coupling member 38 into the position where it can engage the extensions 43 and 44 of the cutout 41 in the inner plate 31. This position can be reached even though the link 52 and the pin 50 have been assembled as shown in Figure 1.

The particular embodiments of the present invention which have been illustrated and discussed herein are for illustrative purposes only and are not to be considered as a limitation upon the scope of the appended claims. In these claims, it is our intent to claim the entire invention disclosed herein, except as we are limited by the prior art.

We claim:

1. A thumb-operated latch, comprising: frame means, said frame means having an opening therein; an operating member having a portion thereof receivable in said opening and provided with a notch in the underside thereof with respect to the normal attitude of said operating member; fulcrum means including a first plate, said first plate having an aperture therein, said operating member being receivable in said aperture to the extent of engaging said notch with said plate at the bottom of said aperture, said aperture providing freedom of movement of said plate with respect to said frame to disengage said notch from said plate, and said frame opening being of sufficient size to provide limited freedom of rocking movement of said operating member on said fulcrum means; detachable fastening means for securing said plate with respect to said frame means in the operating position thereof; stop means preventing disengagement of said notch from said plate with said fastening means in assembled position; and actuating means responsive to the attitude of said operating member about said fulcrum means for retracting a latch bolt.

2. A thumb-operated latch, comprising: frame means, said frame means having an opening therein; an operating member having a portion thereof receivable in said opening and provided with a notch in the underside thereof with respect to the normal attitude of said operating member; fulcrum means, said frame opening providing limited freedom of rocking movement of said operating member on said fulcrum means; detachable fastening means for securing said fulcrum means with respect to said frame means in the operating position thereof; stop means preventing disengagement of said notch from said fulcrum means with said fastening means in assembled position; and actuating means responsive to the attitude of said operating member about said fulcrum means for retracting a latch bolt.

3. A thumb-operated latch, comprising: frame means; an operating member pivotally mounted with respect to said frame means; a first plate normally fixed with respect to said frame means; a second plate, said second plate being fixed with respect to said first plate, a portion of said second plate being in spaced and substantially parallel relationship with said first plate, said second plate having an irregularly shaped hole in said portion, and said first plate having a hole in alignment therewith, said second plate also having an elongated cutout therein and a tab at one end thereof; a first radius arm having a longitudinal axis, said first radius arm being pivotally mounted on said second plate; a rotary member having a first cross section of greater width than thickness, said width extending in a direction substantially parallel to a plane, said rotary member having another cross section of reduced width rotatable in the said irregularly shaped hole said rotary member being axially engageable with said irregularly shaped hole to the extent of placing said portion of reduced width therein only with said rotary member in a position outside the range of normal operating movement thereof, said rotary member having an end projection receivable in said aligned hole in said first plate, and also having a portion of intermediate width adjacent said portion of reduced width and on the opposite side thereof from said end projection; a second radius arm, said second radius arm having a cutout receiving said rotary member in driving relationship at said portion of intermediate width; link means connecting said first and second radius arms, said first radius arm normally being disposed in substantially perpendicular relationship with said second plate elongated cutout and adjacent the top of the inner end of said operating member, said first radius arm also being normally substantially parallel to the axis of rotation of said operating member; biasing means including a spring disposed in said second plate elongated cutout and in engagement with said tab, said biasing means urging said first radius arm toward said operating member, the normal operating range of movement of said radius arm, link, and rotary member being determined by the engagement of said first radius arm with said operating member, said rotary member being rotatable from a position in which the direction of said width at said first cross section is substantially perpendicular to the longitudinal axis of said first radius arm to a position in which the direction of said width is substantially parallel to the longitudinal axis of said first radius arm by actuation of said operating member, and latch means, said rotary member normally having driving engagement with said latch means.

4. A thumb-operated latch, comprising: frame means; an operating member pivotally mounted with respect to said frame means; a first plate normally fixed with respect to said frame means; a second plate, said second plate being fixed with respect to said first plate, a portion of said second plate being in spaced and substantially parallel relationship with said first plate, said second plate having an irregularly shaped hole in said portion, and said first plate having a hole in alignment therewith; a first radius arm having a longitudinal axis, said first radius arm being pivotally mounted with respect to said second plate and engaging said operating member; a rotary member having a first cross section of greater width than thickness, said width extending in a direction substantially parallel to a plane, said rotary member having another cross section of reduced width rotatable in the said irregularly shaped hole said rotary member being axially engageable with said irregularly shaped hole to the extent of placing said portion of reduced width therein only with said rotary member in a position outside the range of normal operating movement thereof, said rotary member having an end projection receivable in said aligned hole in said first plate, and also having a portion of intermediate width adjacent said

portion of reduced width and on the opposite side thereof from said end projection; a second radius arm, said second radius arm having a cutout receiving said rotary member in driving relationship at said portion of intermediate width; link means connecting said first and second radius arms, said first radius arm also being normally substantially parallel to the axis of rotation of said operating member, the normal operating range of movement of said radius arm, link, and rotary member being determined by the engagement of said first radius arm with said operating member, said rotary member being rotatable from a position in which the direction of said width at said first cross section is substantially

perpendicular to the longitudinal axis of said first radius arm to a position in which the direction of said width is substantially parallel to the longitudinal axis of said first radius arm by actuation of said operating member, and latch means, said rotary member normally having driving engagement with said latch means.

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