May 12, 1931. J. REIF 1,804,482

DOORLOCK

Filed April 4, 1928 2 Sheets-Sheet 1

Fig. 1

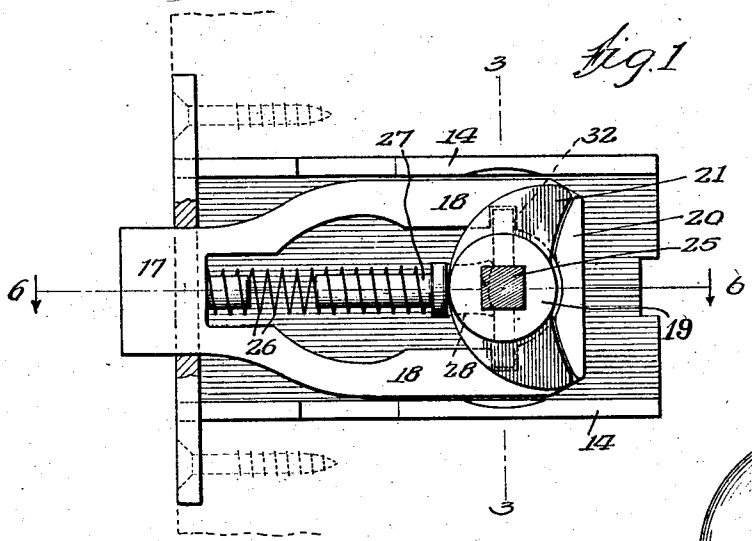



Fig. 5

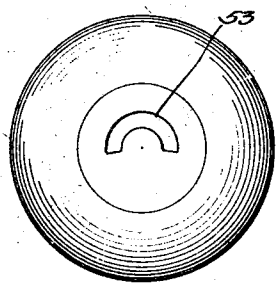



Fig. 2

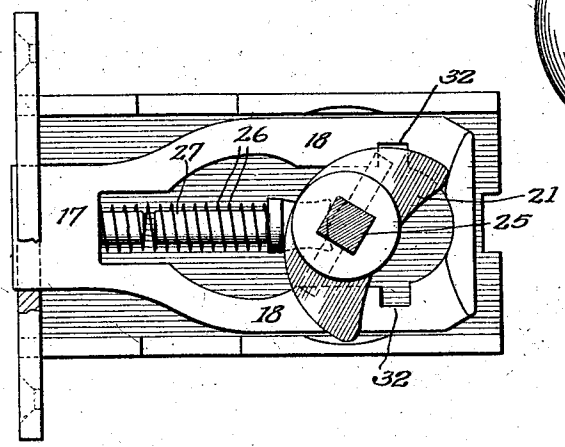



Fig. 4

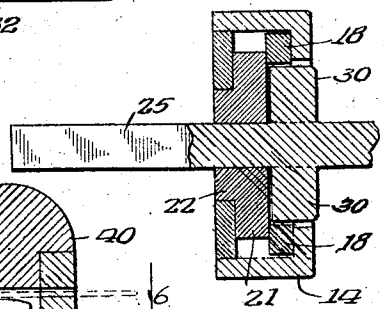
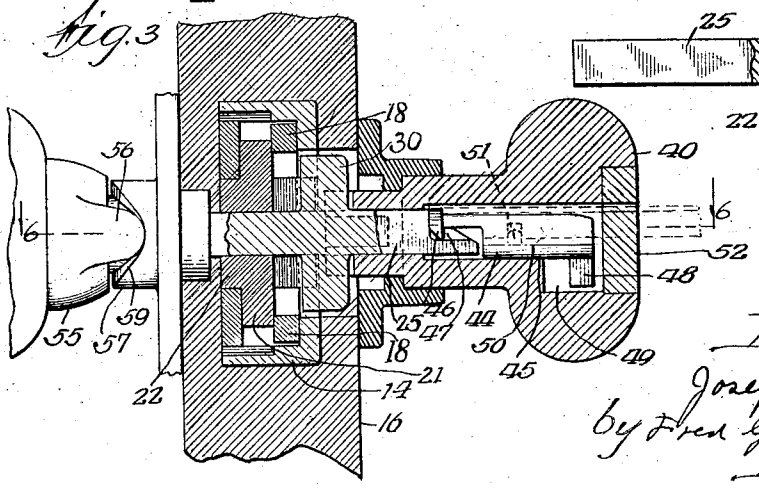



Fig. 3




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DOORLOCK

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Fig. 6

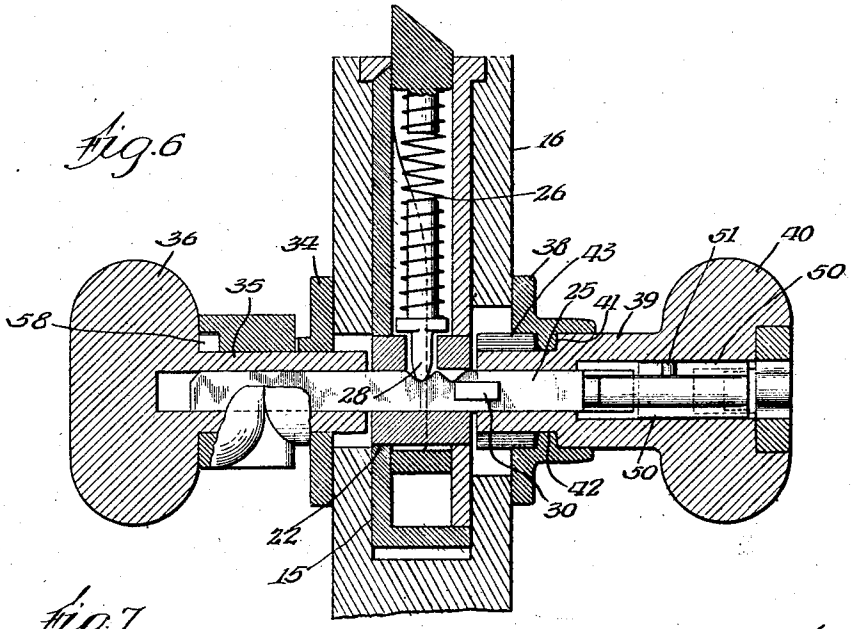



Fig. 7.

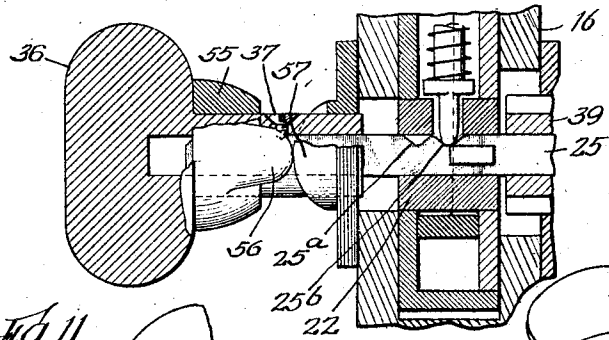



Fig. 8

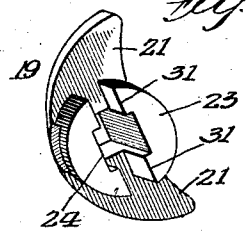



Fig. 11

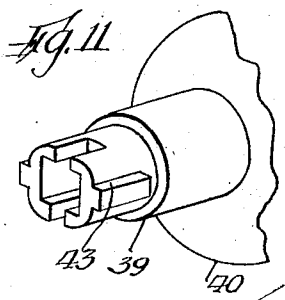
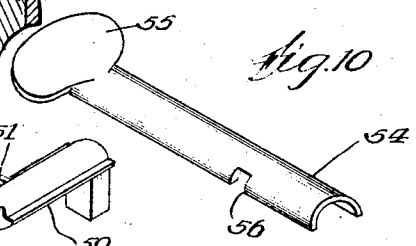



Fig. 9




Fig. 10




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Patented May 12, 1931 1,804,482

# UNITED STATES PATENT OFFICE

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## DOORLOCK

Application filed April 4, 1928. Serial No. 267,181.

The invention relates to door locks.

The primary object of the invention is to provide an improved door lock which may be set so as to be operable by the handles on both sides of the door or operable by one handle only, and either operable or inoperable by a key from the outside of the door.

Other objects of the invention will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings: Fig. 1 is an elevation of the locking bolt in its case and its shifter device, one section of the case being removed for illustrative purposes and the bolt being shown in its operative or extended position. Fig. 2 is a similar view showing the bolt retracted. Fig. 3 is a section taken on the line 3—3 of Fig. 1, the slidable stem for actuating the bolt being shown in the position assumed when the bolt is operable by either of the handles. Fig. 4 is a view similar to Fig. 3 showing the stem in the position assumed when it has been shifted to lock the bolt against operation by its rotation. Fig. 5 is a front view of the outer handle showing the key slot in the same. Fig. 6 is a section taken on the line 6—6 of Fig. 1, showing the various parts in position to render the bolt operable by either of the handles. Fig. 7 is a view similar to Fig. 6, showing the stem locked so the bolt will be inoperable by the outside handle or by the key-controlled device. Fig. 8 is a perspective of the rotary device for shifting the bolt. Fig. 9 is a perspective of the slidable stem and the key-operated element for shifting the stem. Fig. 10 is a perspective of the key. Fig. 11 is a perspective of the outer handle.

The invention is exemplified in a lock comprising a case composed of a main section or body 14 and a removable section 15. This case is inserted in a door 16. A locking bolt 17 is longitudinally slidable in the case and its outer end is adapted to pass into the usual socket in the door frame to hold the door closed. The inner portion of the bolt is divided to form upper and lower members 18 to straddle a rotatable shifter member 19. At its inner end the bolt is provided with an abutment 20 adapted to be engaged by arms 21 or member 19 to retract the bolt when said member is rotated in either direction from its normal position shown in Fig. 1. Shifter member 19 has integrally formed therewith a hub 22 journalled in an opening in case-section 15 and a hub 23 journalled in case-section 14. A square hole 24 is formed in, and extends through, shifter member 19, and a square stem 25 is longitudinally slidable in said hole, and is adapted to rotate said member. A spring 26 engages the bolt 17, and its inner end is coiled around a shifter stem 27 which has at its inner end a terminal 28 to engage the stem 25. Spring 26 acts to hold normally the bolt 17 in its extended or locked position. The abutting faces between stem 25 and terminal 28 are shaped to cause the spring to hold the stem in its normal position, and to retract the stem after it has been rotated in either direction. Stem 25 is provided with two notches $25^a$ and $25^b$ into which the terminal 28 is pressed by the spring, so as to hold the stem in two longitudinal positions. Lugs 30 are formed on the stem 25, and are adapted, when the stem is in the position shown in Figs. 4 and 7 to enter notches 31 in the hub 23 of shifting member 19 and notches 32 in the members 18 of the locking bolt to secure the bolt and the shifting member against relative movement, so that said member will be locked against rotation and will be inoperative to withdraw the bolt. When the lugs 30 are in the position illustrated in Figs. 3 and 6, they will be withdrawn from the notches 32 in the locking bolt and held in the outer portions of notches 31, so that shifter member 19 may be rotated by rotation of the stem 25. Notches $25^a$ and $25^b$ are V-shaped so that the force of spring 26 will be applied through terminal 28 to hold yieldingly the stem in two longitudinal positions, in one of which the locking bolt will be secured against operation by the shifter-member 19,

and in the other of which the bolt will be operable by the rotation of said member in either direction.

At the inner side of the door a bearing-plate 34 is secured. A hub 35 on an inside handle 36 is rotatably and slidably held in said plate (see Fig. 6). A screw 37 in the hub secures the handle 36 to the stem 25 so that the latter will be rotatable by the handle, and longitudinally movable between its alternative positions by the handle. When the handle 36 is in the position shown in Fig. 6, the bolt 17 may be withdrawn against the force of the spring by rotation of the handle and operation of stem 25, lugs 30, hub 23, arms 21, and abutment 20. A bearing-plate 38 is secured to the outer side of the door. A hub 39 on an outside handle 40 is rotatably mounted in said plate. A shoulder 41 on hub 39 engages the outer face of an annular rib 42 in bearing-plate 38, and lugs 43 on the hub 39 engage the inner face of rib 42 to interlock plate 38 and handle 40 to secure said handle against longitudinal movement. Rib 42 is formed with notches through which lugs 43 may be inserted in assembling the handle 40 and plate 38, the lugs 43 having an operative range in which they will be kept out of alignment with said slots after assembling. When the stem 25 is in the position illustrated in Figs. 3 and 6, the stem is rotatable by the outer handle 40, as well as by the inner handle 36, and consequently the bolt 17 may be retracted, either from the inside or outside of the door. When the stem 25 is in the position illustrated in Figs. 4 and 7, the bolt 17 will be inoperable by the outside handle 40.

A key operable device is provided for shifting the stem 25 longitudinally when it is desired that the door may be unlocked from the outside by a suitable key. This device consists of a member 44 which is slidably confined in a socket 45 in handle 40 and is provided at its inner end with a hook or tooth 46. The latter engages a hook or tooth 47 on the outer end of stem 25, so that the stem may be shifted longitudinally by key-operable member 44. Member 44 is provided with a lug 48 confined in a recess 49 in handle 40, to hold the member against rotation in the handle. The upper portion of member 44 is convex, and has longitudinally extending shoulders 50 at the sides thereof. A tooth 51 is formed on one of the shoulders 50. The outer end of socket 45 is permanently closed by a plug 52 which is formed with a key-slot 53 which is arcuate in cross section to admit a semi-clindrical key 54 (see Figs. 5 and 10). The outer end of the key is provided with a handle 55, and the inner end is provided at one side with a notch 56 which is adapted to be rotated after the key has been inserted in the socket 45 into interlocking engagement with the tooth 51 on member 44. The slot 53 is formed to permit the key to be inserted into the socket and then rotated in order to effect an interlocking of the notch and tooth. When the proper key has been inserted and interlocked with member 44, an outward pull upon the key will shift the stem 25 into position to release the locking bolt 17, so that the door may be unlocked from the outside of the door by rotating the key 54 and handle 40. This exemplifies key-operable means for operating the sliding stem to unlock the bolt 17 for retraction.

At times it is desirable to lock the bolt 17 so that it cannot be operated from the outside with a key, and for that purpose a device is provided for locking the stem 25 in the position in which it locks the bolt 17 against retraction, and this consists of a ring 55 which is rotatable around the hub 35 of the inside handle 36. This ring is provided with abutments or cam surfaces 56 which may be turned to engage the crests of cam surfaces 57 formed on the bearing-plate 34. This ring is confined by a lug 58 so it will be rotatable through an arc of approximately 90°. When the lock is to be operable by either the inside or outside handles, the stem 25 will be pushed outwardly and the cams 56 will rest in the recesses 59 between cam-surfaces 57 on the locking plate. In this position the stem 25 and both handles will be rotatable to retract the bolt 17, and the inside handle 36 will be rotatable without shifting the ring 55. When it is desired to render the bolt 17 operable from the outside only by a key, the handle 36 will be pulled inwardly or the stem 25 may be pushed inwardly by key 54 to shift similarly the handle 36. When the handle is thus shifted, the ring 55 will be left so that its cams 57 will be aligned with the recessed portions 59 of plate 34, so that the ring will not interfere with the shifting of the stem 25 and the bolt 17 by the key. When the handle 36 is pulled inwardly, the bolt 17 will be locked, so that if it is desired to prevent the door from closing, it is only necessary to shift said handle while the door is open. When it is desired to render the bolt inoperable from the outside by the key, the ring 55 is rotated to bring its cams 56 into engagement with the cams 57 on plate 34. In this position the ring will lock the stem 25 against outward movement by the key.

The invention exemplifies an improved lock which may be set by the manipulation of the inside handle, so that the locking bolt may be retracted by a handle at the outside of the door, as well as at the inside, or so that it will be inoperable by the outside handle and operable by a key inserted into

the outer handle; also a lock in which the handle shiftable stem may be locked against longitudinal movement so that the door cannot be unlocked by the key. The invention also exemplifies a lock with a key which is difficult of simulation, and in which it is necessary for the key to be shaped to effect a longitudinal movement of the stem. The lock is simple in construction and efficient in operation.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

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

1. In a door lock, the combination of a case, a lock-bolt movable in the case, inner and outer handles, bolt-shifting means comprising a rotatable and longitudinally slidable stem, one of the handles being connected to said stem so that the latter is rotatable and slidable thereby, means operable upon slide movement of the stem in one direction to render the bolt inoperable by the shifting-means, and key operable means adjacent the other handle for slidably shifting the stem in the opposite direction to render the shifting-means operable to shift the bolt.

2. In a door lock, the combination of a case, a lock bolt movable in the case, inner and outer handles, bolt-shifting means comprising a rotatable and slidable stem rotatable by both handles and slidable by the inner handle, means operable by slide movement of the stem in one direction to render the bolt inoperable by the outer handle, and key-operable means adjacent said outer handle for slidably shifting the stem in the other direction to render the shifting means operable to shift the bolt.

3. In a door lock, the combination of a case, a lock bolt movable in the case, inner and outer handles, bolt-shifting means comprising a rotatable bolt actuating member and a stem connected to rotate the member and slidable therein, said stem being rotatable by both handles and slidable by the inner handle, means operable by slide movement of the stem in one direction to interlock the bolt and rotatable member to render the bolt inoperable by the outer handle, and key-operable means adjacent the outer handle for slidably shifting the stem in the opposite direction to retract the interlocking means and render the shifting means operable to shift the bolt.

4. In a door lock, the combination of a case, a lock bolt movable in the case, inner and outer handles, bolt-shifting means comprising a rotatable and slidable stem rotatable by both handles and slidable by the inner handle, means operable by the slide movement of the stem in one direction to render the bolt inoperable by the shifting-means, key operable means adjacent the outer handle for slidably shifting the stem in the opposite direction to render the shifting means operable to shift the bolt, and means for locking the stem to render it inoperable by the key-operable means.

5. In a door lock, the combination of a case, a lock bolt movable in the case, inner and outer handles, bolt shifting means comprising a rotatable and shiftable stem rotatable by both handles and slidable by the inner handle, means operable by slide movement of the stem in one direction to render the bolt inoperable by the shifting means, key operable means adjacent the outer handle for slidably shifting the stem in the opposite direction to render the shifting means operable to shift the bolt, and means carried by the inner handle for locking the stem to render it inoperable by the key operable means.

6. In a door lock, the combination of a case, a lock bolt movable in the case, inner and outer handles, bolt shifting means comprising a rotatable and slidable stem rotatable by both handles and slidable by the inner handle, means operable by slide movement of the stem in one direction to render the bolt inoperable by the shifting means, key operable means adjacent the outer handle for slidably shifting the stem in the opposite direction to render the shifting means operable to shift the bolt, and a ring rotatable on the inner handle for locking the stem to render it inoperable by the key operable means.

7. In a door lock, the combination of a case, a lock-bolt movable in the case, inner and outer handles, bolt-shifting means comprising a rotatable bolt actuating member and a stem connected to rotate the member and slidable therein, said stem being rotatable by both handles and slidable by the inner handle, means operable by slide movement of the stem in one direction to interlock with the bolt and member to render the bolt inoperable by the shifting means, key-operable means adjacent the outer handle for slidably shifting the stem in the opposite direction to render the shifting means operable to shift the bolt, and means for locking the stem to render it inoperable by the key-operable means.

8. In a door lock, the combination of a case, a lock-bolt movable in the case, inner and outer handles, bolt-shifting means operable by rotation of one of the handles and comprising a rotatable and slidable stem, means operable by inward slide movement of the stem to render the bolt inoperable by the shifting means, and a movably mounted key-operable member for sliding the stem outwardly to render the bolt operable by

said shifting means, said member embodying means for interlocking with a key and being adapted, when interlocked with the key, to be shifted outwardly for stem sliding purposes.

9. In a door lock, the combination of a case, a lock-bolt movable in the case, inner and outer handles, bolt-shifting means operable by rotation of the inner handle and comprising a rotatable and slidable stem, means operable by inward slide movement of the stem to render the bolt inoperable by the shifting means, and a member movable longitudinally in the outer handle for sliding the stem to render the bolt operable by said shifting means, said member embodying means for interlocking with a key and being adapted, when interlocked with the key, to be shifted outwardly for stem sliding purposes.

Signed at Hebron, Indiana, this 8th day of March, 1928.

JOSEPH REIF.