Aug. 25, 1953

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LATCH MECHANISM

2,650,123

Filed April 22, 1949

2 Sheets-Sheet 1

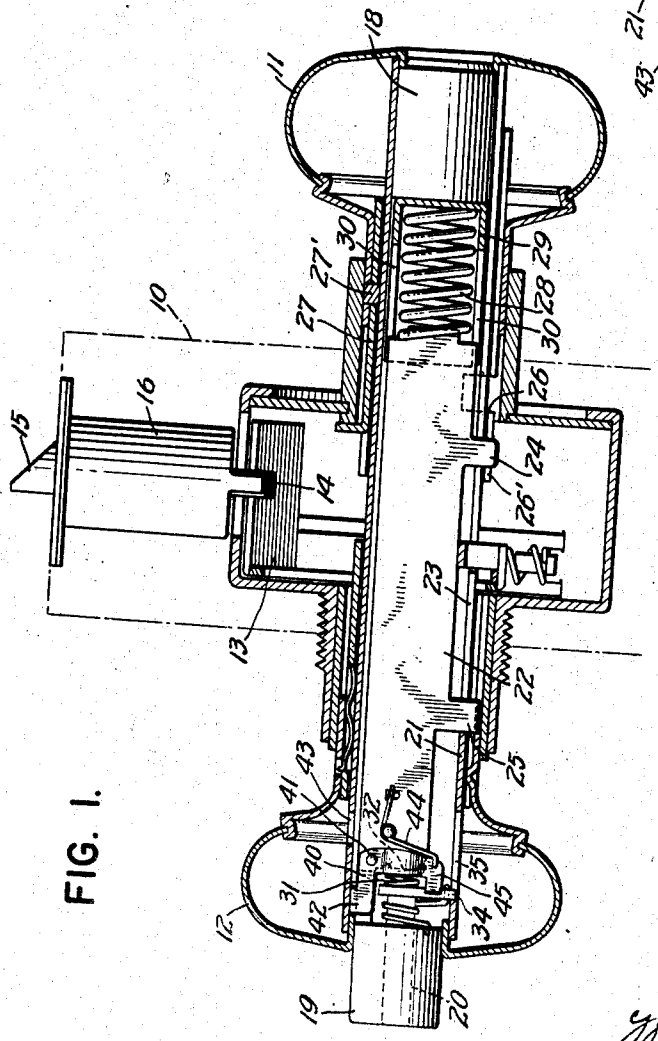


FIG. 1.

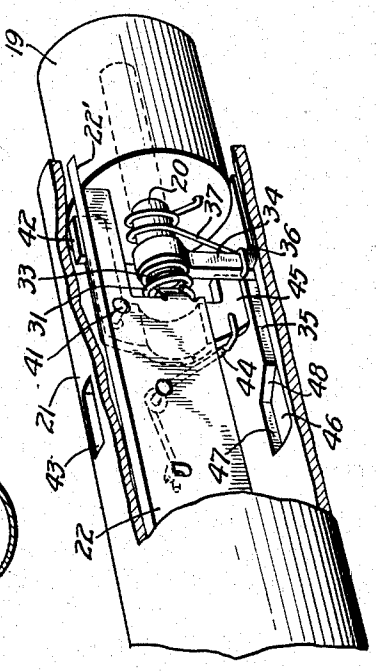


FIG. 2.

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FIG. 3.

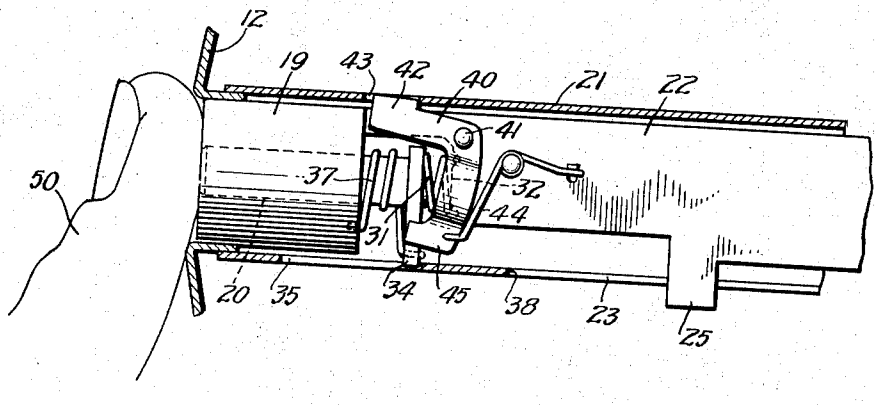


FIG. 4.

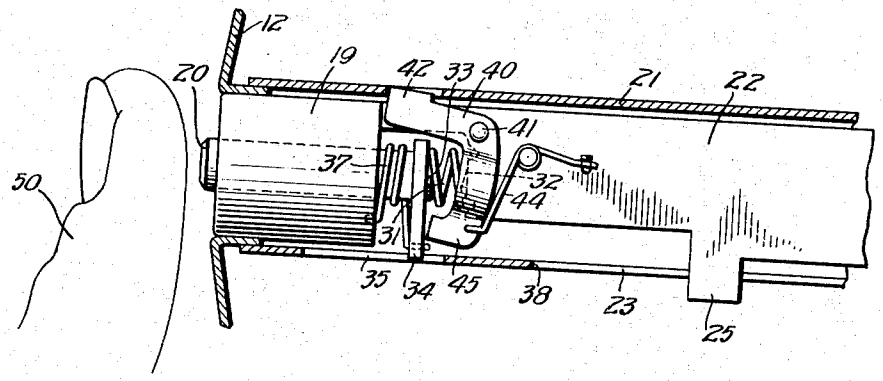
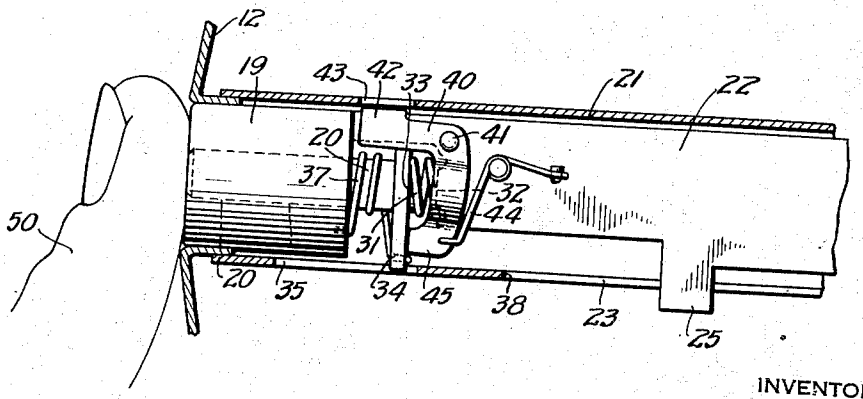


FIG. 5.



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LATCH MECHANISM

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Application April 22, 1949, Serial No. 88,994

9 Claims. (Cl. 292—169)

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My invention relates to latching mechanisms and in particular to an improved push-button control therefor.

It is an object to provide an improved device of the character indicated.

It is another object to provide an improved push-button latch-setting and throw-off mechanism wherein purely axial pushing is involved both in setting and in throwing off the latch.

It is an object to provide a push-button-operated latching mechanism wherein two concentric buttons are employed, one of said buttons being used to the exclusion of the other of said buttons for throwing off the latch mechanism.

It is also an object to provide a push-button-operated latching mechanism wherein an indication of the locked or unlocked condition of the latching mechanism may be had by simple visual observation of the relative axial position of the said buttons.

Still another object is to provide a push-button-operated latch-setting and throw-off mechanism wherein the throw-off push may be relatively shorter than the latch-setting push.

Other objects and various further features of the invention will be pointed out or will occur to those skilled in the art from a reading of the following specification in conjunction with the accompanying drawings. In said drawings, which show, for illustrative purposes only, a preferred form of the invention:

Fig. 1 is a longitudinal horizontal sectional view of a latching mechanism incorporating features of the invention and shown in application to a door;

Fig. 2 is a fragmentary view in perspective with certain parts broken away in order further to reveal the relationship of parts in Fig. 1; and

Figs. 3, 4, and 5 are enlarged fragmentary partly sectioned longitudinal views illustrating a sequence of relative positions of the parts of the structure of Fig. 1.

Briefly stated, my invention contemplates a push-button-controlled latching mechanism which may employ two push buttons. The buttons may be concentric and relatively slidable and mounted in the center of a knob. Both the buttons may be flush with each other in a first axial position (determining one operating condition of the latching mechanism); and both said buttons may be axially displaced from said first position, with one of the buttons spaced axially relatively to the other button, in another actuated position (representing another controlled condition of the latching mechanism).

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Because the buttons assume different relative positions for different conditions of lock setting, it may be known upon inspection (that is, without touching the lock latching mechanism or the push buttons) whether or not the latching mechanism has been set. In the form to be described, both buttons are flush and in an out-position when the latching mechanism has not been set, that is, when knob actuation of the latching mechanism is freely permitted. When the latch is set and knob operation is not possible or is not effective, both buttons may be in an in-position, with the inner button projecting slightly outwardly of the outer button. Upon finger engagement with the inner button, a slight displacement, within the slight axial projecting distance, may be utilized for throwing off the set condition of the latching mechanism.

Referring to the drawings, my invention is shown in application to a cylindrical latching mechanism applied to a door 10. The mechanism may be built up of generally tubular or cylindrical parts, and in the form shown the assembly includes an outside knob 11 and an inside knob 12. Both knobs may be effective through rollback means (not shown) to actuate a retractor carriage 13 for displacement downwardly (in the sense of Fig. 1) in order to pull the tail 14 of the latch bolt 15 of a latch assembly 16. The latch assembly 16 may be of a type disclosed in detail in the copending application Serial No. 59,461, of Nicholas A. Welch, filed November 12, 1948, now Patent No. 2,591,647, issued April 1, 1952. In the form to be described, I provide only for knob operation from the outside, and there is no provision for key operation of the mechanism from the outside; in this respect, the mechanism resembles that disclosed in another copending Welch application Serial No. 81,964, filed March 17, 1949. In certain applications key operation may be desired, but for such cases a cylinder lock may be inserted in place of the dead plug 18 shown, in accordance with the teachings of a further Welch copending application Serial No. 74,963, filed February 7, 1949.

As disclosed in the said Welch application Serial No. 81,964, push-button means 19—20 carried by the inside knob 12 may determine the locked or unlocked condition of the latching mechanism. The push-button means 19—20 is shown in application to a latching mechanism in which both knobs 11—12 may be keyed to each other by way of a tubular through-spindle 21. For controlling the locked or unlocked condition of the mechanism, I may employ a blade member

22 engaging a longitudinal slot 23 in the through-spindle 21, as by means of lugs 24—25 on the blade 22.

When the latch has been set (i. e. disabled for operation from the outside, as by means of knob 11), as in the case for the relation of parts shown in Fig. 4, the blade lug 24 will have entered an axially limited arcuate slot 26 in a tubular outside-knob spindle 27, which may be keyed, as at 27', to the outside knob 11. Thus, for the set condition of the latch the outside knob 11 will be effectively disengaged from the blade 22 and, hence, from operative relation with the latch mechanism. When the mechanism is thrown off, as in the case of the relation of parts shown in Fig. 1, the lug 24 will have been displaced (leftward in the sense of Fig. 1) out of the disabling slot 26 and along an axially extending relatively narrow slot 26' in the outside-knob spindle 27. Thus, for the thrown-off condition of the mechanism, both knobs 11—12 and the through-spindle 21 and the blade 22 may freely rotate in order to operate the latch 15.

It has been explained that the locked or thrown-off condition of the latching mechanism may be determined by the longitudinal displacement of the blade 22 (that is, of the lug 24) with respect to the disabling slot 26. In the form shown, resilient means, such as a compression spring 28, may normally urge the blade 22 in an outward or throwing-off direction. The spring 28 may be contained within a cupped member 29 held in the knob 11 and including guide means, such as longitudinal slots 30, slidably to receive the blade 22. The blade 22 may be permanently connected, as by sweating at 22', to the outer push button 19 of the concentric push-button means 19—20. The inner push button 20 may also be urged normally in an outward direction by resilient means, and in the form shown a compression spring 31 (located between a guide lug 32 on the blade 22 and the projecting end 33 of the push button 20) may perform this function.

For a purpose which will later be clear, the inner push button 20 may carry a generally radially projecting arm 34, which is shown to have a boss or collar part fitted over the inner end of the push button 20 so as to provide a locating abutment shoulder for the compression spring 31. The arm 34 preferably projects radially outside the outer push button 19 for engagement with a longitudinal slot 35, and outward displacement of the inner button 20 may be limited by an abutment 36 in the slot 35; to facilitate insertion of certain locking parts associated with the push buttons, the slot 35 may extend axially from the abutment 36 to the push-button end of the through-spindle 21, so that the arm 34 will not interfere with such insertion of parts. A torsion spring 37 may normally urge the arm 34 clockwise (in the sense of Fig. 2) so as to align the arm 34 with the inner part of the slot 35 and for positive location by the abutment 36. Outward displacement of the outer button 19 may be limited by abutment of the blade lug 25 with the end of the inner knob, as at 38 (see Fig. 3).

In accordance with a feature of the invention, the two push buttons 19—20, although relatively displaceable, are permitted but a relatively small degree of such relative movement; on the other hand, the buttons 19—20 may be permitted a relatively long total displacement, as in a shifting from a first controlled condition of the latching mechanism to a second controlled condition

thereof. Both buttons may be flush for the out-position, which in the form shown represents an unset condition of the latch (see Figs. 1 and 2); for the in-position, the inner button 20 may be slightly outwardly displaced relatively to the outer button 19, representing a set condition of the latching mechanism, as in Fig. 4.

In order to hold the in-position against the action of spring 28, I may employ latching means in the form of a latch member 40, pivoted as at 41 to the blade 22 and engageable at the latch end 42 thereof with a latching abutment or slot 43 in the through-spindle 21. Spring means 44 carried by the blade 22 may normally resiliently urge the latch member 40 in a latching direction. In the form shown, the latch member 40 is more or less of bell-crank shape and includes a downwardly extending arm 45 which may be engaged by the latch spring 44.

The relationship of the various described elements is preferably such that, for the out-position represented by Figs. 1 and 2, the slot 35 holds the arm 34 against the action of the torsion spring 37 and in slight angular clearance relation with an axially overlapping part of the end 45 of the latching member 40. At some point longitudinally inwardly of this position the slot 35 preferably effectively widens or enters into an opening 46 which (for a purpose which will later be clear) may include an abutment-wall portion 47 and a cam-wall portion 48. It will be understood that the effect of the opening 46 in the through-spindle 41 may be to permit the torsion spring 37 to urge arm 34 in a direction to take up the above-mentioned angular clearance with the end 45 of the latch member as the buttons are being pushed and as the arm 34 clears or enters upon the cam wall 48.

A better understanding of the cooperation of the described parts may be had from a description of a full cycle of operation. As indicated above, with both buttons flush and in an out-position as in Fig. 1, an unset condition of the mechanism may be indicated, and in such case either or both of knobs 11—12 may operate the latch 15. In this unset condition, the latching end 42 of the latch member 40 will be urged freely by spring 44 so as to ride the inner surface of the tubular through-spindle 21. The arm 34, which may be termed a second or throw-off latch member will be in slight axial overlapping relation with a part of the end 45 of the latch member.

To set the lock, a thumb or finger 50 may be pressed simultaneously against both buttons 19—20, to thrust the entire mechanism carried by the blade 22 against the action of spring 28. Upon sufficient depression, the parts will assume the relation shown in Fig. 3, wherein the latching end 42 of the latch member 40 has just dropped into the latch-abutment slot 43. Upon release of finger pressure (see Fig. 4), spring 28 will urge the blade assembly outwardly, and the latch member 40 will engage the latch abutment 43 to hold the in-position of the assembly. Immediately upon such engagement and as the thumb 50 is being removed, spring 33 may urge the inner button 20 outwardly so as to cause arm 34 to axially clear the end 45 of the latch member 40. When arm 34 is thus cleared, the torsion spring 37 may urge arm 34 to rotate until stopped by the abutment wall 47, at which time the arm 34 preferably overstands the end 45 of the latch 40. The blade 22 is now held in the in-position, and

the outside knob 11 is rendered inoperative to actuate the latch 15.

If desired, abutment means may be provided for limiting the outward movement of the inner push button 20 with respect to the outer button 19, when in the Fig. 4 relationship. However, in the form shown, the torsion spring 37 may have sufficient axial action to offset the force of compression spring 31 just after arm 34 has cleared the end 45 of the latch member 40. In its angular shift into abutment with the abutment wall 47, the arm or throw-off latch member 34 may be said to have reset itself, as will be clear.

In order to release or throw off the mechanism, the thumb 50 may again be applied to the push buttons; but, because the button 20 projects slightly outwardly, the button 20 will first be engaged. Upon such engagement, the relatively weak compression spring 31 may give in order to permit closing the endwise clearance between arm 34 and the end 45 of the latch member 40; thereafter arm 34 may drivingly abut the latch arm 45 in order to crank the latch member 40 in a latch-releasing direction. As soon as the latching end 42 clears the latch slot 43, the spring 28 will drive the blade assembly outwardly against the thumb and towards the out-position of Fig. 1. In the course of this outward movement, the throw-off latch member or arm 34 will strike the cam wall 48 and be cammed out of alignment with the end 45 of the latch member 40, thus throwing off what might be called the latching relation between arm 34 and latch member 40. In this out-position, the driving relation between the knobs 11—12 and the lock mechanism is again established, and free knob actuation of the latch 15 is permitted.

It will be clear that I have described a relatively simple double-push-button means for operating a latching mechanism. In the described mechanism, a definite relative positioning of the push buttons clearly indicates the locked or the unlocked condition of the mechanism. Essentially, one button may be utilized to set the mechanism, while another button may be effective to throw off the mechanism. The short displacement required when the inner and smaller push button alone is actuated (as in throwing off the mechanism) may be relatively weakly opposed and of such easy action as to constitute no annoyance in use.

While I have described my invention in detail for the preferred form shown, it will be understood that modifications may be made within the scope of the invention as defined in the appended claims.

I claim:

1. In a latching device of the character indicated, latch mechanism and knob means therefor, two concentric push buttons in said knob means and longitudinally slidable therein, one of said buttons including control means for determining the locked and unlocked condition of said mechanism in accordance with longitudinal placement of said one button, the other of said buttons serving to unlock the means on said first button when the latch mechanism is in the locking position, spring means independently urging both said buttons longitudinally in an outwardly extended direction, abutment means cooperating between said buttons and a part of said mechanism in the path of longitudinal movement of said buttons and fixed against longitudinal movement for holding said buttons flush in an outwardly projecting position, said control means

including first latch means and means operatively connecting said first latch means to said one button, said first latch means being engageable with a second part of said mechanism in the path of longitudinal movement of said first latch means and fixed against longitudinal movement for holding said one button in a depressed position, means cooperating between said buttons and limiting outward projection of the other of said buttons relatively to said one button to an extent substantially less than the total displacement between the extended and depressed positions of said one button, and throw-off means for said first latch means and including second latch means, means operatively connecting said second latch means to said other button, said second latch means being movable into longitudinal actuating alignment with said first latch means during an outward displacement of said other button with respect to said one button.

2. A device according to claim 1, in which said one button is the outer and said other button is the inner of said concentric push buttons.

3. A device according to claim 1, and including throw-off means for said second latch means and cooperating between said second latch means and a third part of said mechanism in the path of longitudinal movement of said second latch means and fixed against longitudinal movement, said last-defined throw-off means being effective upon a movement of said other button from its depressed to its extended position.

4. A device according to claim 3, in which said throw-off means for said second latch means includes cam means, and cam-follower means associated with said second latch means.

5. In a latching device of the character indicated, latch mechanism including an elongated longitudinally extending tubular spindle, two slidable concentric push buttons slidable longitudinally in one end of said spindle, one of said buttons including a control portion for controlling the blocked and unblocked condition of said mechanism, spring means in said spindle and urging said one button outwardly, first abutment means cooperating between a part operatively associated with said one button and a part operatively associated with said spindle for determining the extended position of said one button, and abutment on said spindle, a first latch including a latch member pivotally carried by said one button and engageable with said abutment in a depressed position of said one button, a second latch including a latch member carried by said other button and pivotally related to said one button, second abutment means cooperating between said spindle and said other button for determining the outer extended position of said other button, and limiting means cooperating between said buttons for limiting the outward projection of said other button relatively to said one button to an extent less than the total throw of said one button between the projecting and depressed positions thereof, said second latch including means resiliently urging said second latch into longitudinal actuating alignment with said first latch during an outward projection of said other button relatively to said one button.

6. A latching device according to claim 5, in which said second latch is carried as an arm on said other button.

7. A latching device according to claim 6, in which said spindle includes a longitudinally extending cam surface, and in which said arm in-

cludes a radially projecting cam-follower portion, said cam being inclined to withdraw said second latch from possible engagement with said first latch during an outwardly projecting stroke of said buttons.

8. A latching device according to claim 6, in which said spindle includes a longitudinally extending cam surface, and in which said arm includes a radially projecting cam-follower portion, said cam being inclined to permit said second latch to be spring urged into latching engagement with said first latch when said other button is retained in its depressed position.

9. In a latching device of the character indicated, two concentric push buttons longitudinally and in the in-direction and in the out-direction slidable relatively to each other, mechanism controlled by said buttons, spring means urging both said buttons outwardly relatively to said mechanism, first latch means for one button, second latch means for the other button, abutment means in the path of longitudinal movement of said first latch means and fixed against longitudinal movement and poised to intercept said first latch means after a first inward displacement of both said buttons, said first

latch means including a part to be longitudinally inwardly actuated to disengage said first latch means, resilient means urging said second latch means for longitudinal alignment with said part of said first latch means after an outward displacement of said other button with respect to said one button, first retaining means cooperating between said buttons for retaining and thus limiting the outward projection of said other button relatively to said one button to an extent less than the extent of said first longitudinal depressing throw, and second retaining means cooperating with each of said buttons and including a longitudinally fixed part of said mechanism for limiting the outward projection of both buttons when in the inwardly projecting position.

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