

Jan. 20, 1953

D. C. HAY

2,625,812

PLUNGER TYPE LOCK

Filed Sept. 24, 1945

3 Sheets-Sheet 1

Fig. 1

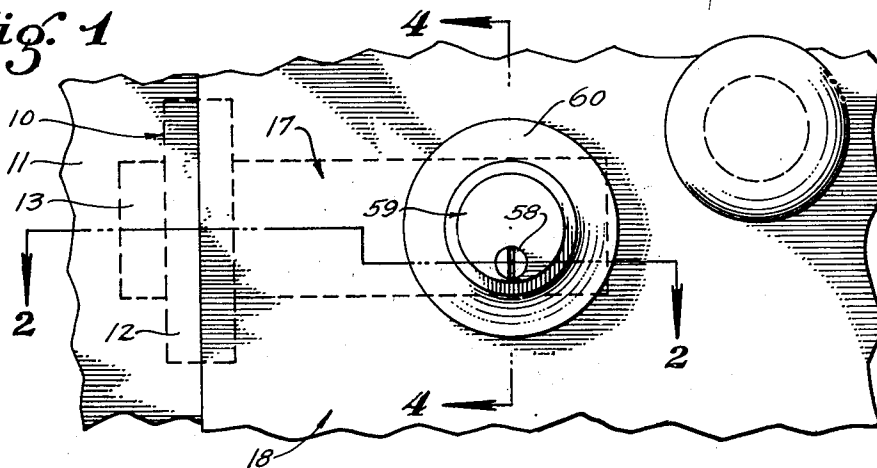


Fig. 2

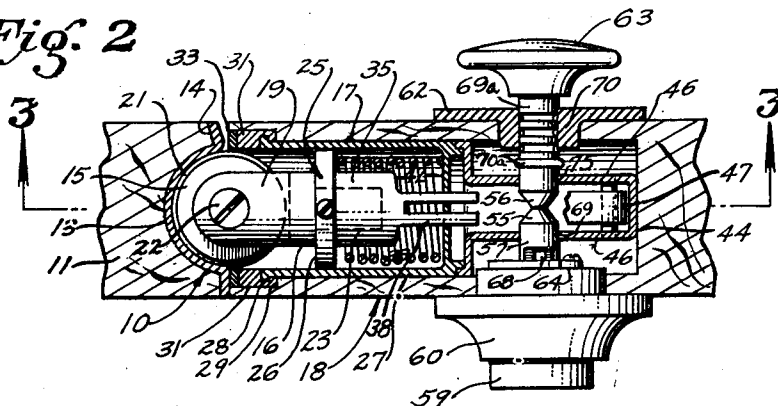


Fig. 7

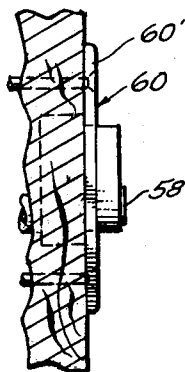
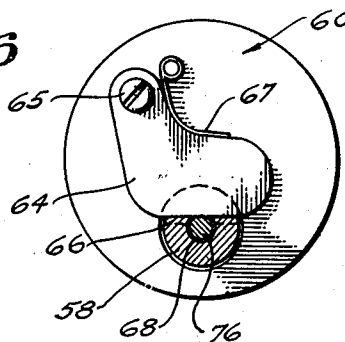


Fig. 6



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Fig. 3

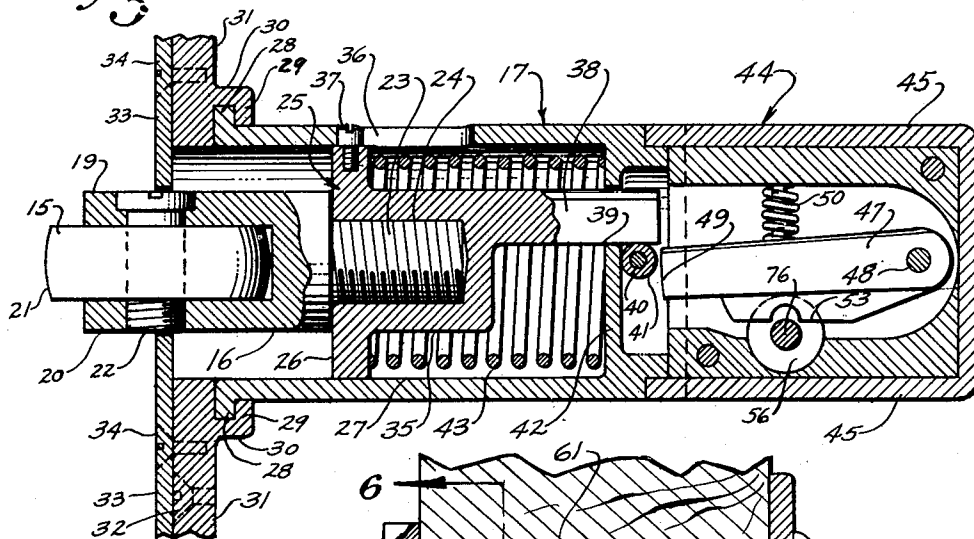


Fig. 4

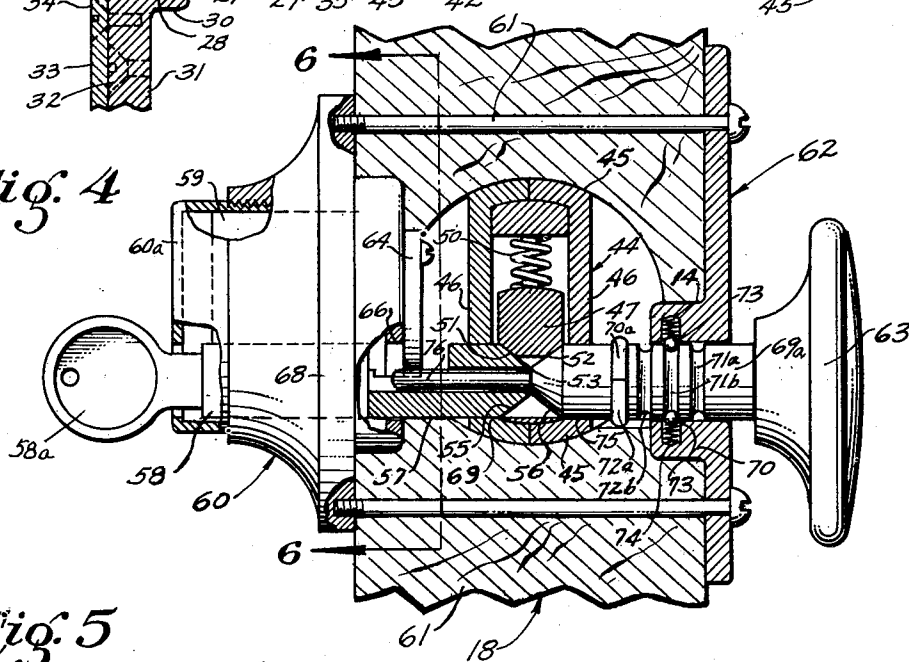
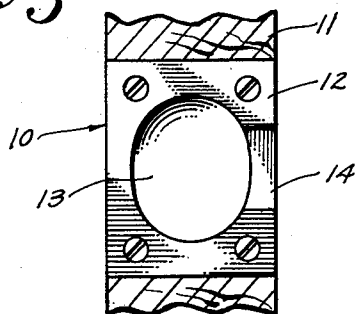


Fig. 5



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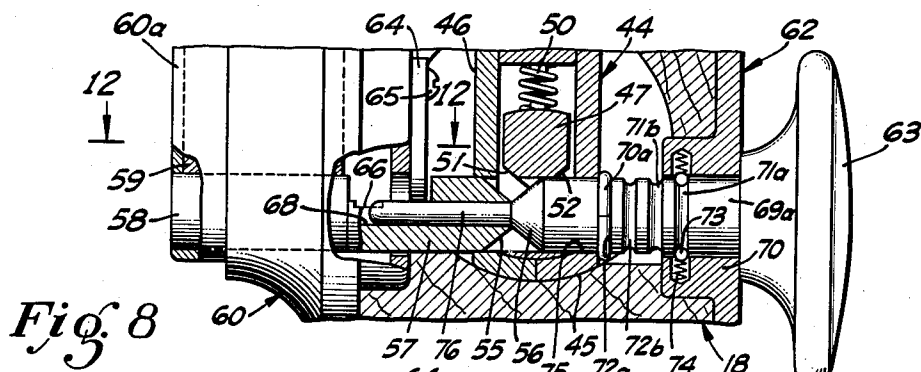


Fig. 8

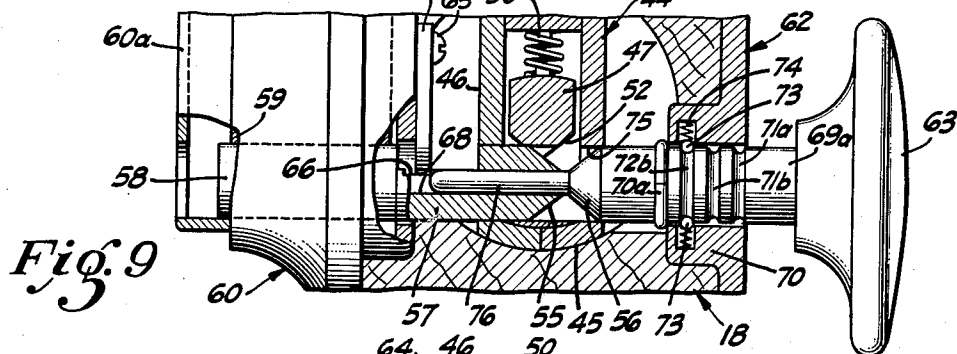


Fig. 9

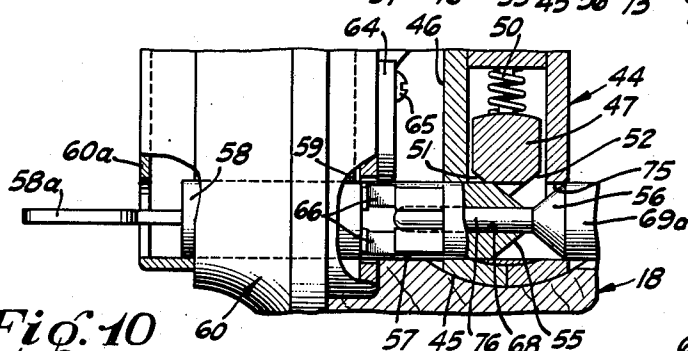


Fig. 10

Fig. 11

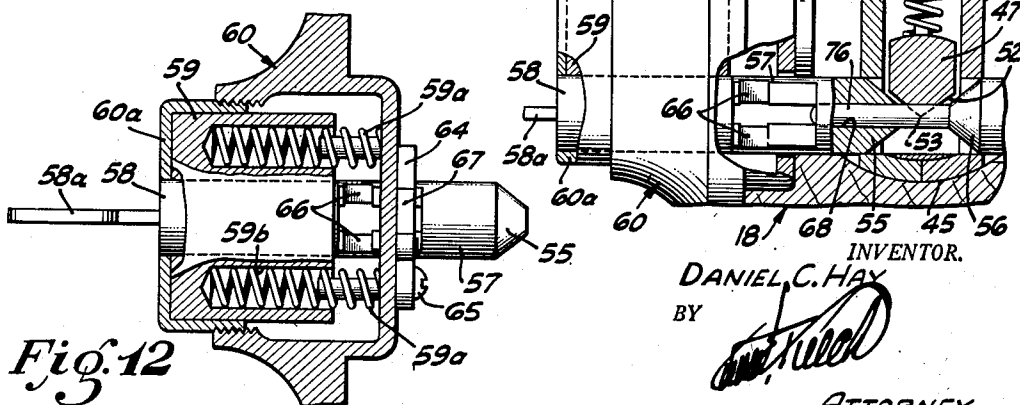


Fig. 12

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UNITED STATES PATENT OFFICE

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PLUNGER TYPE LOCK

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10 Claims. (Cl. 70—144)

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This invention relates to equipment for locking a door or the like, and particularly pertains to a plunger type lock.

Heretofore it has been common practice to provide doors and French windows with lock structures in which a lock bolt is moved outwardly from the free edge of a door into a recess or pocket in a strike plate, the bolt being moved and held by actuating devices which may embody the direct engagement of a key with the bolt or the actuation of a cylinder and barrel by means of a key. In each device the lock structure has embodied the use of large and cumbersome lock mechanism which must be set into the edge face of the door, and in connection with which provisions must be made for door knobs and key openings at opposite sides of the door. These structures require considerable time for their installation in a door and also require care in order to insure that the bolt and striker are in proper register and alignment. It is desirable to provide a lock structure which is simple and compact in design, and is of such shape as to be easily mounted within a straight cylindrical bore formed directly in the edge of the door. It is the principal object of the present invention, therefore, to provide a lock structure which is simple and compact in construction, may be easily installed within a door, and can be quickly locked and unlocked, and is further constructed so that the door will be held normally in a closed position but may be opened and closed without the manipulation of knobs or movable door handles or the like, the structure being equally desirable for use with one-way and swinging doors.

The present invention contemplates the provision of a cylindrical lock housing adapted to be countersunk into a cylindrical bore to be drilled in the edge of a door, said housing carrying a longitudinally movable plunger yieldably urged toward its outermost position and at the outer end of which a roller is mounted to rotate on an axis parallel to the axis of the hinges supporting the door, said roller engaging a strike plate within which it is held yieldably by the plunger, the housing also carrying lock means by which the plunger may be prevented from moving in a retracting direction and thus locking the door.

The invention is illustrated by way of example in the accompanying drawings in which:

Figure 1 is a fragmentary view in elevation showing the application of the present invention to an ordinary swinging door.

Fig. 2 is a view in horizontal section through the lock structure as seen on the line 2—2 of Fig. 1.

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Fig. 3 is an enlarged view in vertical section as seen on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged view in vertical section through the lock structure as seen on the line 4—4 of Fig. 1 and shows the key and lock mechanisms.

Fig. 5 is a view in elevation showing the face of the strike plate.

Fig. 6 is an enlarged view in transverse section and elevation as seen on the line 6—6 of Fig. 4.

Fig. 7 is a fragmentary view in vertical section and elevation showing another form of lock barrel.

Fig. 8 is a diagrammatic sectional view similar to Fig. 4 and showing the knob on the inside of the door pushed entirely into its latch actuating position, and with the key lock cylinder retracted to its extreme outward position.

Fig. 9 is a view similar to Fig. 8 in which the key lock on the outside of the door is pressed inwardly into latch actuating position and the knob on the inside of the door is in its extreme retracted position, this view illustrating how the detent release pin on said knob is slightly withdrawn from the key lock cylinder extension to permit said detent to retain said extension in latch actuating position.

Fig. 10 is a view similar to Fig. 9 illustrating the manner in which a key inserted into said key lock cylinder rotates said cylinder to raise said detent to release said lock cylinder thereby permitting the latter to withdraw from latch actuating position under the impulse of the springs within the lock, when pressure on said key is released, said lock cylinder when it has so withdrawn being located in the position in which it is shown in Fig. 8.

Fig. 11 is a view similar to Fig. 10 showing the lock cylinder in its fully withdrawn position following its being unlocked by a key as shown in Fig. 10, and with the bolt latch lowered to its inoperative position so as to unlock the door.

Fig. 12 is a diagrammatic horizontal sectional view taken on the line 12—12 of Fig. 8 and illustrating the mounting of the springs in the key lock of the invention which yieldably urge the barrel towards its outward position.

Referring more particularly to the drawings, 10 indicates a strike plate for a lock which is set into the vertical post 11 of a door frame. The strike plate has a face plate section 12 which is inset into the face of the jamb and which is formed integral with a hemispherical pocket 13. This pocket has a diameter somewhat less than that of the outer dimensions of plate 12, as shown

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in Fig. 5 of the drawings. Formed along at least one vertical edge of the face plate 12 is an inclined runway 14 which extends from the edge of the pocket 13 outwardly and away from that edge to form an inclined runway along which a lock bolt roller 15 may ride. It is to be understood that when the door swings in one direction only one runway 14 is provided, and when the door is a full swinging door two runways 14 are disposed upon opposite sides of the pocket 13 in the strike plate. The roller 15 is carried upon a reciprocating bolt 16 forming part of the lock unit 17. The lock unit 17 is mounted within a cylindrical bore in the edge of the door 18. The bolt 16 is formed with an end fork comprising upper and lower parallel arms 19 and 20. These arms are substantially flat and receive the roller 15 between them. The roller 15 is circular and lies in a horizontal plane. Its circular edge, however, is convex in shape, as indicated at 21, so that it will contact and roll along the concave surface of the pocket 13. The diameter of the roller is such as to insure that when pressure is exerted upon the door 18 the roller will ride out of the pocket 13 as the bolt 16 is retracted. The roller is held in position by a threaded pivot pin 22 which passes through the arms 19 and 20 and provides a rotatable support for the roller. The fork structure of the bolt is formed at its rear end with a threaded shank 23. The threaded shank extends into a threaded bore 24 of a guide head 25. This head is in longitudinal alignment with the fork portion of the bolt and is formed with an enlarged circular flange 26 which is of a diameter slightly greater than the diameter of the roller 15. This flange is slidably mounted within a tubular cylindrical housing 27 of the lock unit 17. The housing is open at its forward end to receive the fork structure and the roller 15 and is there formed with an annular outwardly flaring flange 28. The flange 28 is engaged by a complementary retaining flange 29 which is carried upon a ring 30. The ring 30 is fastened to the back of a mounting plate 31. This plate is set within a recess in the edge face of the door and is held by screws 32. A face plate 33 is mounted upon the outer face of the mounting plate 31 and is held by screws 34. The guide head 25 has a body portion 35 which is cylindrical and is axially aligned with the tubular housing 27. A slotted opening 36 is formed through the wall of the housing 27 and extends longitudinally thereof. This opening receives a guide pin 37 which maintains the bolt 16 in a constantly aligned position while allowing it to reciprocate. Extending rearwardly from the portion 35 of the guide head 25 is a lock finger 38. This finger may be formed by cutting away a section of the cylindrical portion 35 for a distance here shown as representing more than one-half of the diameter of the portion 35 so that a flat guide face 39 will be formed and will extend parallel to the longitudinal axis of the bolt. Extending transversely of the cylindrical housing portion 27 and with its axis normal to the longitudinal axis of the housing is a pin 40. This pin carries a roller 41, the surface of which contacts the face 39 of the finger 38 and supports and guides the head 25 while preventing rotation of the head and the bolt around its longitudinal axis. A stop collar 42 is mounted within the tubular housing 27 in advance of the roller 41. It is formed with a central opening through which the finger 38 extends. Disposed between the stop collar 42 and the shoulder formed by the member 26 is a helical

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expansion spring 43. This tends to urge the bolt 16 to its outermost position and to seat the roller 15 within the recess 13 of the strike plate.

It will be evident that if the lock bolt 16 is held so that it cannot be forced to a retracted position the door will remain bolted. It is desirable to provide a key actuated lock for locking the door in its bolted position on the outside of the door, and to provide a simple form of latch for locking the bolt against movement on the opposite side of the door. A structure for accomplishing this purpose is shown particularly in Figs. 3 and 4 of the drawing. In Fig. 3 it will be seen that an extension housing 44 is formed at the inner end of the tubular housing 27. This extension housing has upper and lower walls 45 which are arcuate and form continuations of the wall 27 and opposite parallel side walls 46. Between these walls a lock latch 47 is housed. This latch is pivotally mounted upon a transverse pivot pin 48 extending from one side wall 45 to the other and being disposed near the inner end of the housing extension 44. The latch swings vertically and has a free end 49 which may swing upwardly and into the path of travel of the lock finger 38. Thus, when the free end of the latch 47 is in the path of travel of the lock finger 38 the lock finger cannot have any retracting movement and the bolt 16 will be held in its bolted position. Normally, the latch is in its lowermost and non-obstructing position. This is brought about by a coil spring 50 which is interposed between the upper wall 45 and the upper face of the latch 47. The spring acts to urge the latch to its lowermost and non-obstructing position. The lower edge of the latch 47 is formed with opposite inclined faces 51 and 52, which converge at 53. This line of convergence extends longitudinally of the latch 47 and in the median plane between the walls 46 of the housing extension 44. Cones 55 and 56 are mounted below the pivotal axis of the latch. The cone 55 is secured to a cylindrical extension 57 carried upon the inner end of a key cylinder 58. The key cylinder is rotatably mounted within a lock barrel 59 which may reciprocate longitudinally while being splined against rotation within a lock fitting 60 having a face cap 60a for holding the lock barrel 59 in the fitting. The cap 60a is apertured in alignment with the cylinder 58 so that the front end of the latter extends through said cap when the barrel 59 is in its forwardmost position as shown in Fig. 8. Barrel 59 and cylinder 58 may comprise a standard Yale key lock assembly in which tumbler means (not shown) are provided, in the manner well known in the art, to prevent rotation of the cylinder 58 in the barrel 59 excepting when a matching key 58a is inserted in said cylinder. The cylinder 58 in such a lock is keyed against endwise movement relative to the barrel 59 and extends a slight distance rearwardly from said barrel, where the extension 57 is attached to said cylinder, as by brazing, as shown in Fig. 11. The barrel 59 has compression springs 59a (Fig. 12) which preferably extend into bores 59b provided in said barrel and expand to yieldably hold the barrel in its extreme retracted position as shown in Figs. 8 and 11. The lock fitting 60 is mounted in the outer face of the door 18 and with its longitudinal axis at right angles to the longitudinal center of the lock unit 17. The fitting 60, as shown in Fig. 4 of the drawing, is flanged to rest against the front face of the door. This fitting is secured in place by screws 61 which are threaded into the fitting and extend through the door and

through a plate 62 designed for carrying a knob 63. The lock fitting 60, as shown in Fig. 6 of the drawing, carries a detent 64 mounted upon a pivot 65. This detent swings transversely of the end of the key cylinder 58 and normally rests with its lower edge in a groove 66 cut transversely of the upper face of the cylindrical extension 57. A spring 67 tends to urge the detent 64 into this groove. When the detent 64 is seated within the groove 66 it will be obvious that the key cylinder 58 will be held against longitudinal movement. It is to be understood that at this time the key cylinder and the lock barrel 59 are in their innermost positions, and that springs 59a tend to urge the lock barrel 59 to the position shown in Fig. 8 of the drawings. The cone 55 and the cylindrical extension 57 have a central bore 68 extending longitudinally through them and intersecting the groove 66 so that the lower edge of the detent 64 will extend partly across the bore 68 and in an obstructing path to a releasing member to be hereinafter described. It will be understood that when the lock barrel 59 is moved inwardly after having been released it will move the cone 55 inwardly. This cone passes through a side opening 69 in the housing extension 44 so that its tapered face may engage the inclined face 51 on the latch 47 and as it moves to the inner end of its stroke will raise the latch 47 to its obstructing position. This will cause the lock bolt 16 to be held against retraction. It will be obvious that if the movement of the cone 55 by the cylinder 58 was the only way in which the detent 64 could be retracted the door could only be unlocked by the use of a key in the key cylinder 58 of the lock. This is accomplished when the key rotates the cylinder 58 to cause the detent 64 to release the lock barrel 59 and to permit the cone member 55 to retract.

In order to make it possible to release the lock bolt 16 from within a room, as well as from the outside, the knob 63 is provided. This knob is mounted at the end of a cylindrical actuator member 69a which reciprocates within a bearing 70 carried by the plate 62. It will be understood that the cylindrical member 69a is designed to move longitudinally upon an axis coincident with the axis of the cone 55 and in order to hold the cylindrical member 69a and the knob 63 in their various positions annular grooves 71a, 71b, 72a and 72b are cut around the cylindrical member 69a at appropriate points. Of these grooves, grooves 71a, 71b and 72b are adapted to receive a lock ball 73, which is held yieldably by a spring 74 within the bearing portion 70. Annular groove 72a is fitted with a split lock ring 70a which limits the retraction of the cylindrical member 69a.

Mounted upon the inner end of the cylindrical member 69a is the cone 56. This cone extends through an opening 75 in the side wall of the lock extension 44 and bears against the inclined face 52 formed on the lower edge of the lock latch. It is to be understood that the taper on the cone 56 is opposite from that upon the cone 55, and that when the cones 55 and 56 are positioned as in Fig. 4 their small ends abut against each other. The small end of the cone 56 is formed with a cylindrical pin 76 which is rounded or tapered at its forward end and projects into the bore 68. The length of the projecting pin 76 is such as to enable it to just engage the lower edge of the detent 64 and to lift it out of the lock groove 66, under circumstances to be explained later so that the spring which tends to urge the lock barrel 59 outwardly within the fitting will be free to move

the lock barrel outwardly and thus release the key lock. As this pin releases the key lock, the cone 56 will be free and in a position to be pressed further inwardly to engage the inclined face 52 of the latch 47 and lift it to its obstructing position.

By reference to Fig. 7 of the drawing it will be seen that a modification of the design of the lock fitting 60 is shown. In this modification the lock fitting is formed with an end cover face 60' which has an opening therethrough to accommodate the end of the key cylinder 58. The outer face of the fitting 60 is here shown as being flush with the face of the bore so that the only portion extending outwardly for operation would be the end of the key cylinder 58.

In operation of the present invention the structure 17 is mounted within a door countersunk in the edge of the bore, as shown, and the strike plate 10 is suitably mounted within the door jamb 11. The lock fittings 60 and 62 are then mounted at opposite sides of the door with their lock cones 55 and 56 in appropriate position with relation to the latch 47. The lock is then ready for operation. If the lock is actuated from the outside of the door the lock barrel 59 is forced inwardly. This will cause the cone 55 to engage the inclined face 51 of the latch 47 and lift the free end of the latch to an obstructing position with relation to the bolt extension 33. The cone 55, in this movement, will move in to where the notch 66 is beneath the latch detent 64 and will propel the member 69a outward to where the detent balls 73 will snap into the groove 72b, thereby withdrawing pin 76 a sufficient distance from the bore 68 to allow the detent 64 to shift down into notch 66 so that, when inward pressure on the lock cylinder is relaxed, this cylinder will be held inwardly, in actuating relation with bolt latch 47, by the detent 64 resting in notch 66. The withdrawal of pin 76 a slight distance from bore 68 to permit the detent 64 to enter notch 66 is effected partly by the member 69a being snapped toward the right by entry of the detent balls 73 into the groove 72b, and partly by the slight return leftward of the key lock barrel 59 under its own spring power which takes place when the inward pressure against this barrel by the hand of the operator, is relaxed. The lock barrel 59 can be released at any time from the inside of the door by applying force to the knob 63, which will cause the pin 76 to move into the bore 68 and engage the lower edge of the detent 64 and raise the same, so that the lock barrel 59 may spring outwardly to a released position. The lock barrel 59 may be released from the outside of the door by rotating the key within cylinder 58 to move the latch detent 64 to a position of disengagement with the groove 66. In the event it is desired to lock the door from the inside the knob may be pressed inwardly, as shown in Fig. 8 until the cone 55 forces the latch 47 upwardly to its locking position. The initial leftward movement of the knob inserts the pin 76 further into the bore 68 bringing the rounded tip of said pin against the detent arm 64 so as to lift the latter out of the notch 66 in the key lock cylinder extension 57. Immediately upon this release of said extension from said detent, the spring action of the key lock barrel 59 retracts the barrel, the lock cylinder and the extension 57 of the latter to their extreme leftward position in which they are shown in Figs. 8 and 11. Completion of the leftward locking movement of the knob 63 follows rapidly with the lock parts positioned as shown

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in Fig. 8 and with the knob held in its latch actuating position by the detent balls 73 being pressed into annular groove 71a of the member 69a. It will be obvious that the door may be locked and unlocked from the inside merely by forcing the cone 56 inwardly or retracting the same.

My invention is thus seen to provide a simple lock structure for a swinging door in which the lock bolt will perform the services of a spring detent for yieldably holding the door in closed position but in which the bolt may be latched against withdrawal from the strike plate, so as to effectively lock the door closed. This locking may be effected manually from either the outside or inside of the door and without the use of a key. Once locked either from the inside or outside, however, the door may be unlocked manually without a key from the inside. The invention further provides that with the door locked either from the outside or the inside, it may not be unlocked from the outside without the use of a key matching the tumblers of the lock.

While I have shown the preferred form of my invention as now known to me, it will be understood that various changes may be made in combination, construction and arrangement of parts by those skilled in the art, without departing from the spirit of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A door lock comprising in combination with a lock bolt and a latch therefor disposed in a plane normal to the edge of the door; control means for said latch including a pair of longitudinally aligned latch moving means, one disposed upon each side of a door, and each being mounted for longitudinal reciprocation to control the movement of said latch toward and from a latching position, yieldable means acting to hold one of said latch moving means in a set position, a key-controlled lock means acting to hold the other one of said latch moving means in its locking position, and means carried by the first-named latch moving means to release the key-controlled lock from the other latch moving means and thereby release the latch.

2. The structure of claim 1 wherein the latch moving means are pushed and pulled along their common longitudinal axis.

3. A door lock comprising a lock unit adapted to be inserted into the edge of a door and including an outer housing, a bolt freely slidable therein between extended and retracted positions, yieldable means urging said bolt towards its extended position, a latch member shiftable into the path of said bolt while the latter is extended, to prevent the retraction of said bolt, means yieldably holding said latch member out of said path, and a pair of latch member actuators mounted to be manipulated from opposite sides of the door, each of said actuators being independently movable from its side of the door to actuate said latch member to shift the latter into said bolt path, and means for releasably and automatically retaining each actuator in its latch member actuating position when said actuator is placed in such position.

4. A combination as in claim 3 including a key controlled lock mounted for movement with a first one of said actuators and by manipulation of which said first actuator may be shifted into and snap locked in latch member actuating position.

5. A combination as in claim 4 in which said actuators are associated whereby movement of either into actuating position causes it to engage

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the other actuator, if the latter is in actuating position, and displace it therefrom; and means associated with the second of said actuators and operating automatically, when the latter is shifted toward its latch member actuating position, to release said key controlled lock thereby freeing said first actuator for displacement from actuating position.

6. A door lock comprising: a housing; a reciprocating locking bolt mounted within said housing; a latch in said housing movable into the path of movement of said bolt for blocking reciprocation thereof; and a pair of oppositely extending independently movable latch operating members each of which is shiftable inwardly to engage and shift said latch to bolt blocking position, said members being so opposed that each member, when thus shifted inwardly, will shift the other member out of operative engagement with said latch if the latter should be so engaged.

7. A door lock comprising: a housing; a reciprocating locking bolt mounted within said housing; a latch in said housing movable into the path of movement of said bolt for blocking reciprocation thereof; and a pair of actuator members having conical noses and coaxially mounted in said housing to be independently reciprocated manually from the respective opposite sides of the door, there being bevelled cam faces on said latch which are engageable respectively by said noses, when one or the other of said members is moved inwardly, whereby the member so moved engages and shifts said latch into bolt blocking position.

8. A combination as in claim 7 in which said members are cylindrical, the first of said members having spaced detent grooves; detent means engaging said grooves to retain said first member in operative or inoperative position, the second of said members being provided with a central bore, a deep cut opening into said bore, and a transverse notch in the bottom of said cut; a pin formed axially on the nose of said first member said pin having a rounded nose and extending into said bore and said notch when the noses of said members are brought together; a spring pressed detent mounted on said housing to drop into said notch when said second member is moved into latch actuating position, thereby retaining said member in said position; a lock barrel slidably and non-rotatably mounted on said housing; a key cylinder rotatably mounted in said barrel coaxial with said second member and connected to the same, rotation of said key cylinder in said barrel being key controlled, such rotation being operative to dislodge said detent from said notch and free said second member therefrom; and spring means withdrawing said second member from actuating relation with said latch when thus freed from said detent.

9. A door lock comprising a housing adapted to be mounted in an edge portion of a door; a door bolt mounted within said housing for extension into a locking position, and retraction therefrom into an unlocking position; a latch mounted within said housing and movable toward and away from a position in which said latch obstructs the retraction of said bolt; a key controlled lock cylinder mounted on said housing to be shiftable inward when key actuated; a pair of latch control members one of which is mounted on said cylinder and actuated by movement thereof, the other member being permanently mounted in said housing and shiftable inwardly from the opposite side of said door, said latch

being extended into bolt obstructing position by either of said members being shifted inwardly; a detent automatically operative to retain said cylinder in an inwardly shifted position; means responsive to key actuation of said cylinder to release the latter from said detent; and means provided on said other member, and operative when the latter is shifted inwardly as aforesaid, for releasing said cylinder from said detent, from the opposite side of the door.

10. A combination as in claim 9 including spring means operative to withdraw said cylinder and the member mounted thereon outwardly from latch actuating position upon the release of said cylinder from said detent; and means for yieldably retaining said other member in either an inward latch actuating position or in an outward inoperative position.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
394,949	Ansher et al.	Dec. 25, 1888
491,763	Brown	Feb. 14, 1893
695,888	Secker	Mar. 18, 1902
1,079,138	Manning	Nov. 18, 1913
1,494,949	Butterworth	May 20, 1924
1,547,357	Butterworth	July 28, 1925
1,916,266	Hillgren et al.	July 4, 1933
1,937,930	Woernel	Dec. 5, 1933
2,006,457	Jerling	July 2, 1935

FOREIGN PATENTS

Number	Country	Date
249	Great Britain	Jan. 25, 1872