July 2, 1968 A. KUCHLER 3,390,910

LATCH CONTROL DEVICE

Filed Sept. 1, 1966 2 Sheets-Sheet 1

FIG. 1.

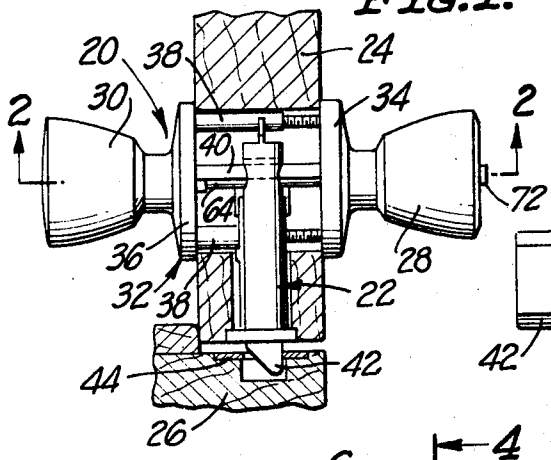


FIG. 3.

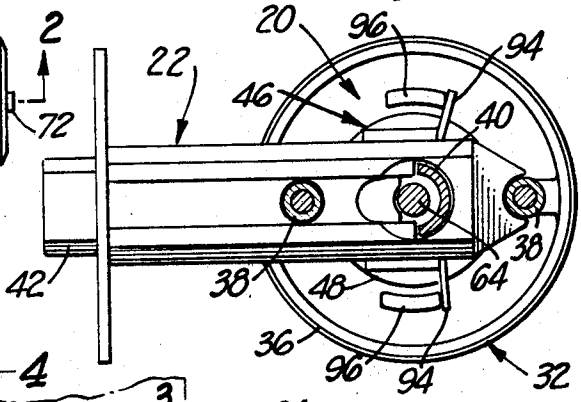


FIG. 2.

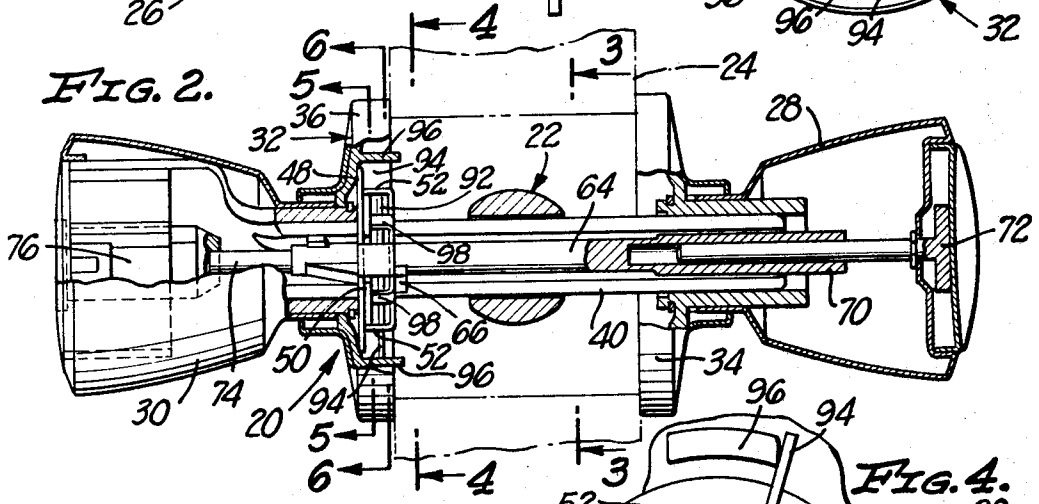


FIG. 4.

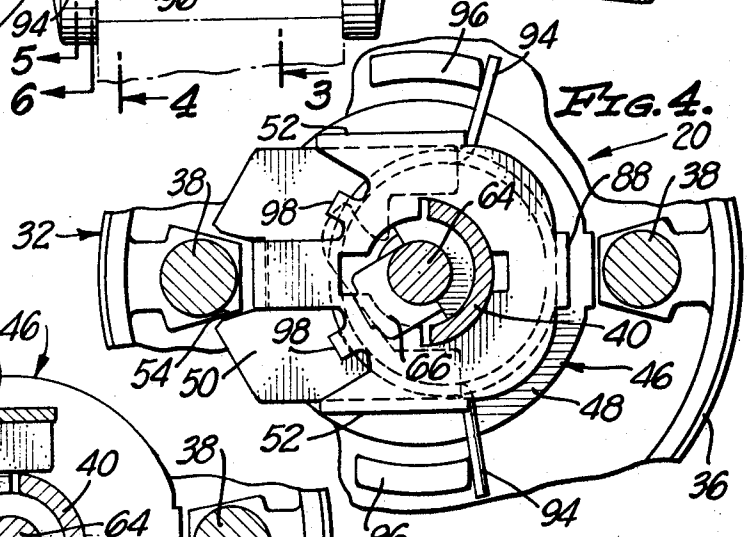
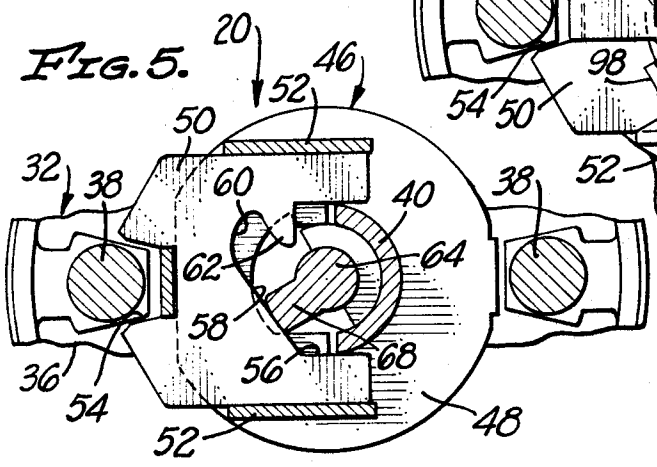


FIG. 5.



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FIG. 6.

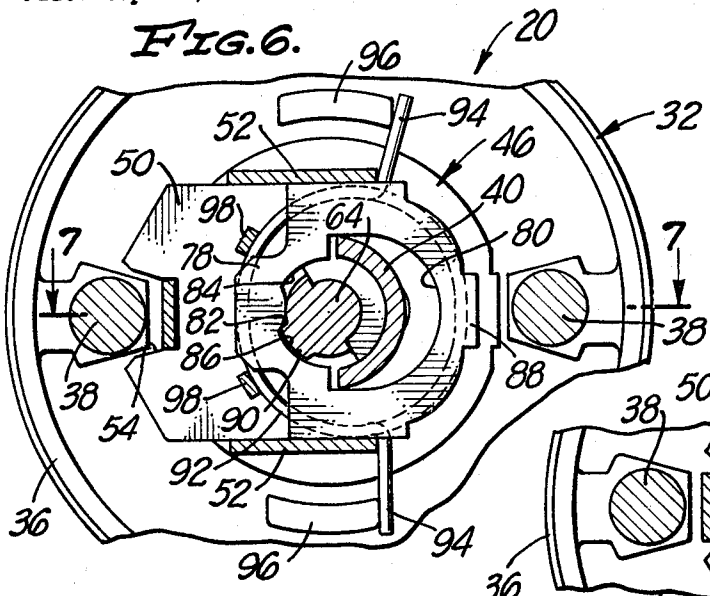


FIG. 8.

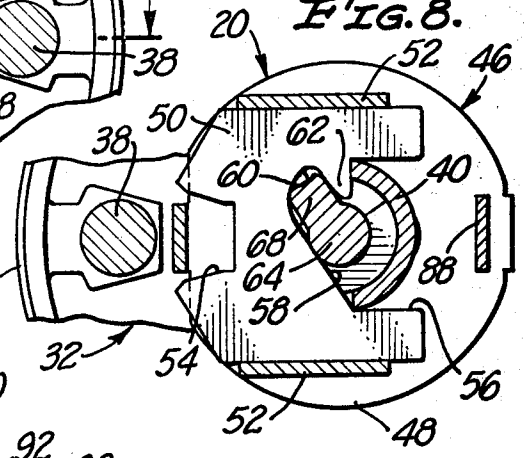


FIG. 7.

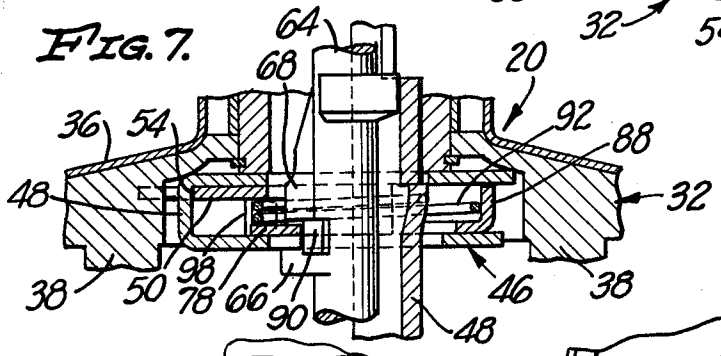


FIG. 9.

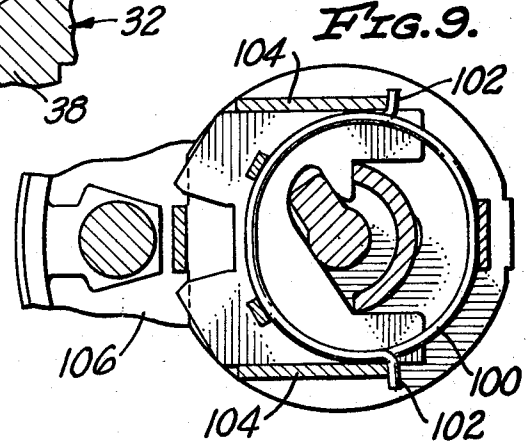
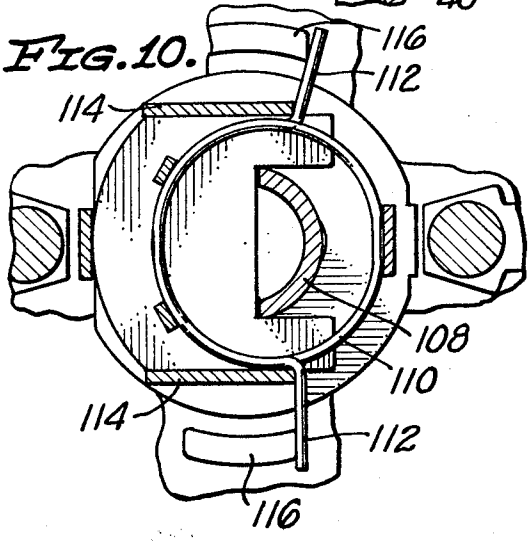


FIG. 10.



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LATCH CONTROL DEVICE

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Filed Sept. 1, 1966, Ser. No. 576,657
13 Claims. (Cl. 292—359)

This invention relates to a latch control device and more particularly, to a latch control device which, when formed as a part of a lock set includes a unique spring arrangement therein for retaining a locking member in each of its locking and unlocking positions retaining a latch actuating spindle locked stationary or permitting rotation of said spindle for actuating the latch. Even more particularly, this invention relates to a latch control device which may be of the foregoing type and in which said unique spring arrangement therein also simultaneously serves as self-alignment means for the latch actuator spindle which resiliently returns said spindle to a center or neutral position after rotation of said spindle in either direction of rotation to actuate the latch, or in the alternative, said latch control device may be formed with said unique spring arrangement serving solely as said latch actuating spindle self-aligning means.

Certain of the prior latch control devices for operating door latches, such as that described and shown in the prior Unetic United States Letters Patent No. 2,998,273, issued Aug. 29, 1961, have included interior and exterior rotatable doorknobs operatively connected through a latch actuating spindle to a latch mechanism mounted in the door, said latch mechanism having a latch member normally resiliently urged to a doorframe strike engaging position and movable to a retracted position disengaged from said strike upon rotation of either of said doorknobs in either direction of rotation. Further, a spindle retainer housing is secured on the latch actuating spindle rotatable with said spindle, and said housing encloses a radially slidable locking member which may be selectively moved between an extended locking position engaging a stationary frame of the latch control device and locking said spindle and doorknobs against latch operating rotation, and a nonlocking retracted position disengaged from said stationary frame and permitting rotation of said doorknobs for operating said latch. The movement of the locking member between said locking and nonlocking positions is accomplished through cam means on an auxiliary locking spindle extending within the latch actuating spindle and controlled by a selectively pivotal button at the interior doorknob and usually a lock at the exterior doorknob.

The particular rotative positioning of the auxiliary locking spindle to place the locking member in one of its locking or nonlocking positions is controlled by a detent or retainer slide mounted in association with said auxiliary locking spindle and cam connected thereto. The retainer slide is constantly resiliently urged toward the locking spindle, normally resiliently retaining through the cam connection said locking spindle in one or the other of its positions. The resilient urging of the retainer slide, however, permits radial outward movement of said slide to permit the rotative movement of said auxiliary locking spindle between its positions.

The resilient urging of the retainer slide toward the cam engagement with the auxiliary locking slide has usually been accomplished by some form of leaf-type spring, either a continuous arcuate leaf or one having an intermediate loop for additional resiliency, in either case, the free ends of the leaf-type spring being engaged with the retainer housing and a mid portion of said spring engaged by the retainer slide. Such leaf-type retainer slide springs have caused some difficulties due to the problems

of retaining such leaf-type springs properly positioned within the retainer housings while still providing the retainer slides properly engaged therewith and with sufficient resilient force thereagainst to provide proper movement of such retainer slides. The improvements of the present invention are primarily concerned with such retainer slide spring arrangement and the mounting thereof in the retainer housing.

Furthermore, in latch and latch control devices of the foregoing character, the latches are normally resiliently urged toward extended position, that is, engaging the strikes when the doors are closed. Such resilient urging of the latches toward extended positions, in view of the operable connection of the latches with the main operating spindles, normally also serves to return the doorknobs to a neutral position and retain them in said neutral position through said resilient urging. There are many occasions where the springs associated with the latches and providing this resilient urging for both the latches and the doorknobs cannot be provided of sufficient size and resilient strength to properly accomplish such action, thereby not properly functioning for the intended purpose.

Additionally, it is desirable that the doorknobs will be relatively firmly retained in the neutral position during the aforesaid locking and unlocking of the latch control devices. Whether the latch control devices are unlocked from the interior doorknob by pivoting the button relative to said interior doorknob to move the locking spindle or by turning the lock with a key relative to the exterior doorknob to move the locking spindle, the inadequancy of the latch springs to firmly retain the doorknobs in their neutral positions has resulted in the necessity of retaining the doorknobs with one hand while manipulating the interior button or exterior lock with the other hand. Even under this two-handed operation, the proper locking or unlocking of the latch control devices can be relatively difficult.

It is, therefore, an object of my invention to provide a latch control device having a unique spring arrangement therein for resiliently urging the retainer slide thereof toward the auxiliary locking spindle retaining position, which spring arrangement is much more positive than has been possible heretofore and which eliminates the mounting difficulties for the required springs. A retainer slide spring is provided which is a coil spring having at least one complete turn, and preferably at least one and one-half turns, said coil spring being peripherally engaged by tabs depending from the retainer housing, and also being peripherally engaged by a portion of the retainer slide, preferably a tab depending from said slide. Such spring constantly resiliently urges the retainer slide into its auxiliary locking spindle retaining positions while, at the same time, squashing or radially inwardly circumferentially deforming to permit the slidable movement of the retainer slide for the movement of said auxiliary locking spindle between the positions thereof.

It is a further object of my invention to provide a latch control device of the foregoing type in which said coil spring has substantially diametrically oppositely depending ends engaging the stationary frame of the latch control device wherein said coil spring will not only provide the foregoing retainer slide control and the required resilient urging thereof, but will also provide resilient urging for the doorknobs to return said doorknobs to neutral latch extended positions. Such provides additional resilient force tending to retain the doorknobs in their neutral positions and resisting rotation thereof during either interior or exterior unlocking of the latch control device, as previously discussed. Thus, the coil spring provides the dual function of retainer slide control and self-aligning or neu-

tral positioning knob control supplementing the previously discussed knob control by the latch springs.

It is still another object of my invention to provide a latch control device wherein the unique coil spring arrangement may be provided for serving solely as the knob self-aligning means and in the same manner as previously discussed, in which case, the locking mechanism for the latch control device is eliminated and said latch control device is nonlocking. With such arrangement, a single standard model of latch and latch control assembly may be provided with which the choice of a locking or unlocking latch control device may be offered with only minor alterations in the various parts thereof so that the latch portion of the parts for the assembly may be standard regardless of the choice, with only a few of the parts being specifically formed for the particular form. Such standardizing feature promotes economics in manufacture and reductions in selling costs.

Other objects and advantages of the invention will be apparent from the following specification and the accompanying drawings which are for the purpose of illustration only, and in which:

FIG. 1 is a top plan view of a latch and latch control assembly incorporating the principles of the present invention and mounted in association with a door and doorframe, said door and doorframe being shown in horizontal section;

FIG. 2 is an enlarged, vertical, sectional view taken along the broken line 2—2 in FIG. 1 and showing the latch control device in locked position;

FIG. 3 is a vertical, sectional view taken along the broken line 3—3 in FIG. 2;

FIG. 4 is an enlarged, fragmentary, vertical, sectional view taken along the broken line 4—4 in FIG. 2;

FIG. 5 is an enlarged, fragmentary, vertical, sectional view taken along the broken line 5—5 in FIG. 2;

FIG. 6 is an enlarged, fragmentary, vertical, sectional view taken along the broken line 6—6 in FIG. 2;

FIG. 7 is a fragmentary, horizontal, sectional view taken along the broken line 7—7 in FIG. 6;

FIG. 8 is a view similar to FIG. 5, but showing the latch control device in the unlocked position;

FIG. 9 is a view similar to FIG. 8, but additionally showing the retainer slide coil spring, said spring being a modified form providing the single function of controlling retainer slide movement without the knob self-aligning feature; and

FIG. 10 is a view similar to FIG. 9 showing the latch control device modified to eliminate the locking feature thereof, but the coil spring arranged to provide the knob self-aligning feature thereof.

Referring to FIGS. 1 through 7 of the drawings, the latch and latch control assembly illustrated and incorporating the principles of the present invention includes a latch control unit generally indicated at **20** and a latch unit generally indicated at **22**, said control and latch units being assembled for actuation of the latch by the latch control unit and arranged for mounting in a door **24** cooperable between said door and a doorframe **26**. As shown particularly in FIG. 1, the latch control unit **20** includes usual interior and exterior doorknobs **28** and **30** rotatably mounted on a stationary frame **32** formed by rosette plates **34** and **36** axially connected through the door **24** by studs **38**, said doorknobs **28** and **30** being connected for rotating an axially extending main latch spindle **40** connecting said knobs through the door **24**. The main latch spindle **40** is the usual half-round spindle and is engaged axially through the latch unit **22** within the door **24** for withdrawing a latch member **42** of the latch unit from engagement with a strike **44** mounted on the doorframe **26** upon rotation of the doorknobs **28** and **30** and the main latch spindle **40**.

A spindle retainer assembly generally indicated at **46** is secured on the main latch spindle **40** for rotation therewith and is located axially telescoped by the exterior rosette plate **36** and axially inward of the exterior doorknob **30**. Said spindle retainer assembly **46** includes a housing **48** press-fit axially telescoping the main latch spindle **40** and axially enclosing a radially slidable locking slide or member **50**. The locking member **50** is guided for said radial slidable movement within and from the housing **48** by opposite housing sides **52**, with the locking member being bifurcated at one edge to form a locking recess **54** engageable with one of the stationary frame studs **38** when the locking member is in extended position projecting radially from the housing **48**, as best seen in FIGS. 4, 5 and 6, said locking recess being disengaged from said stud when the locking member is in a retracted position slid radially into the housing **48**, as shown in FIG. 8.

Thus, the extended position of the locking member **50** is a locking position in which the engagement between the locking member and the stationary frame stud **38** retains the locking member and through the locking member, the retainer assembly housing **48**, the main latch spindle **40** and the doorknobs **28** and **30** against rotation so that the latch unit **22** cannot be actuated thereby. Furthermore, the retracted position of the locking member **50** in which said locking member is disengaged from the stationary frame stud **38** constitutes a nonlocking position wherein rotation of the main latch spindle **40** and the doorknobs **28** and **30** is permitted to actuate the latch unit **22**.

An edge of the locking member **50** radially opposed to the locking recess **54** is formed with a cam recess **56** having an angled cam surface **58**, cam slot **60** and a cam projection **62**. An auxiliary locking spindle **64** is received within the channeled contour of the half-round main latch spindle **40** extending co-axially therewith, said auxiliary locking spindle being rotatable or circumferentially pivotal relative to the main latch spindle and having an integral guide lug **66** juxtaposed axially outwardly of the retainer housing **48**. For controlling movement of the locking member **50**, the auxiliary locking spindle **64** is formed with an integral locking cam **68** axially within the retainer housing **48** and radially aligned with the locking member **50** within the locking recess **54**.

The auxiliary locking spindle **64** is received rotatable through the stationary frame rosette plates **34** and **36** and the doorknobs **28** and **30** within the main latch spindle **40**, with an interior end **70** keyed to a locking button **72** at the interior doorknob **28** and an exterior end **74** engaged with a cylinder lock **76** at the exterior doorknob **30**. Thus, by manipulating either the interior knob locking button **72** or the exterior knob cylinder lock **76** to rotate or pivot the auxiliary locking spindle **64** relative to the doorknobs **28** and **30** and the main latch spindle **40**, the locking cam **68** will pivot within the locking member cam recess **56** to move the locking member **50** between the previously described locking and nonlocking positions. As best seen in FIG. 5, the locking cam **68** bears against the angled cam surface **58** of the locking member **50** to force the locking member radially into locking position engaged with the stationary frame stud **38**, and as shown in FIG. 8, pivotal movement of the locking cam **68** along the angled cam surface **58** into the cam slot **60** of the locking member engages the locking cam with the cam projection **62** of the locking member, forcing the locking member radially inwardly relative to the stationary frame stud **38** to disengage the locking member therefrom and place the locking member in the nonlocking position.

A retainer slide or member **78** is also received within the retainer housing **48** axially spaced from the locking member **50** and guided for radial slidable movement relative to said housing between the housing sides **52**, as best seen in FIGS. 6 and 7. Said retainer member **78** is formed with an interior opening **80** forming a cam follower lobe **82** separating cam dwell portions **84** and **86**, said cam follower lobe **82** being at the side of the retainer member

opening and radially aligned with the locking recess **54** of the locking member **50**. Radially opposite the cam follower lobe **82**, the retainer member **78** is formed with an axially extending tab **88** projecting axially toward but spaced from, the locking member **50**, for an important purpose to be hereinafter described.

A retainer cam **90** is formed integrally on the auxiliary locking spindle **64** projecting radially therefrom radially aligned for engagement with the retainer member **78** within the retainer member interior opening **80**, said retainer cam being axially aligned on the auxiliary locking spindle with the locking member locking cam **68**. The retainer cam **90** is normally received within one or the other of the cam dwell portions **84** and **86** of the retainer member **78**, but upon selective pivotal movement of the auxiliary locking spindle **64** relative to the main latch spindle **40**, the retainer cam is movable over the cam follower lobe **82** of the retainer member to force the retainer member radially slidably relative to the auxiliary locking spindle and the retainer housing **48**. When the locking cam **68** is in the locking position forcing the locking member **50** to locking position, as shown in FIG. 5, the retainer cam **90** is received in the cam dwell portion **86**, as shown in FIG. 6, and when the locking cam **68** is in nonlocking position withdrawing and placing the locking member **50** in nonlocking position, as shown in FIG. 8, the retainer cam **90** is received in the cam dwell portion **84** of the retainer member **78**, with the movement of the retainer cam **90** over the cam follower lobe **82** of the retainer member **78** being the period of movement of the locking cam **68** between such locking and nonlocking positions.

Most important to the improvements of the present invention, a coil retainer spring **92** is positioned within the retainer housing **48** axially between the locking member **50** and the retainer member **78** spaced radially outwardly from and circumferentially surrounding the main latch spindle **40** and the auxiliary locking spindle **64**. The coil retainer spring **92** includes at least one complete circumferentially extending coil, and preferably at least an additional substantially one-half coil, terminating in generally diametrically oppositely depending ends **94** oppositely circumferentially engaged with the retainer housing sides **52** and extending generally radially outwardly beyond the retainer housing **48** and oppositely circumferentially engaging stationary frame lugs **96** extending axially from the stationary frame exterior rosette plate **36**, as best seen in FIGS. 2, 4 and 6. The previously described axially extending tab **88** of the retainer member **78** peripherally and radially engages the coil retainer spring **92**, with an opposite side of the coil retainer spring generally radially opposite the retainer member tab **88** being peripherally and radially engaged by spaced spring positioning tabs **98** extending axially from the retainer housing **48**, said spring positioning tabs being radially outward of the retainer member **78** and permitting the slidable movement of said retainer member within the retainer housing.

The coil retainer spring **92** is positioned between the retainer member tab **88** and the housing spring positioning tabs **98** slightly circumferentially or radially inwardly deformed at all times to constantly resiliently urge the retainer member **78** radially toward the retainer cam **90** of the auxiliary locking spindle **64** so that the coil retainer spring normally resiliently urges the retainer cam of the auxiliary locking spindle into one of the retainer member cam dwell portions **84** or **86**. Further circumferential or radially inward deformation of the coil retainer spring **92**, however, will permit the retainer member **78** to slide radially as radially forced by the retainer cam **90** of the auxiliary locking spindle **64** sliding over the retainer member cam follower lobe **82**. The unique arrangement of the retainer member **78** and the coil retainer spring **92**, therefore, resiliently retains the auxiliary locking spindle **64** in one of the locking member locking or nonlocking positions, while permitting pivotal movement of the auxiliary locking spindle **64** relative to the main latch spindle **40** between said locking and nonlocking positions by circumferential deformation of the coil retainer spring, as described.

In view of the fact that the coil retainer spring ends **94** engage generally radially outwardly with the stationary frame lugs **96**, as also described, the coil retainer spring **92** performs the dual function of not only resiliently retaining the auxiliary locking spindle **64** and the locking member **50** in one of the locking or non-locking positions while permitting movement therebetween, but also resiliently resisting rotation of the main latch spindle **40** and the interior and exterior doorknobs **28** and **30** secured thereto so as to always resiliently urge from either direction of rotation the doorknobs to return to a neutral or center position in which the latch member **42** of the latch unit **22** is extended. Such resilient force of the coil retainer spring **92** resiliently resisting the rotation of the doorknobs **28** and **30** is in addition to any resilient urging by the latch member **42** of the latch unit **22** attempting to move to extended position and thereby provides what might be termed a self-aligning latch and latch control assembly. Furthermore, such antirotation or self-aligning feature for the doorknobs **28** and **30** will provide a much greater resilient force tending to retain the doorknobs stationary during manipulation of either the locking button **72** at the interior doorknob **28**, or the cylinder lock **76** at the exterior doorknob **30** for locking or unlocking the latch control unit **20**, making it unnecessary to retain the doorknobs with one hand while performing such manipulation with the other, as was required in most prior constructions.

As shown in FIG. 9, where it is not desired to provide the self-aligning feature, it is merely necessary to provide a coil retainer spring **100** having shortened spring ends **102** which merely engage retainer housing sides **104** and do not extend radially to engage any portion of stationary frame **106**. Otherwise, the positioning and function of the coil retainer spring **100** is the same as previously described.

As shown in FIG. 10, where the self-aligning or antirotation feature is desired, but it is not desired to provide locking of a main latch spindle **108**, the locking mechanism is eliminated, while coil retainer spring **110** remains the same, with spring ends **112** extending radially engaging both retainer housing sides **114** and stationary frame lugs **116**. In this modified form, the coil retainer spring **110** will still resiliently resist rotation of the main latch spindle **108** to provide the self-aligning function for the coil retainer spring **110**.

According to the present invention, therefore, I have provided a unique coil spring arrangement in a latch control device which may be constructed to perform the dual function of locking or unlocking retainment and doorknob self-alignment. Furthermore, the locking or unlocking retainment, and the movement therebetween, is accomplished by a coil retainer spring being circumferentially deformed through peripheral and radially inward force thereagainst. The self-alignment feature is accomplished by engaging the ends of the same coil retainer spring with the stationary frame, wherein rotation of the doorknobs from a neutral or center position in either direction of rotation will force circumferentially tighter coiling of the coil retainer spring, again circumferentially deforming the same, to resiliently resist this rotation and return the doorknobs to the neutral or centered position.

I claim:

1. In a latch control device, the combination of: latch actuator means for operating a latch including a stationary frame rotatably mounting a spindle, means connecting said spindle to said latch for operating said latch upon rotation of said spindle, latch operating means for selectively rotating said spindle; and a spindle retainer assembly including a housing secured to said actuator spindle rotatable therewith, a locking member on said

housing movable between an extended locking position engaging said stationary frame and locking said actuator spindle against rotation and a retracted nonlocking position disengaged from said stationary frame and permitting rotation of said actuator spindle, positioning means selectively operable for moving said locking member between said extended and retracted positions, retainer means radially slidable between positions retaining said locking member in each of said extended and retracted positions and permitting movement of said locking member between said extended and retracted positions, a coil retainer spring on said housing having at least one complete circumferentially extending coil, engagement means on said retainer means peripherally engaged with said retainer spring coil for said coil to normally resiliently resist said retractor means slidable movement and for radially inwardly and circumferentially deforming said coil upon slidable movement of said retainer means to permit said locking member movement between said extended and retracted positions.

2. A latch control device as defined in claim **1** in which said retainer spring coil circumferentially surrounds said actuator spindle.

3. A latch control device as defined in claim **1** in which said retainer spring coil circumferentially surrounds said actuator spindle; and in which said housing includes spaced tabs peripherally engaging said retainer spring coil at circumferentially spaced locations and generally radially opposed to said engagement means peripheral engagement of said retainer spring coil.

4. A latch control device as defined in claim **1** in which said retainer spring coil circumferentially surrounds said actuator spindle and extends at least substantially one and one-half turns terminating in generally diametrically oppositely depending ends engaged with said housing.

5. A latch control device as defined in claim **1** in which said retainer spring coil circumferentially surrounds said actuator spindle and extends at least substantially one and one-half turns terminating in generally diametrically oppositely depending ends engaged with said housing; and in which said housing includes spaced tabs peripherally engaging said retainer spring coil at circumferentially spaced locations and generally radially opposing said engagement means peripheral engagement of said retainer spring coil.

6. A latch control device as defined in claim **1** in which said retainer spring coil circumferentially surrounds said actuator spindle and extends at least substantially one and one-half turns terminating in generally diametrically oppositely depending ends engaged with said stationary frame, said retainer spring coil through said coil end engagement with said stationary frame resiliently resisting rotation of said spindle and housing relative to said stationary frame in either direction of rotation.

7. A latch control device as defined in claim **1** in which said retainer spring coil circumferentially surrounds said actuator spindle and extends at least substantially one and one-half turns terminating in generally diametrically oppositely depending ends engaged with said stationary frame, said retainer spring coil through said coil end engagement with said stationary frame resiliently resisting rotation of said spindle and housing relative to said stationary frame in either direction of rotation; and in which said housing includes spaced tabs peripherally engaging said retainer spring coil at circumferentially spaced locations and generally radially opposed to said engagement means peripheral engagement of said retainer spring coil.

8. In a latch control device of the type having a stationary frame rotatably mounting a spindle operably connected to a latch for operating said latch upon rotation of said spindle, latch operating means for selectively

rotating said spindle, a housing secured to said spindle rotatable therewith, a locking member on said housing movable between an extended locking position engaging said stationary frame and locking said spindle against rotation and a retracted nonlocking position disengaged from said stationary frame and permitting rotation of said spindle, positioning means selectively operable for moving said locking member between said extended and retracted positions, retainer means radially slidable between positions retaining said locking member in each of said extended and retracted positions and permitting movement of said locking member between said extended and retracted positions; the improvements including, a coil retainer spring on said housing having at least one complete circumferentially extending coil, engagement means on said retainer means peripherally engaged with said retainer spring coil for said coil to normally resiliently resist said retainer means slidable movement and for radial inward and circumferential deformation of said coil upon slidable movement of said retainer means to permit said locking member movement between said extended and retracted positions.

9. A latch control device as defined in claim **8** in which said retainer spring coil circumferentially surrounds said spindle; and in which said housing includes spaced tabs peripherally engaging said retainer spring coil at circumferentially spaced locations and generally radially opposing said engagement means peripheral engagement of said retainer spring coil.

10. A latch control device as defined in claim **8** in which said retainer spring coil circumferentially surrounds said spindle and extends at least substantially one and one-half turns terminating in generally diametrically oppositely depending ends engaged with said housing.

11. A latch control device as defined in claim **8** in which said retainer spring coil circumferentially surrounds said spindle and extends at least substantially one and one-half turns terminating in generally diametrically oppositely depending ends engaged with said housing; and in which said housing includes spaced tabs peripherally engaging said retainer spring coil at circumferentially spaced locations and generally radially opposed to said engagement means peripheral engagement of said retainer spring coil.

12. A latch control device as defined in claim **8** in which said retainer spring coil circumferentially surrounds said spindle and extends at least substantially one and one-half turns terminating in generally diametrically oppositely depending ends engaged with said stationary frame, said coil ends resiliently resisting rotation of said spindle and housing relative to said stationary frame.

13. A latch control device as defined in claim **8** in which said retainer spring coil circumferentially surrounds said spindle and extends at least substantially one and one-half turns terminating in generally diametrically oppositely depending ends engaged with said stationary frame, said coil ends resiliently resisting rotation of said spindle and housing relative to said stationary frame; and in which said housing includes spaced tabs peripherally engaging said retainer spring coil at circumferentially spaced locations and generally radially opposing said engagement means peripheral engagement of said retainer spring coil.

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