

Aug. 27, 1963

E. W. NORTH ET AL

3,101,604

PANIC-PROOF DOOR LOCK

Filed Jan. 23, 1961

3 Sheets-Sheet 1

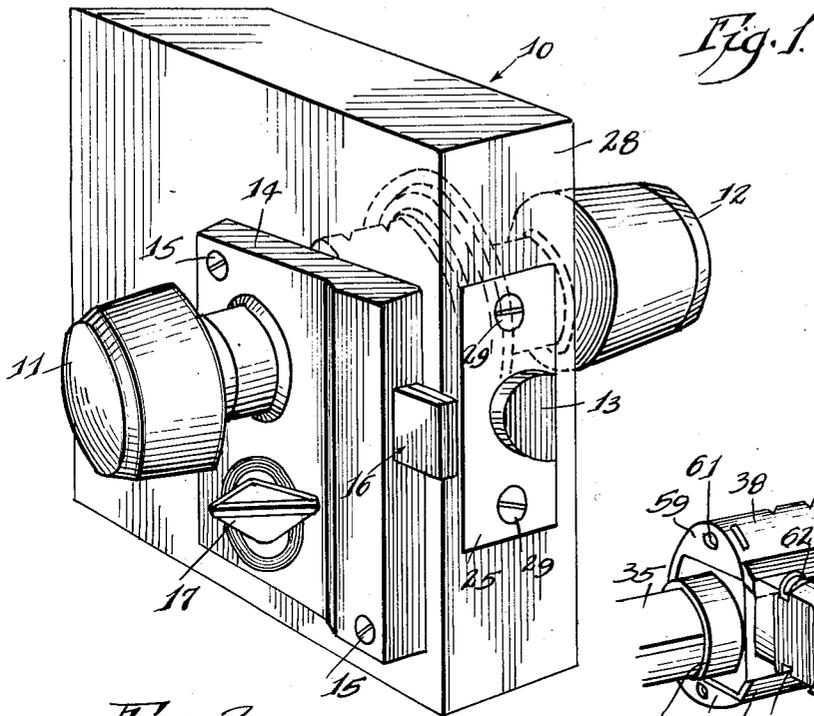


Fig. 1.

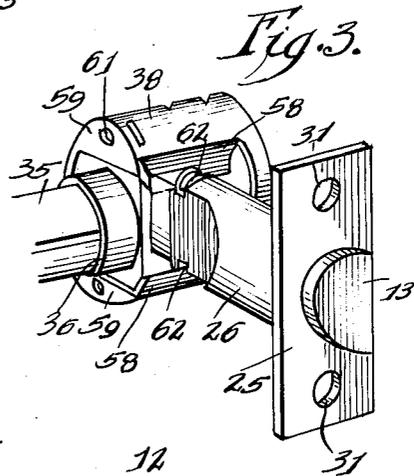


Fig. 3.

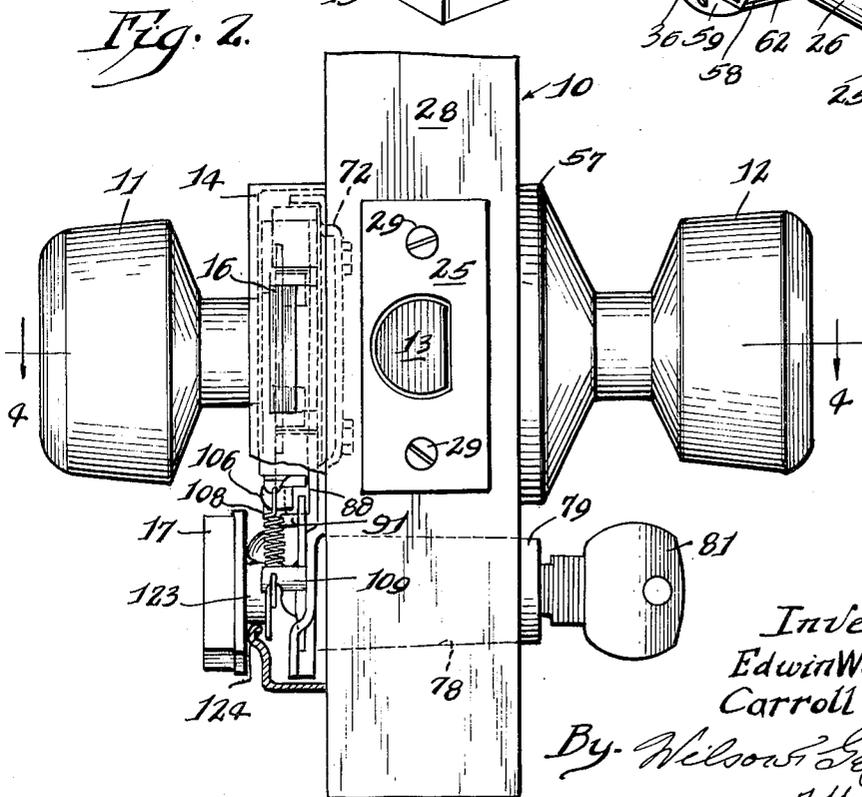


Fig. 2.

Inventors.
Edwin W. North.
Carroll V. Sporn
By *Wilson & Steppert*
Attorneys.

Aug. 27, 1963

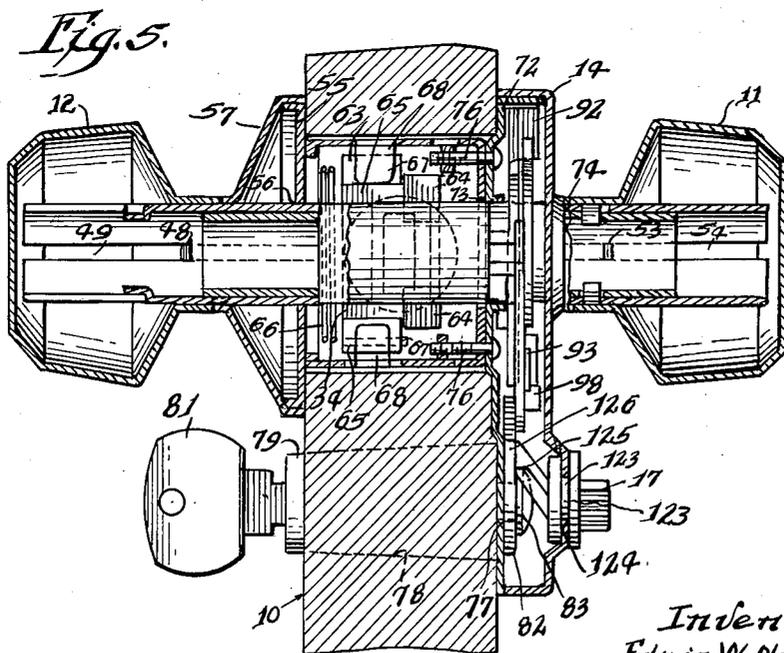
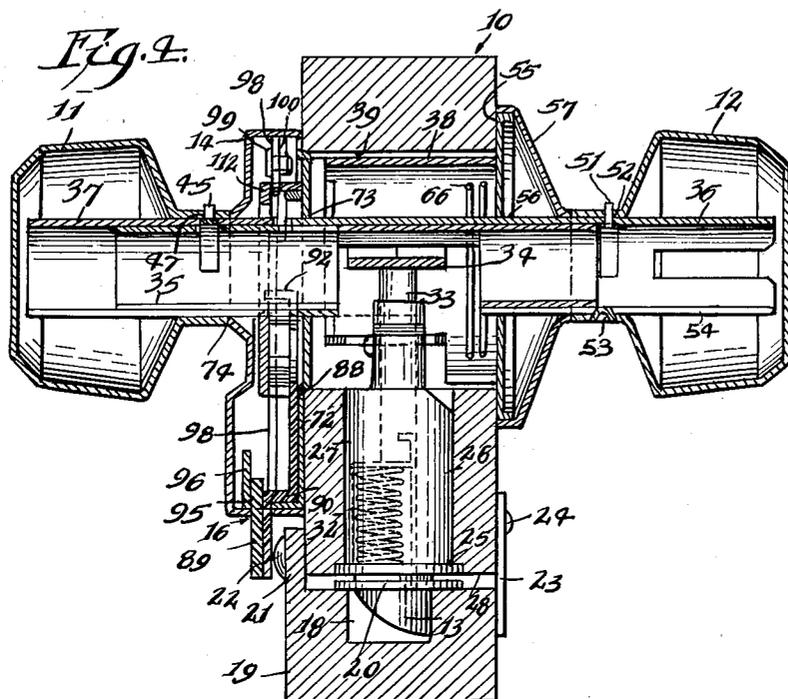
E. W. NORTH ETAL

3,101,604

PANIC-PROOF DOOR LOCK

Filed Jan. 23, 1961

3 Sheets-Sheet 2



Inventors,
Edwin W. North
Carroll V. Spon.

By *Wilson & Giffert*
Attorneys.

Aug. 27, 1963

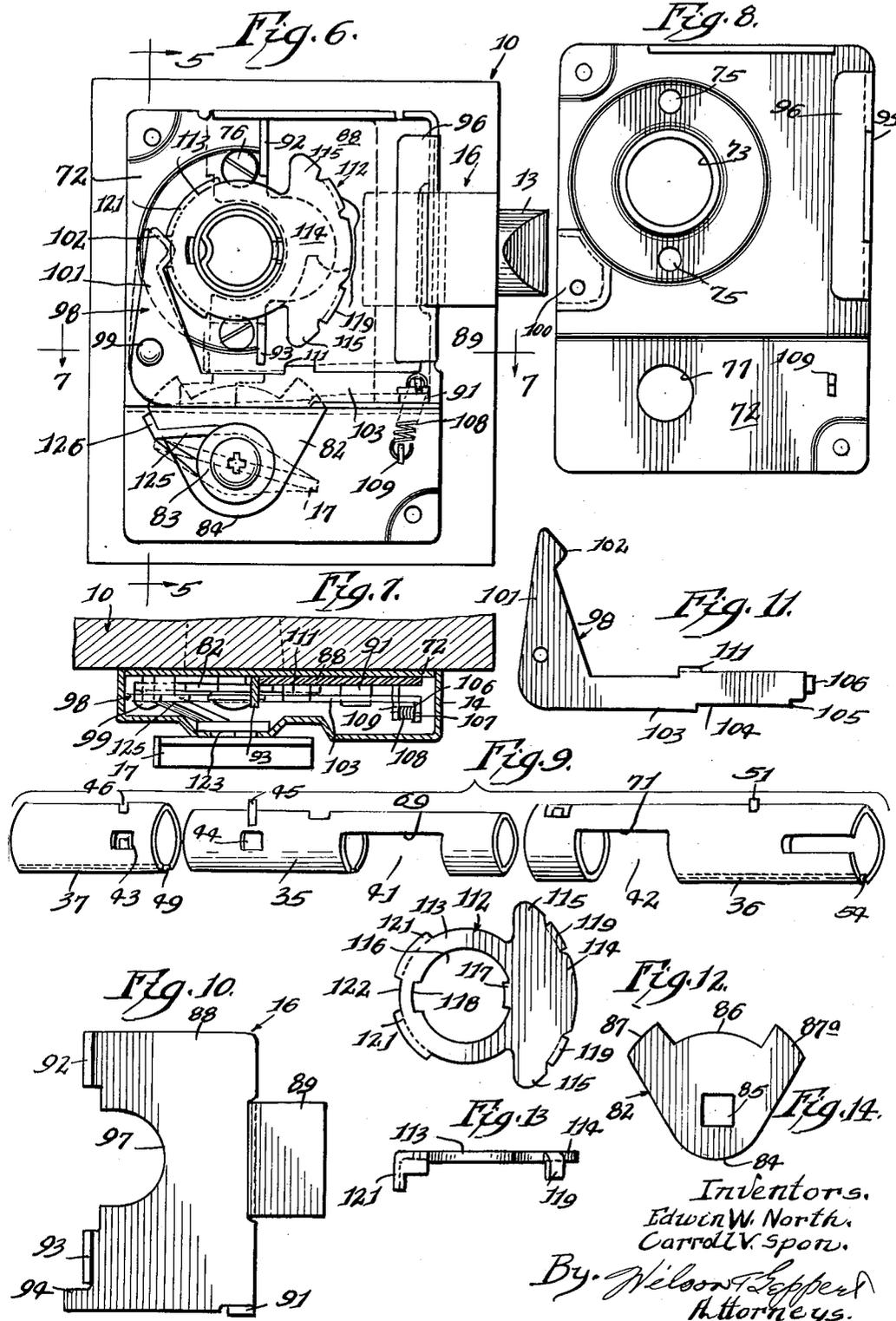
E. W. NORTH ET AL

3,101,604

PANIC-PROOF DOOR LOCK

Filed Jan. 23, 1961

3 Sheets-Sheet 3



Inventors,
Edwin W. North,
Carroll V. Sporn.
By *Wilson & Lippert*
Attorneys.

1

3,101,604

PANIC-PROOF DOOR LOCK

Edwin W. North and Carroll V. Spon, Rockford, Ill., assignors to National Lock Co., Rockford, Ill., a corporation of Delaware

Filed Jan. 23, 1961, Ser. No. 84,002

15 Claims. (Cl. 70-107)

The present invention relates to a novel lock construction and more particularly to a so-called "panic-proof" lock used on doors or other closures, such as doors for mobile homes to prevent a person from being locked in with no means of egress.

Where a door can be locked from the inside, problems continually arise with small children or other persons who cannot unlock the door once it is locked. If a trailer or mobile home is involved, the problem is heightened since trailer doors must have key operated locks to lock the door from the outside to prevent strangers from entering. The present invention encompasses a door lock which may be released by the proper key from the outside and may be released from the inside by turning the inside door knob. Thus, a person cannot be accidentally locked in a trailer or mobile home.

Among the objects of the present invention is the provision of a novel lock construction for a door or other closure where a tumbler lock acts to advance or retract the lock or dead bolt of the lock assembly. The lock construction further includes a latch bolt adapted to be retracted or operated by means of a knob on the inside and another on the outside of the door. The tumbler lock is operated by a proper key from the outside to lock or unlock the door and thus preventing unauthorized entry into an enclosure such as a trailer or mobile home, etc.

A further object of the present invention is the provision of a dead bolt actuating means on the inside of the door or other closure and separate from the inside door knob which advances the bolt to its locked position, and the inside knob through an associated camming means retracts the dead bolt when the knob is rotated in either direction.

Another object of the present invention is to provision of a novel lock or latch assembly embodying a pair of tubular cam members and a sleeve or relatively short tubular member. The pair of cam members telescope within each other with an end of the inner tubular cam member telescoped within the sleeve and secured thereto to prevent relative movement between the sleeve and the inner or central tubular camming member. The exterior knob is secured to the outer tubular camming member and this knob and the outer member are free to rotate relative to the inner tubular camming member and the sleeve. The inner knob is secured to the sleeve and likewise is free to rotate relative to the outer tubular camming member and the outer knob. Both inner and outer knobs are adapted to retract the latch bolt upon rotation.

The present invention also comprehends the provision of a novel advancing and retracting assembly for the lock or dead bolt and a locking mechanism to retain this bolt in its advanced position so that the lock cannot be easily picked or otherwise tampered with. The advancing and retracting mechanism includes a rotatable cam plate which is secured to the rotatable plug of a tumbler lock having a key opening at the exterior of the door. This cam plate contacts an extension of the lock bolt for movement. A manually-operated turn button has an arm which will contact and rotate the cam plate to advance the lock bolt upon rotation of the turn button. A pivoted arm has a recess at one end which engages a lateral arm of the lock bolt to lock this bolt in advanced

2

position. Either rotation of the cam plate by means of the proper key at the exterior or the inner door knob releases this arm.

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 perspective view of the present novel panic-proof door lock assembled in operative position in a door or other closure.

FIG. 2 is a side elevational view of the novel door lock assembled in operative position on a door and viewed toward the edge of the door.

FIG. 3 is a fragmentary view in perspective showing the manner of assembling the latch bolt unit inserted in the edge of the door and the center housing inserted into a transverse opening extending through the door.

FIG. 4 is a view in horizontal cross section taken on the line 4-4 of FIG. 2 and viewed in the direction of the arrows, this view showing the operative relationship of the tubular camming members and the latch bolt.

FIG. 5 is a view in vertical cross section taken on the line 5-5 of FIG. 6 and viewed in the direction of the arrows, this view showing the relationship of the tumbler lock and the inner locking knob.

FIG. 6 is a view in front elevation of the camming and locking mechanism for the lock bolt mounted within the casing on the interior of the door and with the face plate of the casing broken away to show the interior assembly.

FIG. 7 is a horizontal cross section taken on the line 7-7 of FIG. 6 and viewed in the direction of the arrows.

FIG. 8 is a view in front elevation of the base for the casing or housing for the actuating mechanism for the lock bolt.

FIG. 9 is an exploded or disassembled view of the telescoping inner and outer tubular camming members and the sleeve member, which members extend through the door and have the inner and outer door knobs secured thereto.

FIG. 10 is a front view of the lock or dead bolt with its camming surfaces for advancing or retracting the bolt.

FIG. 11 is a front view of the pivotally mounted arm in the locking mechanism which locks the dead bolt in its advanced position.

FIG. 12 is a front view of the rotatable camming member which is actuated by rotation of the inner door knob and the sleeve member.

FIG. 13 is a view in end elevation of the camming member shown in FIG. 12.

FIG. 14 is a front view of a rotatable camming plate secured to the rotatable plug of the tumbler lock which when rotated engages the camming surface shown on the lock or dead bolt of FIG. 10.

Referring more particularly to the disclosure in the drawings and to the novel illustrative embodiment therein shown, the present novel lock assembly is primarily adapted for use on a door 10 such as for access into and out of a trailer or mobile home where the door opens outwardly and a lock is required to prevent unauthorized entrance, and rotation of either of the knobs 11 or 12 at the inner and outer sides of the door, respectively, will readily retract a latch bolt 13 to open the door 10 when the door is unlocked.

As clearly shown in FIG. 1, a casing 14 is mounted on the inner surface of the door 10 by screws 15 and encloses the actuating mechanism for the lock or dead bolt 16. A manually actuated turn button 17 is utilized to

3

advance the bolt 16 to its locking position. As seen in FIG. 4, the latch bolt 13 extends into an opening 18 in the door frame 19 defined by a strike plate 20, said frame having an extension 21 on the inner edge which overlaps the door 10 providing a stop when the outwardly swinging door is closed. When in its advanced or locking position, the lock or dead bolt 16 overlaps or projects beyond the extension 21 to prevent the door from opening. A small bumper or button 22 may be attached to the inner surface of the extension 21 whereby the lock bolt 16 contacts the button to retain the door tightly closed and to prevent marring of the finish of the door frame. A metal plate 23 is secured to the exterior of the door 10 by screws 24 and overlaps the door frame to further limit closing movement of the door and assure a tight closure.

The projected end of the latch bolt 13 extends through a face plate 25 and is longitudinally movable within a casing 26 secured to and projecting from the face plate. An opening 27 extends into the door from the outer edge 28 and conformably receives and houses the latch bolt casing 26 and latch bolt assembly. The assembly is secured to the door 10 by screws 29 extending through openings 31 in the face plate 25. The actuating mechanism for the latch bolt 13 within the casing 26 is essentially the same as that shown in the Edwin W. North Patent No. 2,733,945, issued February 7, 1956, and includes a spring 32 urging the latch bolt 13 into the opening of the strike plate 20 and the opening 18 in the door frame 19 and a slide member 33 which is actuated by movement of a pusher plate or follower 34 to retract the latch bolt 13.

As more clearly shown in FIGS. 4, 5 and 9, a pair of tubular camming members 35 and 36 and a sleeve member 37 extend through the door and lock bolt assembly and beyond the door for a sufficient distance to allow the knobs 11 and 12 to be secured thereon. These members extend through a central and substantially cylindrical housing 38 which is conformably received within a transverse opening 39 in the door 10. The central or inner tubular camming member 35 is cut away at 41 to provide a roll back, said opening being to the right of the center of the member as seen in FIG. 9 and of a size to encompass the pusher plate or follower 34. The outer tubular camming member 36 is partially telescoped over the central member 35 and is cut away at 42 to provide a roll back, said openings 41 and 42 of the members 35 and 36 being aligned in the normal position of the assembled latch mechanism and the members 35 and 36 being free to rotate relative to each other. The sleeve member 37 is telescoped over and secured to the opposite or outer end of the inner member 35 by means of an interlocking projection 43 on the sleeve member 37 seating in a recess 44 of the inner member 35. A spring-loaded projection 45 is mounted in the inner cam member 35 by any suitable means and adapted to project through an opening in the central camming member 35 and an aligned opening 46 in the sleeve member 37.

The knob 11 is clinched or attached to the sleeve member 37 by means of the spring-loaded projection 45 extending through an opening 47 in the shank of the knob (FIG. 4) and a projection 48 seated in the longitudinal slot 49 of the sleeve member 37 (FIG. 5) so that the knob 11, sleeve member 37 and inner camming member 35 will rotate as a unit. Likewise, the knob 12 is attached to the exposed projected end of the outer camming member 36 by means of a spring-loaded projection 51 mounted in the member 36 and extending through an opening in the member 36 and an aligned opening 52 in the shank of the knob 12. A projection 53 on the knob 12 also is seated in a longitudinal slot 54 in the member 36.

The central housing 38 is affixed at one end to a clamp plate 55, the latter abutting the exterior surface of the door 10 when the latch assembly is in adjusted position in the opening 39, and having an opening 56 to conformably receive the outer camming member 36. An es-

4

cutcheon 57 covers this clamp plate. The housing is cut away or open at its outer or forward portion (see FIG. 3) and thereat provided with a pair of inwardly extending or inturned tongues or flanges 58. The open end of the housing 38 is also provided with inturned flanges 59, each flange provided with a tapped or threaded opening 61, the purpose of which will appear subsequently.

The casing 26 for the latch bolt 13 is provided adjacent its inner end with a pair of slots 62 (FIG. 3) which receive the inturned flanges 58 on the housing 38 and thus locate latch bolt assembly and the camming tubes 35 and 36 in their operative relation with the pusher plate 34 received within the central housing 38. This pusher plate is of substantially channel shape and provided with a widened or expanded portion 63 at one end. The body of this pusher plate and its widened end portion 63 have their opposite sides bent inwardly to provide inturned and returned flanges 64 and 65. A coil spring 66 within the housing 38 has its inturned ends 67 projecting inwardly into the channels or spaces formed by the end portion 63 and its inturned flanges 65. A pair of inturned tongues or flanges 68 in the housing 38 limit movement of the pusher plate 34 under the influence of the spring 66. The above details of the latch bolt assembly and pusher plate are clearly disclosed in the above mentioned North Patent No. 2,733,945, with the pusher plate shown in FIGS. 2a and 10 of that patent.

By so locating the ends 67 of the spring 66, this coil spring carries and controls the movement of the pusher plate 34. Upon release of the knob being turned, the ends 67 of the coil spring 66 spring-bias the pusher plate or follower to its normal or inoperative position in contact with the camming edges or surfaces 69 and 71 of the cut-outs 41 and 42 of the inner and outer tubular camming members 35 and 36. Upon rocking of this floating pusher plate or follower by these camming edges or roll backs upon turning a knob, either inturned tongue or flange 68 provides a fulcrum on the interior of the housing 38 for such rocking movement.

As shown, the edges or cam surfaces 69 and 71 of the central arcuate portions of the inner and outer tubular camming members engage or abut against the flanges 64 at one or the other side of the pusher plate 34. This plate 34 is held in contact with the inner end of the slide member 33 mounted in the casing 26, and is adapted to be depressed or forced inwardly by turning movement of either knob which rotates one of the two tubular camming members 35 or 36 and the latter in turn through the cam surfaces 69 or 71 pivots or rocks the pusher plate 34 which presses against the slide member 33 and applies a thrust to force this pusher member outwardly through its connecting mechanism to retract the latch bolt 13. The connecting mechanism of the latch bolt and the pusher plate 34 are also fully disclosed in the above mentioned North Patent No. 2,733,945.

FIGS. 6 and 8 disclose a backing plate 72 which forms the inner wall or base of the enclosure for the lock bolt or dead bolt 16, the cover 14 forming the remainder of the enclosure. The tubular camming members 35 and 36 extend through an opening 73 in the plate 72, and the inner camming member 35 and the sleeve member 37 extend through an opening 74 in the cover 14. A pair of smaller openings 75 on opposite sides of the opening 73 in the plate 72 are aligned with the threaded openings 61 in the flanges 59 of the central housing 38 to receive screws 76 or other suitable fastening means extending through the openings 75 and 61 to secure the backing plate and the central housing 38 onto the door 10.

A second opening 77 below the opening 73 in the plate 72 is aligned with a transverse opening 78 extending through the door conformably receiving a tumbler lock 79 adapted to be actuated by a key 81 operated from the exterior of the door. The tumbler lock is secured at its inner end to the base plate 72 and has a rotatable plug extending through the opening 77 in said plate. A plug

5

cam (FIG. 14) 82 is anchored to the rotatable plug by means of a screw or other fastening means 83 and rotates with the tumbler lock, the plug cam 82 having the general configuration of a sector of a circle with the apex rounded off at 84. A square opening 85 receives the square shank of the rotatable plug of the tumbler lock 79. The arcuate edge of the cam has a central recessed area at 86 and a pair of projections 87, 87a at the opposite ends of the arc, the recess providing a lost motion means to return the key 81 in the lock 79 to a vertical position.

The lock or dead bolt 16 (FIGS. 4 and 10) is provided with a flat plate or body 88 and a laterally offset locking projection 89, the projection being offset from the plane of the body by means of an arm 90 to which the locking projection is rigidly affixed. As seen in FIG. 10, the lower right-hand corner of the flat body 88 has a transversely extending arm or projection 91, a pair of vertical transverse arms or projections 92 and 93 extending from the top and bottom of the body 88, and a rearward extension 94 adjacent the lower arm 93. The backing plate 72 (FIG. 8) has a guide slot 95 for the locking projection 89 of the lock bolt 16 formed in a rearwardly extending and returned flange 96. A recess 97 between the arms 92 and 93 is so formed as to conformably receive the tubular camming element 35 and the sleeve 37 when the bolt 16 is in its retracted position shown in dotted lines in FIG. 6.

A locking lever 98 (FIG. 11) is pivotally mounted on a rivet 99 secured to the backing plate 72 at the raised area 100, the lever having a short arm 101 terminating in an inwardly extending projection or tooth 102 and a long arm 103 extending parallel to and adjacent to the flat body 87 of the lock bolt 16. The lower edge of the arm 103 is slightly recessed at 104 and terminates in a recess 105 adapted to receive the transverse projection 91 of the lock bolt 16. Also at the end of the long arm 103 is a transverse projection 106 notched at 107 to receive one end of an expansion spring 108. The opposite end of the spring 108 is connected to a notched arm 109 extending transversely from the backing plate 72. The spring 108 thus biases the locking lever 98 in a clockwise direction as seen in FIG. 6 around the rivet or pivot 99. An intermediate projection 111 on the locking lever 98 extends from the top edge of the arm 103 in toward the flat plate body 88 of the lock bolt 16 and over the plug cam 82.

A shifter 112 (FIGS. 12 and 13) operatively connected to the inner knob 11 is mounted on the sleeve 37. The shifter 112 consists of a circular member 113 having an enlargement or projection 114 on the right side as viewed in FIGS. 6 and 12. The enlargement or projection 114 has outwardly extending ears 115 adapted upon rotation in either direction to engage the arms 92 and 93 of the lock bolt 16. An opening 116 centrally located in the circular portion 113 closely conforms to the exterior diameter of the sleeve or tubular member 37. A projection 117 in the opening 116 fits within the longitudinal slot 49 of the member 37. A recess 118 is located on the opposite side of the opening 116 so as to allow the shifter 112 to be slid onto the sleeve member 37 without interference from the spring-loaded projection 45. A pair of tabs 119 extend inwardly from the enlargement 114 toward the flat plate 88 of the lock bolt 16. A pair of spaced lateral or inward projections 121 on the outer edge of the circular member 113 form a notch 122 therebetween to receive the tooth or projection 102 of the arm 101 of the locking lever 98. The tooth or projection 102 is engaged by either arm 121 of the shifter 112 on rotation of the latter in either direction by rotation of the inner knob 11.

The cover 14 contains an opening 74 for the sleeve member 37 and a second opening 124 for the shank 123 of the turn button 17. A shifter arm 125 is secured to the shank 123 and rotates with the turn button 17. As seen in FIG. 6, the shifter arm 125 engages the left-hand edge

6

of the plug cam 82 so as to turn the cam in a clockwise direction to advance the lock bolt 16. Movement of the shifter arm 125 in a counterclockwise direction has no effect on the lock bolt 16. The projecting end 126 of the shifter arm 125 which contacts the plug cam 82 is inwardly offset from the portion of the shifter arm secured to the turn button 17 as shown in FIG. 6.

With further reference to FIG. 6, with the lock bolt 16 in retracted position, rotating the key 81 in the tumbler lock 79 to turn the plug cam 82 in a clockwise direction, the left-hand projection 87 of this cam contacts the lower projection 93 of the body 88 of the lock bolt 16, and on further rotation urges the lock bolt 16 to its advanced or extended position where the projection 91 is disposed below the recess 105 of the locking lever 98, and the lever urged by the spring 108 pivots in a clockwise direction to lock the bolt in its advanced position. The key 81 may then be returned to a vertical position by virtue of the recess 86 on the plug cam 82.

In a like manner, turning the key 81 to rotate the plug cam 82 in a counterclockwise direction, the right-hand projection 87a contacts the intermediate projection 111 on the locking lever 98 to lift the arm 103 against the action of the spring 108 and release the projection 91 on the body 88 of the lock bolt 16, and while retaining the lever arm 103 in lifted position contacts the projection 93 of the lock bolt 16 to move the bolt to its retracted position. Thus, the door 10 can be locked or unlocked from the exterior of the door by use of the key 81.

The turn button 17 may be manually rotated in a clockwise direction so that the offset end 126 of the shifter arm 125 contacts and moves the plug cam 82 in a clockwise direction to advance the bolt to its locked position. However, rotation of the turn button 17 in a counterclockwise direction does not retract the bolt 16. Instead, rotation of the inner knob 11 in either direction will retract the lock bolt from its locked position. Rotating the knob in a clockwise direction will rotate the shifter 112 in the same direction through the agency of the sleeve 37, and the lower projection 121 will contact the lower camming surface on the projection 102 to pivot the locking lever 98 and lift the arm 103 to release the lock bolt for movement. While the lever arm 98 is in an elevated position, the lower ear 115 on the enlargement 114 of the shifter 112 engages the projection 93 of the lock bolt 16 to retract the bolt. If the shifter 112 and knob 11 are rotated in a counterclockwise direction, the upper projection 121 will contact the projection 102 to lift the lever arm 103 and the upper ear 115 will contact the projection 92 of the lock bolt 16 to retract said bolt.

Thus, we have invented a panic-proof door lock which can be locked or unlocked from the outside by use of a proper key in a lock and can be locked from the inside by means of a turn button. If a person is accidentally locked within the trailer or other enclosure or for any reason the occupants must seek quick escape, rotation of the inner knob will retract both the lock bolt and the latch bolt to open the door. While a door lock of a particular type has been shown and described by way of illustration, it is not our intent or desire to unnecessarily restrict the present invention by virtue of this limited showing. It is also contemplated that the specific descriptive terms employed herein be given the broadest possible interpretation consistent with the actual disclosure.

Having disclosed the invention, we claim:

1. In a lock construction, a housing adapted to be mounted in a transverse opening of a door or other closure, a pair of telescoping cam tubes and a sleeve member telescoping over the end of and secured to the inner cam tube and the cam tubes being rotatable relative to each other, means in said housing and adapted to be rocked by either of said cam tubes, an inner knob secured to said sleeve member, an outer knob secured to the

7

outer cam tube, a latch bolt adapted to be retracted by turning of either knob and rocking of said means, and a lock bolt mechanism on the inner surface of the door including a reciprocable lock bolt, a turn button adapted to only advance said lock bolt to its locked position, and means actuated solely by rotation of the inner knob and said sleeve member to retract both said lock bolt and said latch bolt.

2. In a lock construction as set forth in claim 1, including a key-actuated lock operable from the exterior of the door for advancing said lock bolt to locked position or retracting said lock bolt from locked to open position by means of the proper key.

3. In a lock construction, a latch bolt and a latch bolt operating unit extending through a transverse opening in a door, said unit including a cam tube assembly extending through said unit and having an inner and an outer knob secured to the ends thereof, each knob adapted to separately retract said latch bolt through rotation of said cam tube assembly, and a lock bolt assembly secured to the inner surface of the door, said assembly including a reciprocable lock bolt, a tumbler lock extending through a second transverse opening in the door below the latch bolt operating unit and adapted to advance or retract said lock bolt, a turn button on the inner side of the door and spaced from the inner knob adapted to only advance the lock bolt to locked position, and means actuated solely by turning of said inner knob in either direction to retract said lock bolt.

4. In a lock construction, a latch bolt and a latch bolt operating unit extending through a transverse opening in a door or other closure, said unit including a cam tube assembly extending through and beyond each side of said door, a knob secured to each end of said cam tube assembly and individually operable to retract said latch bolt, and a lock bolt assembly secured to the inner surface of said door, said lock bolt assembly comprising a casing, a lock bolt member reciprocable therein, an offset bolt formed at the forward edge of said member, means at the rear of said bolt member engaged by motion inducing means, a turn button on the exterior of the casing and spaced from the knob at the interior of the door, motion inducing means connected to said turn button and adapted upon rotation of said turn button to solely advance said member and its bolt to its locking position, and cam means secured to said cam tube assembly and adapted upon rotation of the inner knob in either direction to retract latch bolt and said member and its bolt to unlocked position.

5. In a lock construction as set forth in claim 4, a tumbler lock extending through a second transverse opening in the door or other closure spaced from the first transverse opening, a rotatable plug in said tumbler lock extending into the casing for the lock assembly, and a plug cam secured to the plug and rotatable therewith, said plug cam adapted to advance or retract the lock bolt member and its bolt upon rotation of the proper key in the tumbler lock.

6. In a lock construction as set forth in claim 5, said means at the rear of the lock bolt member comprising a pair of vertically spaced outwardly projecting arms, said member having a recess between said arms adapted to encompass the cam tube assembly when said member and its bolt are retracted, and said plug cam including a pair of spaced projections on the outer arcuate surface of said cam adapted to engage the lower arm on said member.

7. In a lock construction, a latch bolt and a latch bolt operating unit extending through a transverse opening in a door or other closure, a cam tube assembly extending through and beyond each side of the door, a knob secured to each end of said cam tube assembly and individually operable to retract said latch bolt, and a lock bolt assembly comprising a casing mounted upon the inner surface of the door, said cam tube assembly extending through said lock bolt assembly, a locking plate

8

reciprocable between unlocked and locked positions within said casing and terminating in an offset lock bolt, a guide opening in the side of said casing adjacent the edge of the door to accommodate said lock bolt, vertically spaced projections on the edge of said locking plate opposite to the lock bolt, a central recess between said projections and open at said edge adapted to receive the cam tube assembly when the locking plate and lock bolt are in their retracted unlocked position, a key-operated tumbler lock extending through a second transverse opening in said door with the key adapted to be inserted in said lock from the exterior of the door, a rotatable plug in said tumbler lock extending into said casing, a plug cam secured to and rotatable with said plug, spaced projections on said cam adapted to engage the lower projection of said locking plate to advance and retract said plate and lock bolt upon rotation of said plug cam, and locking means to retain said locking plate and lock bolt in its advanced locked position.

8. In a lock construction as set forth in claim 7, said locking means comprising a pivotally mounted lever extending adjacent the locking plate and having an arm terminating in a recess, spring-biasing means connected to the free end of said lever arm and urging the lever to its locked position, and a transversely extending projection on the locking plate adapted to be received in said recess when the locking plate is in its advanced position.

9. In a lock construction as set forth in claim 7, a turn button on the exterior of said casing and having a shank extending into said casing, an arm secured to said turn button adapted to engage the edge of the plug cam upon rotation of the turn button in one direction to urge said lock bolt to its locked position.

10. In a lock construction as set forth in claim 7, a shifter mounted on said cam tube assembly within said casing and adapted to be rotated by rotation of said inner knob, said shifter including a pair of ears adapted to engage the upper and lower vertically spaced projections on said locking plate to retract said locking plate and lock bolt to the unlocked position.

11. In a lock construction as set forth in claim 10, said locking means comprising a pivotally mounted locking lever having a pair of arms at right angle to each other, one of said arms extending parallel to and adjacent said locking plate and terminating in a recess on the bottom edge of said arm, means to spring-bias said lever to a locking position, said locking plate having a transversely extending projection adapted to be received in said recess when the locking plate and its lock bolt are advanced to the locked position, the other arm of said lever terminating in projection having inclined surfaces, said shifter having a notch in its periphery adapted to receive said projection, said shifter having surfaces adapted to engage the inclined surfaces on said projection upon rotation of said shifter to pivot said lever to its unlocked position.

12. In a lock construction, a latch bolt and a latch bolt operating unit extending through a transverse opening in a door or other closure, said unit comprising a central housing received within said transverse opening and having an opening in its forward wall, a pair of partially telescoping cam tubes extending through said housing and rotatable therein, a sleeve member partially telescoping over and secured to the inner cam tube, said cam tubes being rotatable relative to each other and said sleeve member rotating with said inner cam tube, an inner knob secured to said sleeve member, an outer knob secured to said outer cam tube, and means actuated by rotation of either cam tube and adapted upon rotation to retract said latch bolt, and a lock bolt assembly secured to the inner surface of said door, said assembly comprising a locking plate reciprocable between advanced and retracted positions and terminating in a lock bolt offset from the body of said locking plate, guide means to accommodate said lock bolt and guide its movement between its retracted unlocked position and its advanced locked position, ver-

tically spaced projections on the edge of said plate opposite said lock bolt and extending away from said door, a recess between said projections and extending to the edge of the plate adapted to accommodate said sleeve member secured to the inner cam tube when the locking plate is in its retracted position, a tumbler lock extending through a second transverse opening in said door below said latch bolt operating unit and having a key adapted to be inserted in said tumbler lock from the exterior of said door, a rotatable plug in said tumbler lock extending into said lock bolt assembly, a plug cam secured to and rotatable with said plug, spaced projections on said plug cam adapted to engage said lower projection on the locking plate to advance and retract said lock bolt upon rotation of said cam, a shifter removably mounted on said sleeve member and adapted to rotate therewith, said shifter having ears adapted to engage the upper and lower projections of said locking plate to retract said lock bolt, and a locking lever for locking said locking plate in its advanced position.

13. In a lock construction as set forth in claim 12, including a turn button having an arm secured thereto and adapted upon rotation of the turn button to engage said plug cam and advance said lock bolt to its advanced position.

14. In a lock construction as set forth in claim 12, said locking lever being pivotally mounted in said assembly

and having a pair of arms arranged at right angles, one of said arms terminating in a recess, a transversely extending projection on said locking plate adapted to be received in said recess when said plate is in its advanced position, means biasing said lever to its locking position, the other arm of said lever terminating in a projection having camming surfaces, said shifter having a notch to receive said projection when said lever is in its locked position and spaced surfaces to engage said camming surfaces on said projection when said shifter is rotated to pivot said lever to its unlocked position and allow retraction of said lock bolt.

15. In a lock construction as set forth in claim 14, a transversely extending projection on said one arm of the lever intermediate the ends of said arm and adapted to be engaged by a projection on the plug cam to raise said one arm of the locking lever to unlocked position during rotation of said plug cam and to retract said locking plate and its lock bolt.

References Cited in the file of this patent

UNITED STATES PATENTS

1,033,028	Mason	July 16, 1912
1,060,413	Augenbraun	Apr. 29, 1913
1,229,319	Page	June 12, 1917
2,733,945	North	Feb. 7, 1956