Sept. 22, 1953 A. ERKKILA 2,653,046

TUBULAR LATCH CASING

Original Filed Feb. 7, 1946 4 Sheets-Sheet 1

Fig. 1.

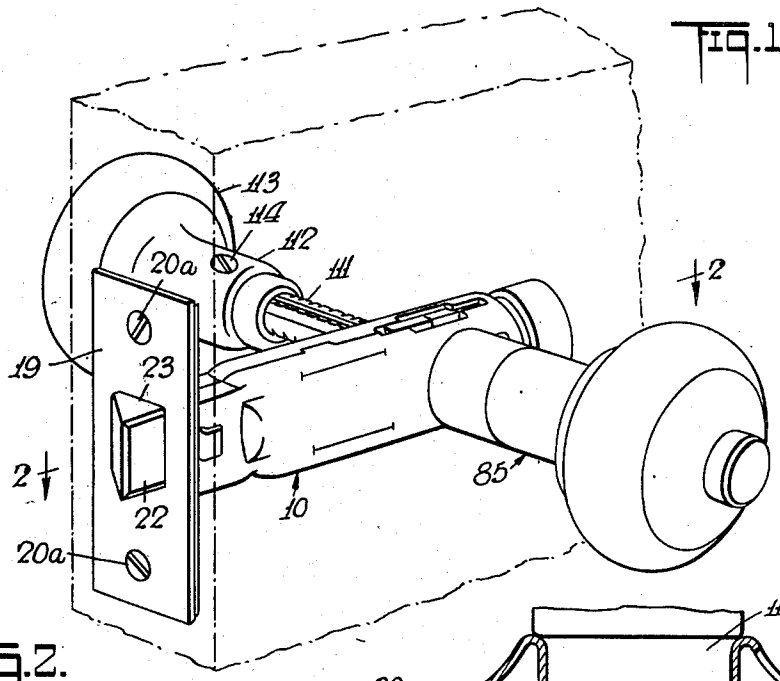


Fig. 2.

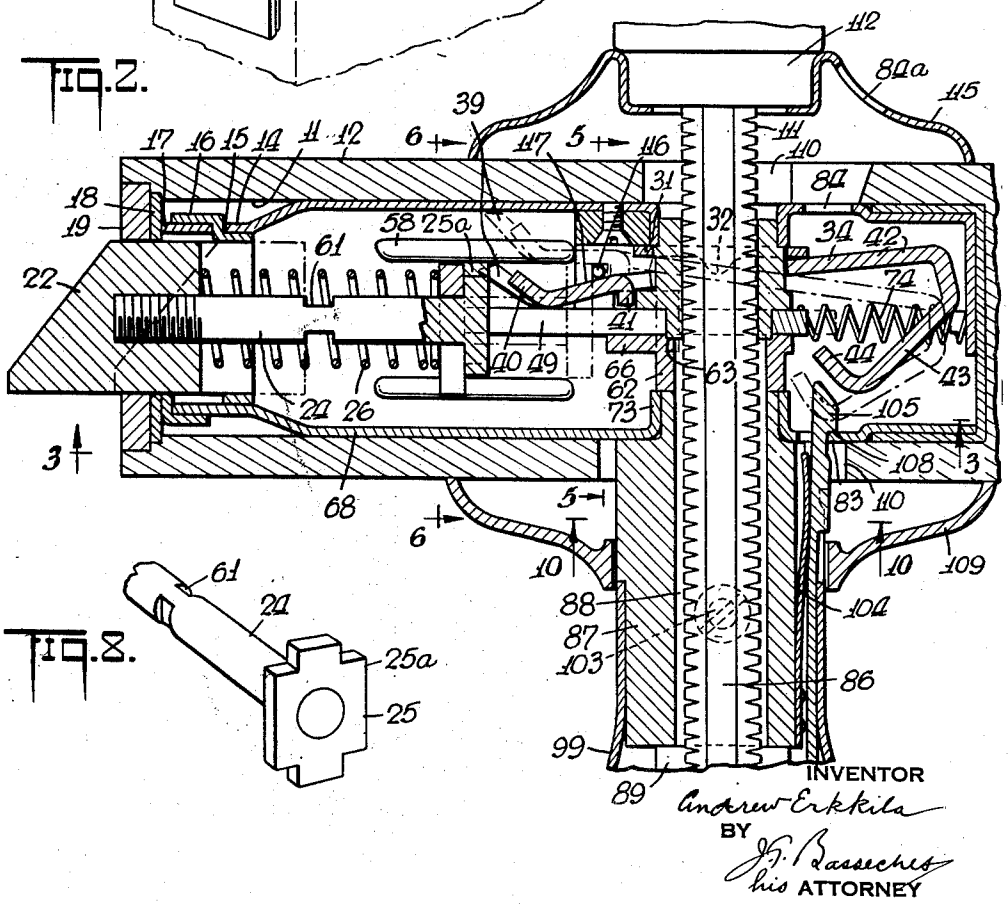


Fig. 8.

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Sept. 22, 1953 A. ERKKILA 2,653,046

TUBULAR LATCH CASING

Original Filed Feb. 7, 1946 4 Sheets-Sheet 2

Fig. 3.

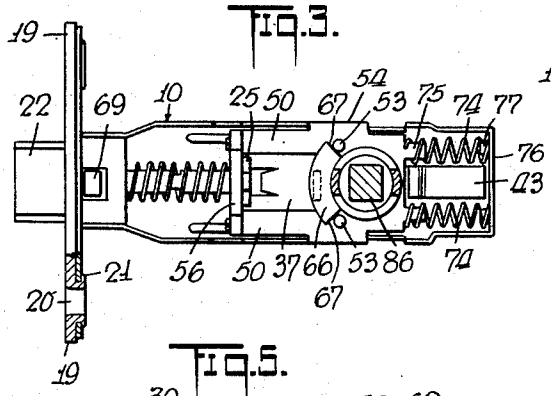


Fig. 4.

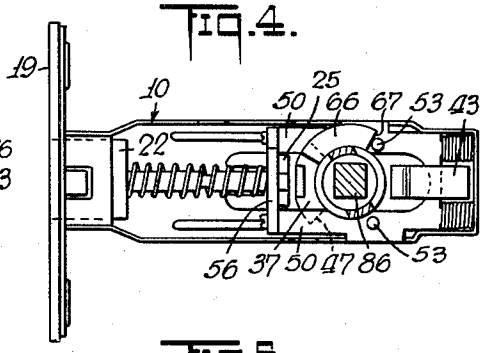


Fig. 5.

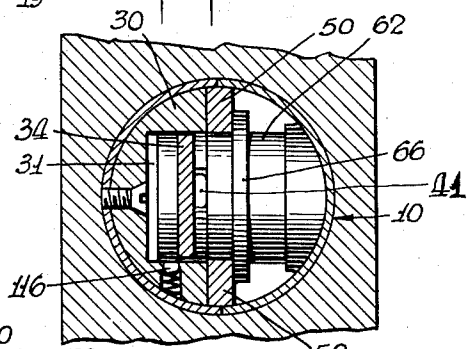


Fig. 6.

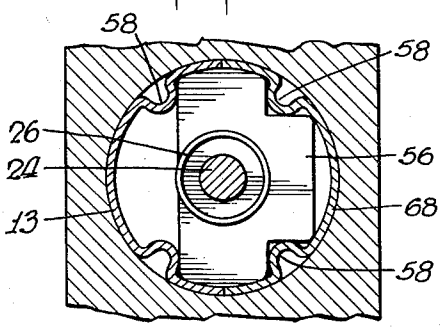


Fig. 9.

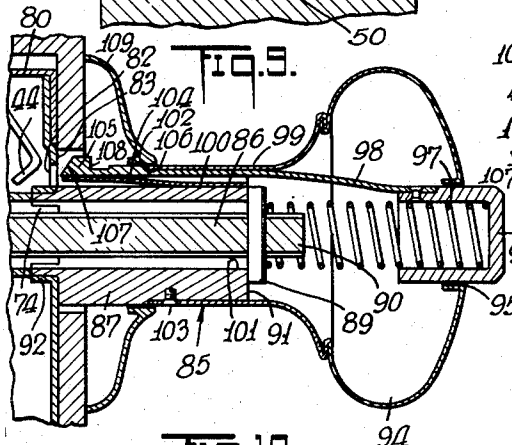


Fig. 11.

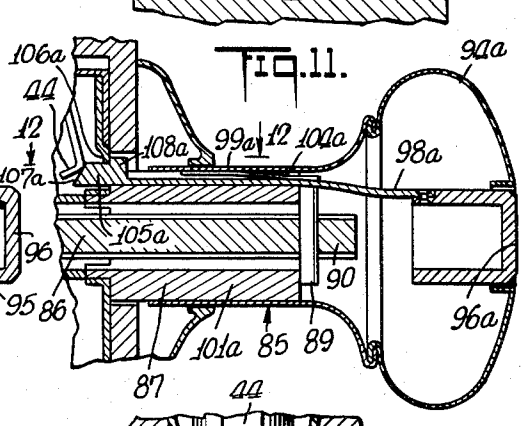


Fig. 10.

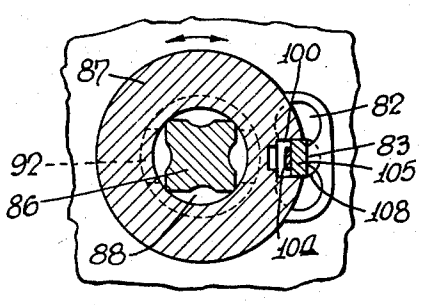
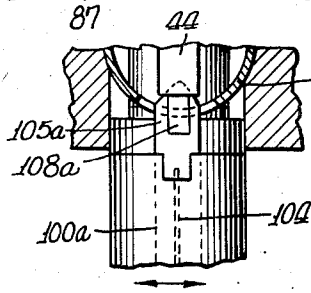


Fig. 12.



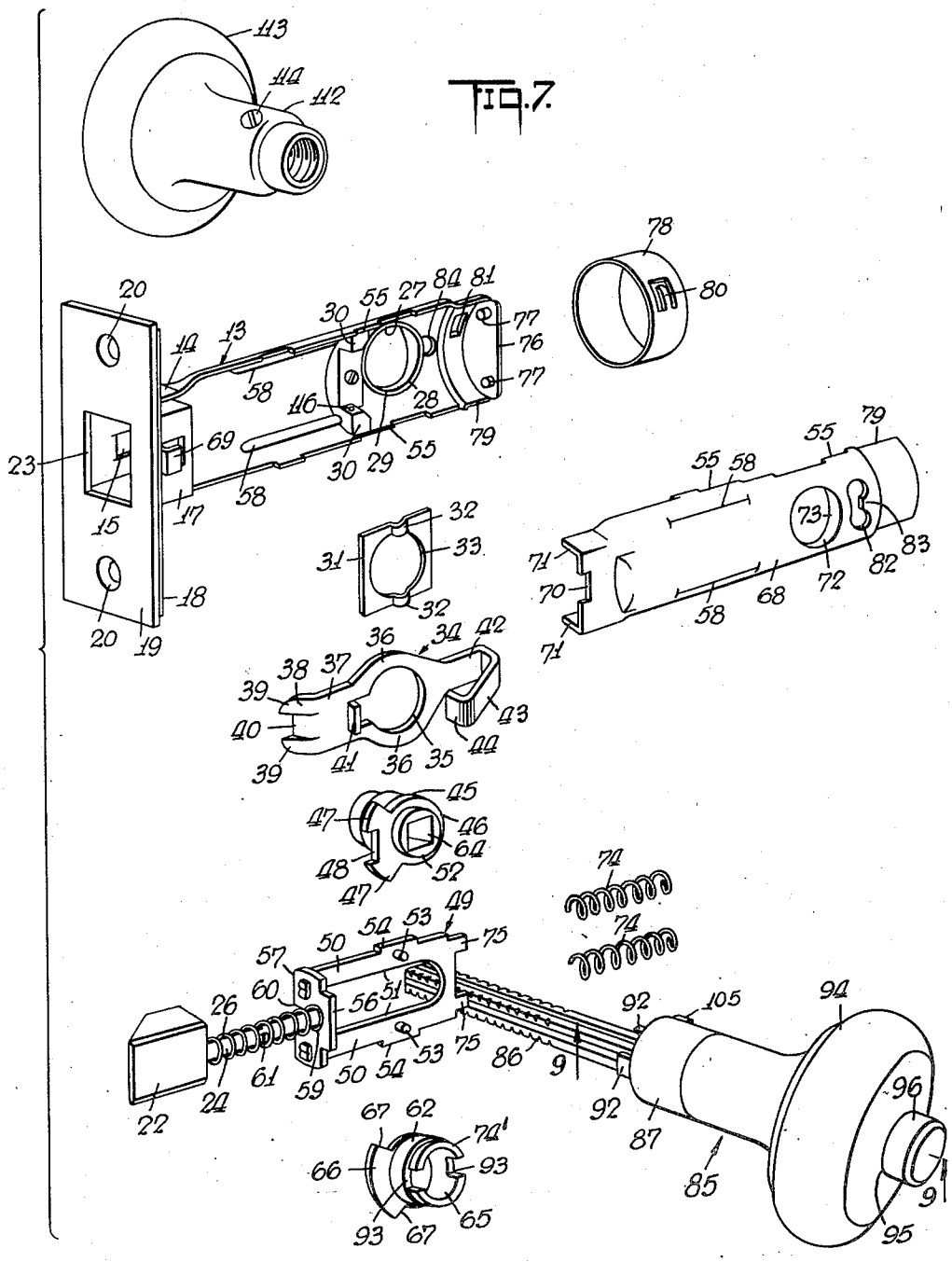
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TUBULAR LATCH CASING

Original Filed Feb. 7, 1946 4 Sheets-Sheet 3

FIG. 7.



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Sept. 22, 1953 A. ERKKILA 2,653,046

TUBULAR LATCH CASING

Original Filed Feb. 7, 1946 4 Sheets-Sheet 4

Fig. 13.

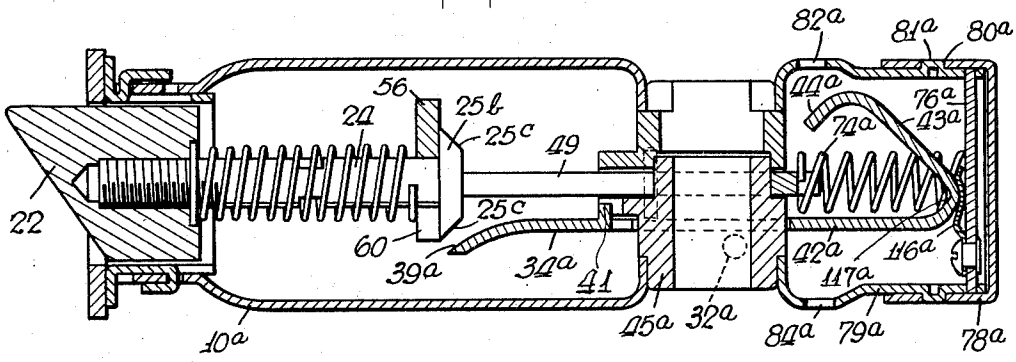


Fig. 14.

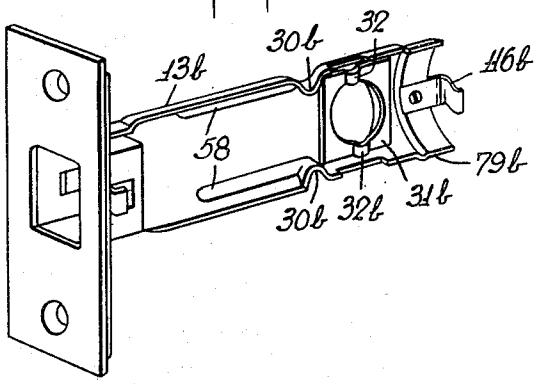


Fig. 15.

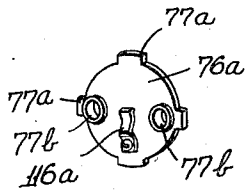


Fig. 16.

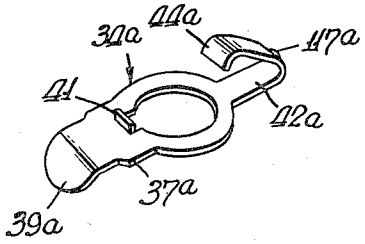
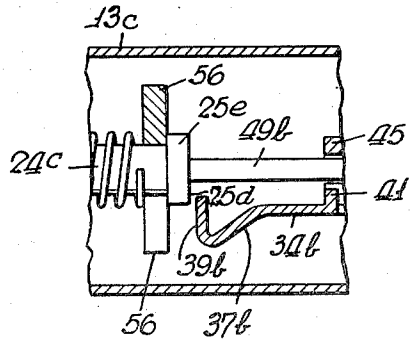


Fig. 17.



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2,653,046

UNITED STATES PATENT OFFICE

2,653,046

TUBULAR LATCH CASING

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Original application February 7, 1946, Serial No. 646,019, now Patent No. 2,486,268, dated October 25, 1949. Divided and this application June 1, 1949, Serial No. 96,503

1 Claim. (Cl. 292—337)

1

This invention relates to a tubular knob latch; more particularly to a casing construction therefor.

This application is a division of my application Serial Number 646,019, filed February 7, 1946, now Patent No. 2,486,268, October 25, 1949.

It is an object of my invention to provide a tubular latch characterized by compactness of assembly.

It is a further object of my invention to provide a tubular latch casing construction which may be economically produced and assembled, yet which satisfies all the requirements of unfailing performance and rigidity of construction.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, I make reference to the accompanying drawings, forming a part hereof, in which—

Figure 1 is a perspective view of my installation, shown in connection with a fragmentary portion of a door;

Figure 2 is a section taken on the line 2—2 of Figure 1;

Figure 3 is a section taken on the line 3—3 of Figure 2, with the latch bolt in the projected position;

Figure 4 is a view similar to Figure 3, with the latch bolt and roll back mechanism retracting the latch bolt;

Figure 5 is a section taken on the line 5—5 of Figure 2;

Figure 6 is a section taken on the line 6—6 of Figure 2;

Figure 7 is an exploded perspective view of my latch bolt assembly shown in Figure 1;

Figure 8 is a fragmentary perspective view of the latch bolt shank heel;

Figure 9 is a section taken on the line 9—9 of Figure 7;

Figure 10 is a section taken on the line 10—10 of Figure 2;

Figure 11 is a view corresponding to Figure 9, of another embodiment of my invention with the knob push button in the depressed position;

Figure 12 is a fragmentary section taken on the line 12—12 of Figure 11;

Figure 13 is a longitudinal sectional view of another embodiment of my invention;

Figure 14 is a perspective view of a casing in accordance with still another embodiment of my invention;

Figure 15 is a perspective view of a detail;

Figure 16 is a perspective view of the dogging lever in accordance with another embodiment of my invention;

Figure 17 is a fragmentary perspective view of still another embodiment of my invention.

2

Making reference to the drawings, I show a casing 10, of generally tubular cross-section, arranged to be fitted within a boring 11 of a door 12. The casing comprises a section 13, which includes a rectangular portion 14, having a locking slot 15 to receive the tongue 16 of the channel 17 formed on the inner lamination 18 of the end plate 19. In this construction, the end plate 19 may be of brass and the inner lamination 18 of iron. Screw holes 20 to receive the attaching screws 20a (Figure 1) are defined by material spun from the body of the plate 19, entering a complemental drill hole 21 in the lamination 18 (Figure 3) and headed thereover to unite plate 19 and lamination 18.

The channel 17 forms a guide for the latch bolt 22, which channel is aligned with the aperture 23 in the end plate 19. The latch bolt 22 has screw-threadedly connected thereto a latch bolt shank 24 which is formed with a heel portion 25, in which the end of the shank 24 is rigidly headed. A coiled spring 26 is distended between the latch bolt 22 and the heel 25.

Rearwardly of the casing 13, a spindle hub aperture 27 is formed by spinning the flange 28 therefrom inwardly directed, to form a bearing, and an inner seat 29 for the rollback hub hereinafter described.

Guide fingers 30—30 are positioned forwardly of the flange 28 and serve as an abutment for the disk 31, formed with pivots 32, 32 and orificed at 33 to receive the rollback hub heretofore described.

The dogging lever 34 is orificed at 35, at its medial portion. This orifice corresponds to the orifice 28 to receive the rollback hub hereafter to be described.

The dogging lever 34 has its side flanges 36, 36 arranged to rock on the pivots 32 and is formed at its forward portion with a tongue 37, guided between the guides 30, 30. The extremity of the tongue 37 is formed with a camming edge 38, and may include spaced fingers 39, 39 outlining a depressed lug 40. A lug 41 is struck up from the tongue 37, for purposes which will appear as this description proceeds.

The rearmost portion of the dogging lever 34 includes an extension arm 42, bent laterally into a branch 43, carrying a camming edge 44. The outside spindle rollback hub 45 is thereupon positioned to be journaled in the bearing portion 28, centering the dogging lever 34. The flange 46 carries the rollback camming arms 47, 47 between which there is formed a slot 48, arranged to receive the lug 41 of the dogging lever.

With this assembly there is then provided the

retractor link 49 comprising spaced branches 50, 50, having guides on their inner edges 51, 51 arranged to span the extension 52 of the hub 45. Spaced pins 53, 53 extend for a length to lie in the path of the rollback cams through each face of the branches 50, 50. The link 49 is formed with extensions 54, 54 comprising bearing shoes entering into the slides 55, 55, at the edge of the casing section 13. The link branches 50, 50 are headed in the plate 56, formed with a bearing edge 57 for engaging the guides 58, 58 by inwardly indenting the metal of the casing section 13 to form longitudinally directed, embossed protuberances.

The plate 56 is formed with a keyhole slot 59, having a restricted entrance portion 60 which may span the slot or neck 61 of the shank 24. By spanning the neck 51 between the rearmost end of the spring 26, upon its compression the plate 56 may be made to span the cylindrical part of the shank 24 for slidable engagement thereupon. Upon the plate 56 passing through the neck 61, and a quarter turn being made expansion of the spring 26 will normally direct the latch bolt 22 to the limit, to engage the heel 25 as the limiting position, yet permitting independent movement of the latch bolt head 22 with respect to the link 49.

Under these conditions, the inside rollback and hub assembly 62 may now be placed in position. This latter hub has a seat 63 (see Figure 2) providing a bearing which may be journaled on the extension 52 of the hub 45. The hub 45 is formed with a keying orifice 64 of square cross-section, to receive in keying engagement the knob spindle hereinafter to be described. The hub 62, however, is orificed at 65 to receive and encircle the square spindle for free rotation in relation thereto.

The hub 62 is formed with a rollback cam 66, having shoulders 67, 67 which may fall behind the pins 53, 53 on the upper face of the link 49. The assembly, in this condition, may have applied to it the casing section 68. This is provided with indentations 58, 58 as described in connection with the casing section 13, cooperating with the indentations 58 on the other casing to form a guide for the plate 56.

The forward end of the square channel 17 is provided with an offset finger 69, cooperating with the slot 70 in the forward edge of the casing section 68, to maintain the casing sections 13 and 68 in alignment at the forward end, the edge 71 abutting the lamination 18 previously described.

The casing section 68 is likewise slotted with the slot 55 for the shoes 54, 54 on the link 50.

A boring 72, with an inwardly spun flange 73 provides a bearing for the extension 74', to maintain the hub 62 journaled therein for rotation. In this position, coiled springs 74, 74 are mounted upon the lugs 75, 75 at the rear of the link 49 and the spacer 76 fixed thereover, to have the lugs 77, 77 pressed therefrom nest over the opposite free ends of the coiled spring 74. A cap 78 fits over the sleeve sections 79, 79 of the casing 13 and 68, respectively, to hold the casing sections together. An offset friction finger 80 is cut out from the side wall of the cap 78, to fall into the seat 81 in the rear sleeve portion 79 and the casing section 13, thus preventing displacement of the cap but being readily removable upon partial rotation to move the finger 80 from its position entering the slot 81.

It will be observed that the dogging lever 34 has its camming end 44 accessible through the orifice 82, having an overhanging lip 83 on the casing section 68.

The casing 13 is provided with a boring 84, making the arm 42 accessible for purposes which will appear as this description proceeds.

With a casing assembled as described, I provide an interior knob assembly 85 which comprises a square knob spindle 86, which is directed through a sleeve 87 in a boring 88, within which the spindle may freely rotate. A cross pin 89 passing transversely through the end 90 of the spindle bears against the shoulder 91 of the sleeve 87, permitting rotation but otherwise holding the spindle against displacement from the sleeve 87. The sleeve 87 is formed with lugs 92, 92, complemental to the slots 93, 93 of the hub 62 for rotation of the hub 62 in a manner which will hereinafter appear.

A knob 94 is axially orificed at 95 to receive a push button 96 comprising a cup shaped member to seat within the same one end of a coiled spring 97. The opposite end of the coil 97 is housed over the head 90 of the spindle 86. The push button 96 carries riveted thereto an elongated normally laterally flexed spring finger 98, extending through the tubular shank 99 in the knob and entering into a slot 100, formed in the neck 101 of the sleeve 87.

The shank 99 abuts a shoulder 102 on the sleeve 87, to hold the knob and sleeve 87 in the assembled limiting position. A set-screw 103 holds the sleeve and knob in assembled position. The free end of the finger 98 is maintained in an upward tilting position by the leaf spring 104, anchored in the slot 100 and bearing against the latching nose 105. A shoulder 106 on the shank of the nose 105 restrains the escape of the push button 96 by engagement of the said shoulder 106 with the rim of the shank 99. The push button 96 and its finger 98 are inwardly slidable, to direct the nose 105 into engagement with the camming end 44 of the dogging lever 34, entering through the orifice 82.

The latching nose 105 is provided with a camming edge 107 and a locking lip 108. The action in depressing the push button serves first to depress the latching nose 105 past the lug 83 of the casing, to become depressed in the slot 100, and thereafter to be held in the depressed latched position by engagement of the lip 108 with the lug 83. This thereby latches the push button in the depressed position against the action of the spring 97 to retract the arm 98.

For assembly of the latch in position, I first slip an inside escutcheon 109 over the shank 99 of the inside knob and then project the spindle 86 through the hub 62 and into keying engagement with the square orifice 64 of the hub 45, until the end of the spindle passes through the boring 110 on the outside face of the door. In this position, the end of the spindle 111 is directed into the shank 112 of the outside knob 113 and locked in position by the set screw 114, after seating the shank 112 in the outside escutcheon 115. This outside knob is of conventional design to receive the square spindle 111 in keying engagement.

The operation of the dogging lever within the tubular latch will now be described.

Normally, the latch bolt 22 is spring projected and is independently depressible with its shank against the tension of the spring 26, as when the door is closed and the latch bolt strikes the strike plate and thereafter as it enters the usual

strike plate orifice (not shown) the latch bolt is again in the projected position.

In the normal position of the dogging member 34, shown in dotted line in Figure 2, the inside knob, upon engaging the rollback 62, may retract the latch bolt 22 by engagement of the rollback 66 with the pins 53 on the front face of the link 50. Thus, clockwise or counterclockwise rotation of the inside knob will withdraw the latch bolt. Operation of the outside knob 113 may likewise be obtained in this position of the dogging lever as the spindle 86 will rotate the rollback 45. Where it is desired to dog the outside knob 113 to prevent retraction of the latch bolt, the push button 96 is depressed. This action directs the latching nose 105 through the orifice 82, where it engages the camming portion 44 and somewhat slidingly tilts the camming lever about the pivots 32. This action in the normally oriented position of the rollback 45 serves to direct the lug 41 into the slot 48.

The tongue 37, being positioned against rotation between the guides 30, thereby effectively dogs the rollback 45 against rotation. Detent means may be employed to maintain the dogging lever in the tripped position.

In the embodiment illustrated in Figures 2 and 7, a detent 116 comprising a spring loaded ball housed in the guide 30 enters behind the rear face 117 of the tongue 37, as shown in Figure 2, to restrain the dogging lever in the dogged position. It will be observed that the latching nose 105 has been held in the depressed position by the engagement of the shoulder 108 with the extension 83. The inwardly projected position of the nose 105 likewise maintains the tripping lever in the dogged position.

As an occupant rotates the inside knob 94, the action is as follows: The inside rollback 66 of the hub 62 being free to rotate on the square spindle which it encircles rotatably will engage a pin 53 and start the link 49 moving slidingly in the housing, notwithstanding the dogged condition of the hub 45, by reason of the lug 41 entering the slot 48. The slight movement of the link 49 draws with it the plate 56 and the latch-shank heel 25. This action serves to bring the heel extension 25a into engagement with the camming portions 39, thereby tripping the dogging lever 34 clockwise (in the position shown in Figure 2, to the position shown in dotted line), thereby retracting the lug 41 from engagement with the slot 48 of the rollback on the hub 45, and releasing the spindle 86 for outside knob operation.

Should the inside push button 96 be depressed to have tripped the dogging lever 34 into the dogging position shown in Figure 2, for emergency purposes the escutcheon 115 is provided with an aperture 84a, aligned opposite the aperture 84 of the casing, whereby some instrument or a key operated member may enter the casing to trip the dogging lever 34, from the position shown in full lines in Figure 2, to that shown in dotted lines in Figure 2. Likewise, should accidental operation of the push button 96 occur to move the same to the dogging position with the door ajar the slamming of the door will serve to inwardly retract the latch bolt 22, as it strikes the strike plate of the door, depressing it and directing the heel 25 into engagement with the camming portion 40 of the tongue 37. This action accordingly resets the dogging lever 34, whereby outside knob rotation may be effected.

While I have described in connection with the embodiment of Figures 1 to 10 a push button dogging element actuating a spring 97, I may operate the dogging trigger by a frictionally urged and positively returned camming nose without spring action in either movement.

In Figure 11, a knob sleeve 87 is employed, as previously described. In this case, the push button 96a carries riveted thereto a finger piece 98a, guided in the groove 100a. No spring means are employed between the head 90 of the spindle 86 and the push button 96a. The finger 98a has a nose 105a, with a camming portion 107a arranged upon rotation to engage the camming edge of the dogging trigger 44, as in the prior embodiment. A shoulder 103a engages the lip 106a of the casing, to limit the inward projection of the nose 105a, to trip the dogging trigger by engagement with the portion 44.

Upon rotation of the knob 94a, the retractor link 49 will draw the plate 56 with it, to cam the dogging lever 34 back to its initial position shown in dotted line in Figure 11. This serves to press the nose 105a outwardly to reset the push button 96a. It is understood that a rectilinear spring 104a warped outwardly engages the shank 99a of the knob, to frictionally hold the push button and its actuating assembly in either the dogging position or re-set position.

In still another embodiment of my invention, as illustrated in Figure 13, I may provide greater tolerances in the operation of the dogging lever. This I accomplish by making the dogging lever 34a with the camming nose 39a simply by deflecting the nose thereof from the branch 37a. In this construction, the shank 24 is provided with a heel 25b, having angularly directed camming faces 25c. In this way, appropriate deflection of the dogging lever 34a may be secured. Lateral guidance, such as by providing the spaced fingers 39, 39 in the previous embodiment need not be here employed.

The dogging lever in this particular case extends rearwardly, to have its branch 42a extend adjacent the casing ends 79a, at which point it contacts a curved leaf detent spring 116a, riveted on the capping plate 76a. The plate 76a has tongues 77a entering into complemental orifices in the front and rear casing, acting as abutments for the springs 74a. Seats 77b retain the springs 74a against lateral displacement.

The fold of the branch 42a at its extreme point is provided with an embossing, bead-like construction 117a, cooperating with the detent spring 116a to retain the dogging lever tripped in the dogged or undogged position.

The casing in this particular case is closed by a cap 78a formed with bayonet slots 80a engaging the extruded bosses 81a. In this embodiment a separate pivot plate need not be employed but the sheet metal casing has embossed thereon the protuberances 32a about which the dogging lever tilts or rocks.

Another embodiment of my invention is illustrated in Figure 14 wherein one half of the casing 13b is shown. Longitudinal guides 58, 58 are pressed inwardly or embossed in the sheet metal of the casing and terminate in embossings 30b, 30b, acting as abutments for the disks 31b carrying the pivots 32b as in the prior embodiment. In all other respects, the casing segment 13b may be formed as in the prior embodiments.

In accordance with this embodiment, a detent spring 116b of general L-shape has one branch attached to the sleeve sections 79b, serving to bear against a dogging trigger, as illustrated in Figures 13 and 16, cooperating with the bead 117a

thereof to restrain the lever **34***a* in either of the tripped positions, i. e. dogging or freeing the rollback hub **45***a*.

In all other respects, the function of the parts is in accordance with the prior embodiments illustrated in Figures 1 to 10.

In Figure 17 there is exemplified a form of latch bolt operation whereby the latch bolt is positively dogged, as well as to dog the outside knob and the spindle controlled thereby. Here the latch bolt shank **24***c* is provided with a heel portion **25***e* of rectangular contour, exposing an abutting end **25***d*.

In this embodiment, the dogging lever **34***b* is actuated as in the prior embodiments. However, the branch **37***b* terminates in a dogging finger **39***b*. This dogging finger is extended so that normally it lies outside of the path of movement of the shank heel **25***e* as well as the plate **56**. When the dogging lever **34***b* is tripped into dogging position, the dogging finger **39***b* lies in the path of the heel **25***e* to engage the abutting surface **25***d*. Under these circumstances, the possibility of "jimmying" or prying of the latch bolt carried by the shank **24***c* to the retracted position is minimized, although the automatic re-setting feature heretofore described is not obtained in this form of construction.

The feature just described indicates the versatility of my construction to obtain a tubular latch which may be employed to latch communicating doors, such as bathroom doors, as well as for exterior entrance doors which may require key operation for the exterior knob.

It will be observed that I have described a latch bolt assembly which may be made economically and by simple assembly means, satisfying all the requirements of rigidity of construction and positiveness of operation for its intended purpose, all combined with a push button control located in the knob and employing, in its preferred form, a one-piece spindle, assuring simplicity of installation and long life in operation.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is:

In a casing for a tubular lock comprising a pair of complementary, parti-tubular sheet metal segments joined to each other in longitudinal edge contact, a latch bolt projectible through one end of the casing, said latch bolt having a shank inwardly guided within said casing, the combination therewith of an end plate on which said segments are supported, said end plate comprising a pair of sheet metal members comprising a face member and a back member, each having bolt apertures in alignment, the bolt aperture of the back member being outlined by struck-up webs integral with the back member defining a bolt guide having side and upper and lower bearing surfaces for the shank of the bolt, a tongue outwardly struck up from each of said side webs, each of said casing segments having a slotted edge engaging said web and tongue to envelope and lock the casing segment to the web and in abutting contact with said back member.

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