July 31, 1956 E. M. MILLER 2,756,582

LOCK HOUSING

Original Filed March 11, 1948 3 Sheets-Sheet 1

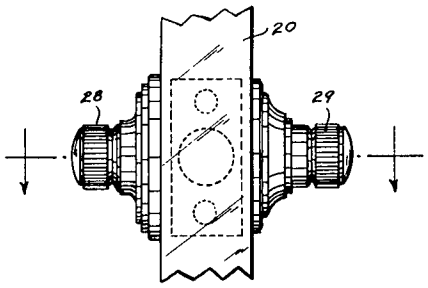


FIG. 1

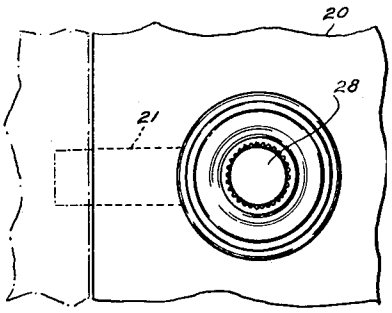


FIG. 2

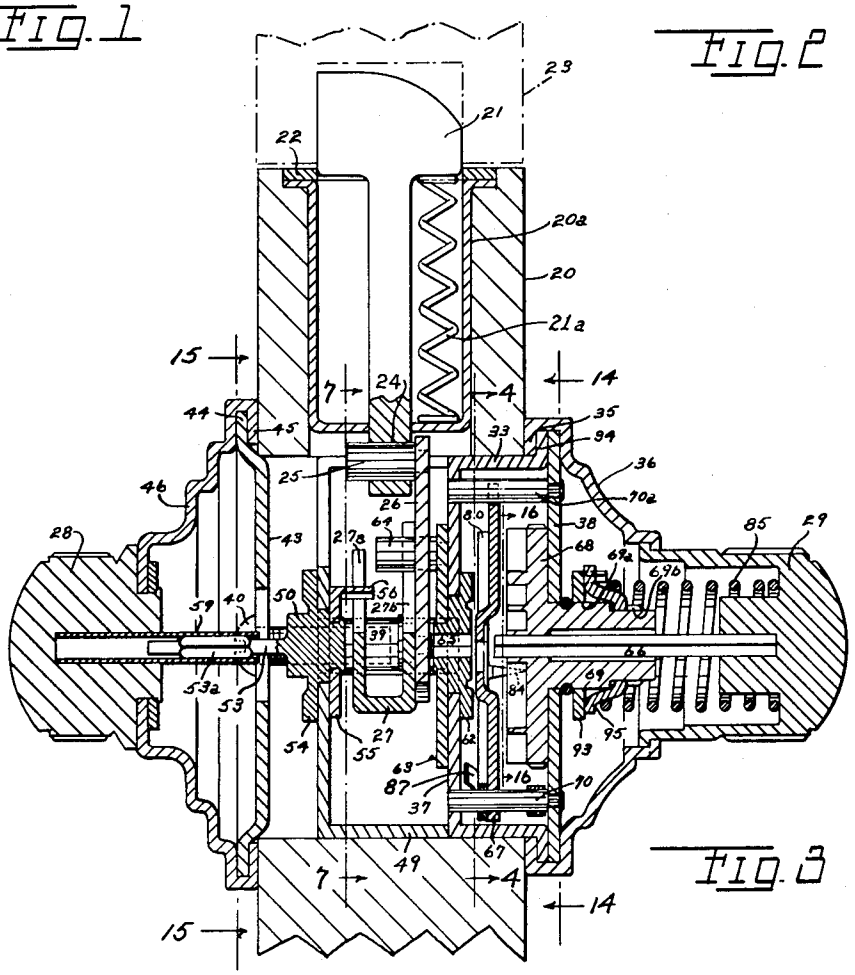


FIG. 3

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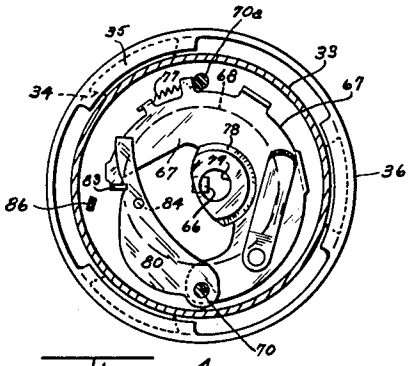


FIG. 4

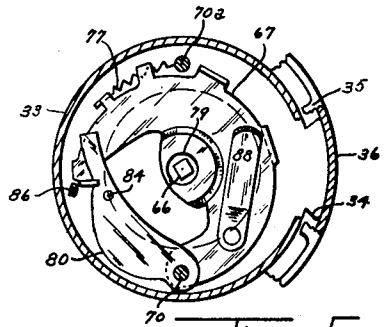


FIG. 5

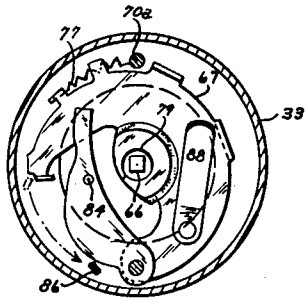


FIG. 6

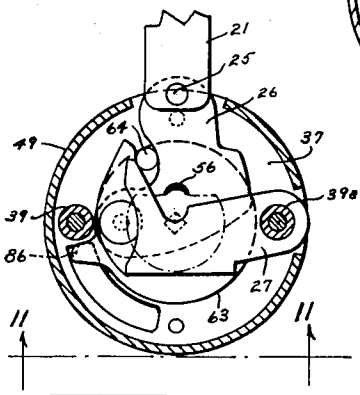


FIG. 7

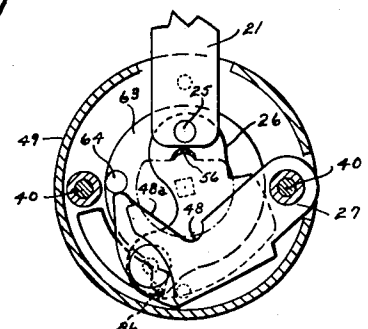


FIG. 8

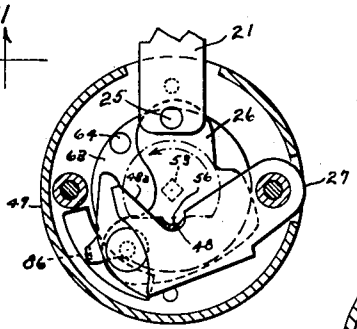


FIG. 9

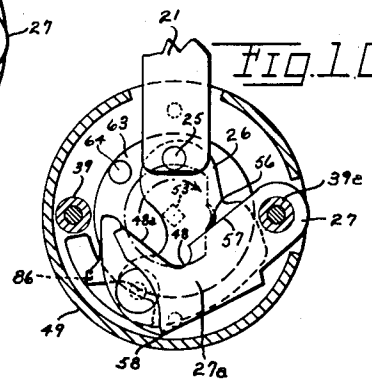


FIG. 10

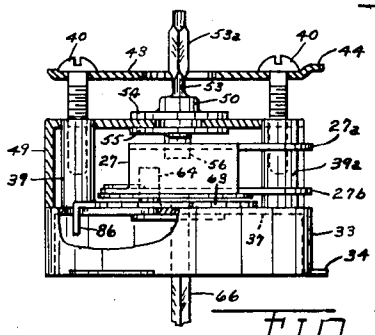


FIG. 11

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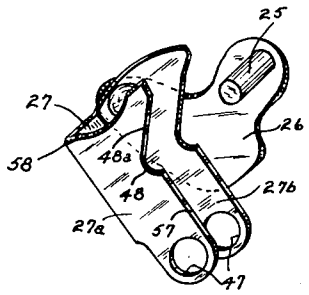


FIG. 12

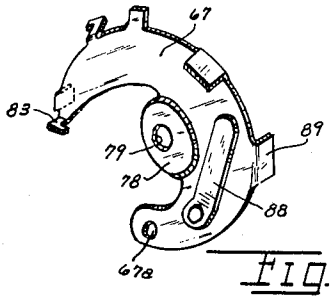


FIG. 13

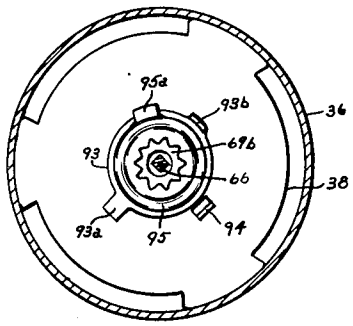


FIG. 14

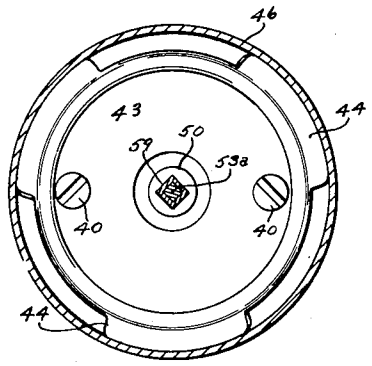


FIG. 15

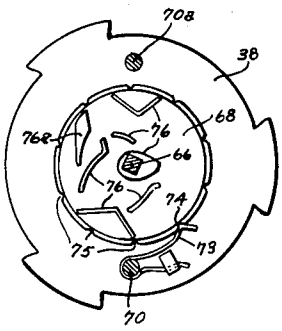


FIG. 16

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United States Patent Office 2,756,582 Patented July 31, 1956

2,756,582

LOCK HOUSING

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Original application March 11, 1948, Serial No. 14,341, now Patent No. 2,645,925, dated July 21, 1953. Divided and this application December 2, 1952, Serial No. 323,680

1 Claim. (Cl. 70—443)

This invention relates to locks, and more particularly to locks especially adapted for use on the outer doors of buildings, residences, or the like.

This application is a division of my copending application Serial No. 14,341, filed March 11, 1948, now Patent No. 2,645,925, dated July 21, 1953.

An object of the present invention is to provide an improved housing for a lock of the character wherein a lock mechanism is housed in a first aperture extending transversely between outer and inner faces of a door and a retractable bolt is reciprocable in a second aperture extending from the free edge of the door to the first aperture and wherein the lock mechanism in the first aperture operates by means of an inwardly projecting actuator to move a retractable bolt in the second aperture. The invention comprises a plate for closing one end of the first aperture, a first cup in the other end of the first aperture and opening outwardly and closed by means of a cover and a cap and a second cup lying in the first aperture opposite the second aperture and opening toward the exterior of the door, the parts being so arranged that lock mechanism in the first cup has an actuator which extends into the open side of the second cup to engage with the retractable bolt operating mechanism.

Other objects and advantages will be apparent from a study of the following description of one embodiment of the invention in conjunction with the illustration thereof in the accompanying drawings in which;

Fig. 1 is an elevational view of a fragmentary portion of a door, as seen from the hinged edge thereof;

Fig. 2 is a front elevational view taken from the left of Fig. 1, and showing the inside door knob;

Fig. 3 is a sectional view, enlarged approximately three times, taken on the line as shown in Fig. 1;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3;

Figs. 5 and 6 are sectional views similar to Fig. 4 but showing different working positions of certain operating elements;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 3;

Figs. 8, 9 and 10 are sectional views similar to Fig. 7, but showing different working positions of certain operating elements;

Fig. 11 is a side elevational view taken from the position of the line 11—11 of Fig. 7;

Fig. 12 is a perspective view of a latch bolt lever and cooperating bolt-retracting link;

Fig. 13 is a perspective view of a latch bolt dogging lever; and

Figs. 14, 15 and 16 are sectional views taken respectively on the lines 14—14, 15—15 and 16—16 of Fig. 3.

Speaking first generally, the lock means now to be described, and shown in the accompanying drawings, is mounted in a door 20 in conventional fashion. The door is provided with a cylindrical opening 20*a* (Fig. 3) extending inwardly from the door edge, and a cylindrical transverse aperture extends through the door between its inner

and outer faces to communicate with the first named opening. A latch bolt 21 is shown in Fig. 3, and in fragmentary fashion in Figs. 7 to 10 inclusive. It extends through opening 20*a*, through a suitable aperture in a face plate 22, and, when the door is locked, it projects into a keeper aperture in the door jamb 23.

Since the inventive concept here to be disclosed is independent of the latch bolt construction, further description of the bolt is not considered necessary, although I prefer a bolt of the novel character disclosed and claimed in my Patent No. 2,549,983 of April 24, 1951. It is sufficient here to note that the inner end of the latch bolt is provided with an aperture 24 adapted to receive a pin 25 carried by a latch bolt retracting link 26. Link 26 is pivotally secured at 26*a* to a bolt-operating lever 27, which, as will appear, is operatable from the inner door knob 28, or outer door knob 29 (Fig. 3). Operations by the inner or outer knob are independent of each other. The latch bolt is provided with spring means 21*a* for normally maintaining it in projected position, in engagement with its keeper.

The combination mechanism is housed in a cup 33 which has a friction fit in the transverse aperture in the door. The cup 33 is provided with a plurality of circumferentially spaced out turned tabs 34 adapted to cooperate with complementary inturned tabs 35 on the cap 36 in a bayonet joint connection. The combination mechanism is enclosed between the cup bottom 37, and a cup cover plate 38 which carries said mechanism.

Extending inwardly from the cup bottom towards inner door knob 28 are a pair of diametrically opposed posts 39, 39*a* (Fig. 11) each of which is axially drilled and tapped to receive the shanks of a pair of lock-retaining screws 40. The inner opening to the lock retaining aperture is closed by a plate 43 through which screws 40 pass. Plate 43 likewise has spaced breech lock tabs 44 somewhat offset from the plane of the major portion of the plate to permit the insertion between tabs 44 and the door face of complementary inturned tabs 45 on an inner cap 46. Cap 46 may be applied or removed in familiar breech lock or bayonet joint fashion by matching the tabs on one member with the spaces between tabs on the other member, and then turning cap 46 sufficiently to effect the engagement.

Before cap 46 is assembled on plate 43, the apertures in the plate are aligned with the threaded bores in posts 39, and 39*a*. The screws 40 are then inserted and drawn up until the door is tightly gripped between plate 43 and the tabs 35 on cap 36. Cap 46 may then be applied, and the assembly operation is complete.

The operation of the lock by means of the inner knob 28 will first be described. The bolt operating lever 27 is channel shaped in cross section, as best seen in Fig. 12, having flanges 27*a* and 27*b* which, near one end thereof, are provided with aligned apertures 47 permitting the lever to be rotatably carried on post 39*a*. The latch bolt retracting link 26 is pivotally secured at 26*a* to flange 27*b* near the free end of lever 27. The flange 27*a* has a detent recess 48 approached by means of a cam track 48*a* on the edge of the flange (Fig. 12). A cup 49, substantially equal in diameter to previously described cup 33, serves as a cover for lever 27, and carries the lever manipulating member 50. Said member comprises a spindle 53 having affixed thereto a pair of spaced collars 54, 55 closely fitted, one each side of the bottom wall of cup 49, so that spindle 53 and its collars are rotatable on the said bottom wall. The inner collar 55 is provided with a finger projection 56. When the spindle and collars are rotated in the direction of the arrow in Fig. 9, the finger 56 rides down cam track 48*a* and seats in detent recess 48, thereby swinging lever 27 so as to retract link 26 and bolt 21. While finger 56 is in recess 48 the spindle position is

stable, being on the longitudinal center line of the bolt movement, and the bolt remains retracted since the spring 21*a* which urges the bolt to projected position cannot produce rotation of collar 55 by a straight pull. However, if the spindle 53 is rotated in the direction of the arrow in Fig. 10, finger 56 abuts the uncammed edge portion 57 of lever leg 27*a*, but the finger can never reach detent 48 because, before it does so, the heel 58 of lever 27 abuts the inner wall of cup 49. Therefore in the position shown in Fig. 10, the outward bias by spring 21*a* exerted on lever 27 through bolt 21, pin 25, and link 26 finds finger 56 off the center line of the applied force, and the pressure of lever edge 57 against finger 56 rotates the collar 55 when bolt-retracting torque is no longer applied to spindle 53 thereby permitting bolt 21 to move outwardly.

The spindle 53 is actuated by rotation of inner knob 28, Fig. 3, since in the embodiment shown the spindle 53 has a square end portion 53*a*, and the knob is provided with an inward tubular extension 59, squared at its inner end to telescope over the spindle.

From what has been so far described, it will be apparent that the linkage comprising lever 27, link 26 and bolt 21 can be temporarily retained in retracted position by rotation of inner knob 28 in one direction until finger 56 seats in detent recess 48 as shown in Fig. 9, and that this position is maintained until knob 28 is turned backwards to normal, door-locked position. Rotation of knob 28 in the other direction to a positively stopped position with finger 56 as shown in Fig. 10, only holds bolt 21 retracted as long as knob 28 is held, but when the knob is released the bolt springs outwardly, the parts being then as shown in Fig. 7.

The means whereby lever 27 is actuated from the outer knob 29 of the door will now be described.

The transverse wall 37 which forms the bottom of cup 33 is centrally perforated to receive a rotatable grommet 62 having fixed thereto, on the side next to the lever 27, a rotatable plate 63 carrying a pin 64. Pin 64 is an actuator which engages the flange 27*b* of lever 27 in the same manner that finger 56 engaged the flange 27*a*, except that there is no detent recess in flange 27*b*, and therefore rotation of plate 63 actuates lever 27 to withdraw bolt 21, but the bolt is held in retracted position only as long as outer knob 29 is held in lever-retracting position.

The grommet 62 has a square aperture 65 therethrough, adapted to receive a square spindle 66 fixed in the outer knob 29. Normally a dog lever 67 of plate form prevents operative engagement between spindle 66 and aperture 65, and the combination mechanism described below is devised to cause removal of the dog lever 67 to permit such engagement.

A cam plate 68 (Figs. 3 and 16) is rotatably carried within cup 33, having a hub 69 extending outwardly through a central aperture in cover plate 38. The cam plate has a square central aperture to receive, and be rotated by, spindle 66. Cover plate 38 carries a pair of pins 70, 70*a*, pin 70 supporting a leaf spring 73 having a nose portion 74 engageable with detent recesses 75 in the cam plate periphery. Obviously, rotation of the cam plate encounters resistance to motion, and there is a detectable click each time nose 74 enters a recess 75.

Cam plate 68 has integral therewith a plurality of cams 76 extending at diverse angles to each other, and defining therebetween a tortuous path whereby a cam following pin, normally at the center, can be urged outwardly toward the periphery by proper rotation of the cam plate. Certain combination elements herein described are conventional, but a description of the whole mechanism will clarify the operation.

Dog 67 is of crescent-like shape and has an aperture 67*a* in one tip thereof whereby it is rotatably mounted on post 70, as best seen in Figs. 4, 5 and 6. It is normally biased to the position shown in Fig. 4 by a spring 77 fixed to the dog and to post 70*a*. The dog has a boss 78 provided with an aperture 79 which can be aligned with grommet aperture 65 and spindle 66 when the dog is forced, against spring bias, from the position shown in Fig. 4 to that in Fig. 6. In the latter position spindle 66 can be inserted through aperture 79 in the dog, and into its socket in the aperture 65 of the grommet, whereupon rotation of knob 29 can retract the bolt as previously described.

Swinging of the dog lever 67 is accomplished by a swingable arm 80, rotatably mounted on pin 70. The free end of the arm engages a tab 83 struck up from dog 67. Counterclockwise movement of arm 80 (Figs. 4 to 6) swings dog 67 counterclockwise. Arm 80 has a cam-following pin 84 adapted to be engaged by one or other of cam 76 as the cam plate is rotated, and, as will be readily understood by those skilled in the art, three or four alternations in direction of rotation, each one effected by a predetermined number of "click" stops, forces the pin outwardly from a central position until it finally "climbs the hill" on cam 76*a* (Fig. 16) at which time arm 80 has forced dog 67 to the position shown in Fig. 5. At this time, inward pressure on knob 29, against the bias of spring 85 causes spindle 66 to pass through the aperture 79 in dog 67, and enter aperture 65 in grommet 62. Rotation of the knob then rotates the grommet, causing the pin 64 carried thereby to rotate lever 27 and, through link 26, to withdraw bolt 21. The final position of pin 64 when the lock bolt is fully withdrawn, is shown in Fig. 8.

Rotation of the grommet 62 produces a further effect. The rotatable grommet plate 63 has a tab 86 extending backwardly through bottom plate 37 into cup 33. When the grommet is being rotated, this tab contacts the outer edge of arm 80 and as the tab moves from the broken line position to the full line position of Fig. 6, the arm 80 is thrown back to starting position with the cam-following pin 84 near the center of the cam plate.

The only thing now holding the dog lever aperture 79 in bolt-operating alignment is the fact that spindle 66 still extends through it and into the grommet. As soon as the grommet has been turned to retract the bolt 21, and the door has been opened to prevent re-engagement of the bolt with the keeper aperture in the door jamb, the hand may be removed from the knob 29. The knob is freely slidable in shell 36 (Fig. 3) and spring 85 snaps the knob with spindle 66 outwardly to the position shown in Fig. 3. As soon as the spindle tip passes out of the aperture 79 in dog 67, the dog is pulled by its spring 77, back to the position shown in Fig. 4, and to again retract the bolt by means of knob 29 the combination must again be operated.

Cup 33 is prevented from rotation with respect to its cover plate 38 by the fact that pins 70 and 70*a* pass through the bottom wall 37 of the cup. A leaf spring 87 on the inner face of wall 37 impinges on arm 80 and maintains the cam-following pin 84 in tight working engagement with the cam plate 68. Another leaf spring 88 (Fig. 13) is fixed on dog 67 and abuts the inner face of the wall 37 to maintain the feet 89 of the dog in sliding engagement with the inner face of wall 38.

The rotational starting point of the combination lock may be controlled in a number of conventional ways, the one here used being best shown in Figs. 3 and 14. The hub 69 of cam plate 68 extends through cover plate 38, and has a smooth cylindrical portion 69*a* and the splined portion 69*b*. A flat washer 93 is freely rotatable on the cylindrical portion and has two tabs 93*a* and 93*b*. The rotation of washer 93 is stopped by abutment of tab 93*a* with a stop 94 struck up from plate 38. A splined washer 95 of cup like form is interlockable with the splined portion 69*b*, so that it may be fixed in any one of a number of preselected positions on the hub, depending on the number of complementary splines on washer and hub. Washer 95 has an outturned tab 95*a* which clears stop 94 but which abuts the upturned tab 93*b* on washer 93. It will be apparent that rotation of knob 29, so as to rotate hub 69, for example counter-

clockwise in Fig. 14, will produce abutment of tab **95***a* with tab **93***b*, and thereafter washer **93** will be carried counter-clockwise until tab **93***a* abuts stop **94**.

In the embodiment shown there are ten possible angularly varying splined interlocks between washer **95** and hub **69**, and it will be apparent that the starting point of the combination operation may be varied as desired by lifting washer **95** from splined engagement and replacing it in a different angular position.

From a consideration of the description and drawings it will be evident that the lock structure hereinabove disclosed lends itself readily to simple installation, particularly in wooden doors. The complete mechanism, with the exception of the bolt and knobs, is contained within a cylindrical space which can be cut transversely through the door by a carpenter's rotary cutting tool. The bolt **21**, not shown in detail, may be reciprocated in another cylindrical aperture extending inwardly from the door edge to communicate with the transverse aperture.

In assembling the lock in the door aperture, the combination mechanism comprising the cam plate **68** and dog lever **67** are disposed in cup **33**, and cover plate **38** is applied thereto with its bayonet joint tabs in alignment with those of the cup. The combination-setting washers are assembled on hub **69**, and knob **29** with its spindle **66** and spring **85** are disposed in shell **36** which is then clamped on the bayonet joints on the cup and cover plate. Lever **27** is then pivotally mounted on post **39***a*.

The unit thus built up is inserted from the outer side of the door until the inner face of bayonet lugs **35** abut the outer face of the door around the transverse opening. The bolt **21** is inserted inwardly from the door edge through a suitable housing in aperture **20***a* and its inner end is hooked over pin **25** on link **26** carried by lever **27**. Cup **49** is then inserted from the inside face of the door until it rests on the transverse wall consisting of the bottom **37** of cup **33**. Inner cover plate **43** is then placed over the inner end of the transverse aperture, with its edges abutting the aperture edge, and its bayonet joint

lugs spaced from the door face. Screws **40** are inserted and drawn up. Finally bayonet lugs **44** and **45** are engaged, and the assembly is complete.

What I claim is:

A housing for a lock of the character wherein a lock mechanism is housed in a first aperture extending transversely between outer and inner faces of a door and a retractable bolt is reciprocable in a second aperture extending from the free edge of the door to said first aperture, and wherein said lock mechanism in said first aperture operates, by means of an inwardly projecting actuator, said retractable bolt in said second aperture; said housing comprising a cup for holding said lock mechanism and insertable inwardly into said first aperture from the door exterior, said cup opening toward said door exterior, there being an opening through the bottom of said cup for receiving said actuator, a cover plate closing said cup opening save for a central opening through said plate for extension of a portion of said lock mechanism, an outer cap having connecting means engageable with said cup and having a single central opening, a knob closing said last-named opening, said cap and knob preventing access to said housing from the door exterior, an inner cover plate overlying the inner end of said first aperture, a second cup in said first aperture adjacent said second aperture for receiving mechanism for moving said retractable bolt, said second cup opening toward said door exterior and having means therein for supporting, in alignment with the opening through the bottom of said cup, said mechanism for moving the retractable bolt, and there being an opening through a wall of said second cup adjacent said second aperture through which a part of said bolt moving mechanism may extend.

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