Aug. 22, 1967 F. J. RUSSELL ETAL 3,337,248

MORTISE LOCK KNOB LOCKING MEANS

Filed April 23, 1965 3 Sheets-Sheet 1

Fig. 1

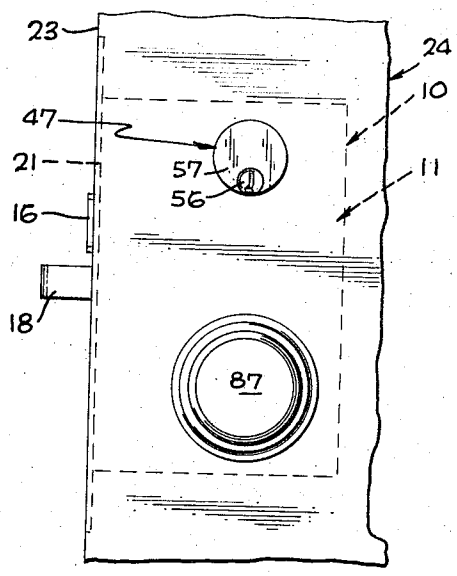


Fig. 2

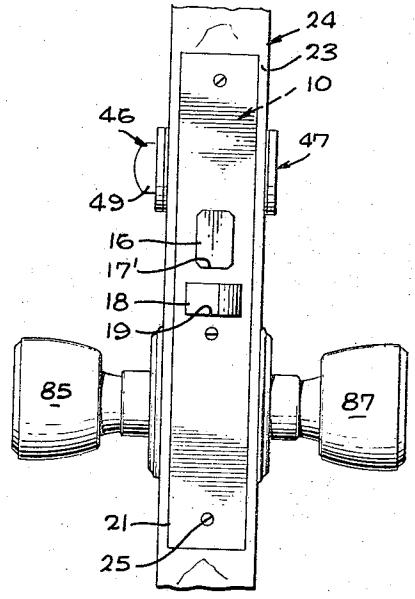


Fig. 6

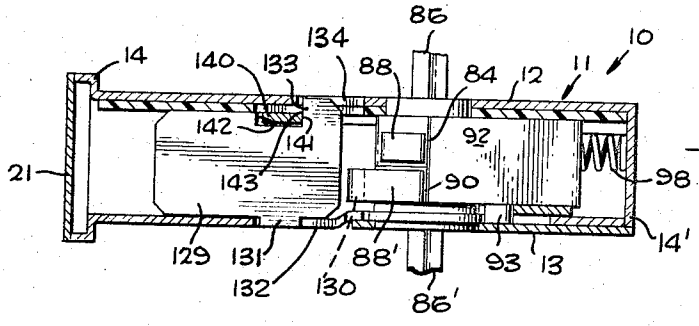
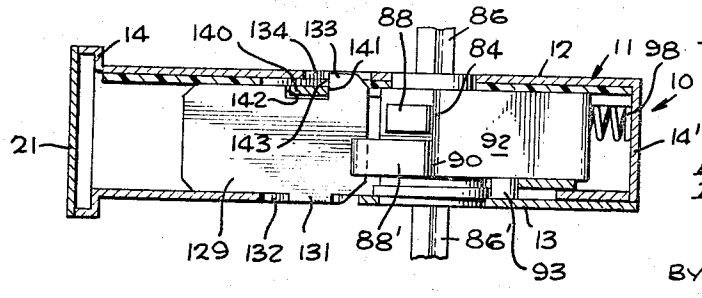


Fig. 7



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Fig. 3

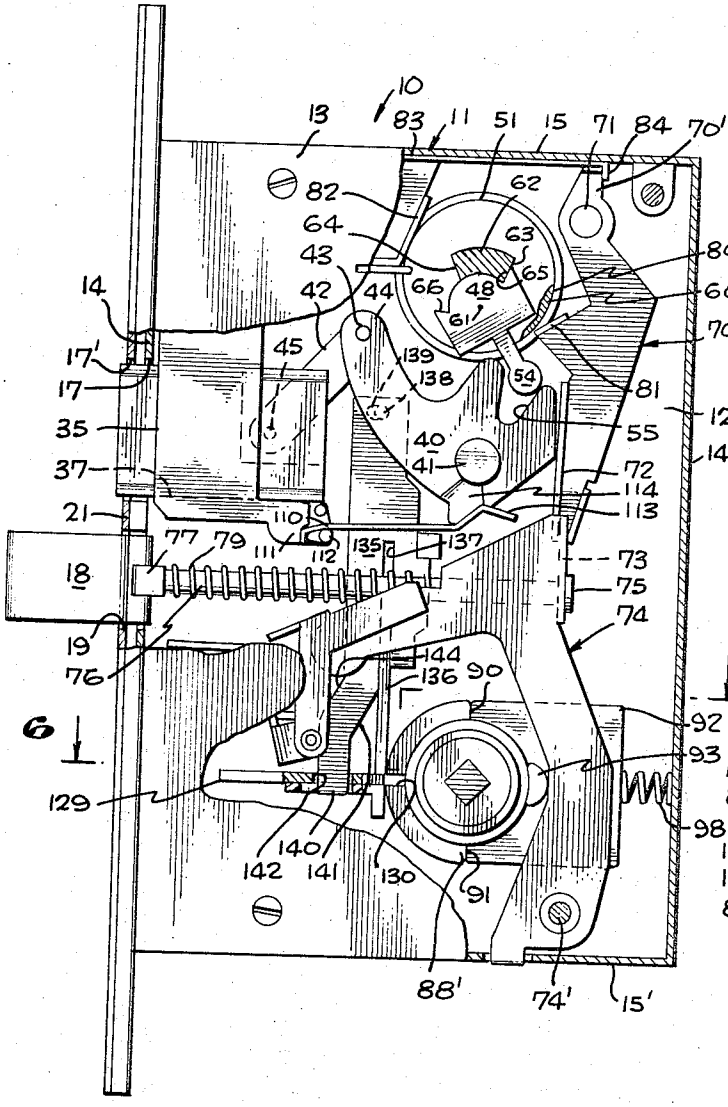
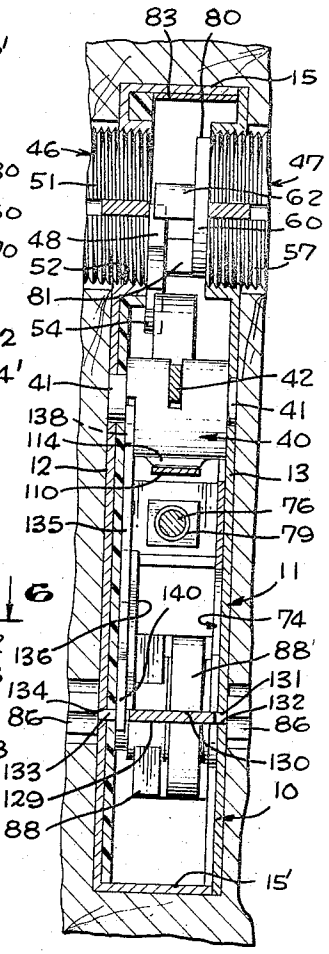


Fig. 5



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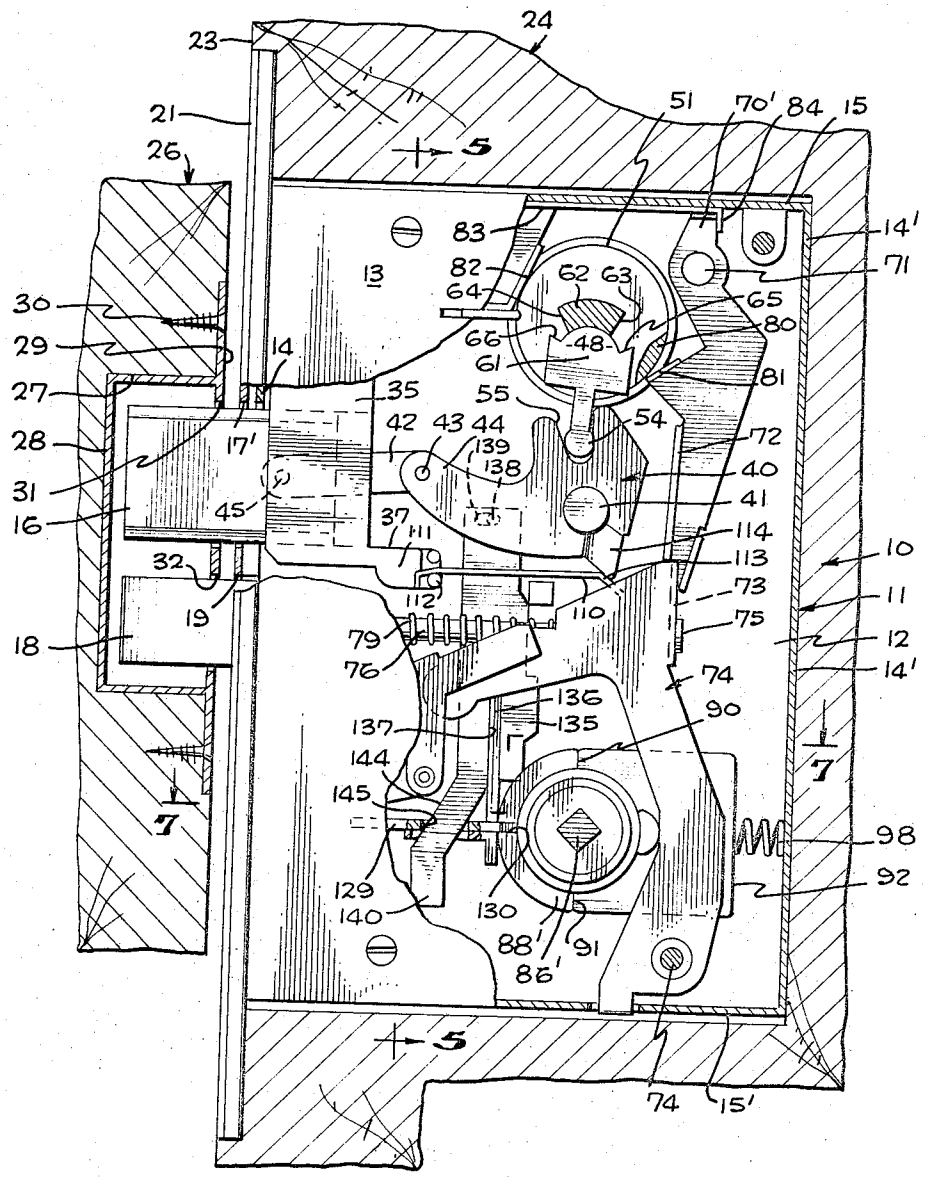
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Fig. 4



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MORTISE LOCK KNOB LOCKING MEANS

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Filed Apr. 23, 1965, Ser. No. 450,446

3 Claims. (Cl. 292—5)

The invention relates to door locks in general and is especially useful in locks usually identified as a mortise lock, namely, one which fits into a recess which has been cut into the door from the edge of the door. When a rugged, high quality type of lock is needed, a mortise lock often is selected. Typical installations for high quality mortise type lock are installations for hotels, hospitals, and schools.

One of the reasons for installing a mortise type lock is for greater locked door security. Accordingly, extra provisions to assure a high degree of security are frequently desirable, such, for example, as double locking the door. Although providing a door with two locks, in order to make double locking possible, does give an added degree of security, such an approach requires many extra parts and extra lock installation costs.

Among the objects of the invention is to provide a new and improved mortise type lock which is capable of being double locked by use of a single locking mechanism.

Another object of the invention is to provide a new and improved mortise type lock wherein a locking mechanism can be made use of for extending a dead bolt into locked position as well as for barring the hand-hold against the operation usually depended upon to withdraw the latch bolt. In this way, a double locking of the door is provided.

Still another object of the invention is to provide a new and improved mortise type lock wherein the dead bolt actuating mechanism is so constructed as to be extended by a key-actuated cylinder or turn device wherein, by employment of relatively few additional pieces, the same mechanism can be used to block rotation of an outside hand-hold which normally withdraws the latch bolt, thereby to make use of the latch bolt in addition to the dead bolt for locking the door against entry from the outside.

With these and other objects in view, the invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims, and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a fragmentary side elevational view of a door, showing a mortise lock mounted therein.

FIGURE 2 is an end elevational view of the installation shown in FIGURE 1.

FIGURE 3 is a side elevational view substantially broken away, showing the operating parts in unlocked position.

FIGURE 4 is a side elevational view similar to FIGURE 3, but showing the operating parts in locked condition with respect to a door frame and strike plate.

FIGURE 5 is a longitudinal sectional view on the line 5—5 of FIGURE 4.

FIGURE 6 is a cross-sectional view on the line 6—6 of FIGURE 3.

FIGURE 7 is a cross-sectional view on the line 7—7 of FIGURE 4.

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A lock construction especially well adapted to the invention here under consideration is shown and described in copending applications Ser. No. 450,461, filed April 23, 1965; Ser. No. 450,462, filed April 23, 1965; Ser. No. 450,450, filed April 23, 1965; Ser. No. 450,447, filed April 23, 1965; Ser. No. 450,472, filed April 23, 1965; Ser. No. 450,460, filed April 23, 1965.

In an embodiment of the invention which has been selected as one for showing a typical arrangement of structural parts involving the invention, there is shown a mortise type block indicated generally by the reference character **10**, substantially all of which is housed within a case **11**. An inside wall **12** and an outside wall **13**, forming part of the case **11**, form a chamber between them, one end of which is defined by a front end wall **14** and the other by a rear end wall **14'**. A top wall **15** and a bottom wall **15'** complete the enclosure. A dead bolt **16** reciprocatably mounted in the case **11** extends outwardly through a hole **17** in the front end wall **14** and an aligned hole **17'** in a front plate **21**. A latch bolt **18**, also reciprocatably mounted in the case **11**, extends outwardly through the hole **17** and an aligned hole **19**.

To aid in understanding the device and its mode of operation, the case **11** is shown mounted in a door **24** extending inwardly from an end edge **23**. Machine screws **25** extending through the front plate **21** fasten the front plate **21** to the front end wall **14**, and other screws (not shown) hold the case **11** in position on the door **24**. In a door frame **26** is a recess **27** containing a box **28** of a strike plate **29** fastened to the door frame **26** by screws **30**. An opening **31** in the strike plate **29** accommodates the dead bolt **16**, and an opening **32** accommodates the latch bolt **18**.

For reciprocatably mounting the dead bolt **16** in its position in the case **11**, there is provided a block **35**, the block **35** forming part of the interior construction of the case **11**. The dead bolt **16** slides in a slideway **37** in the block **35** and extends outwardly through the hole **17** in the front end wall **14** and the aligned hole **17'** in the front plate **21**. For manipulating the dead bolt **16** between the unlocked position of FIGURE 3 and the lock position of FIGURE 4, there is provided a drive linkage consisting of a rock arm **40** pivotally mounted in the case **11** on a shaft **41** and a link **42** having a pivotal connection **43** at a free end **44** and another pivotal connection **45** at the other end of the link **42** to the dead bolt **16**.

On the inside wall **12** of the case **11** there is provided a turn device indicated generally by the reference character **46**. Opposite the turn device **46** and mounted on the outside wall **13** of the case **11** is a key-actuated mechanism indicated generally by the reference character **47**. Through an appropriate actuator **48**, the dead bolt **16** can be operated either by the turn device **46** or the key-actuated mechanism **47**. The turn device **46** is provided with a handle **49**. A housing **51** for the turn device **46** has a threaded engagement **52** with the structure of which the inside wall **12** is part. The turn device **46** includes the actuator **48** nonrotatably mounted thereon. A rounded driver **54** on the free end of the actuator **48** is movably received in a somewhat pie-shaped pocket **55**, so that as the actuator **48** is rotated by manipulation of the handle **49** in a clockwise direction, as viewed in FIGURES 3 and 4 the actuator **48** will rotate the rock arm **40** in a counterclockwise direction, the rock arm **40**, in turn, moving the link **42**, which results in shifting the dead bolt **16** from

the unlocked position of FIGURE 3 to the locked position of FIGURE 4. When the dead bolt 16 is to be unlocked, the handle 49 is rotated in the opposite direction, causing the actuator 48 to be rotated in a counterclockwise direction, as viewed in FIGURES 3 and 4. Thereby, through the agency of the rounded driver 54 in the pocket 55, the rock arm 40 is caused to rotate in a clockwise direction and, by this motion, pull upon the link 42 to withdraw the dead bolt 16 from the locked position shown in FIGURE 4 to the unlocked position shown in FIGURE 3. The turn device 46 alternately could be a key-actuated mechanism such as is provided on the outside wall 13 of the embodiment and which is described hereafter.

To enable the actuator 48 to be manipulated by operation of the key-actuated mechanism 47, a conventional key plug 56 is rotatably mounted in a housing 57 in a substantially conventional manner. At the inside end of the key plug 56 is a tail disk 60. On the tail disk 60 is a boss 62, a fragment of which is shown in FIGURES 3 and 4. The tail disk 60 and the accompanying boss 62, when rotated by the key-actuated mechanism 47, rotates about a center point 61. Hence, rotation of the tail disk 60 is eccentric.

The boss 62 extends inwardly from the tail disk 60. Opposite ends 63 and 64 of the boss 62 are made use of in rotating the actuator 48 by manipulation of the key-actuated mechanism 47. For example, when the key-actuated mechanism 47 is rotated counterclockwise, as viewed in FIGURES 3 and 4, the end 63 is forced against a shoulder 65 of the actuator 48, causing the actuator 48 to rotate in a clockwise direction and accordingly shift the rounded driver 54 against the rock arm 40, causing the rock arm 40 to rotate in a counterclockwise direction about the shaft 41, as viewed in FIGURES 3 and 4, thereby to extend the dead bolt 16 to locked position through the mechanism previously described. Contrarily, when the key-actuated mechanism 47 is to be used to withdraw the dead bolt 16, it is rotated in a counterclockwise direction, as viewed in FIGURES 3 and 4, through a lost motion distance which is accounted for by the length of the boss 62, as compared with the distance between the shoulder 65 and a second shoulder 66 on the actuator 48. After traversing the lost motion distance, the end 64 is impressed against the shoulder 66, causing the actuator 48 to be rotated in a counterclockwise direction, and thus, in turn, causes the rock arm 40 to rotate in a clockwise direction, thereby to withdraw the dead bolt 16 to the unlocked position of FIGURE 3.

In order to open the door 24 from the outside when it is locked, it is necessary for the occupant to withdraw the latch bolt 18, which is also employed to lock the door 24 from the outside. To accomplish this, a drive linkage is employed interconnecting the tail disk 60 with the latch bolt 18. The drive linkage includes an actuator link 70 pivotally secured to the case 11 by a pivot pin 71. A flange 72 on the actuator link 70 is positioned behind a flange 73 on a roll back link 74. A head 75 on a latch bolt rod 76 overlies the flange 73, the latch bolt rod 76 being attached to the latch bolt 18 by a pivotal connection 77. A coiled spring 79 normally holds the latch bolt 18 in the extended position shown in FIGURES 3 and 4, acting in a substantially conventional manner.

The circumference of the tail disk 60 serves as an arcuate cam 80 which is adapted to engage a cam plate 81 on the actuator link 70. Hence, when the tail disk 60 rotates eccentrically in a clockwise direction about the center point 61, as viewed in FIGURES 3 and 4, for example, the arcuate cam 80 is moved against the cam plate 81, causing the actuator link 70 to swing in a counterclockwise direction about the pivot pin 71, as viewed in FIGURES 3 and 4. This, in turn, causes the flange 72 to move in a direction from left to right, as viewed in FIGURES 3 and 4, against the flange 73, and this flange, in turn, moving against the head 75 of the latch bolt rod 76, withdraws the latch bolt 18.

When the dead bolt 16 is in unlocked position, the latch bolt 18 can be retracted by rotation of the key-actuated mechanism 47 because the dead bolt 16 will be withdrawn by operation of the boss 62, in the manner previously described, at the same time that the latch bolt 18 is being withdrawn by the mechanism details just related above.

The latch bolt 18 can also be withdrawn by reverse rotation, namely, counterclockwise rotation of the tail disk 60. When this occurs, the arcuate cam 80 moves against a flange 82 on a lever 83, causing the lever 83 to shift toward the left as viewed in FIGURES 3 and 4. Movement as described forces the flanged end 84 against an extension 70' of the actuator link 70, which then pivots counterclockwise around the pivot pin 71 and withdraws the latch bolt 18 as previously described.

It is also necessary to be able to withdraw the latch bolt 18 from the inside of the door 24 as, for example, when the dead bolt 16 is withdrawn but the door 24 still is closed. This can be accomplished by rotating an inside door knob 85. The inside door knob 85 is nonrotatably attached to a spindle 86 which is rotatably mounted by substantially conventional construction in the case 11. An inside rollback 88 is nonrotatably attached to the spindle 86. Rotation of the spindle 86 and inside door knob 85 can be in either a clockwise or counterclockwise direction, so that an end 84 (see FIGURES 6 and 7) moves against a block 92 against tension of the spring 93, causing a cam 93 to push against the rollback link 74, in turn causing it to pivot about a pin 74' which mounts the rollback link 74 in the case 11. When this happens, the flange 73 will move in a direction from left to right against the head 75, as viewed in FIGURES 3 and 4, and in this way withdraws the latch bolt 18. When an outside rollback 88' is free, as shown in FIGURE 3, it can be similarly rotated in one direction or another to move either the end 90 or 91 against the block 92 thereby to withdraw the latch bolt 18 in the manner just described.

The latch bolt 18 also can be withdrawn by rotating an outside knob 87 when the dead bolt 16 is withdrawn, but the door 24 still is closed. The outside knob 87 is nonrotatably attached to a spindle 86' which is rotatably mounted by substantially conventional construction in the case 11. An outside rollback 88' is nonrotatably attached to the spindle 86'. The retraction of the latch bolt 18 by rotation of the outside knob 87 is the same as described above in connection with the rotation of the inside knob 85.

Either the inside knob 85 or outside knob 87 alternately could be a conventional handle device (not shown) with a conventional push-down thumbpiece or with a conventional push-in thumbpiece. In such a case, the movement of the thumbpiece would translate through appropriate mechanism to retract the latch bolt 18.

For yieldably holding the rock arm 40 in one position or another, there is provided a leaf spring 110 secured to the block 35 by anchoring elements 111 and 112, so that a free end 113 of the leaf spring 110 can engage one side or the other of a projection 114 on the rock arm 40, as shown respectively in FIGURES 3 and 4.

As second means of locking the closed door against opening from the outside, mechanism is provided interconnecting the dead bolt 16 and its actuating means to the outside rollback 88'. The dead bolt 16 and this interconnecting mechanism can be operated simultaneously by manipulation of the turn device 46 on the inside of the door 24. This can also be done by making use of the key-actuated mechanism 47 on the outside of the door 24.

The interconnecting mechanism consists primarily of a blocking slide 129, which engages a slot 130 in the outside rollback 88', and a driving slide 135.

As shown advantageously in FIGURES 6 and 7, the blocking slide 129 has a tab 131 extending outwardly from one edge riding in a horizontal slot 132 in the out-

side wall **13** and a tab **133** riding in a horizontal slot **134** in the inside wall **12**.

The driving slide **135** is guided for vertical reciprocation by a guide **136** extending from the inside wall **12** into a vertical guide way **137** in the driving slide **135**, the guided relationship being shown in FIGURES 3, 4, and 5. At the upper end of the driving slide **135** is an enlarged aperture **139** into which extends a pin **138** from the rock arm **40**. At the lower end of the driving slide **135** is a drive arm **140**, offset slightly toward the left, as viewed in FIGURES 3 and 4. The drive arm **140** is received in an opening **142** in the blocking slide **129**. A diagonal drive cam face **141** interconnects the drive arm **140** with the main portion of the driving slide **135**. The diagonal drive cam face **141** is adapted to cooperate with a driven cam face **143** which is, in fact, the right-hand side of the opening **142**, as viewed in FIGURES 3, 4, 6, and 7.

In operation, the parts occupy the positions shown in FIGURES 3 and 6. In this position, the dead bolt **16** is withdrawn and the rock arm **40** has been rotated clockwise, as viewed in FIGURES 3 and 4, to the limit of its movement. This results in elevating the driving slide **135** to the top of its position of movement. Likewise, in this relationship of parts, the blocking slide **129** is moved toward the left.

When the turn device **46** is rotated, thereby to rotate the actuator **48** and its rounded driver **54** in a clockwise direction, as viewed in FIGURES 3 and 4, the rock arm **40** will be rotated in a counterclockwise direction. Movement, as described, moves the free end **44** of the rock arm **40** arcuately downwardly, causing the driving slide **135** to move downwardly. When this happens, the drive cam face **141** on the driving slide **135** cams against the driven cam face **143** of the blocking slide **129**, and the blocking slide **129** is by this action forced in a direction from left to right, as viewed in FIGURES 3 and 4, until the blocking slide **129** enters the slot **130**, which extends radially inwardly from the periphery of the outside rollback **88'**. In this manner, the outside rollback **88'** is anchored in position thereby preventing rotation of the outside knob **87**. Hence, the latch bolt **18** is locked against operation by the outside knob **87**. At the same time, and as the result of rotation of the rock arm **40**, the dead bolts **16** has been extended to the locked position of FIGURE 4 and, hence, the door **24** is double locked.

Unlocking is accomplished by merely reversing rotation of the turn device **46**, which results in rotating the rock arm **40** in a counterclockwise direction, as shown in FIGURES 3 and 4.

The driving slide **135** thereupon is lifted and the oblique portion of the drive arm **140** is moved upwardly through the opening **142**. During this upward movement, an upper return cam track **144** on the driving slide **135** cams against the side **145** of the opening **142**, thereby to force the blocking slide **129** from right to left, as viewed in FIGURES 3 and 4, and out of engagement with the slot **130**.

Needless to say, when the rock arm **40** is manipulated by operation of the key-actuated mechanism **47**, thus acting upon the actuator **48** and the rounded driver **54**, the outside rollback **88'** can again be locked against movement by employment of the blocking slide **129** through the same interconnecting mechanism described above.

From the foregoing explanation, it will be understood that the lock **10** can be readily double locked against opening from the outside by rotation of one or another of the actuating mechanisms; namely, the turn device **46** if the operation is accomplished from the inside of the door, or the key-actuated mechanism **47**, if the operation is accomplished from the outside of the door.

While the invention has herein been shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein, but is to be accorded the full scope of the claims, so as to embrace any and all equivalent devices.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. In a mortise type lock including a case, a latch bolt reciprocatably mounted in said case, hand-hold means operatively mounted in said case including a rollback, an operating connection between said rollback and said latch bolt, an interlock for blocking rotation of said rollback, a turn device in operative engagement with said interlock, said interlock including slide means slidably mounted, said slide means including a blocking slide member and a reciprocating driving slide member, said driving slide member having a slidable mounting on the case, oppositely facing cams on respectively opposite edges of said driving slide member sloping in a direction oblique relative to the direction of movement of said driving slide member, said cams being in sliding engagement with respective adjacent cams on said blocking slide member for reciprocatably driving the blocking slide member, said rollback having a slot therein in line with said blocking slide member when the rollback is in the position occupied when the latch bolt is extended, said slot being adapted to receive said blocking slide member in locked position, whereby said rollback is blocked by operation of said turn device.

2. In a mortise type lock including a case, a latch bolt reciprocatably mounted in said case, hand-hold means operatively mounted in said case including a rollback, an operating connection between said rollback and said latch bolt, an interlock for blocking operation of said hand-hold means, a turn device in substantial vertical alignment with said hand-hold means and in operative engagement with said interlock, said interlock including a blocking slide member slidably mounted in said case and a driving slide member having a reciprocating sliding mounting on the case in a position transverse relative to said blocking slide member, said rollback having a slot therein extending radially inwardly from the periphery and in line with said blocking slide member when the rollback is in the position occupied when the latch bolt is extended, said slot being adapted to receive said blocking slide member in locked position, and a driving connection between said turn device and said driving slide member, and drive means between said slide members comprising oppositely facing cams on respectively opposite edges of said driving slide member sloping in a direction oblique relative to the direction of movement of said driving slide member, said cams being in sliding engagement with respective adjacent cams of said blocking slide member for reciprocatably driving said blocking slide member whereby said rollback is blocked by said blocking slide member in response to operation of said turn device and said actuating means.

3. In a mortise type lock including a case, a dead bolt reciprocatably mounted in said case, actuating means for said dead bolt including a rocker rotatably mounted in the case, a connection between said rocker and said dead bolt, and a turn device in operative engagement with said rocker, a latch bolt reciprocatably mounted in said case, hand-hold means operatively mounted in said case including a rollback, an operating connection between said rollback and said latch bolt, and an interlock for blocking rotation of said hand-hold means, said interlock including a driving slide member having a reciprocating sliding mounting in said case and a blocking slide member slidably mounted in said case for movement in a direction transverse to said driving slide member, said rollback having a slot therein extending radially inwardly from the periphery and in line with said blocking slide member when the rollback is in the position occupied when the latch bolt is extended, said slot being adapted to receive said blocking slide member holding said rollback in locked position, said driving slide member having

a movable connection with said actuating means and a drive means between said members comprising oppositely facing cams on respectively opposite edges of said driving slide member sloping in a direction oblique relative to the direction of movement of said driving slide member, said cams being in sliding engagement with respective adjacent cams on said blocking slide member whereby to move said blocking slide member into and out of engagement with said rollback by operation of said turn device and said actuating means.

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