

May 19, 1970

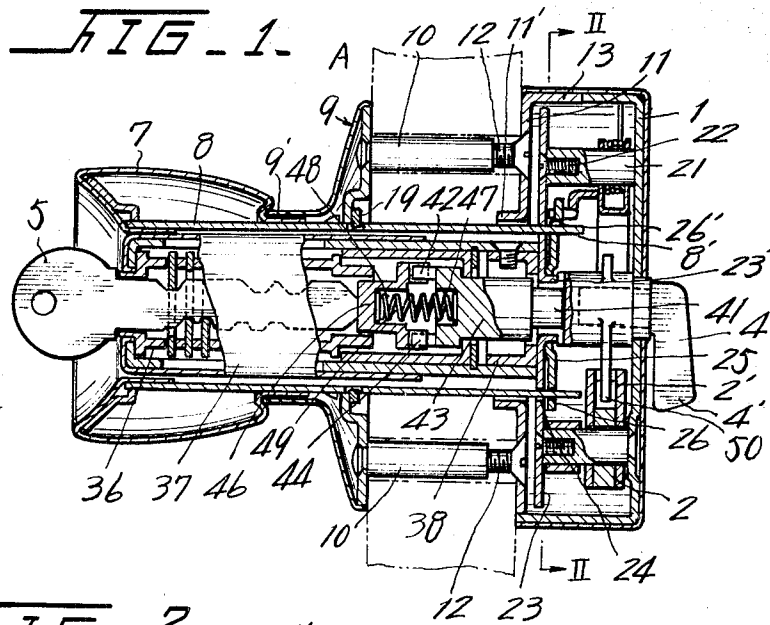
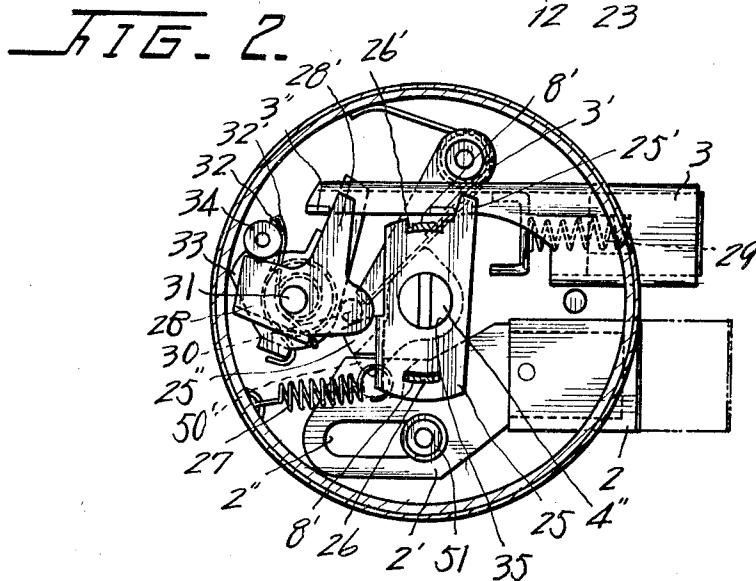
KYUICHI MATSUNAGA

3,512,381

LOCK SET

Filed Dec. 29, 1967

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FIG. 3.

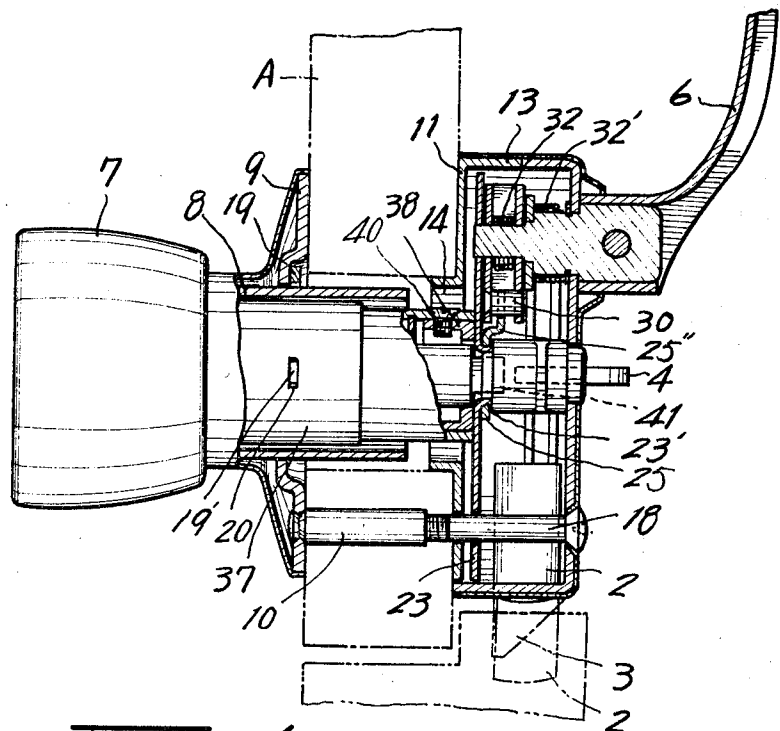
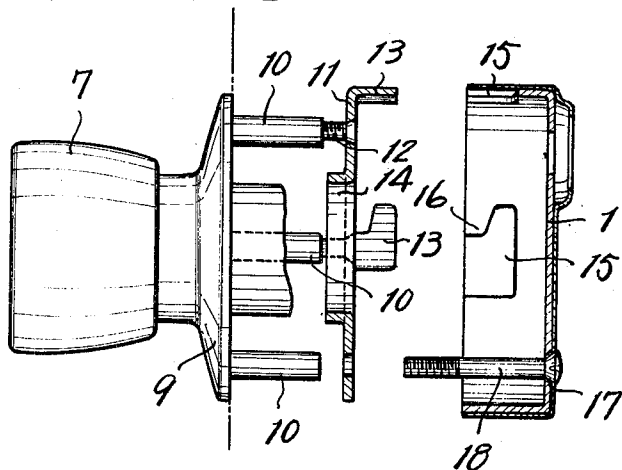


FIG. 4.



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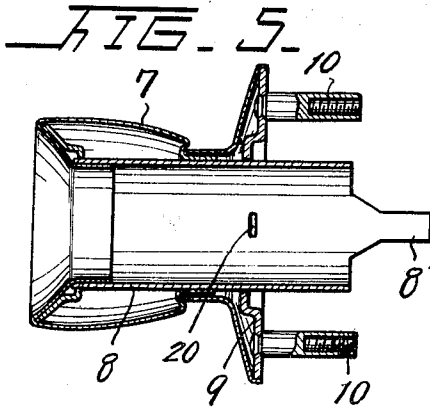
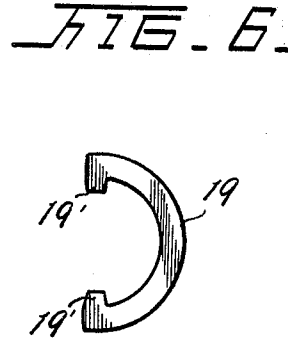
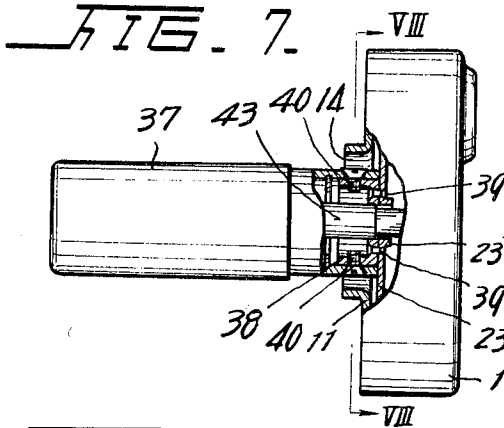
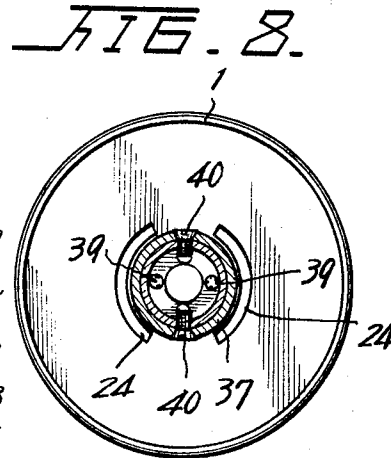
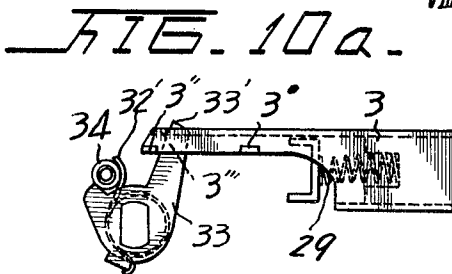
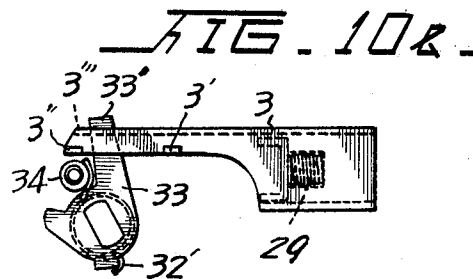
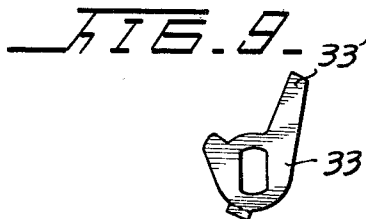
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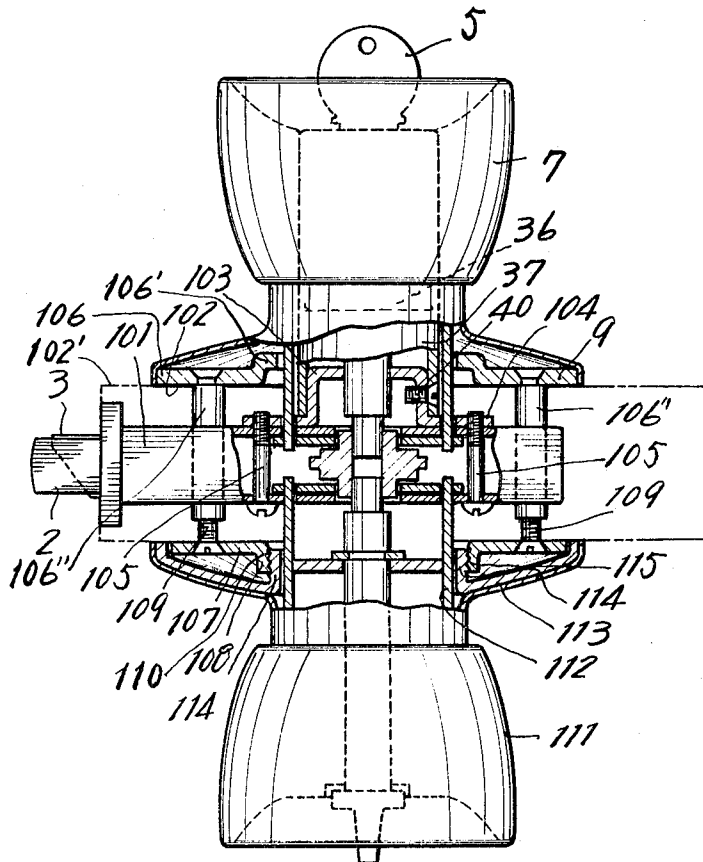
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FIG. 13.



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3,512,381
LOCK SET

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42/398; Feb. 23, 1967 (utility model), 42/14,509
Int. Cl. E05b 59/00, 55/04
U.S. Cl. 70-107

4 Claims

ABSTRACT OF THE DISCLOSURE

A lock set comprising a dead bolt operating cylinder lock, a hollow cylindrical sheath for operatively receiving said cylinder lock, a hollow cylindrical member for receiving said cylindrical sheath and secured to or integrally formed with a knob, a mounting plate connected to one end of said cylindrical sheath and rotatably receiving said knob and said cylindrical member, and a latch and lock mechanism housing secured to said mounting plate whereby the cylinder lock may be prevented from rotating together with the knob and hollow cylindrical member as they are rotated.

BACKGROUND OF THE INVENTION

In a typical prior art mortise lock which has a construction adapted to be employed for latching and locking of a door, a cylinder and a knob manipulating bar are not arranged in such a manner that they have a common axis and as a result, such a prior art lock gives an unpleasant external appearance. Furthermore, in order to install such a prior art lock in a door, separate bores for the cylinder and knob manipulating bar have to be drilled in the door and accordingly, the installation of the lock leads to complicated work procedures resulting in an increase in installation expenditure. Likewise, the fact that the cylinder and bar are arranged in such a manner that they do not have a common axis makes it necessary to manufacture different types of mortise locks depending upon the location of the locks to be installed in doors. And since the prior art mortise locks are generally large in size, it is difficult or impossible to install such a lock in a door reinforcing ridge framework which is usually narrow in width and on a door where a mortise is generally formed.

In a prior art typical lock set which comprises a knob and a lever handle which house a cylinder lock therein, respectively, when the knob is turned so as to operatively connect inner parts to the cylinder within the knob, since the cylinder lock is also cause to turn together with the inner parts, if the knob is forcibly turned in excess of its predetermined upper limit for rotational movement in a direction when a door in which the lock set is installed is to be locked, the knob and its rose or face plate are forced to dislocate thereby to fail to provide a reliable locking. Accordingly, the knob may be broken off the mounting plate resulting in failure of its function as a locking means.

A typical prior art button type lock set is adapted to be locked outdoors by the manipulation of a button only, without the use of any key, and if a person who is a member of the household or uses the building, including a door where the button type lock set is installed, leaves his key inside when he locks the lock set by pushing the button outdoors, he will not be able to unlock the lock set.

There have also been proposed various types of locks which comprise a housing for receiving a latch bolt and a dead bolt therein and in which a cylinder lock for manipulating the dead bolt is housed in a knob which is

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adapted to operate the latch bolt. In this type of lock set, since the knob is not turned when the lock set is locked, the locking operation is performed regardless of the rotation of the knob. However, as mentioned above, since the cylinder lock is disposed within the knob, when the knob is separated from the lock, it is very easy to unlock the lock set.

Therefore, one principal object of the present invention is provide a novel and improved lock set having both the functions of latching and dead locking like a prior art monolock and in which a cylinder lock is operatively disposed within a hollow cylindrical sheath member which is in turn fixedly secured to a housing for receiving a latch bolt, a dead bolt and a mechanism for manipulating the two bolts and which is received within the knob on a door in which the lock set is to be installed and the cylinder lock is so disposed within the cylindrical sheath member that the cylinder lock is perfectly isolated from the knob and a rose or plate in which the knob is rotatably received whereby even when the knob is turned the cylinder lock may remain stationary.

With the above-mentioned disposition of the cylinder lock in the novel lock set, when the lock set is locked, even if the knob is forced to turn in excess of a predetermined upper limit of its rotational movement and/or if the knob is taken off the knob rose or plate, the cylinder lock can not be tampered with by an unauthorized person because the cylinder lock is disposed in the above-mentioned manner within the cylindrical sheath member which is fixedly secured to the door or the housing for receiving the latch and dead bolts in such a manner that the cylinder lock is perfectly isolated from the knob and rose and such a person can not gain access to the various parts in their locked condition. Therefore, a quite reliable lock set can be obtained by the present invention.

A further object of the present invention is to provide a circular section and single body housing for receiving a latch bolt, a dead bolt and an operating mechanism for the bolts thereby eliminating complicated assembly work in fabricating the lock set which would otherwise be necessary.

The above and other objects and advantages of the present invention will be more readily apparent to those skilled in the art from the following description when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal sectional view of a preferred form of lock set constructed in accordance with the present invention when the lock set is installed in a door;

FIG. 2 is a cross-sectional view taken substantially along the line II-II of FIG. 1 as seen in the direction of the arrow and which illustrates details of the inner construction of said lock set;

FIG. 3 is a top plan view partly in horizontal section of the lock set of FIG. 1 when the lock set is installed in a door;

FIG. 4 is an exploded schematic side elevational view of said lock set with portions thereof removed in order to show the relationship between a housing in which a latch bolt, a dead bolt and an actuating mechanism for the bolts are housed and a mounting plate of said lock set;

FIG. 5 is a fragmentary cross-sectional view of a rose and a knob assembly rotatably received in said rose of said lock set;

FIG. 6 is a fragmentary view of a crescent shaped stop or engaging piece for a cylindrical extension of said knob assembly;

FIG. 7 is a fragmentary side elevational view in partial section of the cylindrical sheath and the bolt and actuating mechanism receiving housing with the knob and as-

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sociated knob extension and the lever handle and thumb turn associated with the housing removed and showing the relationship between the sheath and housing;

FIG. 8 is a cross-sectional view taken substantially along the line VIII—VIII of FIG. 7 and as seen in the direction of the arrow therein;

FIG. 9 is a view of a latch bolt operating member;

FIG. 10a is a fragmentary sectional view showing the relationship between a latch bolt and the operating member piece for said latch bolt when the bolt is in its advanced or latching position;

FIG. 10b is a view similar to FIG. 10a, but shows the parts when said latch bolt is in its retracted or unlatching position;

FIG. 11a is a fragmentary view partly in section showing the relationship between said latch bolt, said latch bolt operating piece or member and a driving arm for said latch bolt when the latch bolt is in its advanced or latching position;

FIG. 11b is a view similar to FIG. 11a, but shows the parts when said latch bolt is on its way toward the retracted or unlatching position by reason of said driving arm being partially pulled backwards;

FIG. 11c is a view similar to FIG. 11a and 11b, but shows the parts when said latch bolt is in its fully retracted or unlatching position by reason of said driving arm being fully pulled backwards;

FIG. 12 is a side elevational view partly in section illustrating a modified form of lock set constructed in accordance with the present invention; and

FIG. 13 is a side elevational view partly in section illustrating a further modified form of lock set constructed in accordance with the present invention.

PREFERRED EMBODIMENTS OF THE INVENTION

The present invention will be now described referring to the accompanying drawings and especially to FIGS. 1 through 12 thereof in which a preferred form of lock set according to the present invention is illustrated. The lock set of the invention which is adapted to be secured to a door A shown in phantom lines in FIGS. 1 and 3 by means of a set bolt (not shown) and generally comprises a circular section housing 1 having one end closed and in which a latch and dead bolt actuating mechanism is operatively housed. The housing 1 is provided with two openings (not shown) at different points in its periphery thereof through which extend a dead bolt 2 for locking and a latch bolt 3 for latching, respectively. When the lock set is installed in the door A, the opening for the dead bolt 2 is positioned below that for the latch bolt 3. The lock or dead bolt 2 and latch bolt 3 are operatively mounted within the housing 1 with their respective fore ends extending out of the periphery of the housing through the associated lower and upper openings for movement between advanced or locking and retracted or unlocking positions in a manner which will be described in detail hereinafter. The dead bolt 2 includes a block-shaped fore portion and a thinner rear portion fixedly connected to the fore portion by means of a rivet and having a groove (not shown) formed on the top thereof and an elongated lateral slot 2' formed adjacent to the lower edge thereof. The latch bolt 3 also includes a block-shaped fore portion and an integral rear portion of L-shaped section having a reduced dimension (in the vertical direction). The rear portion of the latch bolt 3 is formed with an elongated notch 3''' on one side, to side adjacent to the closed end of the housing 1 and with a pair of laterally spaced, laterally and outwardly extending projections 3' and 3'' on the other side or the side adjacent to the open end of the housing 1. A manually turnable thumb turn 4 is provided in the housing 1 with a thumb engaging portion 4' disposed on the outer surface of the closed end of the housing 1 in spaced relation to the closed end of the housing 1 and an integral

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cylindrical shank portion 4'' which is substantially at right angles to the thumb engaging portion extending within the housing 1 and movable in one direction or the other when the thumb turn is turned indoors in one direction or the other, to move the lock or dead bolt 2 to the locking or unlocking position through a mechanism which will be described in detail hereinafter. However, when the door A is to be locked outdoors, a conventional key 5 is employed in the manner which will be described hereinafter. A manual lever handle 6 is provided in the housing 1 with the handle portion disposed on the outer surface of the closed end of the housing in spaced relation to such closed end and includes an integral shank which is substantially at right angles to the handle portion and extends into the housing. The handle portion of the lever handle 6 normally lies in the horizontal and when a user grips the lever handle 6 by the handle portion indoors and turns the same downwardly, the lever handle movement in turn moves the latch bolt 3 from the advanced position to the retracted or unlatching position through a mechanism which will be described hereinafter, whereby the door A may be opened and when the lever handle is released from the gripping force acting thereon, the latch bolt is caused to move back to the advanced or latching position. However, when the door A is to be opened outdoors (assuming that the door is latched, but not locked), a hollow cylindrical knob 7, which is positioned on the outside of the door A, is turned in the door opening direction in the conventional manner. The cylindrical knob 7 has a reduced diameter hollow cylindrical member 8 secured to or integrally formed with the inner end thereof. The reduced diameter cylindrical member extends coaxially with and inwardly of the knob 7 and serves as an extension of the knob. The knob 7 and more particularly, the extension 8 is freely received in an outwardly and horizontally extending annular projection 9' integral with a larger diameter rose or plate 9 which extends toward the knob 7 and guides same for rotational movement relative to the rose and the rose also has a plurality of angularly spaced hollow cylindrical projections 10 (three projections in the illustrated embodiment) which extend at right angles with respect to the adjacent surface of the rose from the inner or the opposite surface to that from which the annular projection 9' extends and such projections are internally threaded. The internally threaded cylindrical projections 10 are adapted to extend from the outer door side through corresponding bores formed in the door A into the inner door side for threadably receiving set screws in the manner described hereinafter when the novel lock set is installed in the door A. An annular mounting plate 11 having a reduced diameter annular projection 11' on the surface opposed to the cylindrical projection mounting surface of the rose 9 and a diameter slightly smaller than that of the housing 1 is connected to the rose by means of a plurality of bores formed in the mounting plate 11, the number of which corresponds to that of the internally threaded projections 10 on the rose and of a corresponding number of set screws 12 threadably received in the projections 10 with the door A interposed between the rose and mounting plate. One of the set screws 18 is longer than the other screws and extends to the outside of the housing 1 for the purpose to be described hereinafter. The mounting plate 11 is provided on the side remote from the rose 9 with a plurality of L-shaped engaging projections 13 (three projections in the illustrated embodiment) which horizontally extend toward the housing 1 at three angularly spaced points with an equal distance along the peripheral edge of the mounting plate 11. The L-shaped engaging projections 13 have axially extending first portions and second portions extending substantially at right angles to the first portions and are adapted to be freely received in the corresponding number of larger L-shaped notches 15 formed at the corresponding points in an annular

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anchoring member 16 which is fixedly secured to the inner periphery of the latch and lock bolt-actuating mechanism housing 1 for the purpose to be described hereinafter. The above-mentioned longer set screw 18 extends through a bore 17 (FIG. 4) which is formed in the housing 1 at a point corresponding to one of the inner threaded projections 10 of the rose 9 and is threadably received in the particular projection 10 whereby the housing 1 is secured connected to the rose and to the door A.

The above-mentioned knob extension 8 is formed at two diametrically opposite points in its periphery with bores 20 and a semi-circular stop piece 19 (FIG. 6) is fitted on the knob extension with the inwardly turned opposite ends 19' of the stop piece inserted in the bores 20 so that the knob and extension assembly 7 and 8 may be effectively prevented from slipping off the rose 9. One or the inner end of the cylindrical knob extension 8 is formed with a pair of diametrically opposed projection pieces 8' disposed horizontally and extending inwardly of the door A and through the center bore of the annular mounting plate 11 into a pair of corresponding arcuate slots 24 formed in a second or inner mounting plate 23 having a slightly smaller diameter than that of the first mounting plate 11 which is in turn secured to the inner side of the housing 1 by means of a plurality of internally threaded hollow cylindrical projections 21 extending horizontally and inwardly from the inner side of the housing 1 and the corresponding number of set screws 22 which extend from the outer side of the second mounting plate 11 through bores formed in the second mounting plate 11 at suitable points and are threadably received in the internally threaded projections 21. The second mounting plate 23 has a hollow cylindrical member 38 secured to the outer side thereof and this member extends horizontally and outwardly and is connected to a cylinder lock assembly which will be described hereinafter. The dimension of the arcuate slots 24 is so selected that the projection pieces 8' of the knob extension 8 may be allowed to slide along the slots 24 between the door opening and closing positions as the knob 7 is manipulated outdoors. A latch bolt driving arm 25 is operatively provided within the housing 1 and one or the lower end of the arm has one end of a coiled spring 27 anchored thereto while the other end of the spring is anchored to the annular anchoring member 16. The latch bolt driving arm 25 is provided at a point adjacent to the lower end with an arcuate slot 26 and at the upper end with a notch 26'. The driving arm 25 is also provided on one side or the left side as seen in FIG. 11a with a lateral engaging projection 25''. The slot 26 and notch 26' in the latch bolt driving arm 25 are adapted to loosely receive the pair of projection pieces 8' of the knob extension 8. As seen in FIGS. 2 and 11a, the upper end of the latch bolt driving arm 25 is offset and upwardly projects on the right side of the notch 26 so as to provide a stepped engaging ear 26''. The latch bolt driving arm 25 is adapted to be turned within a limited distance permitted by the projecting pieces 8' of the knob extension 8 as the knob 7 is turned in one direction or the other. A latch bolt operating member 28 having an upwardly extending engaging ear 28' at the upper end on one side thereof is supported at 30 to be actuated by the latch bolt driving arm 25. A transverse pin or stub shaft 30 is provided to be adapted to be engaged and actuated by the lateral projection 25'' of the latch bolt driving arm 25. The latch bolt operating member 28 is also pivoted to a pivot pin 31 extending through the opposite side walls of the member. A coiled spring 29 is provided within the housing 1 under compression with one end anchored to the back of the block-shaped fore portion of the latch bolt 3 while the other end of the spring 29 is anchored to an L-shaped anchoring piece which is welded on one side to and laterally and inwardly projects from the inner side of the closed end of the housing 1 so that the spring normally urges the latch bolt 3 to its advanced or

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latched position. As mentioned above, the rear portion of the latch bolt 3 is provided on one side or the inner side remote from the closed end of the housing 1 along the length of the bolt 3 with a pair of spaced horizontally extending lateral projections 3' and 3'' which are to be engaged by the upwardly extending engaging ear 26'' on the latch bolt driving arm 25 and the upwardly projecting ear 28' on the latch bolt operating member 28, respectively. The rear portion of the latch bolt 3 is further provided on the other side or the side adjacent to the closed end of the housing 1 with the elongated slot for, as mentioned above, the purpose to be described hereinafter. A spring 32 is provided on the pivot pin 31 with one end anchored to the pin while the other end of the spring upwardly extends and abuts against a cross stub shaft extending horizontally from the inner side of the closed end of the housing 1.

The shank of the above-mentioned handle lever 6 rotatably mounted on the housing 1 on the inner side of the door A extends inwardly into the housing and terminates short of the adjacent side wall of the latch operating member 28 and also serves as the drive shaft for the latch bolt operating member 28. A spring 32' is provided on the lever handle shank or drive shaft with one end anchored to the shank while the other end of the spring partially surrounds a cross shaft 34 and abuts against the shaft. A second latch bolt operating member 33 is pivoted to the shank of the lever handle 3 and has an upwardly extending engaging projection 33' which is adapted to slide along the elongated notch 3''' of the latch bolt 3. The second latch operating member 33 is normally held in its non-operative or inclined position with respect to the vertical by the force of a spring 32' one end of which is anchored to the lever handle shank and the other end partially surrounds and abuts against the cross shaft 34. The above-mentioned cross shaft 34 also serves as a stop for the first latch operating member 28 and the second latch operating member 33 and more particularly, so as to limit the movement of the two operating members in their retracting or backward stroke.

Thus, when the knob 7 is gripped and turned in the counter-clock direction so as to rotate the driving arm 25 in the same direction against the force of the spring 27, the engaging ear 26'' engages the lateral projection 3' of the latch bolt 3 and pushes the latch bolt 3 toward the unlatched position while the latch bolt operating member 28 remains inoperative. On the other hand, when the knob 7 is turned in the opposite or clockwise direction, the latter projection 25'' on the latch bolt driving arm 25 is caused to push up the pin or sub shaft 30 on which the operating member 28 is mounted which in turn pivots the operating member 28 about the shaft 31. As the member 28 pivots in the above manner, the upwardly extending projection 28' of the member 28 abuts against the lateral projection 3'' of the latch bolt 3 and pushes the bolt 3 backwards or toward the retracted or unlatched position. When the knob 7 is released, the operating member 28 and latch bolt 3 are caused to automatically return to their normal positions by the forces of the springs 27, 29 and 32'. And when the lever handle 6 is manually rotated in the counter-clockwise direction, the shank of the handle moves back the second latch bolt operating member 33 against the force of the spring 32' whereby the engaging projection 33' of the operating member retracts the latch bolt 3 toward its unlatched position until the operating member 33 abuts against and is restrained by the stop 34 from further retracting movement. A hollow cylindrical sheath means 37 having a cylinder lock 36 disposed therein is press fitted on the cylindrical member 38 of the second mounting plate 23 and secured to the mounting plate 23 by means of rivets or any other suitable securing means 39 and to the cylindrical member 38 by means of set screws 40 thereby to form a cylinder lock and mounting plate assembly. The thus formed assembly is freely

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inserted within the hollow cylindrical knob extension 8 at the inner end of the knob extension.

Now, description will be made on the operating mechanism associated with the dead lock bolt 2. The cylindrical sheath means 37 in which the cylinder lock 36 is disposed also houses a follower member 43 having at one end or the end adjacent to the second mounting plate 23 a reduced diameter piece 41 and at the other end an engaging pawl 44; and a connecting member 46 having at one end or the end adjacent to the follower member 43 an engaging pawl 44 adapted to engage the engaging pawl 42 and is adapted to be operationally connected at the other end to the rotational portion of the cylinder lock 36. The opposite end surfaces of the follower member 43 and the connecting member 46 are provided with recesses 47 and 48, respectively and a coiled spring 49 is received within the recesses 47 and 48 abutting against the bottoms of the two recesses so that the spring normally urges the follower member 43 and connecting member 46 away from each other or to the disconnected relation. The reduced diameter projecting piece 41 of the follower member 43 is provided on its exposed end surface with a slot (not shown) extending across the diameter of the piece for receiving the inwardly extending complementary-shaped engaging piece 4' which is provided at the free end of the shank of the thumb turn 4 and passes through the bore 35 in the latch bolt actuating arm 25. The shank of the thumb turn 4 further has an arm plate 50 secured thereto by any suitable means for rotational movement with the latter and the arm plate includes an upper annular portion which is disposed around and secured to the shank of the thumb turn 4 and a lower arm portion 50'. The lower arm portion 50' is received within an elongated groove (not shown) formed on the upper surface of the thinner rear portion of the dead bolt 2 and adapted to move within the groove forwardly and backwardly thereby to move the dead bolt 2 to the locked position or retract the bolt to the unlocked position as the thumb turn 4 is manually manipulated. The advancing and retracting movement of the dead bolt 2 and the rotational movement of the arm lower portion are limited by a stop pin 51 laterally and inwardly extending from the back side of the closed end of the housing 1 and projecting into the elongated slot 2' formed in the rear portion 2' of the dead bolt 2. When it is desired to unlock the door A outdoors, a key 5 is inserted into the key way (not shown) formed in the cylindrical lock 36 and turned in the unlocking direction and at the same time, the connecting member 46 is pushed inwardly against the force of the spring 49 whereupon the engaging piece 44 of the connecting member abuts against the engaging piece 42 of the follower member 43 to rotate the latter. The rotational movement of the follower member 43 causes the thumb turn 4 to rotate in the unlocking direction by virtue of the notch and engaging piece arrangement 41 and 4' whereby the arm plate 50 is rotated in the unlocking direction so as to retract the dead bolt 2 toward the unlocking position until the pin 51 abuts against the fore end of the slot 2'. The locking operation of the dead bolt 2 from the outside of the door A may be understood from the description of the unlocking operation mentioned just above and description of the locking operation is not made herein.

When it is desired to unlock the dead bolt 2 from the inside of the door A, the thumb turn 4 is manually rotated in the unlocking direction or the counter-clock direction as seen in FIG. 2 so as to rotate the arm plate 50 secured to the shank of the thumb turn whereupon the lower arm portion 51' of the arm plate also rotates in the same direction while pulling the dead bolt 2 toward the unlocked position until the movement of the lower arm portion is stopped by the pin and slot arrangement 51 and 2'. However, in this case, since the spring 49 maintains the connecting member 46 and follower member 43 in

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their inoperative or disconnected position, the rotational movement of the thumb turn 4 will not be transmitted to the cylinder lock 36 in spite of the fact that the follower member 43 is rotated by the notch and engaging piece arrangement 41 and 4'.

Now, referring to FIG. 12 of the accompanying drawings in which a modified form of lock set according to the present invention is shown in a longitudinal section. The construction of the modified embodiment of FIG. 12 is substantially the same as that of the first embodiment except for a few parts and description will be made of only parts different from the corresponding parts of the first embodiment. The first mounting plate 23' secured to the housing 1 is not provided with the center bore and instead with a pair of diametrically opposite arcuate slots 51 which correspond to the arcuate slots formed in the second mounting plate 11' in dimension and position. The cylindrical sheath means 37 receiving the cylinder lock 36 therein is secured by means of rivets 40 to the cylindrical member 38 secured to the second mounting plate 11'.

FIG. 13 illustrates a further modified embodiment of the present invention which is somewhat different from the foregoing embodiments. As in the case of the first modified embodiment shown in FIG. 12, description will be made of only parts different from those of the corresponding parts of the foregoing embodiments. The housing 101 in which a dead bolt 2, a latch bolt 3 and an actuating mechanism for the bolts are housed has a circular cross section as in the cases of the previous embodiments, but the housing 101 is adapted to be housed in a door A instead of being secured to the inner side of the door at a point adjacent to one edge of a door A. An annular member 103 having a radially bent outer flange 104 provided with diametrically opposite arcuate grooves (not shown) is secured to the housing 101 by means of threaded bars 105 which are threaded from the inner side of the housing into the flange of annular member 103. A hollow cylindrical sheath 37 having a cylinder lock 36 disposed therein is press fit on the annular member 103 and the cylindrical sheath is secured to the member 103 and thus to housing 101 by means of rivets 40 to form a unitary housing assembly. An outdoor annular mounting plate 106 having an outwardly and radially extending flange 106' on the outer side and a plurality of horizontally and inwardly extending internally threaded cylindrical projections 106'' on the inner side surface is disposed around the cylindrical sheath means 37 adjacent to the annular member 103 with the cylindrical projections extending through the outer door side into the housing 101. An annular bored indoor mounting plate 107 having an annular outwardly extending portion 108 is applied against and secured to the inner door by means of a plurality of set screws 109 which are threaded from the inner door side through the housing 101 into the internally threaded cylindrical projections 106'' of the annular mounting plate 106 whereby the mounting plates 106 and 107 are connected to each other so as to secure the housing in the door A. The annular portion 108 of the indoor mounting plate 107 is formed on the inner surface with a thread 110. In this modified embodiment, in place of the lever handle 6 in the foregoing embodiments, an indoor knob 111 is employed and the knob 111 is mounted on a hollow cylindrical member 112 which is in turn rotatably mounted on an annular mounting plate 113 which has an inwardly bent annular portion 114 the outer surface of which is formed with a thread 115 for threaded engagement with the threaded inner surface of the annular portion 108 of the mounting plate 107.

From the foregoing, it will be understood that the novel lock set can be easily operated from the outside and inside of a door in which the lock set is installed. As mentioned above, the housing, which houses the latch bolt, dead bolt and the mechanism associated therewith, may be secured to the indoor side of the door or within the door itself. The dead bolt can be locked by the use of a key from the outdoor side or by the use of the thumb

turn from the indoor side and the latch bolt can be latched by the use of the lever handle (the indoor knob in the embodiment of FIG. 13) from the indoor side or by the use of the knob from the outdoor side. And the hollow cylindrical sheath, which houses the cylinder lock therein, is adapted to be secured to the mounting plate having the integral hollow cylindrical member which is fixedly secured to the housing in such a manner that the cylindrical sheath may not be rotated even when the outdoor or indoor knob is turned. And since the cylindrical sheath houses the cylinder lock therein and is fixedly secured to the particular mounting plate which is in turn fixedly secured to the housing, as compared with the comparative prior art lock sets, the novel lock set assures more security and is highly reliable. Furthermore, since the novel lock set can be equally used in conjunction with cylinder locks having various different lengths, a wide variety of keys may be used in the novel lock set.

Although certain preferred embodiments of the present invention have been illustrated and described herein, it is to be understood that these are illustrative in nature and not necessarily limiting upon the scope of these teachings in their broader aspects.

What is claimed is:

1. A lock set comprising a circular section housing adapted to be secured to the indoor side of a door, a dead bolt received in said housing for movement between locked and unlocked positions, a latch bolt received in said housing for movement between latched and unlatched positions, an operating mechanism associated with said dead bolt and received in said housing for moving the dead bolt between said locked and unlocked positions, an operating mechanism associated with said latch and received in said housing for moving the latch bolt between said latched and unlatched positions, a lever handle rotatably supported by said housing with a portion of said handle projecting out of the housing on one side of the housing and adapted to operate said latch bolt through said mechanism associated with the latch bolt from the indoor side, a thumb turn rotatably supported by said housing with a portion of said thumb turn projecting out of the housing on the indoor side of said housing and adapted to operate said dead bolt through said mechanism associated with the dead bolt from the indoor side, a rose secured to the outdoor side of said door and connected to the other side of said housing with the door interposed therebetween, a knob rotatably supported by said housing on the outdoor side and adapted to operate said latch bolt through said mechanism associated with the latch bolt from the outdoor side, a hollow cylindrical member secured to said knob and extending from one end of the knob through said rose to said housing, a hollow cylindrical sheath means within said cylindrical member, a cylinder lock disposed within said hollow cylindrical sheath means, and one end of said cylindrical sheath means being fixedly secured to said housing whereby the rotational movement of said knob is not transmitted to said cylinder lock.

2. A lock set as set forth in claim 1, in which said rose is provided with a plurality of internally threaded cylindrical projections which extend from one side of the rose through said door to said housing so as to connect the rose to the housing, said housing including a peripheral wall having notches therein, said housing further including a mounting plate having bores through which said cylindrical projections extend and a plurality of engaging projections adapted to fit in said notches formed in the inner periphery of said housing.

3. A lock set as set forth in claim 1, in which said housing is adapted to be received within a door structure and further including an outdoor mounting unit adapted to be secured to the outdoor side of said door and an indoor mounting unit adapted to be secured to the indoor side of said door.

4. A lock set comprising a circular section housing

adapted to be secured to the indoor side of a door, a dead bolt received in said housing for movement between locked and unlocked positions, a latch bolt received in said housing for movement between latched and unlatched positions, an operating mechanism associated with said dead bolt and received in said housing for moving the dead bolt between said latched and unlatched positions, an operating mechanism associated with said latch bolt and received in said housing for moving the latch bolt between said latched and unlatched positions, a lever handle rotatably supported by said housing with a portion of said handle projecting out of the housing on one side of the housing and adapted to operate said latch bolt through said operating mechanism for the latch bolt from the indoor side, a thumb turn rotatably supported by said housing with a portion of said thumb turn projecting out of the housing on the indoor side of said housing and adapted to operate said dead bolt through said operating mechanism for the dead bolt from the indoor side, a rose secured to the outdoor side of said door and connected to the other side of said housing with the door interposed therebetween, a knob rotatably supported by said housing on the outdoor side and adapted to operate said latch bolt through said operating mechanism for the latch bolt from the outdoor side, a hollow cylindrical member secured to said knob and extending from one end of the knob through said rose, a hollow cylindrical sheath means within said cylindrical member, a cylinder lock being disposed within said hollow cylindrical sheath means, one end of said cylindrical sheath means being fixedly secured to said housing whereby the rotational movement of the knob will not be transmitted to said cylinder lock, said operating mechanism for the dead bolt comprising a follower member connected to said thumb turn at one end and having an engaging member at the other end, a connecting member adapted to engage said engaging member of the follower member and adapted to be operatively connected to said cylinder lock, and an arm plate secured to said thumb turn and having a portion adapted to engage said dead bolt for moving the bolt between said latched and unlatched positions; and said operating mechanism for the latch bolt comprising a latch bolt driving arm operatively provided in said housing and connected to said knob, said latch bolt driving arm including a lateral projection on one side and a stepped ear at said other end adapted to engage portions of said latch bolt in one direction, a latch bolt operating member connected to said lateral projection at one end and connected to said latch bolt at other end, a second latch bolt operating member secured to a shank of said lever handle at one end and connected to said latch bolt at the other end.

References Cited

UNITED STATES PATENTS

1,714,286	5/1929	Waldo	70—149
173,853	2/1876	Gardiner	70—107
1,112,347	9/1914	Young	70—107
2,178,132	10/1939	Anderson	70—450
2,304,612	12/1942	Voight	70—451 X
2,638,771	5/1953	Comey	70—129
3,025,694	3/1962	George	70—107
3,390,558	7/1968	Tornoe	70—107

FOREIGN PATENTS

1,359,270 3/1964 France.

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70—147, 448