

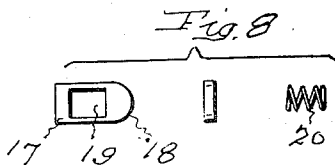
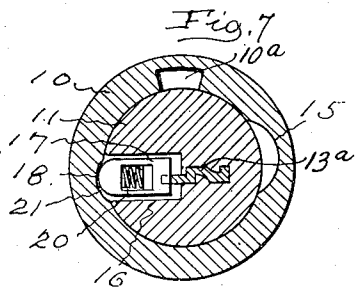
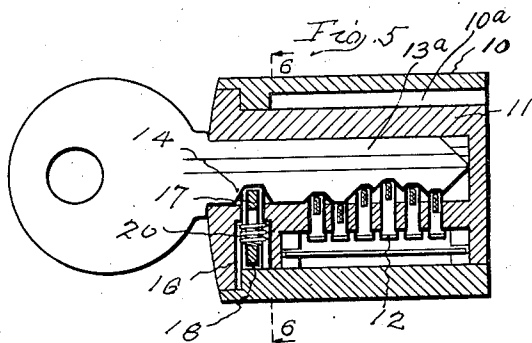
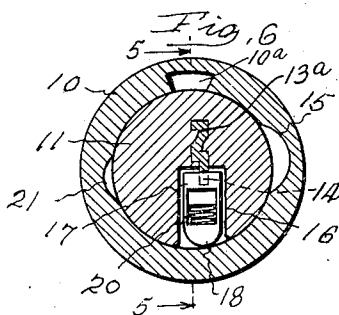
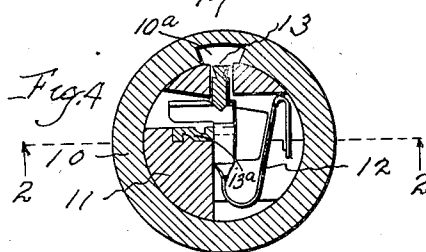
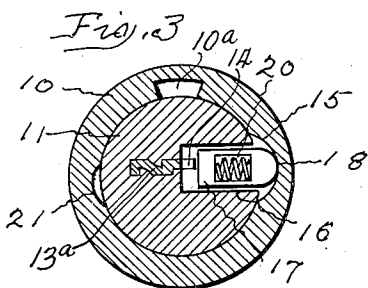
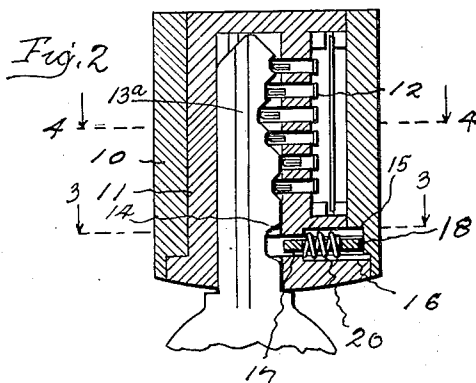
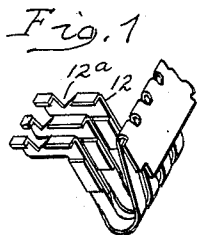
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2,469,018

CYLINDER LOCK KEY RETAINER AND POSITIONER

Filed Aug. 17, 1945



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CYLINDER LOCK KEY RETAINER
AND POSITIONER

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Application August 17, 1945, Serial No. 611,039

6 Claims. (Cl. 70—389)

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This invention relates to means for preventing the removal of a key from a cylinder lock until the cylinder is turned to such position that the key can be freely pulled out without liability of straining or damaging the tumblers. And it is particularly adapted for locks that have unit-spring tumblers or disk tumblers that are liable to be injured if an attempt is made to pull out the key with the cylinder in a wrong position. The means to which the invention relates further serves to indicate to the user when the cylinder has been turned to the proper position for key withdrawal.

The present invention contemplates providing the correct key with a notch in its bitted edge or in its back edge, or side, providing the inner wall of the barrel with one or more recesses and providing the cylinder near one end with a slot in which is a pin or plate that is adapted to be projected into the notch in the key when the cylinder is in the wrong position for key withdrawal and moved out of the notch and into a recess when the cylinder is turned to a position which will allow the free withdrawal of the key.

Of the accompanying drawings Fig. 1 shows a portion of a unit-spring tumbler.

Fig. 2 is a longitudinal section of a unit-spring tumbler lock on the dotted line 2—2 of Fig. 4, this view showing the cylinder in position for locking and showing the key free for withdrawal.

Fig. 3 is a transverse section on the dotted line 3—3 of Fig. 2.

Fig. 4 is a transverse section on the dotted line 4—4 on Fig. 2.

Fig. 5 is a longitudinal section on the dotted line 5—5 of Fig. 6, this view being similar to Fig. 2 but showing the cylinder out of position for locking and showing the key held to prevent withdrawal.

Fig. 6 is a transverse section similar to Fig. 3 but with the parts in the relative positions shown in Fig. 5, this view being on the dotted line 6—6 on Fig. 5.

Fig. 7 is a transverse section similar to Figs. 3 and 6 but with the parts in other relative positions.

Fig. 8 shows views of the retaining means.

The barrel 10, the cylinder 11, which is rotatable in the barrel, the unit-spring tumblers 12 carried by the cylinder, and the locking bar 13 which is subject to the action of the tumblers, that are illustrated, are of the type and are co-operatively arranged as fully shown and described in my co-pending application, Serial No. 599,877,

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filed June 16, 1945 now Patent No. 2,460,551, dated February 1, 1949.

The barrel 10 has a longitudinal slot 10^a into which the locking bar 13 is moved to effect locking and from which it is withdrawn to effect unlocking. The bar 13 is biased for movement in the inward or unlocking direction. The bar is permitted to move inward for unlocking when the notches 12^a on the several spring tumblers 12 are brought into alignment. The said notches are aligned when the tumblers are engaged and flexed, as shown in Figs. 2 and 4, by a correctly bitted key 13^a inserted in the key slot. Upon withdrawal of the key 13^a the spring tumblers return to their unflexed positions and the bar 13 is forced into the slot 10^a to effect locking. The said bar 13 and the unit spring tumblers 12 collectively constitute the locking means on the cylinder.

When the cylinder is out of locking position as shown in Figs. 2, 3 and 4, as for instance in the position shown in Figs. 5 and 6, the spring tumblers 12 are prevented by the bar 13 from flexing, and the said tumblers are therefore held in engagement with the key so as to prevent, or at least tend to prevent, withdrawal thereof. However, the spring tumblers, when held against flexing, offer but limited resistance to key withdrawal, and they would be buckled or distorted with resultant damage if the key were forcibly withdrawn with the cylinder in other than locking position, as for instance in the position shown in Figs. 5 and 6. The parts to be now described positively hold the key to prevent any possible withdrawal thereof, except when the cylinder is in locking position, as shown in Figs. 2, 3 and 4.

In carrying out the invention as herein illustrated the key 13^a has a notch 14 in its bitted edge, the interior wall of the barrel has a concave recess 15, and the cylinder near its front end has a slot 16 that is thinner at its inner end than at its outer end. The inner edge of the notch 14 in the key provides a shoulder which serves as hereinafter described to retain the key in places, except when the cylinder is in its locking position. Preferably the said shoulder is inclined or bevelled as shown. The key retaining means comprises a plate 17 having a rounded outer end 18 and a perforation 19 (Fig. 8) loosely fitted in the cylinder slot, and a spring 20 set in the plate perforation with one end engaged with the plate and its other end engaged with the bottom of the widest part of the cylinder slot and tensioned to normally press the plate outward (Fig. 2).

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The barrel recess 15 and the key slot are so related that, when the cylinder is turned to the locking position in which the key can be freely withdrawn without straining the tumblers 12, the retaining plate 17 is moved by the spring 20 into the barrel recess 15 and out of the key notch 14 so as to free the key for withdrawal (Figs. 2 and 3). In fact, when the cylinder has been turned approximately to the locking position as shown in Fig. 3, the spring biased plate 17 serves by engagement with one inclined wall of the recess 15 to additionally turn the cylinder to the exact locking position. The plate 17 also tends by reason of the spring 20 to resist turning of the cylinder out of its locking position. The cylinder can be turned out of the said locking position, as for instance to the position shown in Fig. 6, only by applying sufficient force to overcome the action of the spring 17 and to cam the plate 17 inward by engagement with one inclined wall of the recess 15.

When the cylinder is turned out of the locking position shown in Fig. 3, the retaining plate 17 is forced inward by contact with one inclined wall of the recess 15 so that its inner end projects into the key notch 14. Thus any attempted withdrawal of the key 13^a will be resisted solely by the plate 17 and the key cannot bend or distort the tumblers 12. It will be clear that the cylinder can be turned in either direction from the locking position shown in Fig. 3 and that the key retaining action of the plate 17 will be the same irrespective of the direction of turning.

From the foregoing description it will be apparent that the retaining plate 17 and the spring 20 serves in conjunction with the barrel recess 15 and the key notch 14 to accomplish several results. The plate 17 and the spring 20 not only serve to finally bias the cylinder to its locking position and to retain it therein, but they also serve to indicate to the user that the cylinder has been turned to its locking position so that the key can be readily withdrawn. When the cylinder is rotated the user can readily feel the entry of the member 17 into the recess 15 and can feel the resultant increased resistance to rotation. This indicates that the cylinder is in locking position and that the key can be withdrawn. Without this means for indicating, the user would be unable to readily ascertain whether the cylinder had been moved to locking position and could determine the locking position only by the trial and error method of repeatedly attempting to withdraw the key in different positions. Furthermore, the retaining plate 17, when forced inward as the result of turning the cylinder out of locking position, enters the key notch 14 to positively prevent key withdrawal. This is very important when the tumblers of the lock are small and delicate so that they would be damaged by a forcible withdrawal or attempted withdrawal of the key with the cylinder out of locking position. The spring tumblers 12 constitute an example of tumblers which would be damaged under the conditions stated.

The barrel 10 may, if desired, have a supplemental shallow recess 21 by means of which the cylinder may be located in a predetermined unlocking position as shown in Fig. 7. The plate 17 is moved into the recess 21 by the spring 20, but the recess is relatively shallow and does not permit the plate to be moved far enough to release the key. The supplemental recess 21 in conjunction with the spring 20 and the member 17 serves to indicate to the user that the barrel

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has been turned to a predetermined position other than the locking position and also serves to resist turning of the cylinder out of the said predetermined position.

The invention claimed is:

1. A cylinder lock comprising in combination, a barrel having a longitudinal locking slot, a rotatable cylinder in the barrel provided with a longitudinal key slot and provided with locking means which projects into the barrel slot to prevent cylinder rotation and thereby effect locking and which upon insertion of a correctly bitted key is withdrawn from the said slot to permit cylinder rotation and thereby effect unlocking, a movable member carried by the cylinder and adapted to enter a notch in the key to prevent key withdrawal, means on the barrel which permits the said movable member to be moved out of the key notch when the cylinder is in locking position and which causes the said member to move into the key notch when the cylinder is turned out of locking position, and a spring which biases the said movable member for movement out of the key notch so as to permit key withdrawal when the cylinder is in locking position, the said spring in conjunction with the said movable member serving to indicate to the user that the cylinder has been turned to locking position and also serving to resist turning of the cylinder out of locking position.

2. A cylinder lock comprising in combination, a barrel having in its inner wall a longitudinal locking slot and a recess with lateral inclined sides, a rotatable cylinder in the barrel provided with a longitudinal key slot and provided with locking means which projects into the barrel slot to prevent cylinder rotation and thereby effect locking and which upon insertion of a correctly bitted key is withdrawn from the said slot to permit cylinder rotation and thereby effect unlocking, a movable member carried by the cylinder and so located that it can enter the recess in the barrel wall when the cylinder is in locking position, the said member upon rotation of the cylinder from locking position being movable inwardly out of the barrel recess by the inclined sides thereof to an inner position in which it is adapted to enter a notch in the key to prevent key withdrawal, and a spring which biases the said movable member for outward movement into the barrel recess and out of the key notch so as to permit key withdrawal when the cylinder is in locking position, the said spring in conjunction with the said movable member and the said barrel recess serving to indicate to the user that the cylinder has been turned to locking position and also serving to resist turning of the cylinder out of locking position.

3. A cylinder lock as set forth in claim 2, wherein the cylinder is turnable in either direction from and to its locking position, and wherein the spring in conjunction with the movable member and the barrel recess serves upon turning of the cylinder in either direction to indicate to the user that the locking position has been reached.

4. A cylinder lock as set forth in claim 2, wherein the cylinder has in its inner wall a second recess shallower than the first said recess and so positioned that the said movable member can enter it when the cylinder is in a predetermined position other than the locking position, the second recess being of such depth that the movable member is prevented from moving outward sufficiently to permit key withdrawal and

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the said second recess in conjunction with the said movable member and the said spring serving to indicate to the user that the barrel has been turned to the said predetermined position and also serving to resist turning of the cylinder out of the said predetermined position.

5. A cylinder lock comprising in combination, a barrel having a longitudinal locking slot, a rotatable cylinder in the barrel provided with a longitudinal key slot, locking means on the cylinder comprising an element adapted to enter the barrel slot and comprising tumblers which upon engagement by a properly bitted key permit the said element to move inward from the barrel slot to permit cylinder rotation and thereby effect unlocking and which upon withdrawal of the key cause the element to move outward into the barrel slot to prevent cylinder rotation and thereby effect locking, the said tumblers when the locking means is in unlocking position serving by reason of their engagement with the key to resist key withdrawal, a movable member carried by the cylinder and adapted to enter a notch in the key to prevent key withdrawal and to thereby avoid strains upon the tumblers due to attempted withdrawal of the key, means on the barrel which permits the said movable member to be moved out of the key notch when the cylinder is in locking position and which causes the said member to move into the key notch when the cylinder is turned out of locking position, and a spring which biases the said movable member for outward movement into the barrel recess and out of the key notch so as to permit key withdrawal when the cylinder is in locking position, the said spring in conjunction with the said movable member serving to indicate to the user that the cylinder has been turned to locking position and also serving to resist turning of the cylinder out of locking position.

6. A cylinder lock comprising in combination, a barrel having in its inner wall a longitudinal locking slot and a recess with lateral inclined sides, a rotatable cylinder in the barrel provided

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with a longitudinal key slot, locking means on the cylinder comprising a locking bar adapted to enter the barrel slot and comprising spring tumblers which upon engagement by a properly bitted key permit the bar to move inward from the barrel slot to permit cylinder rotation and thereby effect unlocking and which upon withdrawal of the key causes the bar to move outward into the barrel slot to prevent cylinder rotation and thereby effect locking, the said spring tumblers when the locking means is in unlocking position serving by reason of their engagement with the key to resist key withdrawal, a movable member carried by the cylinder and so located that it can enter the recess in the barrel wall when the cylinder is in locking position, the said member upon rotation of the cylinder being movable inwardly out of the barrel recess by the inclined sides thereof to an inner position in which it is adapted to enter a notch in the key to prevent key withdrawal and to thereby avoid strains upon the spring tumblers due to attempted withdrawal of the key, and a spring which biases the said movable member for outward movement into the barrel recess and out of the key notch so as to permit key withdrawal when the cylinder is in locking position, the said spring in conjunction with the said movable member and the said barrel recess serving to indicate to the user that the cylinder has been turned to locking position and also serving to resist turning of the cylinder out of locking position.

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