

[54] POSITIVE CATCH

[75] Inventor: Marlo Van Klompenburg, Owatonna, Minn.

[73] Assignee: Amerock Corporation, Rockford, Ill.

[22] Filed: Feb. 4, 1974

[21] Appl. No.: 439,293

[52] U.S. Cl. 292/127; 292/DIG. 38

[51] Int. Cl.² E05C 19/10

[58] Field of Search 292/DIG. 38, 64, 110, 127, 292/170, 174, 175, 191, 192, 221, 227, 350

[56]

References Cited

UNITED STATES PATENTS

1,338,153	4/1920	Peterson	292/127
1,662,119	3/1928	Lewis	292/127
3,830,535	8/1974	Read	292/DIG. 38

FOREIGN PATENTS OR APPLICATIONS

1,114,404 9/1961 Germany 292/DIG. 38

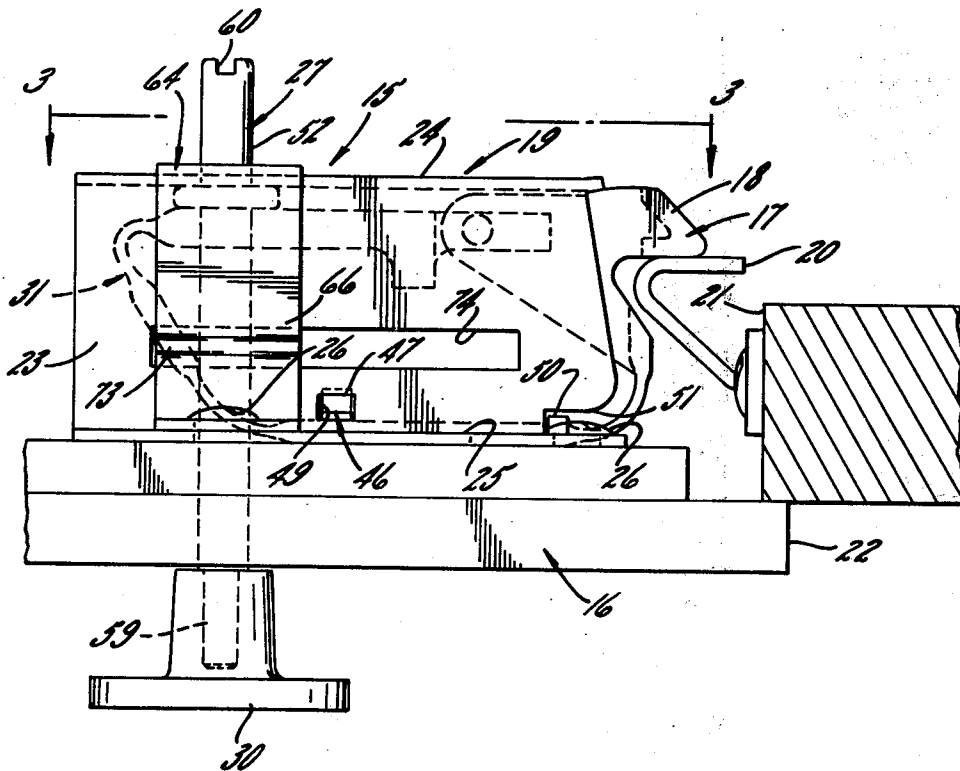
Primary Examiner—Peter M. Caun
Attorney, Agent, or Firm—Wolfe, Hubbard, Leydig, Voit & Osann, Ltd.

[57]

ABSTRACT

A catch adapted for mounting on the inside of a door includes a bolt mounted within a bracket to move between projected and retracted positions so the head of the bolt catches on and releases from a strike secured to the door frame. Connected to the head of the bolt is a resiliently flexible loop which normally urges the head into its projected position. When the loop is collapsed by manual operation of an actuator member, the head is retracted to release from the strike.

13 Claims, 10 Drawing Figures



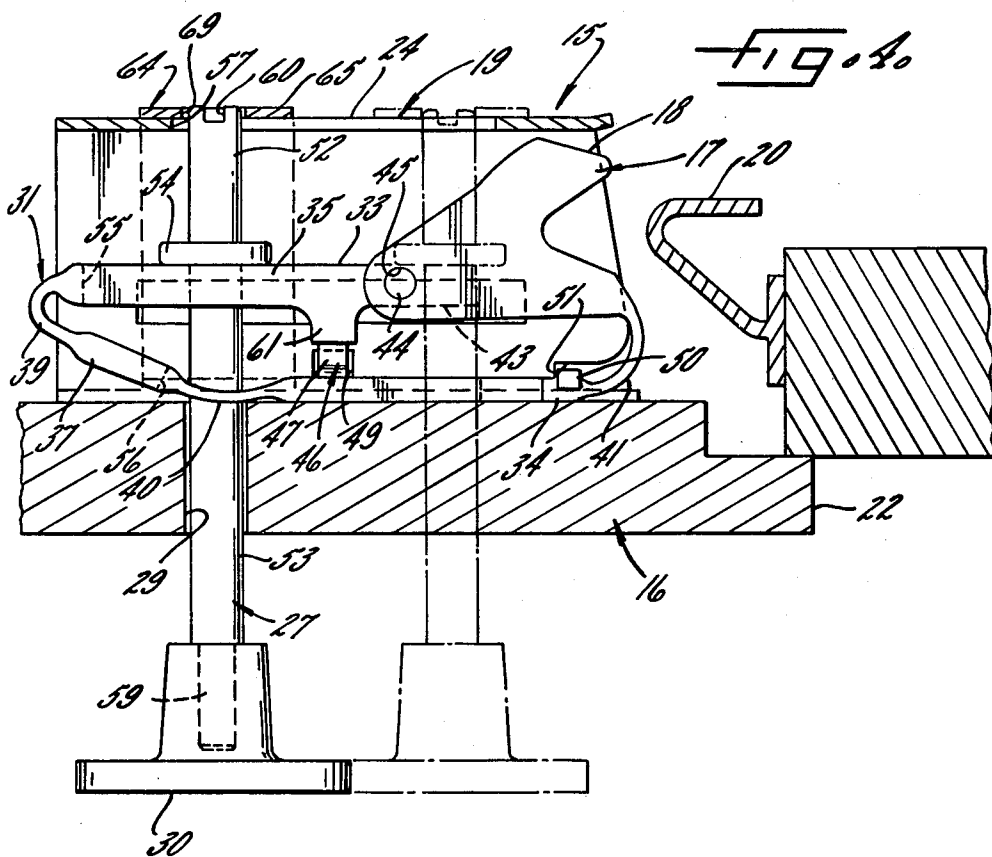


FIG. 4

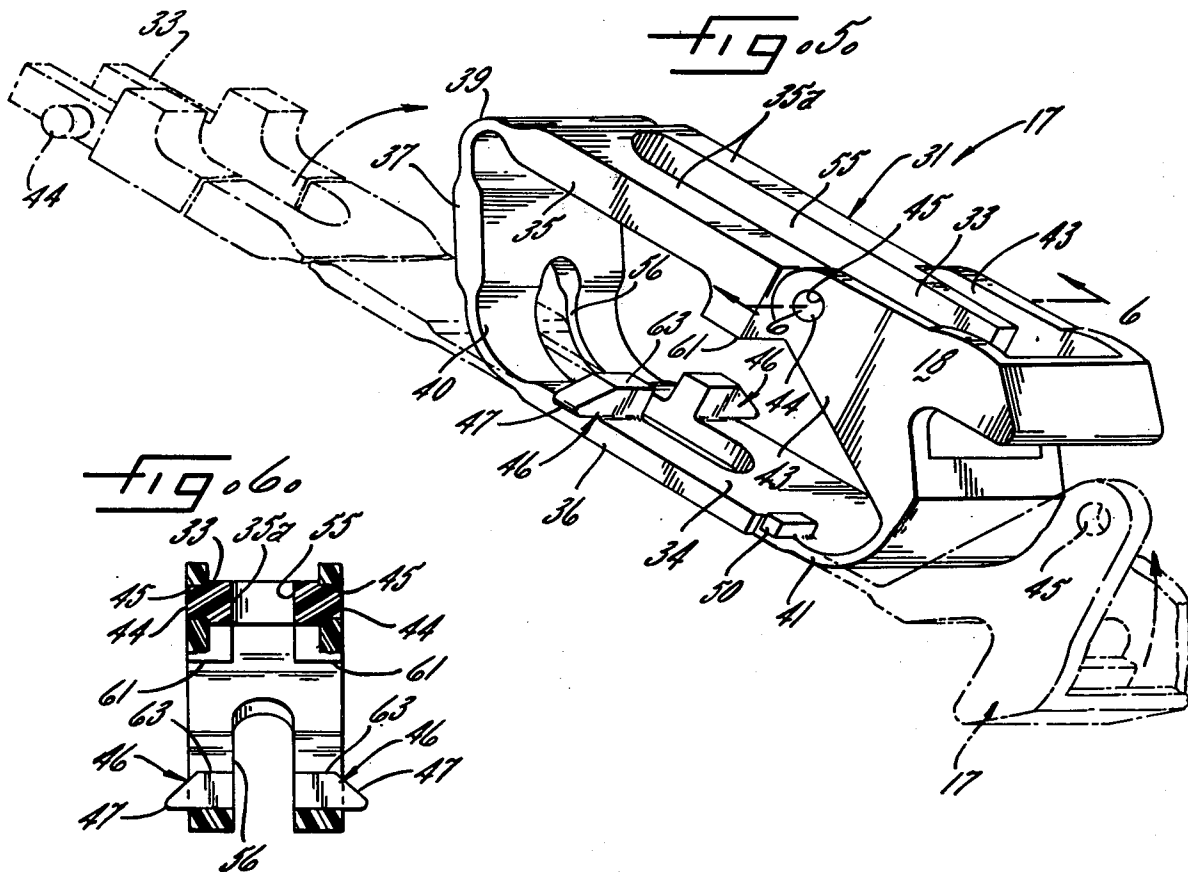
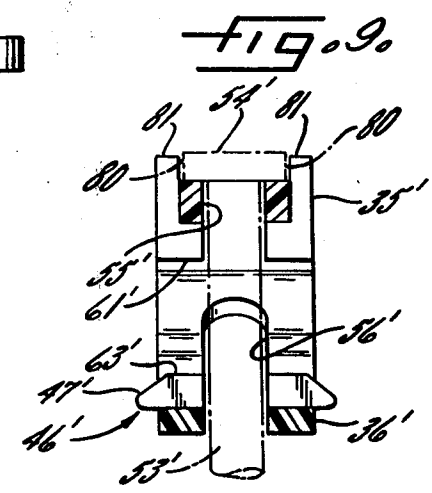
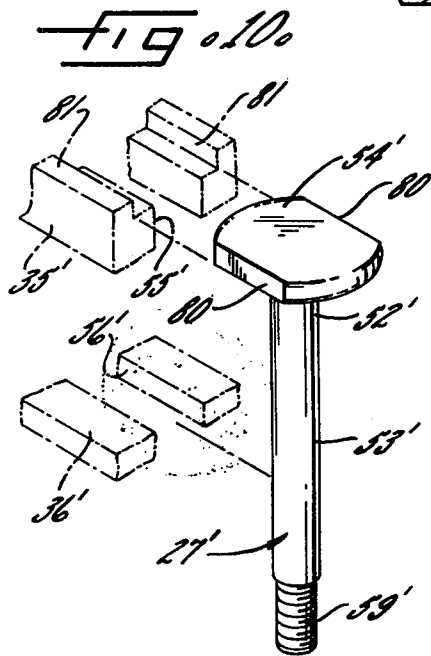
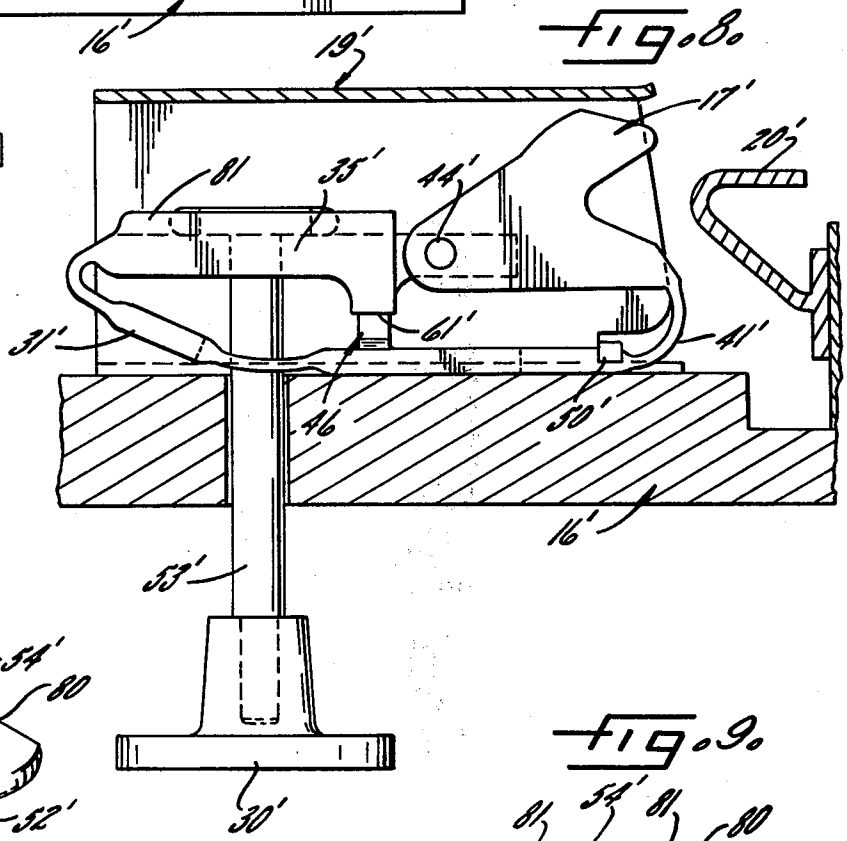
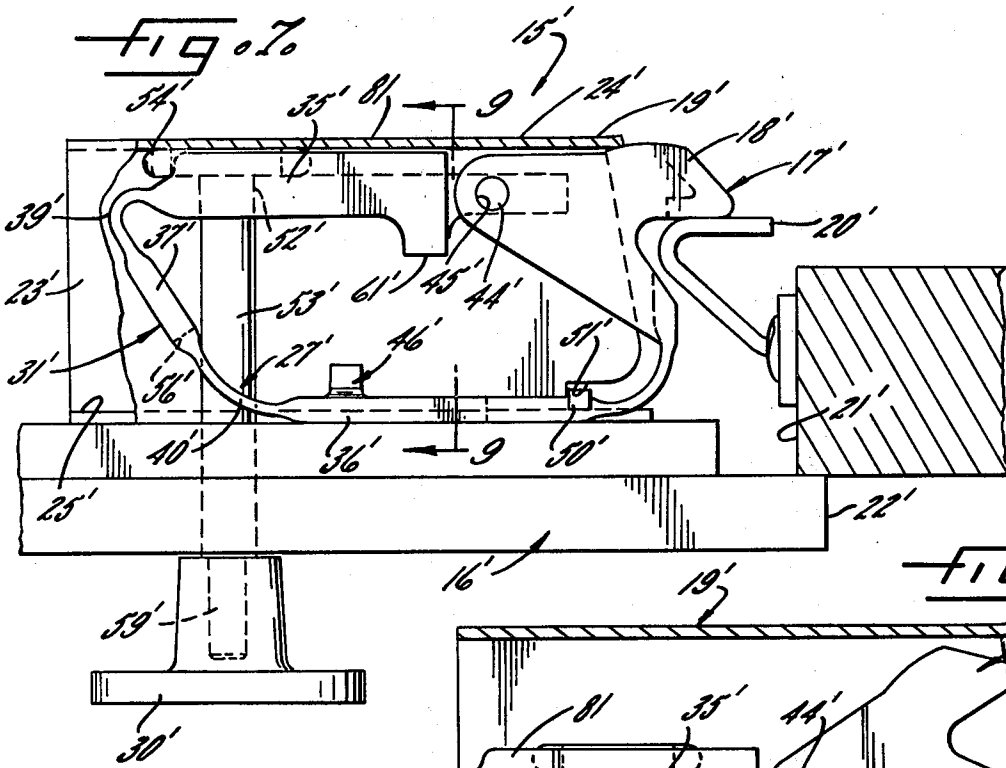


FIG. 5

FIG. 6



POSITIVE CATCH

BACKGROUND OF THE INVENTION

This invention relates to a concealed positive catch mountable on the inside of a door and including a bolt mounted within a support bracket for movement between projected and retracted positions from the end of the bracket to catch and release with a strike secured to the door frame. More particularly, the invention relates to a catch of the foregoing type which also includes an actuator member adjustable along the bracket to extend outwardly through the door at various distances from the edge of the door to connect with a knob thereby permitting the catch to be actuated from the outside of the door.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide a catch of the above general character which is simpler, less expensive and easier to manufacture than prior catches of the same general type. A related object is to achieve the foregoing through the provision of a catch having a unique bolt which is self-urged into the projected position so as to enable the latching end or head of the bolt to catch with the strike.

A more detailed object is to provide the bolt with a resiliently flexible loop integrally formed with the head of the bolt and acting against the bracket to normally urge the head of the bolt into its projected position.

The invention also resides in the provision of a novel actuator which is adapted for use with standard knobs and in the unique construction of the bolt enabling the actuator to be positioned at various distances from the edge of the door.

Still further, the invention resides in the novel manner in which the actuator member and the loop coact to hold the knob inwardly against the door and in the unique way in which the loop is collapsed by the actuator when the knob is pulled so as to retract the head of the bolt to release from the strike.

These and other objects and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary plan view of a catch embodying the novel features of the present invention, the catch being shown mounted on a door.

FIG. 2 is a fragmentary elevational end view of the catch shown in FIG. 1.

FIG. 3 is an elevational view taken substantially along line 3—3 of FIG. 1.

FIG. 4 is a fragmentary view similar to FIG. 1 but with parts of the catch broken away and shown in cross section and with other parts of the catch shown in moved positions.

FIG. 5 is an enlarged perspective view of a part of the catch and also showing a fragmentary unfolded view of the part in phantom lines.

FIG. 6 is a cross-sectional view taken substantially along line 6—6 of FIG. 5.

FIG. 7 is a fragmentary plan view similar to FIG. 1 but showing an alternative embodiment of the invention with parts broken away and shown in cross section.

FIG. 8 is a fragmentary plan view similar to FIG. 7 but showing parts of the catch in moved positions.

FIG. 9 is a cross-sectional view taken substantially along line 9—9 of FIG. 7.

FIG. 10 is a perspective view of a part of the alternative embodiment of the invention, other parts of the catch being shown in phantom.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in the drawings for purposes of illustration, the present invention is embodied in a catch 15 mountable on a closure member such as a cabinet door 16 and operable to latch the door in a closed position (FIG. 1). In the present instance, a bolt 17 is mounted within a support or bracket 19 attached to the inside of the door. The bolt includes a latching end or head 18 which normally is located in a projected position (FIG. 1) adjacent the free edge 22 of the door to positively hold the door shut by interlocking with a strike 20 fixed to the frame 21 of the cabinet. When the bolt is moved to a retracted position (FIG. 4), the head 18 releases the strike to free the door for opening.

As shown in FIG. 2, the bracket 19 is generally U-shaped in cross section and includes parallel upper and lower sides 23. An inner wall 24 is formed integrally with the inner margins of and extends vertically between the two sides. The outer margins of the upper and lower sides are bent in upward and downward directions, respectively, to form vertical flanges 25 which are fixed to the door 16 such as by screws 26 (FIGS. 1 and 3) to hold the catch 15 on the inside of the door.

In its projected position (see FIG. 1), the head 18 of the bolt 17 extends forwardly out of the open front end of the bracket 19 so that, as the door is closed, the head is cammed rearwardly by engagement with the strike and then snaps forwardly to interlock with the strike 20 and hold the door shut. To open the door, the bolt is moved into its retracted position by a manually operated actuator member 27 which is connected to the bolt and is movable generally perpendicular to the bolt to move the latter away from the strike. Herein, the actuator extends outwardly from the bolt and through a hole 29 (FIG. 4) formed through the door 16. Fastened to the outer end of the actuator is a knob 30 which facilitates manual movement of the actuator.

When mounting a catch 15 of the type described thus far, it is desirable to be able to position the knob 30 at various horizontal distances from the free edge 22 of the door 16. Accordingly, the catch 15 is constructed so the actuator 27 may connect with the bolt 17 virtually anywhere along the length of the bolt (see FIG. 4) and still serve to move the head 18 of the bolt to its retracted position when the actuator is moved perpendicular to the bolt. This enables the hole 29 to be drilled through the door either closer to or farther away from the free edge so the knob may be positioned as desired. In addition, the catch may be used universally with doors having actuator-receiving holes spaced various distances from the free edges of the doors.

In accordance with the primary aspect of the present invention, the construction of the catch 15 is simplified and the assembly of its components is facilitated by forming the bolt 17 so that it coacts with the bracket 19 in a novel manner to urge itself into the projected position while still permitting the actuator 27 to be moved selectively along the bolt when mounting the catch on the door 16 so the knob 30 may be positioned as desired from the free edge 22 of the door. For these

purposes, the bolt includes a resiliently flexible loop 31 whose ends 33 and 34 are connected to the head 18 of the bolt. More particularly, the loop extends rearwardly of the head and is captivated within the bracket for engagement with the actuator so that, when the latter is moved perpendicular to the loop, the loop is collapsed thereby causing the head to retract from the strike 20. When the knob 30 is released, the loop expands against the bracket and urges the head into its projected position to interlock with the strike. Advantageously, the actuator may engage with and collapse the loop virtually anywhere along the length thereof so as to retract the bolt head. Thus, by virtue of the novel construction of the bolt and its unique coaction with the bracket, the construction and assembly of the catch is simplified substantially while still enabling the knob to be positioned selectively from the free edge of the door.

In the present instance, the loop 31 is formed of a resiliently flexible plastic and includes opposing parallel inner and outer sides 35 and 36. An intermediate section 37 is connected between the rearward end portions of the two parallel sides of the loop by hinge sections 39 and 40 integrally formed with the opposite ends of the intermediate section. Integrally formed with and connected between the forward end of the outer side 36 of the loop and the head 18 of the bolt 17 is a flexible web 41 so the loop is formed as an integral part of the bolt. Extending rearwardly from the head 18 of the bolt are two parallel wings 43 which are connected pivotally with the forward end portion of the inner side 35 of the loop by two bosses 44 (see FIG. 6). The latter are formed integrally with the opposite edges of the forward end portion of the inner side 35 and interfit with corresponding apertures 45 in the wings to form the pivotal connection between the head and the inner side of the loop. Advantageously, an elongated notch 55 is formed through the inner side and opens in a forward direction from the forward end portion thereof. Accordingly, the notch causes the inner side 35 of the loop to take the form of a pair of resilient fingers 35a (FIG. 5), the fingers being capable of being flexed toward one another to enable insertion of the bosses into the apertures with a snap fit.

To facilitate assembly of the catch 15, the bolt 17 snap fits within the bracket 19 with the bracket compressing the loop 31 slightly so as to constrain it against expansion and thereby to urge the bolt head 18 into the projected position. In the exemplary catch, two lugs 46 (FIG. 5) are formed integrally with the outer side 36 of the loop intermediate the ends thereof with one lug extending upwardly and the other downwardly beyond the adjacent edges of the outer side (see FIG. 3). Each lug includes a cam surface 47 (FIG. 5) slanted inwardly from the outer side of the loop and generally toward the opposite edge of the inner side of the loop. Advantageously, when assembling the bolt 17 with the bracket 19, the lugs are received with a snap fit in holes 49 in the sides 23 of the bracket. Accordingly, the bolt is locked easily and securely within the bracket by simply pressing the bolt into the bracket so that the surfaces 47 on each lug cam against the sides of the bracket to snap into the holes.

In addition to the lugs 46, each edge of the outer side 36 of the loop 31 is formed with a vertically extending projection 50 which further serves to hold the bolt 17 in the bracket 19. The projections are integrally formed

with the outer side 36 adjacent the forward end thereof with one projection extending upwardly from the upper edge and the other extending downwardly from the lower edge (see FIG. 3). The projections fit within forwardly opening notches 51 (FIG. 1) formed through the sides of the bracket and extending along the forward end portions of the flanges 25. The projections thus keep the bolt from tilting in the bracket as the catch 15 is actuated.

Preferably, the catch 15 is actuated by pulling on the knob 30 so that, as an incident to pulling the actuator 27 with the knob, the bolt 17 is released from the strike 20 and, at the same time, the door 16 is pulled open. As shown in FIGS. 3 and 4, the actuator 27 includes a rod 53 having a circumferential flange 54 integrally formed therewith and spaced outwardly from the inner end portion 52 of the rod. More particularly, the inner end portion of the rod is telescoped through the elongated notch 55 in the inner side 35 of the loop, an elongated notch 56 formed in the outer side 36 and an elongated opening 57 in the inner wall 24 of the bracket (see FIGS. 4 and 5). The flange is captivated between the inner wall of the bracket and the inner side of the loop so that, prior to mounting the catch 15 on the inside of the door 16, the rod is free to be slid along the bolt within the openings 55, 56 and 57 to enable the knob 30 to be positioned selectively from the edge 22 of the door. The outer end portion 59 of the rod 53 is threaded externally to enable the use of conventional knobs 30 therewith and, in this form of the invention, the rod is free to turn axially within the catch. To facilitate threading the knob on the rod, the inner end portion 52 of the rod is provided with a slot 60 adapted to receive a driver or the like (not shown) to hold the rod against turning as the knob is threaded on the rod.

To actuate the catch 15, the loop 31 is collapsed by the flange 54 as the rod 53 is pulled outwardly by pulling on the knob 30. This causes the inner side 35 to be cammed rearwardly and toward the outer side 36 of the loop which, in turn, causes the bolt head 18 to be swung rearwardly into its retracted position to release the strike 20. Advantageously, this movement is achieved by virtue of the unique rhomboidal shape of the loop and the novel coaction between the rod 53 and the loop. These two features enable the outward pulling motion on the knob 30 and rod to be converted into a rearward, retracting motion for the bolt head while still permitting the rod and flange to be moved to engage and actuate the bolt 17 virtually anywhere along its length so the knob may be positioned as desired from the edge 22 of the door. Because of the rhomboidal shape of the loop, the inner side 35 follows the path of least resistance in moving toward the outer side 36 and thus slides rearwardly relative to the rod, swinging both the intermediate section 37 of the loop and the head 18 of the bolt 17 rearwardly. As shown in FIG. 4, the bolt head is swung rearwardly into its retracted position from the web 41 and the latter, being resiliently flexible, serves as a spring for the head, bending rearwardly and yet urging the head toward its projected position. At the same time, the outer hinge section 40 is flexed rearwardly while the inner hinge section 39 is flexed forwardly so the inner hinge section also urges the bolt head back toward the projected position. When the knob is released, the two hinge sections and the web cause the loop to expand into its original constrained position within the bracket thereby urging the head

into its projected position to catch on the strike 20. At the same time, the expanding loop pulls the rod inwardly so as to draw the knob against the outer surface of the door. Thus, it is seen that the bolt itself is constructed so as to be self-urged into the projected position while also coacting with the actuator to hold the knob inwardly against the door.

To keep the inner end portion 52 of the rod 53 from being pulled completely into the bracket 19 and to keep loop 31 from being collapsed or flattened to the point where the hinge sections 39 and 40 and the web 41 possibly are flexed beyond their elastic limits, outwardly extending stops 61 (FIGS. 4 and 5) are formed on the inner side 35 of the loop to engage with the inner surfaces 63 of the lugs 46. Herein, the stops are located adjacent the bosses 44 on opposite sides of the elongated notch 55 and forwardly of the lugs 46 so that as the loop is collapsed, the lugs and stops move into alignment with each other to hold the inner side 35 spaced from the outer side 36.

To guide the rod 53 as it is moved perpendicular to the loop 31, a metal strap 64 (FIG. 1) is clipped on the bracket 19 over the inner end portion 52 of the rod. As shown in FIG. 2, the strap is generally U-shaped and includes a cross piece 65 which extends between upper and lower legs 66 and 67 and is integrally formed therewith. A central hole 69 (FIG. 4) formed in the cross piece telescopically receives the inner end portion of the rod to permit the latter to move inwardly and outwardly as the catch is actuated. Integrally formed on the end of each leg is a vertically extending flange 70, the flange on the upper leg 66 extending upwardly over a slot 71 in the flange 25 of the upper side 23 of the bracket and the flange 70 on the lower leg 67 extending downwardly over a similar slot in the flange 25 of lower side 23 of the bracket. A rib 73 (FIG. 2) extends laterally across each leg and mates with a corresponding longitudinal slot 74 (FIG. 1) in each side of the bracket so the strap snap fits on the bracket and may be slid along the bracket with the rod to adjust the position of the rod relative to the loop. Holes 75 (FIG. 2) in each of the strap flanges 70 receive two of the screws 26 used in securing the bracket so the strap is held securely in place on the bracket once the latter is fastened to the inside of the door. Thus, as the rod is moved perpendicular to the loop, the strap guides the movement of the rod and flange 54 to collapse the loop and thereby retract the head 18 of the bolt 17 from the strike 20.

An alternative form of the present invention is shown in FIGS. 7 through 10 wherein parts corresponding to similar parts of the first form of the invention are indicated by the same but primed reference numerals. In this form of the invention, the flange 54' on the inner end portion 52' of the rod 53' is formed with flats 80 on opposite sides thereof and slides between two spaced, parallel rails 81 as the rod is actuated to retract the head 18'. Herein, the rails are integrally formed in the inner side 35' of the loop 31' along the elongated notch 55' formed in that side of the loop and are spaced from each other a distance slightly greater than the width of the flange between the two flats 80. Accordingly, when the knob 30' is being tightened on the outer end portion of the rod 53', the flats engage with the rails to keep the rod from turning within the bolt 31'.

From the foregoing it is seen that the concealed positive catch 15 of the present invention is uniquely adapted so that the knob 30 may be located at virtually any distance desired from the edge 22 of the door 16 within the length of the bolt 17 so that the catch may be used with many different styles of doors. Advantageously, this is accomplished by forming the bolt to include the loop 31 which, when collapsed by pulling on the actuator 27, retracts the bolt head 18 from the strike 20 regardless of where the actuator engages the loop along the length of the latter. The elongated notches 55 and 56 within the opposing sides 35 and 36 of the loop permit the actuator to be moved either toward or away from the head of the bolt prior to mounting the catch on the door so that the actuator may extend through the door at the position where the knob 30 is desired to be located.

I claim:

1. A catch comprising, a support, a bolt mounted on said support and having a head movable between a projected position and a retracted position, a resiliently flexible loop mounted on said support and having opposing sides with ends connected to said bolt head; said loop urging said head into said projected position, and an actuator engageable with said loop and manually operable to collapse said loop to move the head into its retracted position, said opposing sides being spaced from and extending generally parallel to each other, said loop further comprising an intermediate section connecting said sides together, said loop being constrained within said support in the general shape of a rhombus and having an elongated slot formed through one of said sides, said actuator being slidably connected to the opposite side of said loop, projecting outwardly of said support through said slot and being movable along said loop within said slot.

2. A catch as defined by claim 1 further including a resiliently flexible web integrally formed with and connecting the end of the one side of said loop to said head, and a resiliently flexible hinge section integrally formed with each end of said intermediate section and with the adjacent side of said loop to connect said intermediate section to said sides.

3. A catch as defined by claim 2 in which first and second spaced parallel wings are integrally formed with said bolt and project rearwardly thereof, an aperture formed in each of said wings adjacent the rearward tip thereof, fingers forming the end portion of said opposite side of the loop, and a boss integrally formed with each of said fingers, said bosses being adapted to snap into said apertures to connect said opposite side of the loop pivotally with said wings.

4. A catch as defined by claim 2 further including a stop integrally formed with one of said sides and projecting toward the opposite one of said sides for engagement therewith when said loop is collapsed thereby to limit flexure of said web and hinge sections.

5. A catch as defined by claim 1 further including a second elongated slot formed the opposite side of said loop, said actuator comprising a rod having an outer end portion extending through both said first mentioned slot and said second slot, said rod having an inner end portion with a flange located between said opposite side and said support so when said rod is pulled outwardly, said opposite side is drawn toward said one side thereby moving the head of the bolt into its retracted position.

6. A catch as defined by claim 5 further including an elongated opening formed in said support and aligned with the slots in said sides, said inner end portion of the rod projecting inwardly through said opening, a slidable strap with a central hole telescoped over said inner end portion and fastened to said support to guide the inward and outward movements of said rod.

7. A catch as defined by claim 6 wherein said support includes upper and lower parallel sides, each of said sides having an elongated notch formed therein, said strap including spaced parallel legs adapted to fit along the sides of said support, each of said legs including a lateral rib extending toward the other leg, said ribs snap-fitting within said notches to fasten said strap slidably on said support.

8. A catch as defined by claim 1 further including means for fastening said bolt with a snap-fit within said support.

9. A catch as defined by claim 8 wherein said fastening means includes a first lug integrally formed with said one side of the loop adjacent one edge thereof and extending beyond said edge, a second similar lug adjacent the opposite edge of said one side, said lugs engaging the inside surfaces of said support when the bolt is inserted into said support and snap-fitting within holes in said support thereby to retain said bolt within the support.

10. A catch as defined by claim 9 further including first and second lateral projections spaced from said lugs, said projections being integrally formed with and extending beyond the opposite edges of said one side of the loop to interfit with said support to help hold said loop in the general shape of a rhombus.

11. A catch mountable on the inside of a door and adapted for selective positioning of an outside knob from the edge of the door, said catch comprising a bracket adapted for attachment to the inside of the door, a bolt mounted within said bracket and including a head movable between a retracted position and a projected position, said head, when in said projected position, extending forwardly beyond one end of the bracket adjacent the edge of the door to latch the door closed, a resiliently flexible loop captivated within said bracket and connected to said head, said loop being constrained generally in the shape of a rhombus within said bracket, urging said head into its projected posi-

tion and having an elongated slot formed through one side thereof, an actuator slidably connected to the opposite side of said loop and projecting outwardly of said bracket through said slot, said actuator being movable along said loop within said slot to be inserted through the door at a selected distance from the edge of the door for connection with the knob so that, when the knob and the actuator are pulled, the loop is collapsed thereby moving the head of the bolt into its retracted position.

12. A catch mountable on the inside of a door and adapted for selective positioning of an outside knob from the edge of the door, said catch comprising a bolt and including a head movable between a retracted position and a projected position, a resiliently flexible loop connected to said head, means for mounting said loop on the inside of the door and constraining said loop in the shape of a rhombus with said head being urged into its projected position, said loop having an elongated slot formed through one side thereof, and an actuator slidably connected to the opposite side of said loop and projecting outwardly through said slot, said actuator being movable along said loop within said slot to be inserted through the door at a selected distance from the edge of the door for connection with the knob so that, when the knob and the actuator are pulled, the loop is collapsed thereby moving the head of the bolt into its retracted position.

13. A catch mountable on the inside of a door comprising, a bolt having a head movable between a projected position and a retracted position, collapsible loop means formed of a resiliently flexible material and having at least two opposing sides with ends connected to said bolt head, said loop means being movable between an expanded shape urging said head into said projected position with said sides spaced apart and a collapsed shape with said sides moved toward each other, means for mounting said loop means on the inside of the door, and an actuator slidably connected with one of said sides and projecting outwardly thereof for movement along said loop to be inserted through the door at a selected position with respect to the edge of the door, said actuator being manually operable from outside the door in said position to collapse said loop and thereby move the head into its retracted position.

* * * * *

50

55

60

65