Aug. 31, 1954 G. E. SWANSON 2,687,639

CYLINDER LOCK AND KEY

Filed June 3, 1948

Fig. 1.

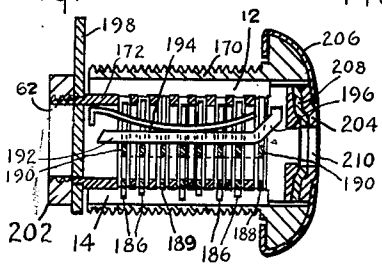


Fig 2

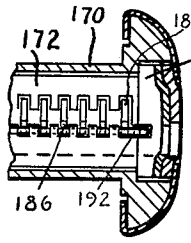


Fig. 3.

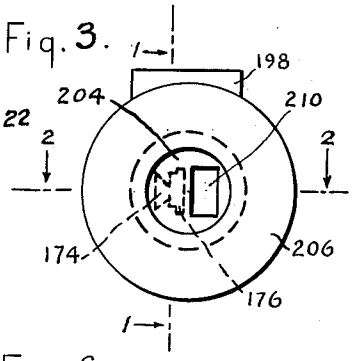


Fig. 4.

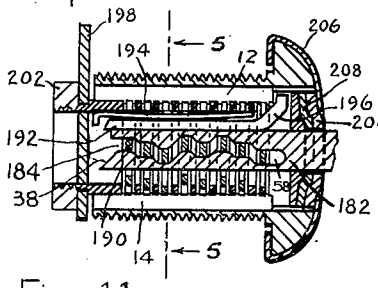


Fig. 5.

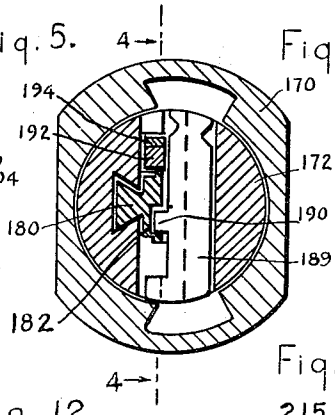


Fig. 6.

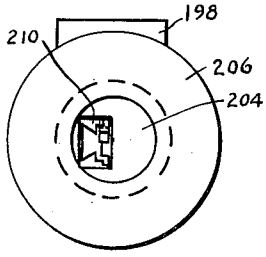


Fig. 11.

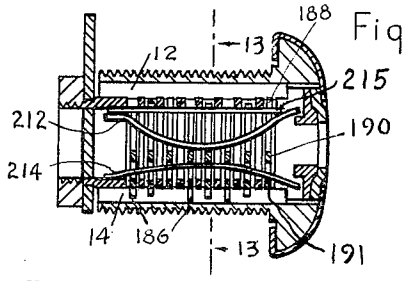


Fig. 12.

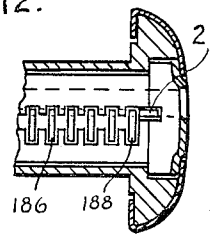


Fig. 13

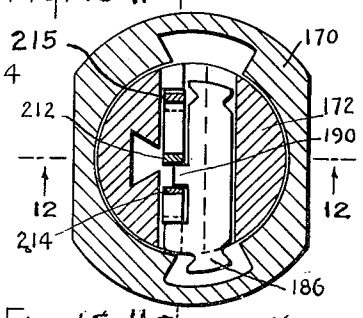


Fig. 14

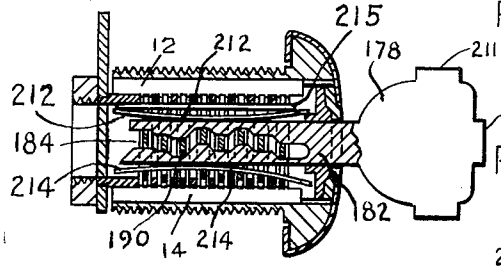


Fig. 7.

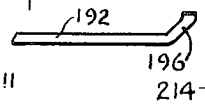


Fig. 8.

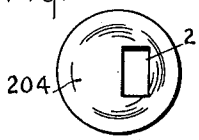


Fig. 15

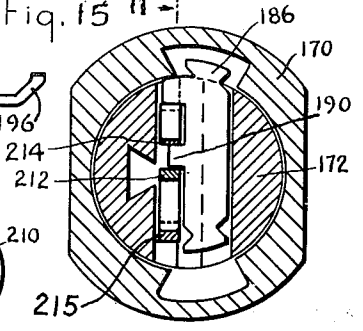


Fig. 9.

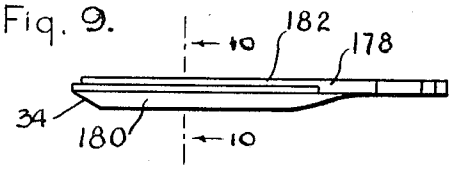
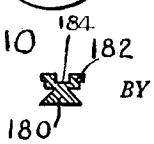


Fig 10



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UNITED STATES PATENT OFFICE

2,687,639

CYLINDER LOCK AND KEY

Gunnar E. Swanson, New Britain, Conn.

Application June 3, 1948, Serial No. 30,854

16 Claims. (Cl. 70—364)

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The invention relates to a lock of the cylinder type and to a key therefor, and as to certain of its features it relates to a lock and a key therefor somewhat similar to the lock and key set forth in my copending, now abandoned, application for Lock and Key, Serial No. 724,195, filed January 24, 1947.

One of the objects of the invention is to provide a lock and a key therefor wherein the cross sectional shapes of the keyhole and the key are such as to minimize the possibility of picking.

Another object of the invention is to provide a lock having a longitudinal member or members normally at least partly in the keyhole to obstruct a picking tool but movable out of obstructing relationship upon the insertion of a key.

Another object of the invention is to provide a lock wherein the tumbler projections which are engageable by the key are also engaged by spring means located in part in the keyhole and which tend to hold the tumblers in their normal locking positions.

Various other objects of the invention will be apparent from the drawings and from the following specification and claims.

In the drawings I have shown in detail two embodiments of the invention but it will be understood that various changes can be made from the constructions shown and that the drawings are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawings:

Fig. 1 is a longitudinal vertical sectional view of a lock embodying the invention, this view being taken along the line 1—1 of Fig. 3.

Fig. 2 is a fragmentary longitudinal horizontal sectional view of the lock shown in Fig. 1, this view being taken along the line 2—2 of Fig. 3 but showng the cylinder in elevation.

Fig. 3 is a front view of the lock shown in Figs. 1 and 2, with the guard in position to close the keyhole.

Fig. 4 is a longitudinal vertical sectional view similar to Fig. 1 but showing a key inserted and showing the tumblers moved to their unlocking positions.

Fig. 5 is an enlarged transverse vertical sectional view taken along the line 5—5 of Fig. 4.

Fig. 6 is a front view similar to Fig. 3 but showing the front guard in position to permit the insertion of a key.

Fig. 7 is a detail view of the tumbler controlling bar as shown in Figs. 1 and 4.

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Fig. 8 is a detail front view of the front guard as shown in Figs. 1 to 4 and 6.

Fig. 9 is a side view of a key adapted for use with the lock shown in Figs. 1 to 6 and also adapted for use with the lock shown in Figs. 11 to 15.

Fig. 10 is a cross-sectional view of the key shown in Fig. 9, this view being taken along the line 10—10.

Fig. 11 is a longitudinal vertical sectional view of an alternative lock which is in many respects similar to that shown in Figs. 1 to 6, this view being taken along the line 11—11 of Fig. 13 and showing the tumblers in their unlocking positions.

Fig. 12 is a fragmentary longitudinal horizontal sectional view of the lock shown in Fig. 11, this view being taken along the line 12—12 of Fig. 13 and showing the cylinder in elevation.

Fig. 13 is an enlarged transverse sectional view taken along the line 13—13 of Fig. 11.

Fig. 14 is a longitudinal vertical sectional view similar to Fig. 11 but showing a key inserted and showing the tumblers moved to their unlocking positions.

Fig. 15 is a view similar to Fig. 13 but showing certain parts of the lock in reversed positions.

Throughout the following specification such terms as "vertical" and "horizontal" will be used to describe the several parts in the positions as shown in the drawings. It will be understood, however, that such terms are to be interpreted as merely describing the relationships of parts and that they do not in any way limit the invention as concerns the positions of the several locks in actual use.

Referring to the drawings, particularly Figs. 1 to 10 thereof, 170 represents the casing of the lock, this being provided with a central cylindrical opening having a tumbler recess 12 at one side and having a second tumbler recess 14 at the opposite side. The casing 170 is adapted for location within an aperture in a mounting wall, not shown. The casing is exteriorly threaded and a nut, not shown, serves to hold the casing in fixed position with respect to the wall.

Movably mounted, preferably rotatably, in the casing 170 is a cylinder 172 having a flange 22 which fits within a countersink in the front end of the casing. The cylinder 172 is provided with a longitudinal keyhole which is specially shaped in accordance with the invention. The keyhole includes a guiding opening 174 which has a vertically narrow portion and a vertically wider portion, the said guiding opening being shown as having a dovetail shape. The keyhole also in-

cludes a slot 176 which is immediately adjacent the vertically narrow portion of the guiding opening 174 and which projects transversely therefrom in opposite directions. The slot 176 has a substantially flat face at the side thereof opposite the guiding opening 174. The said keyhole has a uniform cross sectional shape throughout its length.

A key 178 is provided, as shown in detail in Figs. 9 and 10. The key has a guiding portion 180 which is adapted to enter and fit the guiding opening 174 of the keyhole, the said guiding portion of the key being shown as having a dovetail shape. The key also has a longitudinal flat wing 182 projecting transversely in opposite directions from the guiding portion 180 and adapted to enter and fit the slot 176 of the keyhole. The key 178 is of uniform cross sectional shape substantially throughout its effective length. The major portion of the external faces of the key 178 and of the keyhole in the cylinder 172 are straight. However, in order to facilitate insertion of the key in the keyhole, the inner portion of the guiding portion 180 is beveled, as indicated at 34. The flat wing 182 is provided with a generally longitudinal tortuous bitting groove 184 which is open at the inner end of the wing. This groove is in the face of the wing 182 which is opposite the guiding portion 180. The groove 184 is of substantially uniform width throughout and the wing 182 preferably has at least one diagonal guide wall 38 at one side of the groove. The grooves 184 of different keys vary in direction and location to provide a variety of bitting changes.

Carried by the cylinder 172 at the rear end thereof is a swivel bolt 198. The cylinder 172 has a rearward integral extension 62 which is of reduced diameter and threaded, this extension projecting through a hole in the bolt 198. A nut 202 has threaded engagement with the extension 62 and holds the swivel bolt in place.

The cylinder 172 is provided with a plurality of locking tumblers 186 which are transversely movable parallelly with the face of the keyhole slot 176. The tumblers are separated from each other and are guided by interposed walls formed integrally with the cylinder. As shown in Fig. 1, all of the tumblers when in locking positions extend into the same tumbler recess 14 at one side of the casing 170. However, this is not essential and some of them may extend into one recess and others of them may extend into the opposite recess.

Each of the tumblers 186, 186 has a narrow projection 190 which extends transversely of the direction of tumbler movement and into the slot 176 of the keyhole. When the tumblers are in their normal positions as shown in Fig. 1, the projections 190 are so positioned that they can enter the groove 184 of the key when the key is inserted in the keyhole with the wing 182 thereof in the keyhole slot 176. The several projections are so located with respect to their tumblers and the groove 184 is so shaped that, upon complete insertion of the key, all of the locking tumblers have been positively moved to their unlocking positions as shown in Fig. 4.

In addition to the locking tumblers 186, 186 there is preferably provided a guard tumbler 188, and if desired there may be a second guard tumbler 189. The guard tumblers are similar to the locking tumblers and have similar projections 190. They differ from the locking tumblers in that they are normally out of locking positions, with their projections 190 closely adjacent one side of the keyhole slot 176. Each guard tumbler is at the front of one or more locking tumblers, and any attempt to manipulate the locking tumblers by a picking tool would result in moving one or both of the guard tumblers into one of the tumbler slots in the casing. Inasmuch as the projections 190 on the guard tumblers are closely adjacent one side of the keyhole slot 176, the groove 184 in the key must have guard tumbler portions which are correspondingly close to the side of the wing of the key, one of these guard tumbler portions being shown at 58. As the key is inserted, the guard tumblers are moved momentarily into locking positions, but when the key is fully inserted the projections 190 on the guard tumblers are in the guard tumbler portions, such as 58, of the groove, the guard tumblers being thus restored to their unlocking positions.

A longitudinally extending element is provided which is normally at least partly within the slot 176 of the keyhole adjacent the several tumblers and in position to additionally obstruct the movement of a picking tool into engagement with the several tumblers. The said element is movable out of its obstructing position by the key upon insertion thereof. Preferably the said element is spring biased into its said obstructing position. As shown in Figs. 1, 4 and 5, the said longitudinally extending element is a bar 192 which engages directly with the before-mentioned projections 190 and serves as the means for holding the tumblers in their locking positions. The bar 192 is normally withing or partly within the slot 176 of the keyhole, being in direct engagement with the projections 190 which are longitudinally aligned. A bow spring 194 engages with the bar 192 to bias it transversely in the direction to hold the tumblers in their normal locking positions. The bar 192 has a diagonal portion 196 at its front end.

When a key is inserted as shown in Fig. 4, it is guided by the guiding portion 180 thereof, and the wing 182 engages the diagonal portion 196 of the bar 192 so that the bar is moved transversely in opposition to the spring 194 to the position shown. Inasmuch as the wing of the key holds the bar 192 out of engagement with the projections 190, the tumblers are free to move as the said projections enter the groove 184 in the key. This greatly reduces wear of the tumbler projections and of the key and reduces resistance to key insertion and withdrawal.

Inasmuch as the bar 192 is moved out of engagement with the tumbler projections by the wing of the key, the spring 194 which biases the said bar can be relatively powerful as it is not flexed by the engagement of the tumbler projections with the walls of the bitting groove but rather by the side of the wing of the key. Thus the lock is very highly resistent to picking, this being due in part to the guard tumblers which have been described and also due in part to the relatively powerful spring 194 which resists any movement of the tumblers by a picking tool. The bar 192 lies directly in the keyhole so as to obstruct a picking tool and so as to resist movement of the tumblers by a picking tool.

The bar 192 and the spring 194 can be located in reversed positions without changing any parts of the lock. When so reversed the bar 192 is engaged by the bottom of the wing of the key rather than by the top of the said wing. This

reversibility of the said parts provides additional bitting changes with the same keyhole and cylinder.

A rotatable guard **204** is provided which is within the outer end portion of the opening in the casing, this guard being held in place by a cap **206** carried by the outer end portion of the casing. A gasket **208** is interposed between the guard **204** and the end of the cylinder, being secured to the guard by cementing or otherwise. The guard and the gasket are provided with rectangular openings **210**, these openings being so located that upon rotation of the guard they can be brought into register with the keyhole, as shown in Fig. 6, or out of register with the keyhole as shown in Fig. 3. The guard may be rotated by inserting a portion **211** in the bow of the key in the opening **210**.

The lock as shown in Figs. 11 to 15 is generally similar to that shown in Figs. 1 to 10, but differs as to the spring means for biasing the tumblers. In lieu of the bar **192** there is provided a bow spring **212**, a portion of which enters the slot **176** of the keyhole and engages some of the tumbler projections **190**. A second bow spring **214** is positioned opposite the spring **212**. A portion of the spring **214** also enters the slot **176** of the keyhole and engages some of the tumbler projections **190**, **190** at the opposite sides thereof. The ends of the said spring **214** also bear on the front and rear tumblers at the end projections **191** thereof, and the said spring lies adjacent the end projections **191** on intervening tumblers to limit the movement of such tumblers. The spring **212** is much heavier than the spring **214** and the tumblers are moved by the spring **212** in opposition to the spring **214**.

When a key such as **178** is inserted as shown in Fig. 14, the wing **182** of the key engages the springs **212** and **214** to flex the said springs in opposite directions. With the springs so flexed, the projections **190** are out of engagement with the springs, but the end portions of the lighter spring **214** continue to apply limited pressure to the front and rear tumblers by means of the said projections **191** thereon. Thus when the key is inserted the middle tumblers have free motion and the others are restricted only by the light pressure of the spring **214**.

Fig. 15 is similar to Fig. 13 and illustrates the fact that the springs **212** and **214** and the tumblers can be reversed in positions, without changing any of the lock parts. This multiplies the number of key changes that can be obtained with the same lock. To facilitate reversal there is also provided a longitudinal bar **215** supported by the outer wall and held in position by the spring **212**. This bar is also reversable and forms a guiding rest for the end portions of the tumblers.

The lock and key as shown and described have several advantageous features. The key has ample mechanical strength notwithstanding the relatively deep bitting slot **184** in the wing thereof. The guiding portion **180** serves not only for assisting in guiding the key but also for reinforcing the wing **182** which would otherwise be mechanically weak. The shape of the guiding portion **180** of the key and of the corresponding guiding portion **174** of the keyhole constitute an important factor in preventing picking. The guiding opening **174** of the keyhole is necessarily relatively large but only a narrow space is provided between the said guiding opening and the keyhole slot **176**. This narrow space makes it practically impossible to move the tumblers by a picking tool inserted in the guiding opening. The guiding opening **174** is shown as having a dovetail shape and for convenience it is herein so described and referred to, but it will be understood that there may be variations in the shape of the said guiding opening and of the corresponding guiding portion of the key without departing from the invention.

Picking of the lock is prevented or at least made very difficult by at least three cooperating features as follows: (*a*) the narrow space between the guiding opening **174** of the keyhole and the slot **176** thereof as last above described; (*b*) the guard tumblers **188** and **189**; and (*c*) the bar **192** as shown in Figs. 1, 4 and 5 or the springs **212** and **214** as shown in Figs. 11, 13, 14 and 15.

What I claim is:

1. A lock for use with a key having a longitudinal guiding portion dovetailed in cross section and having a longitudinal flat wing projecting transversely in opposite directions from the narrower part of the dovetailed guiding portion and provided with a tortuous bitting groove in the face thereof opposite the guiding portion and open at the inner end of said face which key is of uniform external cross sectional shape substantially throughout its effective length, the said lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and provided with a longitudinal keyhole including a guiding opening dovetailed in cross section and shaped to receive and fit the dovetailed guiding portion of the key and also including a slot extending transversely in opposite directions from the narrower part of the dovetailed guiding opening and shaped to receive and fit the wing of the key which slot has a flat face at the side thereof opposite the said guiding opening, the said keyhole having a uniform cross sectional shape throughout its length, tumblers carried by the cylinder and transversely movable parallelly with the said flat face of the keyhole slot which tumblers are normally in locking engagement with the casing, and relatively narrow projections on the respective tumblers extending transversely of the direction of relative tumbler movement and into the keyhole slot which projections are positioned to enter and substantially fit the bitting groove of the key upon insertion thereof, the several said projections being so located with respect to their tumblers that the latter are positively moved to unlocking positions by the bitting groove of the key.

2. A key having a straight longitudinal guiding portion dovetailed in cross section and having a straight longitudinal flat wing positioned immediately adjacent the narrower part of the guiding portion and projecting transversely in opposite directions therefrom, the said key being of uniform external cross sectional shape substantially throughout its effective length and the said wing of the key being provided with a tortuous bitting groove of substantially uniform width in the face thereof opposite the guiding portion which groove is open at its inner end.

3. A lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and having a longitudinal keyhole, a series of longitudinally spaced tumblers carried by the cylinder and normally in locking engagement with the casing which tumblers have portions in the keyhole for engagement by an

inserted key to move the said tumblers out of their said locking engagement, an element having a portion thereof normally within the keyhole and extending longitudinally past each of the tumblers of the said series in position to obstruct the movement of a picking tool into engagement with the said tumblers, the said portion of the said element being transversely movable out of its said obstructing position by an inserted key, and means engaging the said element to prevent longitudinal movement thereof.

4. A lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and having a longitudinal keyhole, a series of longitudinal spaced tumblers carried by the cylinder and normally in locking engagement with the casing which tumblers have portions in the keyhole for engagement by an inserted key to move the said tumblers out of their said locking engagement, a bar having a portion thereof within the keyhole and extending longitudinally past each of the tumblers of the said series adjacent the key engageable portions thereof and in position to obstruct the movement of a picking tool into engagement with the said tumblers, the said portion of the said bar being transversely movable out of its said obstructing position by an inserted key, means engaging the said bar to prevent longitudinal movement thereof, and a spring for pressing the bar transversely toward the said key engageable portions of the tumblers.

5. A lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and having a longitudinal keyhole, tumblers carried by the cylinder and normally in locking engagement with the casing which tumblers have portions in the keyhole for engagement by an inserted key to move the said tumblers out of their said locking engagement, and a longitudinally extending spring normally at least partly within the keyhole adjacent the key engageable portions of the several tumblers and in position to obstruct the movement of a picking tool into engagement with the tumblers which spring is movable out of its said obstructing position by an inserted key.

6. A lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and having a longitudinal keyhole, a series of longitudinally spaced tumblers carried by the cylinder and normally in locking engagement with the casing which tumblers have oppositely facing portions in the keyhole for engagement by an inserted key to move the said tumblers out of their said locking engagement, two elements having portions thereof normally within the keyhole and respectively adjacent the oppositely facing key engageable portions of the tumblers of the said series which elements extend longitudinally past each of the said tumblers in positions to obstruct the movement of a picking tool into engagement with the said tumblers, the said portions of the said elements being transversely movable in opposite directions out of their said obstructing positions by an inserted key, and means engaging the said elements to prevent longitudinal movement thereof.

7. A lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and having a longitudinal keyhole, tumblers carried by the cylinder and normally in locking engagement with the casing which tumblers have oppositely facing portions in the keyhole for engagement by an inserted key to move the said tumblers out of their said locking engagement, and two longitudinally extending springs normally at least partly within the keyhole and respectively adjacent the oppositely facing key engageable portions of the several tumblers and in positions to obstruct the movement of a picking tool into engagement with the tumblers which springs are movable out of their said obstructing positions by an inserted key.

8. A lock for use with a key having a longitudinal flat wing provided with a tortuous bitting groove in one face thereof which groove is open at its inner end, the said lock comprising in combiantion, a casing having an opening, a cylinder movable in the casing opening and provided with a longitudinal keyhole including a slot shaped to receive the wing of the key and having a flat face adjacent the grooved face of the said wing, locking tumblers carried by the cylinder and transversely movable parallelly with the said flat face of the keyhole slot which tumblers are normally in locking engagement with the casing, relatively narrow projections on the respective tumblers extending transversely of the direction of relative tumbler movement and into the keyhole slot which projections enter and substantially fit the bitting groove of the key upon insertion thereof, the several said projections being so located with respect to their tumblers that the latter are positively moved to unlocking positions by the bitting groove of the key, and means including a spring and engaging the said projections on the tumblers for biasing the tumblers toward their locking positions.

9. A lock for use with a key having a longitudinal flat wing provided with a tortuous bitting groove in one face thereof which groove is open at its inner end, the said lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and provided with a longitudinal keyhole including a slot shaped to receive the wing of the key and having a flat face adjacent the grooved face of the said wing, locking tumblers carried by the cylinder and transversely movable parallelly with the said flat face of the keyhole slot which tumblers are normally in locking engagement with the casing, relatively narrow projections on the respective tumblers extending transversely of the direction of relative tumbler movement and into the keyhole slot which projections enter and substantially fit the bitting groove of the key upon insertion thereof, the several said projections being so located with respect to their tumblers that the latter are positively moved to unlocking positions by the bitting groove of the key, and means including a spring and engaging the said projections on the tumblers for biasing the tumblers toward their locking positions which means is normally partly within the keyhole slot and is positioned for engagement by the wing of the key so as to be moved out of engagement with the said projections by the said wing when the key is inserted.

10. A lock for use with a key having a longitudinal flat wing provided with a tortuous bitting groove in one face thereof which groove is open at its inner end, the said lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and provided with a longitudinal keyhole including a slot shaped to receive the wing of the key and having a flat face adjacent the grooved face of the said wing, locking tumblers carried by the cylinder and

transversely movable parallelly with the said flat face of the keyhole slot which tumblers are normally in locking engagement with the casing, relatively narrow projections on the respective tumblers extending transversely of the direction of relative tumbler movement and into the keyhole slot which projections enter and substantially fit the bitting groove of the key upon insertion thereof, the several said projections being so located with respect to their tumblers that the latter are positively moved to unlocking positions by the bitting groove of the key, a transversely movable bar normally engaging the said projections, and a spring engaging the bar to bias it in the direction to normally hold the tumblers in their locking positions.

11. A lock for use with a key having a longitudinal flat wing provided with a tortuous bitting groove in one face thereof which groove is open at its inner end, the said lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and provided with a longitudinal keyhole including a slot shaped to receive the wing of the key and having a flat face adjacent the grooved face of the said wing, locking tumblers carried by the cylinder and transversely movable parallelly with the said flat face of the keyhole slot which tumblers are normally in locking engagement with the casing, relatively narrow projections on the respective tumblers extending transversely of the direction of relative tumbler movement and into the keyhole slot which projections enter and substantially fit the bitting groove of the key upon insertion thereof, the several said projections being so located with respect to their tumblers that the latter are positively moved to unlocking positions by the bitting groove of the key, and a transversely movable bar normally within the keyhole slot and engaging the said tumbler projections which bar is spring biased for moving the tumblers toward their locking positions and which bar is positioned for engagement by the wing of the key so as to be moved out of engagement with the said projections by the said wing when the key is inserted.

12. A lock as set forth in claim 11, wherein the bar has a substantially straight portion which normally engages the tumbler projections and has a portion near the outer end of the keyhole and at an angle to the said straight portion for engagement by the wing of the key when the key is first inserted.

13. A lock for use with a key having a longitudinal flat wing provided with a tortuous bitting groove in one face thereof which groove is open at its inner end, the said lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and provided with a longitudinal keyhole including a slot shaped to receive the wing of the key and having a flat face adjacent the grooved face of the said wing, locking tumblers carried by the cylinder and transversely movable parallelly with the said flat face of the keyhole slot which tumblers are normally in locking engagement with the casing, relatively narrow projections on the respective tumblers extending transversely of the direction of relative tumbler movement and into the keyhole slot which projections enter and substantially fit the bitting groove of the key upon insertion thereof, the several said projections being so located with respect to their tumblers that the latter are positively moved to unlocking positions by the bitting groove of the key, and a spring directly engaging at least some of the said tumbler projections for biasing the corresponding tumblers toward their locking positions.

14. A lock for use with a key having a longitudinal flat wing provided with a tortuous bitting groove in one face thereof which groove is open at its inner end, the said lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and provided with a longitudinal keyhole including a slot shaped to receive the wing of the key and having a flat face adjacent the grooved face of the said wing, locking tumblers carried by the cylinder and transversely movable parallelly with the said flat face of the keyhole slot which tumblers are normally in locking engagement with the casing, relatively narrow projections on the respective tumblers extending transversely of the direction of relative tumbler movement and into the keyhole slot which projections enter and substantially fit the bitting groove of the key upon insertion thereof, the several said projections being so located with respect to their tumblers that the latter are positively moved to unlocking positions by the bitting groove of the key, and a spring directly engaging at least some of the said tumbler projections for biasing the corresponding tumblers toward their locking positions, the said spring being located at least in part within the keyhole slot and being positioned for engagement by the wing of the key so as to be flexed out of engagement with the said projections by the said wing when the key is inserted.

15. A lock for use with a key having a longitudinal flat wing provided with a tortuous bitting groove in one face thereof which groove is open at its inner end, the said lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and provided with a longitudinal keyhole including a slot shaped to receive the wing of the key and having a flat face adjacent the grooved face of the said wing, locking tumblers carried by the cylinder and transversely movable parallelly with the said flat face of the keyhole slot which tumblers are normally in locking engagement with the casing, relatively narrow projections on the respective tumblers extending transversely of the direction of relative tumbler movement and into the keyhole slot which projections enter and substantially fit the bitting groove of the key upon insertion thereof, the several said projections being so located with respect to their tumblers that the latter are positively moved to unlocking positions by the bitting groove of the key, a spring directly engaging at least some of the said tumbler projections for biasing the corresponding tumblers toward their locking positions, and a second spring directly engaging at least some of the said tumbler projections at the opposite sides thereof.

16. A lock for use with a key having a longitudinal flat wing provided with a tortuous bitting groove in one face thereof which groove is open at its inner end, the said lock comprising in combination, a casing having an opening, a cylinder movable in the casing opening and provided with a longitudinal keyhole including a slot shaped to receive the wing of the key and having a flat face adjacent the grooved face of the said wing, locking tumblers carried by the cylinder and transversely movable parallelly with the said flat face of the keyhole slot which tumblers are normally in locking engagement with the casing, relatively narrow projections on the respective tumblers extending transversely of the direction of relative tumbler movement and into the key-

hole slot which projections enter and substantially fit the bitting groove of the key upon insertion thereof, the several said projections being so located with respect to their tumblers that the latter are positively moved to unlocking positions by the bitting groove of the key, and two oppositely acting springs directly engaging at least some of the said tumbler projections at opposite sides thereof one of which springs serves to bias the corresponding tumblers toward their locking positions, the springs being located at least in part within the keyhole slot and being positioned for engagement by the wing of the key so as to be moved out of engagement with the said projections by the said wing when the key is inserted.

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