Feb. 1, 1966 W. B. WILSON 3,232,653

PLASTIC DOOR LOCK ASSEMBLY

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Fig. 1.

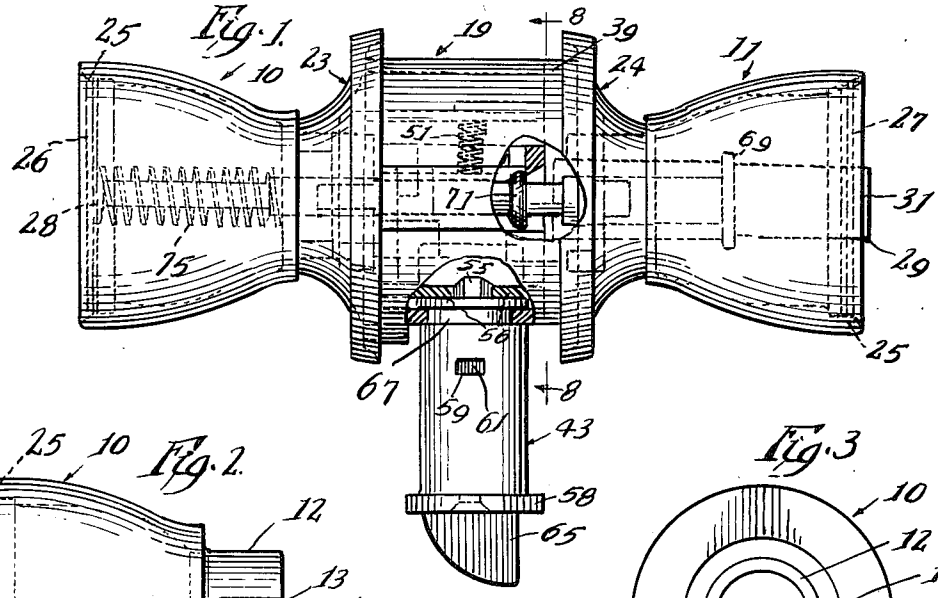


Fig. 2.

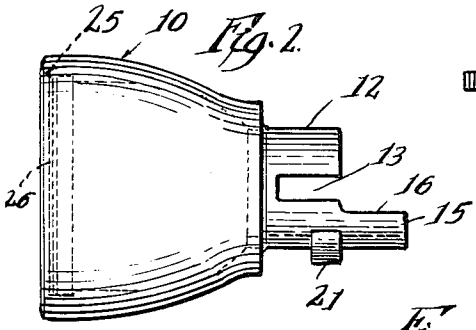


Fig. 3

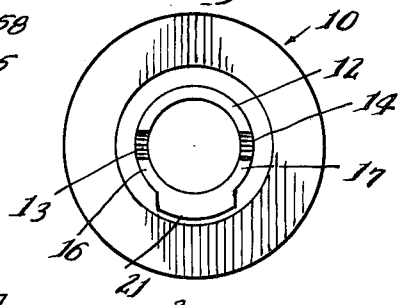


Fig. 4

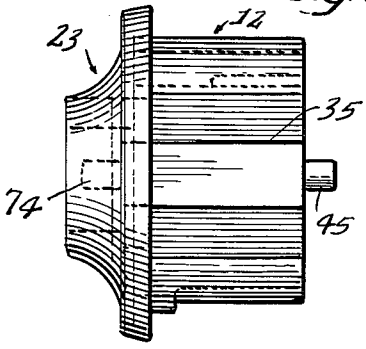


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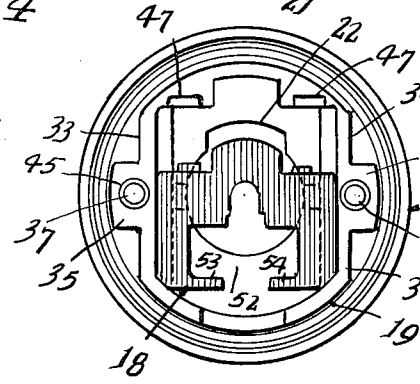


Fig. 6

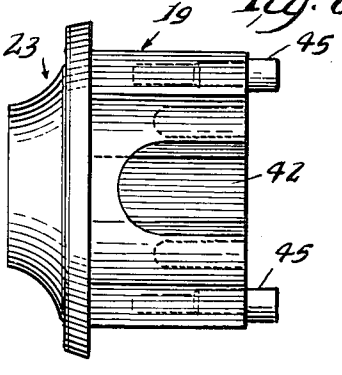
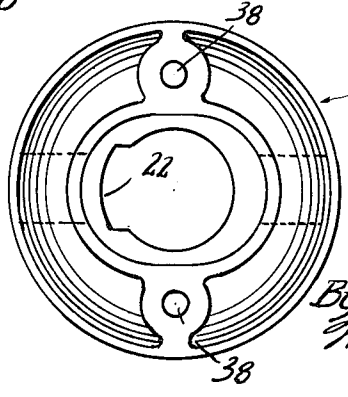


Fig. 7



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PLASTIC DOOR LOCK ASSEMBLY

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Fig. 9.

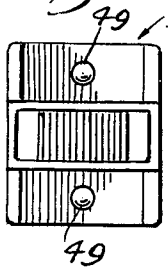


Fig. 10.

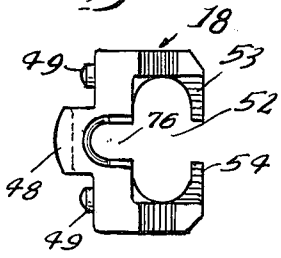


Fig. 11.

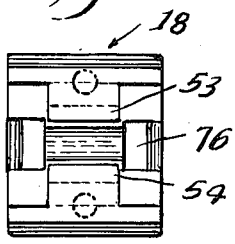


Fig. 12.

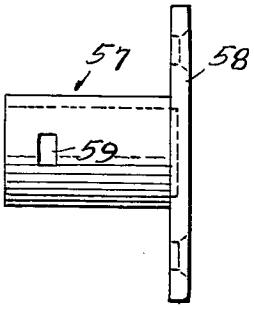
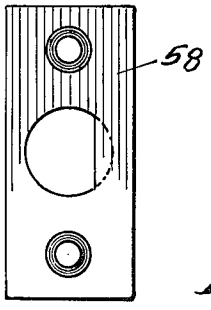


Fig. 13.



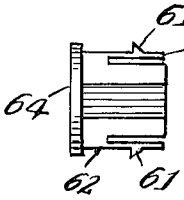


Fig. 14.

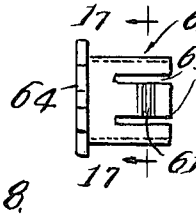


Fig. 15.

Fig. 8.

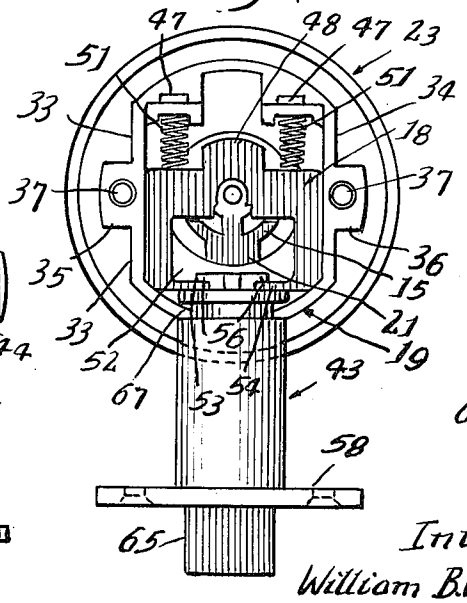


Fig. 16.

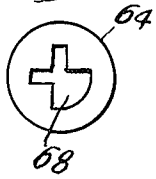


Fig. 17.

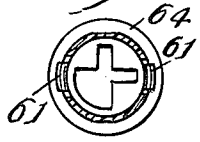


Fig. 29.

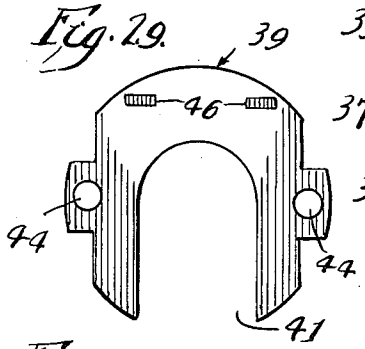
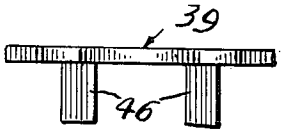


Fig. 30.



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PLASTIC DOOR LOCK ASSEMBLY

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Fig. 21.

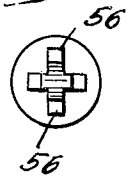


Fig. 18.

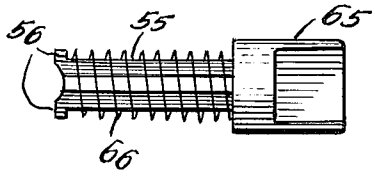


Fig. 22.

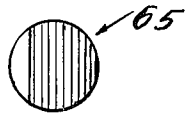


Fig. 19.

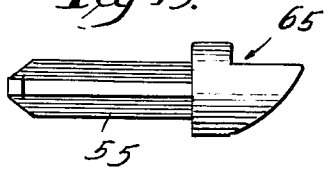


Fig. 20.

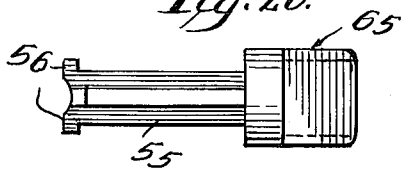


Fig. 24.



Fig. 25.

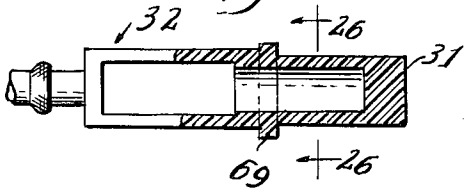


Fig. 26.

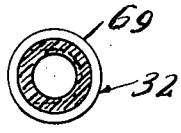


Fig. 27.

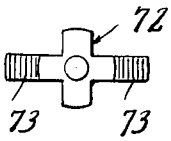
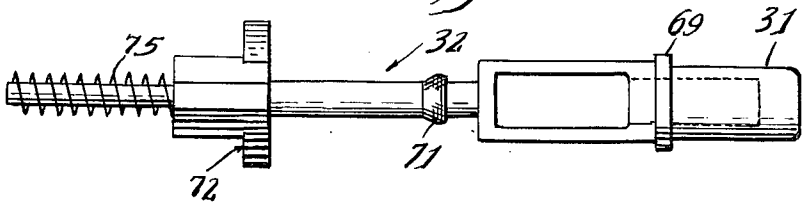


Fig. 23.



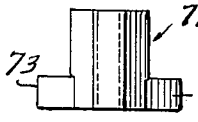


Fig. 28.

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United States Patent Office

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Patented Feb. 1, 1966

3,232,653

PLASTIC DOOR LOCK ASSEMBLY

William B. Wilson, La Habra, Calif., assignor to National Lock Co., Rockford, Ill., a corporation of Delaware

Filed May 9, 1963, Ser. No. 279,219
2 Claims. (Cl. 292—169)

The present invention relates to a novel builder's lock or lock set in which the component parts are all molded or formed of a plastic composition.

In this novel assembly of a simplified and relatively inexpensive lock set, the latch bolt assembly, knobs, housing and locking mechanism are impact-molded of a plastic composition of great inherent strength and long life, the component parts being so constructed and arranged as to be readily snapped or locked together by a tongue and groove or breech connection and thereby retained in final assembly. Such construction greatly facilitates ease of installation in a door or closure as it provides for a minimum number of parts and eliminates all metal except for several springs and screws.

The present assembly comprehends a novel privacy lock set in which the component parts consisting of the outer and inner knobs, housing, escutcheons, locking means actuated by a button in the inner knob for locking the outer knob against entry, and the latch bolt assembly, are all molded or formed of a suitable thermoplastic composition having the necessary strength and wear properties desired in a privacy or passage door lock set.

Another object of the present invention is the provision of a novel latch bolt assembly comprising an integral housing and face plate, a cap and a latch bolt having a stem projecting into the housing of the lock set and thereat provided with a part in interlocking engagement with a retractor actuated directly by an inner camming projection or rollback on the inner knob and by a similar camming projection or rollback on the end of the outer knob when released for turning upon release of the inner knob.

The present invention further comprehends a novel inner and outer plastic knob having an interlocking projection such as a tongue and groove or breech for locking engagement with the adjacent plastic escutcheon and in which embodiment the outer escutcheon and housing are formed as an integral unit. These knobs are identical except for the knob insert. In the disclosed embodiment of a privacy lock, the insert of the inner knob is provided with an opening through which projects a push button on the inner end of a locking bar which when depressed locks the outer knob against turning but which push button and the internal locking mechanism is automatically released upon turning of the inner knob. When this lock set is employed such as in a door of a bathroom, the insert of the outer knob is preferably provided with a narrow or small opening for the insertion of an instrument such as a small tool or screwdriver capable of engaging and releasing the locking bar from its locked position and thus permitting entry in an emergency.

Another important object of the present invention is the provision in a builder's lock set of a latch bolt, retractor and internal operating mechanism constructed of a suitable plastic composition.

The present invention further comprehends a novel privacy or passage door lock set consisting of a minimum number of plastic parts preformed for simple interlocking engagement and capable of being readily assembled by one with little or no prior practical experience. Each knob and its adjoining escutcheon are readily and easily joined by a breech or tongue and groove interlocking connection, and each knob is formed with an annular projection providing a cam or rollback whereby a turn of either assembled knob through an arc of approximately 180° brings this cam or rollback into operative position.

With the component parts of the present novel lock set assembly impact-molded of a plastic composition, the number of component parts and the cost of production is substantially reduced. Among the plastic materials suitable for use in the novel assembly is an acrylic resin or an acetal polymer and copolymer such as the product "Delrin," manufactured by Du Pont de Nemours & Co.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

In the drawings:

FIGURE 1 is a top plan view of the novel lock assembly.

FIG. 2 is a plan view of one of the knobs, the inner and outer knobs being duplicates except for the opening in the face plate.

FIG. 3 is a view in end elevation of the inner end of the knob.

FIG. 4 is a top plan view of the integral retractor housing and outer escutcheon.

FIG. 5 is an end elevation of the inner end of the housing and outer escutcheon and including the retractor.

FIG. 6 is a front elevation view of the housing and escutcheon.

FIG. 7 is an end elevational view of the inner end of the inner escutcheon.

FIG. 8 is a front elevation view of the assembled outer knob, housing, retractor and latch bolt unit but omitting the push-button-actuated locking bar, the view being taken on the line 8—8 of FIG. 1 and viewed in the direction of the arrows.

FIG. 9 is a rear elevational view of the retractor which is mounted and operates within the housing.

FIG. 10 is an end elevational view of the retractor.

FIG. 11 is a front elevational view of the retractor.

FIG. 12 is a side elevational view of the integral latch bolt housing and face plate.

FIG. 13 is a front elevational view of the assembly of FIG. 12.

FIG. 14 is a side elevational view of the inner telescoping part of the latch bolt housing.

FIG. 15 is a view similar to FIG. 14 but with the inner part rotated through approximately 90°.

FIG. 16 is a rear elevational view of the inner part of FIGS. 14 and 15.

FIG. 17 is a view in vertical cross section taken on the line 17—17 of FIG. 15 but including the stem of the latch bolt.

FIG. 18 is a side elevational view of the latch bolt with its stem and encompassing spring.

FIG. 19 is a side elevational view of the latch bolt of FIG. 18 but omitting the spring, the latch bolt having been rotated through 90° from the position of FIG. 18.

FIG. 20 is another side elevational view of the latch bolt but rotated through approximately 180° from the position of FIG. 18.

FIG. 21 is a rear elevational view of the latch bolt of FIG. 18.

FIG. 22 is a front elevational view of the latch bolt of FIG. 18.

FIG. 23 is a side elevational view of the locking bar assembly.

FIG. 24 is an end elevational view of FIG. 25.

FIG. 25 is a fragmentary view, part in plan and part in horizontal cross section, of the right-hand end of the locking bar of FIG. 23.

FIG. 26 is a view in vertical cross section taken in a plane represented by the line 26—26 of FIG. 25.

FIG. 27 is an end elevational view of the locking member shown assembled on the locking bar in FIG. 23.

FIG. 28 is a side elevational view of the locking member of FIG. 27.

FIG. 29 is a rear elevational view of the inside cover of the housing.

FIG. 30 is an end elevational view of the inside cover of FIG. 29.

Referring more particularly to the disclosure in the drawings, the novel illustrative embodiment of the lock set therein shown comprises an outer hollow knob **10** and an inner knob **11**, the outer knob provided with an annular projection or neck **12** having diametrically opposed slots **13** and **14** and an arcuate camming projection **15**, the opposite edges **16** and **17** of which provide a cam or rollback for actuating a latch bolt retractor **18** (FIGS. 8, 9, 10 and 11) in the housing **19**. Except for omission of the opposed slots **13** and **14**, the inner knob **11** is of similar construction and like reference characters have been applied thereto. Each arcuate or cylindrical projection **12** is also provided on its outer periphery with an arcuate lug or embossment **21** adapted to be conformably received in and projected through a groove **22** in the neck of an adjacent escutcheon **23** or **24** to form a locking or breeching engagement between the knob and its escutcheon. It is understood the lug **21** when moved out of alignment with the conforming groove **22** upon turning of the knob, retains its knob assembled but free to rotate in its escutcheon.

Each knob is provided adjacent its outer end with an internal annular groove **25** receiving an insert, the insert **26** providing a closure for the opening in the outer knob **10** and the insert **27** providing a closure for the opening in the inner knob **11**. The outer insert **26** may be provided with a centrally disposed small opening **28** for the insertion of an instrument such as a small screwdriver, while the inner insert **27** has a centrally disposed larger opening **29** through which projects a push button **31** for actuating a locking bar **32** when the push button is depressed.

The outer escutcheon **23** is formed integral (FIGS. 4, 5 and 6) with the housing **19** enclosing the retracting mechanism, the housing having its upper and lower surfaces **33** and **34** substantially flat and parallel and each side provided with diametrically opposed bosses or protuberances **35** and **36** each having an internally threaded opening **37** to receive attaching screws inserted through openings **38** in the inner escutcheon **24** and the adjacent cover **39** for the inner open end of the housing **19**. The cover **39** has an elongated slot **41** (FIG. 29) adapted to be aligned with and opening into a slot **42** in the circumferential wall of the housing **19** opening forwardly to receive the inner end of a pre-assembled latch bolt assembly **43**, a pair of opposed openings **44** to receive the projecting ends **45** of the protuberances **35** and **36** on the housing **19**, and laterally and inwardly projecting spaced tabs **46** conformably received and locating the cover **39** in longitudinally extending elongated slots **47** in the housing **19**. When the cover **39** is assembled on the housing **19**, the projecting ends of the protuberances **35** and **36** are engaged by a solder or hot iron to spread the thermoplastic material of these protuberances sufficiently to retain the cover **39** assembled.

The interior of the housing **19** is so contoured as to conformably receive the retractor **18** (FIGS. 5, 8, 9, 10 and 11). The latter is formed with a longitudinal and substantially rectangular projection **48** arranged centrally and at the rear thereof and disposed at each side of this projection is a cylindrical boss **49** adapted to locate one end of a coil or compression spring **51**, the other end of each spring bearing against the interior of the housing **19**, the latter being cored to conformably receive and permit sliding movement of the retractor within the housing. These springs **51** spring-bias the retractor forwardly toward the slot **42** in the housing **19** and the latch bolt assembly **43**, the inner end of which projects through the slot **42** and into the retractor **18** as hereinafter explained. The interior of the retractor **18** is cored to provide an irregularly-shaped opening **52** therethrough through which projects the locking bar **32**, and at the front thereof this retractor has inturned flanges **53** and **54** spaced apart sufficiently to conformably receive therebetween the stem **55** of the latch bolt assembly **43**, and the inner face of these flanges **53** and **54** being contacted by lateral projections **56** on the latch bolt stem **55** of cruciform shape.

The latch bolt assembly **43** comprises an integral latch bolt housing **57** and face plate **58** (FIGS. 12 and 13) either of the mortise-type as shown or of the non-mortise type. The tubular housing **57** has oppositely arranged and circumferentially spaced slots **59** to conformably receive similarly spaced detents **61** on an inner telescoping tubular part **62** (FIGS. 14 to 17, inclusive) to lock these parts together. The part **62** is longitudinally slotted at its one end at **63** for greater resiliency and provided at its rear or other end with an end cap or flanged closure **64**. As shown in FIGS. 18 to 22, inclusive, a latch bolt **65** is affixed to one end of the latch bolt stem **55** the latter being of cruciform shape and formed at its inner or rear end with the oppositely disposed lateral projections **56** for engagement with the inner face of the flanges **53** and **54** of the retractor **18**.

In the preassembled latch bolt unit **43** of FIGS. 1 and 8, the latch bolt stem **55** projects through the joined telescoped tubular parts **57** and **62** and an enclosed spring **66** encompassing the stem, the telescoped parts being joined together by the detents **61** on the tubular part **62** being tensionally received and anchored in the slots **59** of the outer tubular part **57**. When thus assembled, the flanged closure **64** is disposed in spaced relation at **67** with the adjacent end of the tubular part or housing **57** and the inner end of the latch bolt stem **55** projects rearwardly through the opening **68** in the end closure **64**. The spacing is such that the exposed portion of the inner tubular part **62** is conformably received in the slot **42** and held assembled by the edges of the housing **19** defining this slot.

The locking bar **32** (FIGS. 1 and 23 to 28, inclusive) has a push button **31** on its forward end projecting through the opening **29** in the inner knob **11**. Spaced inwardly from the push button the bar is provided with an annular shoulder or flange **69** and spaced inwardly from the latter is a tapered guide **71** formed on a reduced section of the bar. Spaced rearwardly from this tapered guide **71**, the bar is further reduced in cross section and slidably receives thereon a locking member **72** of cruciform shape in cross section with two of the opposed ends **73** of greater length and of such dimensions as to be conformably received and movable in the diametrically opposed slots **13** and **14** in the neck **12** of the outer knob **10**.

The outer knob is locked against turning effort when the push button **31** on the inner knob **11** is depressed whereby the locking bar **32** moves the locking member **72** inwardly or rearwardly in its slots **13** and **14** until the ends **73** of this member **72** move into the aligned opposed slots **74** formed in the neck of the outer escutcheon **23**, the latter being formed integral with the housing **19**. In this position, the locking member **72** bridges the neck **12** of the outer knob and the encompassing fixed escutcheon **23** whereby the outer knob is locked against rotation until the push button **31** is released by turning the inner knob **11**.

Bearing against the outer end of the locking member **72** is a coil or compression spring **75** disposed within the knob **10** for spring-biasing the locking bar **32** toward release position of the outer knob **11**. However, so that the locking bar **32** and its locking member **72** are effective to retain the outer knob against turning when the push button **31** is depressed, the tapered guide **71** is so constructed and arranged within the reduced bore **76** of the opening **52** in the retractor **18**. This is shown in FIG. 1. However, when the inner knob is turned to open the locked door, its cam **15** engages the retractor **18** which withdraws the latch bolt **65** and upon such inward movement of the retractor **18** the guide **71** is released from its engagement

with the retractor 18 and the spring 75 forces the locking member 72 and locking bar 32 forwardly to release position. To facilitate locating the guide 71 in its bore 76 in the retractor 18 upon depressing the push button 31, it is tapered adjacent the retractor 18 for directing it into the bore 76.

The above disclosure describes the assembly of a privacy lock set such as for a bathroom where the occupant upon entering the room and depressing the push button 31 in the inner knob moves the locking bar 32 outwardly or rearwardly whereby its locking member 72 mounted on and movable with the locking bar effects clutching engagement between the outer knob 10 and the stationary escutcheon 23. This is due to the ends 73 of the locking member 72 which are mounted and movable in the opposed and relatively deep slots 13 and 14 in the neck 12 of the outer knob 10, and moved upon depressing the push button into the similarly arranged and then aligned slots 74 in the escutcheon 23 and thereby lock the rotatable outer knob 10 to the fixed escutcheon 23 and its integral housing 19.

The locking bar 32 is retained in its depressed position by engagement of its tapered guide or latch 71 in the reduced bore 76 of the retractor 18 and the latter held engaged by its springs 51. However, when the inner knob 11 is turned to withdraw the latch bolt 65 and open the locked door, the cam or rollback 15 on the inner knob retracts or withdraws the retractor 18 and concurrently therewith the guide or latch 71 is released from latching contact with the retractor 18 whereupon the spring 75 on the locking bar 32 returns the latter and its locking member 72 to unlocked position.

The disclosed privacy door lock set can be readily converted to a passage door set simply by omitting the locking bar 32 with its push button at one end and its locking member 72 at the other end and substituting imperforate knob inserts 26 and 27

The locking bar 32 is provided with a double locking means including a locking means or member 72 at one end and the intermediate guide or latching means 71 which is retained in a notch in the bore 76 of the retractor when the locking bar 32 is depressed. Then when the inner knob is turned and the arcuate cam member 15 impinged against and moves the retractor 18, the spring 75 biases the locking bar 32 longitudinally to release position.

It will be apparent that the breech locking of the outer knob 10 and the inner knob 11 in the escutcheons 23 and 24, respectively, is such that each knob upon assembly must be rotated through approximately 180° to locate its cam projection 15 in operative position within the retractor 18, and that in such assembled position neither knob can be rotated to release it from its escutcheon without complete disassembly of the lock set.

Having thus disclosed the invention, I claim:

1. A door lock assembly consisting of a plastic latch bolt assembly, said assembly consisting of a tubular housing having an integral face plate, an inner telescoping plastic tubular part having an end cap, and a spring-biased latch bolt mounted for longitudinal reciprocation in said housing and projecting through the face plate, said latch bolt having an integral stem extending rearwardly through the housing and tubular part and projecting through said end cap, an inner and an outer plastic knob each having an integral annular extension providing a neck and an arcuate camming projection, an inner and an outer plastic escutcheon cooperating with said knobs with the outer escutcheon provided with an integral housing, a plastic closure plate for the open end of the housing, said inner escutcheon affixed to said closure plate and said housing, each knob and its escutcheon joined by a breech connection when assembled and the knob rotated relative to its escutcheon and the arcuate cam projections extending through the escutcheons and into the housing, and a spring-biased plastic retractor located in and reciprocable in said housing having camming surfaces cooperating with the arcuate camming projections on the inner and outer knobs, said retractor being operatively connected with the inner end of said stem on the latch bolt so that rotation of either knob actuates said retractor to retract the stem and latch bolt.

2. A door lock assembly as set forth in claim 1, including a spring-biased plastic locking bar projecting through the inner knob, retractor, housing and into the outer knob, said locking bar having an integral push button at its inner end, a locking member of cruciform cross section adjacent its outer end and a tapered guide intermediate its ends engaging at notch in the retractor when the push button is depressed to retain the locking bar against release until the retractor is withdrawn, said outer knob having opposed slots in the annular extension and said outer escutcheon having aligned opposed slots receiving the locking member when the push button is depressed to prevent rotation of the outer knob until the locking bar is released.

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