Jan. 24, 1956 W. B. WILSON 2,732,239

DOOR LATCH

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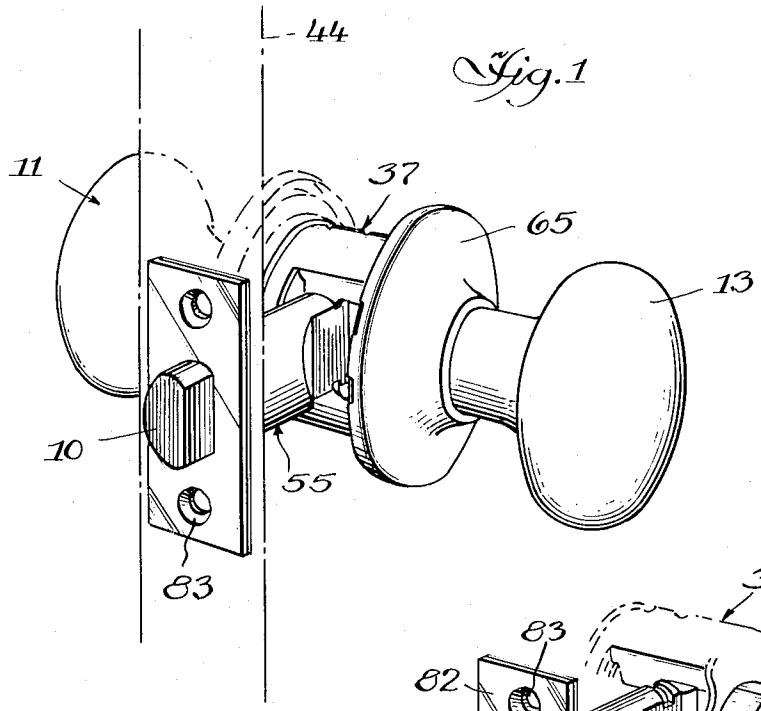


Fig. 1

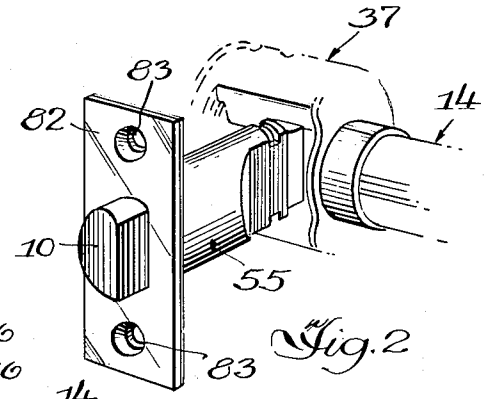


Fig. 2

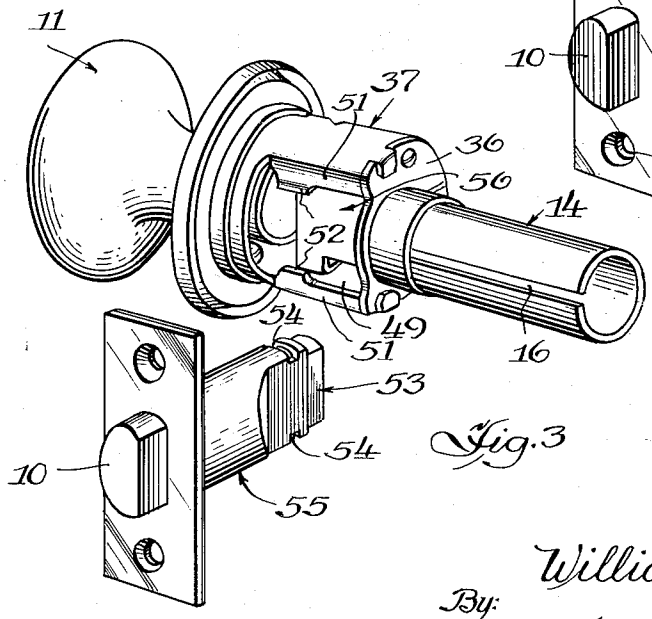


Fig. 3

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Fig. 4

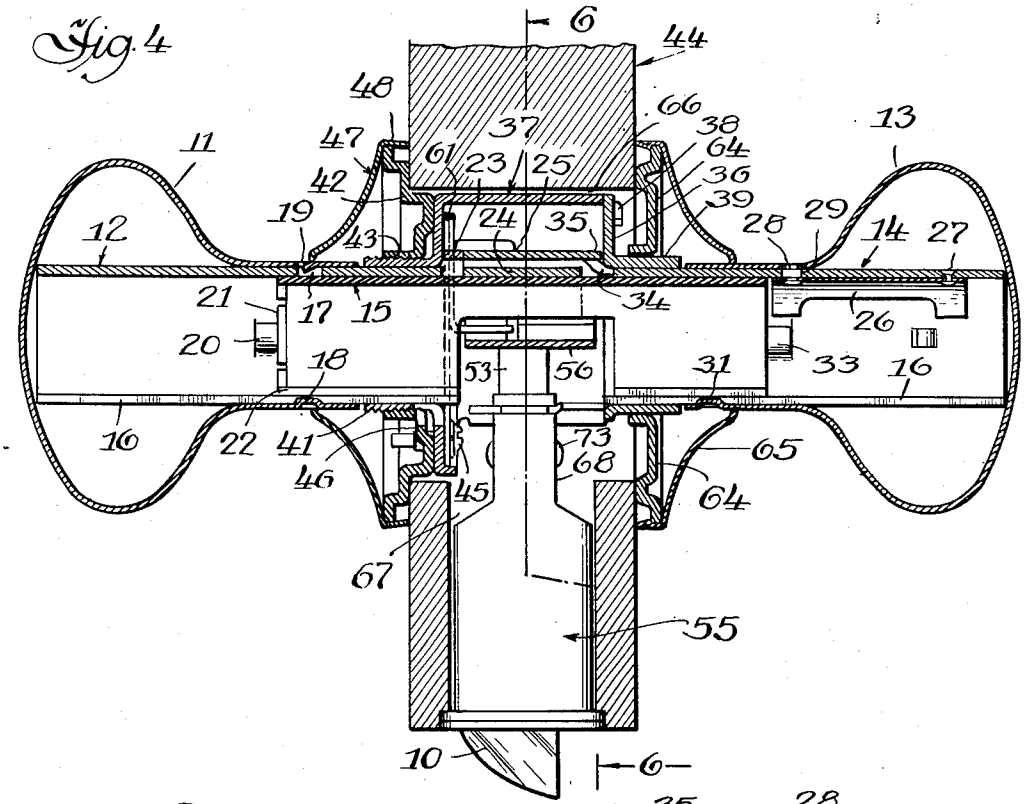
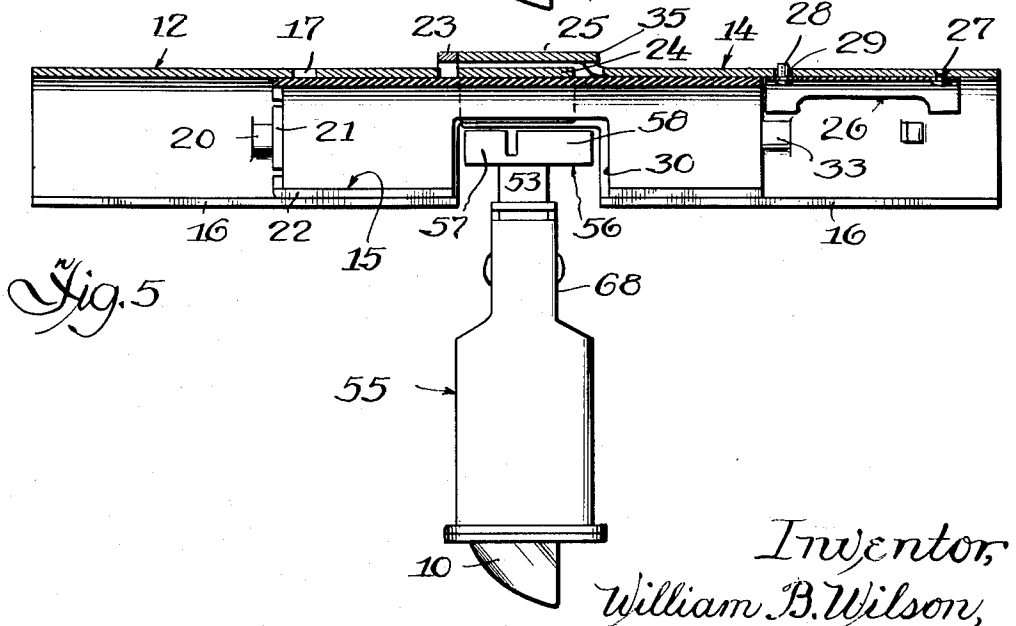


Fig. 5



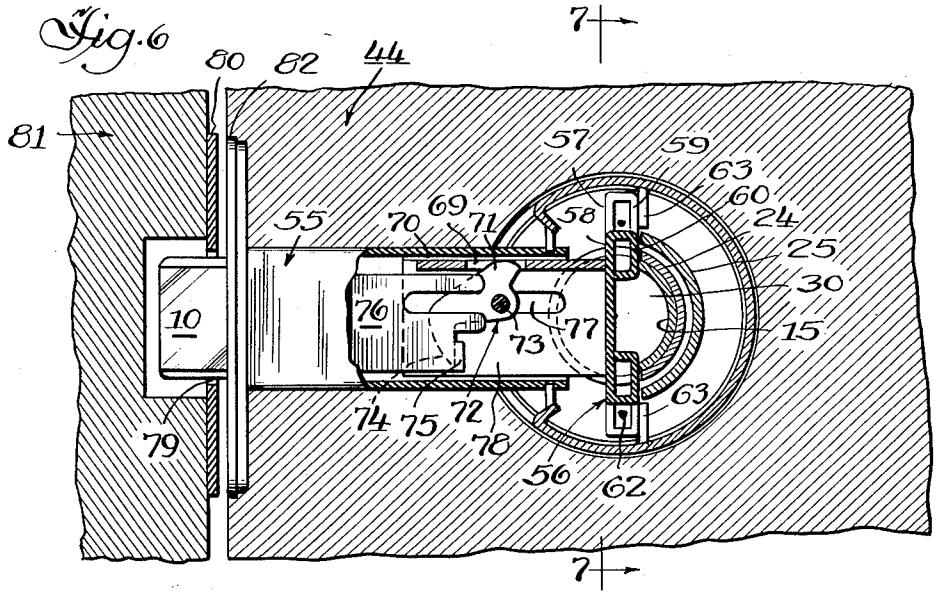
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Fig. 6



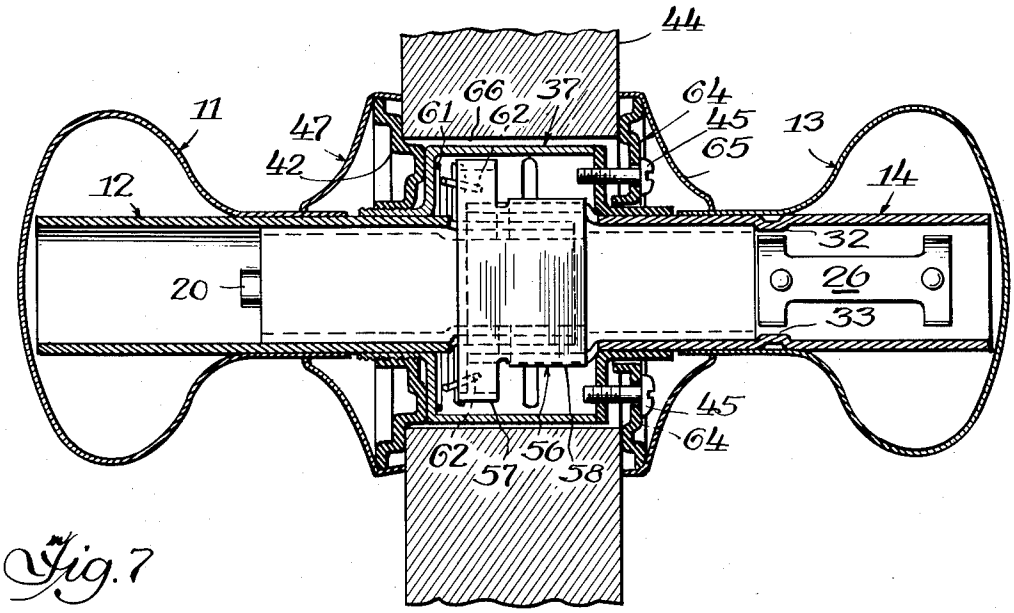


Fig. 7

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2,732,239

DOOR LATCH

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7 Claims. (Cl. 292—169)

The present invention relates to a latch or lock construction of the type adapted to be mounted in a door or other closure for permitting ready access through a passageway into a room or other enclosure by merely turning a knob at either side of the door or closure to retract a latch bolt, and more particularly to a novel cam tube assembly for such a latch or lock construction.

An important object of the present invention is the provision of a novel latch assembly having an inner reinforcing tube and an encompassing cam or spindle assembly including a pair of cam members or spindles having their adjacent cam ends in overlapping relation and thereat engaging a cam follower for retracting the latch bolt permitting opening of a door or other closure.

Another important feature of the present invention is the provision of a novel cam tube assembly including an inner tubular support and a pair of sleeve-like members telescopically mounted upon the opposite ends of the inner member and having their adjoining inner ends arranged in overlapping relation, and these overlapping ends so formed or contoured as to provide separate camming means which when actuated as by the turning of a knob, retracts a latch bolt and permits opening of a door or other closure for access therethrough.

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 view in perspective of an assembled latch construction incorporating the present invention and showing the manner in which such an assembly is mounted in a door or other closure.

Fig. 2 is a fragmentary perspective view showing the manner of assembling or joining a latch bolt unit to the novel cam tube assembly or unit after these units have been inserted into their respective openings in the side or edge rail of a door or closure.

Fig. 3 is a disassembled view of a latch bolt and the novel cam tube assembly but with the inner knob, its escutcheon plate and the clamp plate removed.

Fig. 4 is an enlarged view in horizontal cross section taken longitudinally through the cam tube assembly and associated parts.

Fig. 5 is a horizontal cross sectional view of the cam tube assembly of Fig. 4 but removed or disassociated from its housing, escutcheon assemblies and the knobs.

Fig. 6 is a view in vertical cross section taken on the irregular line 6—6 of Fig. 4.

Fig. 7 is a view in vertical cross section taken in a plane represented by the line 7—7 of Fig. 6.

Referring more particularly to the disclosure in the drawings and to the illustrative embodiment therein shown, the novel cam tube assembly of the present invention is shown embodied in a so-called builder's door lock or latch assembly adapted to be mounted in a door or closure for latching engagement with a strike plate but

permitting free access between rooms or into and out of a room or other enclosure by the mere turning of a knob at either side of the door or closure.

Although the present invention is primarily concerned with the novel cam tube assembly on which the knobs are mounted, it is shown associated with a complete latch assembly including a latch bolt **10** adapted to be retracted from latching engagement by the mere turning of a knob **11** mounted on the outer end of a cam member **12**, or a knob **13** mounted on the end of a cam member **14**, these tubular cam members at their inner or adjoining ends telescopically receiving and encompassing a reinforcing tubular member or insert **15**.

As shown more clearly in Figs. 4, 5 and 7, the cam member **12** is longitudinally slotted at **16** along the front face thereof and at the rear provided with a recess or opening at **17**, the slot **16** for slidably receiving an interlocking projection **18** on the knob **11** and the recess or opening **17** for receiving a diametrically opposed inturned tongue or projection **19** on the sleeved end of the knob whereby to clinch and securely retain the knob **11** in assembled position upon the cam member **12**. This cam member **12** is also provided with diametrically disposed indentations or inwardly extending projections **20** against which the inturned flanges **21** on the adjacent slotted end **22** of the tubular member **15** abut so as to accurately locate and align the cam member **12** and the adjacent end **22** of the tubular member **15** in their proper assembled relationship. An outer radial projection **23** spaced from the inner arcuate camming end **24** of the cam member **12** is provided against which the enlarged arcuate camming end **25** of the cam member **14** abuts when these cam members **12** and **14** and the central tubular member **15** are properly assembled.

As clearly disclosed in Figs. 4, 5 and 6, the camming ends **24** and **25** of the cam members **12** and **14**, respectively, are cut away to provide arcuate segments with the edges of the segments providing camming surfaces for retracting the latch bolt as will be later more fully explained. The tubular member or insert is formed as a continuous member but is cut away or slotted intermediate its length to provide an arcuate section or segment **30** (Fig. 6), the slot or open portion thereof being aligned with the slot or cut away portions of the cam members **12** and **14**.

The cam member **14** is also formed with a longitudinally extending slot **16** and adjacent its outer end is provided on its interior with a snap spring assembly including an elongated snap spring **26** secured at its outer end by a rivet or other suitable anchoring means **27** to the outer end of the cam member **14**. At its inner or free end this spring carries a button **28** having an end adapted to project through a recess or opening **29** in the cam member **14** and into an opening in the knob **13** adapted to be aligned with the recess or opening **29** to detachably lock this knob in place. This knob **13** like the kob **11** is provided with an interlocking projection **31** adapted to be received within the slot **16**. Thus, when the knob **13** is assembled as in Fig. 4, merely depressing the button **28** by any pointed instrument permits the knob to be withdrawn and removed. As shown in Figs. 4, 5 and 7, the snap spring **26** may be formed of any suitable leaf spring material.

The cam member **14** is further provided with indentations or embossments at **32** and **33** disposed at the opposite sides of the spring **26** and providing stops for limiting lateral movement of and locating this spring, and is slotted at **34** at its inner, enlarged camming end **25** to provide a shoulder or ledge **35** against which a cover **36** of a housing assembly **37** abuts. This cover may be clamped or joined to the body of the housing by means of spaced tongues or flanges **38** bent downwardly onto the cover, and is provided with an annular

hub or collar 39 adapted to provide a bearing surface in which the cam member 14 is journalled adjacent its camming end.

The body of the housing 37 is adapted to partially encompass or enclose the overlapping, arcuate camming edges or ends 24 and 25 of the cam members 12 and 14, respectively, and like the hub or collar on the cover 36 which forms a bearing for the cam member 14, the opposite end wall of the housing is provided with a laterally projecting hub or collar 41 forming a bearing in which the cam member 12 is rotatably mounted. However, this hub or collar 41 is externally threaded to adjustably receive a clamping plate 42 provided with an annular threaded hub or shank 43, and is so contoured as to abut one side or face of a door or closure 44 when the latch mechanism is assembled in operative position.

After this clamping plate 42 is rotated and adjusted to its set or adjusted position, the projecting end of a screw 45 carried in the housing 37 is preferably inserted into an aligned opening or slot 46 in the clamping plate whereby to retain this plate in its adjusted position and to prevent its backing off the threaded hub or shank 41 of the housing. An escutcheon 47 is then adapted to cover this clamping plate in the manner shown in Fig. 4, and may be retained thereon by clinching its peripheral flange 48 onto the peripheral edge of the clamping plate.

The housing 37 which is thus located substantially centrally of the cam tube assembly is cut away or provided with a forwardly opening and longitudinally extending slot 49 at its outer or forward portion; i. e. that portion thereof facing the latch bolt. This slot is defined by a pair of inturned flanges 51 each formed with a projection 52 at one end providing opposed, spaced tongues adapted to receive therebetween the inwardly projecting slide or actuating member 53 of the latch bolt assembly 10, with these spaced tongues adapted to be received within oppositely opening slots 54 in the inner end of the stationary housing 55 of the latch bolt carrying the slide or actuating member 53.

To actuate the end of the latch bolt there is provided a follower or pusher plate 56 in the housing 37. It may consist of a member of substantially channel shape having one end 57 of greater width than the other end 58, and each end having its opposite sides bent or folded inwardly to provide spaced, inturned flanges 59 and 60, respectively (Figs. 6 and 7). The flanges 59 and 60 are adapted to be engaged by the arcuate camming edges of end 25 of the cam member 14, and by the arcuate camming edges of end 24 of the cam member 12.

A coil spring 61 mounted within the housing 37 has its opposite inturned ends 62 (Figs. 6 and 7) projecting inwardly into the channels formed by the flanges 59 whereby this coil spring carries and control the movement of the follower or pusher plate 56 and springbiases or returns it to its neutral or inoperative position when either knob 11 or 13 is released from turning movement. Inturned flanges or projections 63 are provided in the housing 37. These may be stamped from the encompassing wall of the housing and bent inwardly as shown in Fig. 6 to provide abutments about which the flange 59 of the end 57 of the follower or pusher plate 56 pivots.

A clamping plate 64 and an escutcheon 65 snapped onto this plate are also provided at the opposite or inner side of the door. This side may be referred to as the snap side where the knob 13, escutcheon 65 and clamping plate 64 may be readily removed for disassembly or removal of the latch assembly, whereas the other side may be referred to as the clinched side. This permits the cam tube assembly with its housing 37, cam members 12 and 14, tubular member or reinforcing insert 15, follower plate 56, centering spring 61, clamping plate 42, escutcheon 47 and knob 11, to be joined

or assembled as a unit at the factory (Fig. 3) and then inserted into an opening or bore 66 extending laterally through the side rail of the door or closure 44 (Figs. 4 and 6), after which the clamping plate 64, escutcheon 65 and knob 13 are applied. To facilitate assembly or removal of the clamping plate 64, the cover 36 is provided with projecting screws 45 and the plate 64 with keyhole slots (Fig. 7) to receive the heads of the screws, whereby rotating the plate to seat the shanks of the screws in the ends of the keyhole slots and then tightening the screws retains the clamping plate 64 in assembled relation.

The slide or actuating member 53 of the latch bolt 10 is slidably mounted in its housing 54 with the entire latch bolt assembly insertable as a unit in an opening or bore 67 provided in the edge of the door (Fig. 4). This actuating member or slide 53 is slidably mounted in the reduced neck 68 at the inner end of the latch bolt housing 54 and is adapted to be depressed or forced inwardly by turning movement of either knob 11 or 13 through the rotation of its respective cam member 12 or 14, respectively, whereby the camming edges of the arcuate camming ends 24 and 25 (Fig. 6) engage and pivot or rock the follower or pusher plate 56. This causes the pusher plate to press against the pusher or slide member 53 and apply a thrust forcing the member 53 outwardly and through its connecting mechanism to retract the latch bolt 10.

This retraction of the latch bolt may be accomplished by providing a slot 69 in the end wall 70 of the channelled slide member 53 intermediate its ends and adapted to receive the end or shoe 71 of a bolt cam or rocker arm 72 pivotally mounted upon a pin 73 carried in the opposite side walls of the neck or reduced end 68 of the latch bolt housing 54. The bolt cam or rocker arm 72 at its other end is provided with hook or projection 74 seating forwardly of and against a formed flange 75 on the inner end of a bolt bracket 76 carrying at its outer end latch bolt 10. The pin 73 projects through aligned elongated slots 77 in the opposite side walls 78 of the slide or actuating member 53 whereby this member is movable longitudinally in the bolt housing 55.

A compression spring or the like (not shown) springbiases the latch bolt to its extended latching position in which it is adapted to enter the opening 79 in a strike plate 80 on a door jamb 81, and retain the door or closure 44 in closed position. A latch face plate 82 affixed to the bolt housing 55 and provided with screw holes 83 permits the ready attachment to the door.

In the operation of the present lock or latch construction, turning or rotation of the clinched knob 11 will rotate its cam member 12 and the inner arcuate camming end 24 thereof in such manner that the camming edges of the latter will pivot or rock the pusher plate or follower 56 and cause it in turn to depress or force the slide or actuating member 53 into the housing of the latch bolt assembly. This movement of the slide or actuating member 53 rocks the rocker arm or bolt cam 72 which in turn retracts the latch bolt 10 from the opening in the strike plate 80 and permits the door or closure to be opened.

The same operation takes place if the knob 13 at the opposite side of the door or closure 44 is turned, except that such rotation will rotate its cam member 14 and the edges of its arcuate camming end 25 will pivot or rock the pusher plate or follower 56 to retract the latch bolt 10. The reinforcing tubular insert 15 being conformably received in the adjacent ends of the cam members 12 and 14 and the edges of its arcuate central portion 30 where it is cut away or notched being disposed adjacent and adapted to be engaged by the pusher plate or follower 56, is free to rotate with either cam member and its knob.

Having thus disclosed the invention, I claim:

1. In a door latch having a retractable latch bolt

assembly, a housing adapted to be mounted in a transverse bore in the door and provided with an opening for reception of an end of the bolt assembly, a cam tube assembly carried by the housing and comprising a pair of longitudinally slotted tubular cam members having their adjacent ends rotatably mounted within the end walls of the housing and their opposite ends adapted to mount a knob at the exterior and interior of the door with each knob having a projection received in a slot in and adapted to turn its tubular cam member whereby to retract the latch bolt, the adjoining ends of these cam members within the housing being notched and one enlarged to partially encompass the other whereby said ends are disposed in overlapping relation with their ends providing concentric, longitudinally arranged camming edges, an inner sleeve conformably received in and connecting and reinforcing the adjoining ends of the tubular cam members and notched in alignment with the opening in the housing and the notched ends of the tubular cam members, and a follower in the opening of the housing and the notch of the inner sleeve adapted to be engaged and rocked by the camming edges of said tubular members and adapted to retract the latch bolt upon turning of a knob.

2. In a door latch having a retractable latch bolt, a cam tube assembly including a housing adapted to be disposed in an opening of a door or other closure and a pair of longitudinally slotted tubular cam members each provided with an arcuate camming end within the housing for retracting the latch bolt, the camming end of one member being enlarged and overlapping the other, a reinforcing tube disposed within the adjacent ends and extending for a substantial portion of the lengths of the cam members and connecting said members, and a knob mounted upon the slotted outer end of each of said cam members at the opposite sides of the closure whereby turning of a knob rotates its cam member and arcuate camming end to retract the latch bolt and permit opening of the closure.

3. In a door latch having a retractable latch bolt, a housing adapted to be mounted in a transverse opening in the door, a cam tube assembly carried by and journalled in the housing and comprising a pair of longitudinally slotted tubular members having their adjacent ends contained within the housing and thereat cut away to provide arcuate camming projections with the camming projections of one being enlarged and partially encompassing the other whereby these arcuate camming projections are disposed in overlapping relation, and a slotted tubular insert conformably received in said tubular members and spanning these overlapping camming projections and extending beyond their ends for connecting and reinforcing the tube assembly.

4. In a door latch having a retractable latch bolt, a cam tube assembly including a housing adapted to project through an opening in a door or other closure and a pair of longitudinally slotted tubular cam members each having its adjacent end confined within the housing and thereat cut away to provide an arcuate camming surface and with one of these camming surfaces enlarged and these arcuate camming surfaces concentrically arranged, a follower in an opening in said housing and disposed adjacent these camming surfaces whereby rotation of either of said tubular cam members rotates its camming surface to rock said follower and retract the latch bolt,

and a reinforcing tube conformably received in and connecting the adjacent ends of the cam members and provided with a slot for said follower, said reinforcing tube projecting through said concentrically arranged camming surfaces with the ends of the tube conformably received in each of said tubular cam members and rotatable therewith.

5. In a door latch having a retractable latch bolt, a housing and a follower mounted within an opening in the housing for rocking movement, a cam tube assembly comprising a pair of longitudinally slotted tubular members having their adjacent ends confined within the housing and thereat contoured to provide an arcuate projection with the edges of this projection providing camming means and these projections being concentrically arranged with the camming edges of either adapted to engage the follower and retract the latch bolt upon turning movement, a reinforcing tube inserted into and connecting these cam members and provided with a slot through which projects the follower, and projections on said tubular members for locating and aligning said members and reinforcing tube in assembled relation.

6. In a door latch having a retractable latch bolt, a housing and a follower mounted within an opening in the housing for rocking movement, a cam tube assembly comprising a pair of longitudinally slotted tubular members having their adjacent inner ends confined within the housing and thereat contoured to provide an arcuate projection with the edges of this projection providing camming means to engage the follower and retract the latch bolt, a reinforcing tube inserted into and connecting these cam members with this tube slotted to receive the follower, means on said tubular member for locating and aligning said members and reinforcing tube in assembled relation, and a knob mounted on the outer end of each tubular member and provided with a projection received in the slot of its tube member.

7. In a door latch having a retractable latch bolt assembly, a housing adapted to be mounted in a transverse opening in the door, a follower freely pivoted in said housing, a cam tube assembly carried by and journalled in the housing and comprising a pair of longitudinally slotted tubular cam members having their adjacent ends confined within the housing and notched to provide overlapping camming surfaces, a tubular insert conformably received in said tubular members and spanning these overlapping camming projections for connecting and reinforcing the tubular cam members, said insert and housing being recessed adjacent the overlapping camming surfaces of said tubular members for the reception of the follower and an end of the lock bolt assembly, means on said tubular members for locating and aligning said members and insert in assembled relation, and a knob mounted on the outer end of each tubular member and provided with a projection received in the longitudinal slot of its tubular member.

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