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R. C. SPAIN

3,080,744

SIDE BAR CYLINDER LOCK

Original Filed Dec. 18, 1956

3 Sheets-Sheet 1

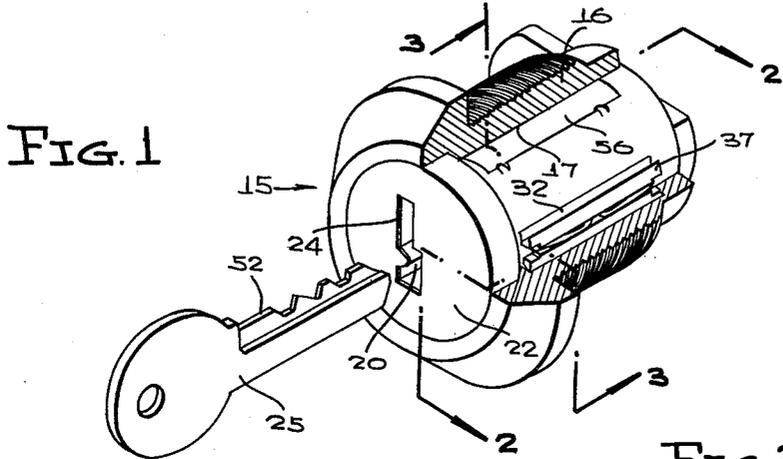


FIG. 1

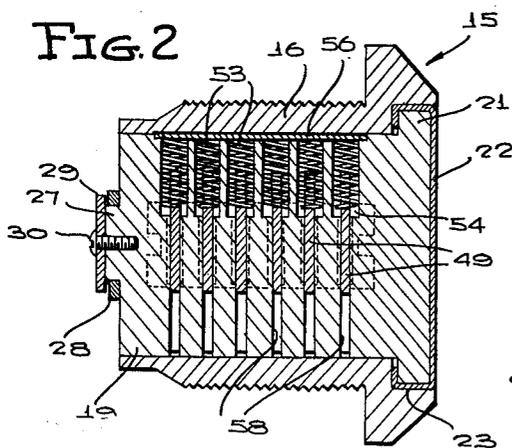


FIG. 2

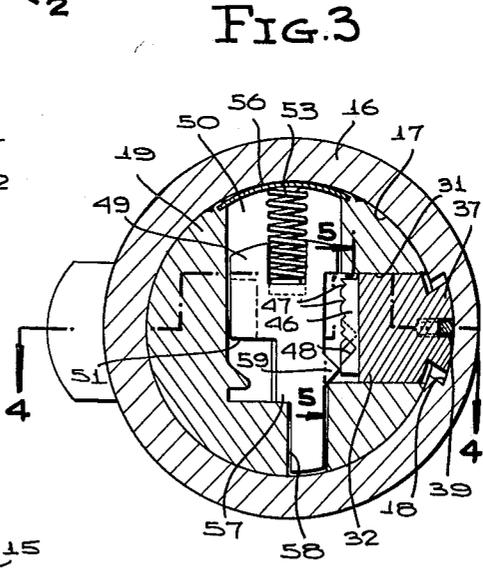


FIG. 3

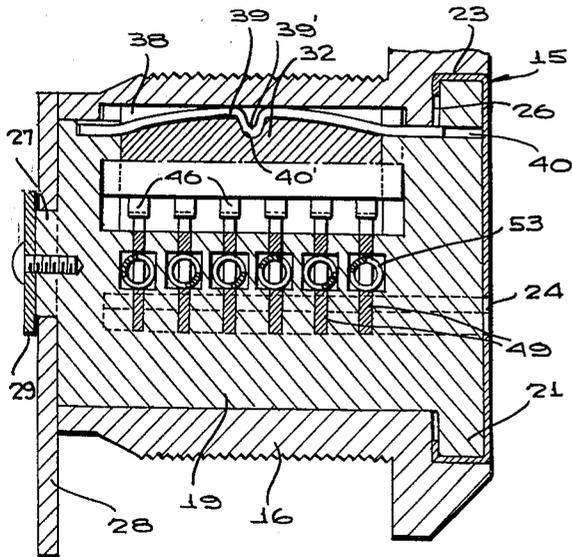


FIG. 4

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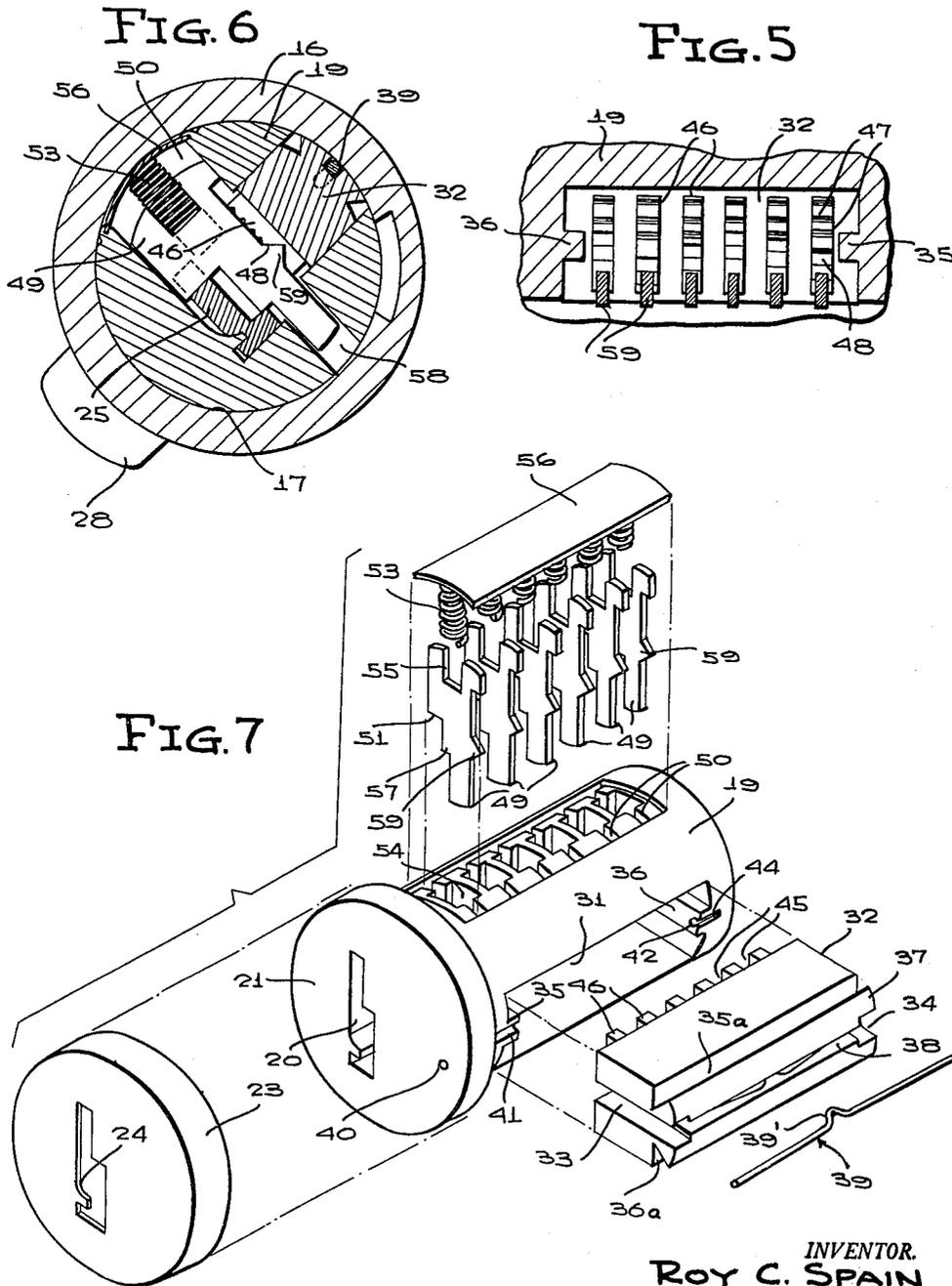
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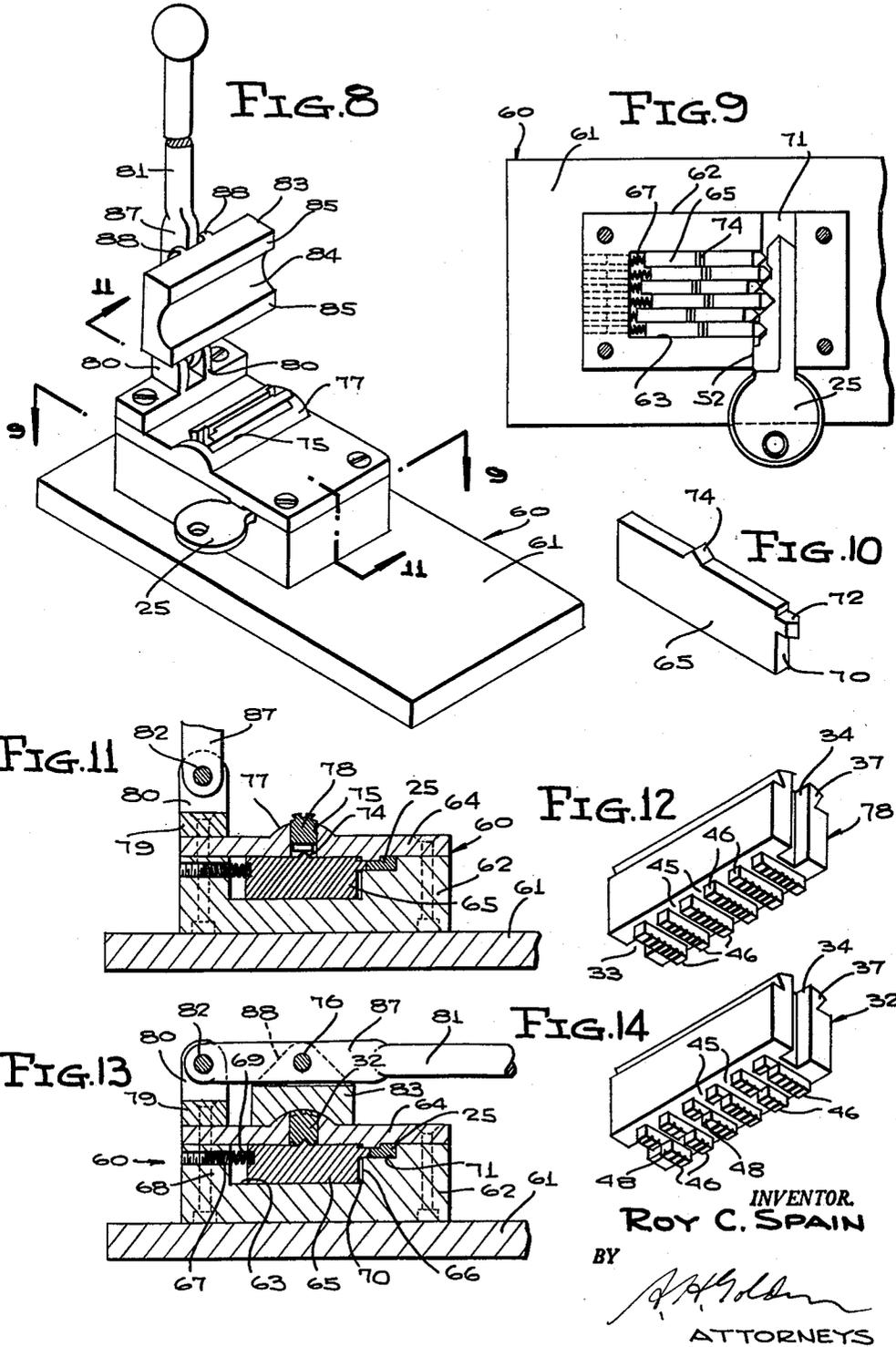
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SIDE BAR CYLINDER LOCK

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Original application Dec. 18, 1956, Ser. No. 629,112, now Patent No. 3,002,268, dated Oct. 3, 1961. Divided and this application Aug. 29, 1960, Ser. No. 52,629

1 Claim. (Cl. 70—364)

This application is a division of my co-pending application, Serial No. 629,112, filed December 18, 1956, now Patent No. 3,002,268 dated October 3, 1961.

The invention that forms the subject of the present application relates particularly to a novel lock of the type having a key plug that rotates in a cylinder, with a side bar or fence that is mounted on the key plug for movement relatively to a locking position in a recess in the cylinder. The locks have a series of tumblers that normally prevent movement of the fence to a release position. Each tumbler is adapted to be moved by a key that is inserted in a keyway in the key plug, and when a properly bitted key is used the tumblers will be set in position to allow a release movement of the fence.

Through the exceedingly novel concept of my invention, I facilitate to a very considerable extent the manufacture and assembly of the locks of this type. More particularly, I utilize in my novel lock a construction that enables each lock to be very readily fitted to the bittings of a key, and that will have a further advantage when several locks are to be fitted to the same key. My lock construction will be relatively simple and low in cost, yet will have excellent resistance to attempts to defeat the lock.

As an important feature of my novel lock, I utilize to coact with the tumblers a fence having surfaces that will be formed in accordance with the key bittings. Thus, to adapt the lock to a key, it will merely be necessary to form the particular surfaces on the fence, and to assemble the fence in the lock. That is a relatively simple procedure, and enables the tumblers to be made and assembled without regard to the bittings of a particular key. In fact, it is then possible to utilize tumblers that are identical, and also to pre-assemble the tumblers on the key plug, thus reducing the cost of making and assembling the lock.

I have thus outlined rather broadly the more important features of my invention in order that the detailed description thereof that follows may be better understood, and in order that my contribution to the art may be better appreciated. There are, of course, additional features of my invention that will be described hereinafter and which will form the subject of the claim appended hereto. Those skilled in the art will appreciate that the conception on which my disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of my invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of my invention, in order to prevent the appropriation of my invention by those skilled in the art.

Referring now to the drawings:

FIG. 1 is a perspective view, with a part broken away, of an improved cylinder lock constructed in accordance with the present invention, and shown with its associated key;

FIG. 2 is a vertical longitudinal cross sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is a transverse vertical cross sectional view taken on the line 3—3 of FIG. 1;

FIG. 4 is a longitudinal vertical cross sectional view taken on the line 4—4 of FIG. 3;

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FIG. 5 is an enlarged cross sectional detail view taken on the line 5—5 of FIG. 3.

FIG. 6 is a transverse vertical cross sectional view, similar to FIG. 3, but showing the fence member in its released position and the key plug rotated from the position shown in FIG. 3;

FIG. 7 is a perspective view showing the parts of the key plug assembly of the cylinder lock of FIG. 1, said parts being somewhat enlarged in scale as compared with FIG. 1 and being shown in separated positions;

FIG. 8 is a perspective view showing an apparatus for forming the fence member of the lock of FIGS. 1 to 7;

FIG. 9 is a fragmentary horizontal cross sectional view taken on the line 9—9 of FIG. 8;

FIG. 10 is an enlarged perspective view of one of the transversely slidable bottom die elements employed in the apparatus of FIGS. 8 and 9;

FIG. 11 is a transverse cross sectional view, somewhat enlarged in scale, taken on the line 11—11 of FIG. 8;

FIG. 12 is a bottom perspective view of a blank for a fence member, enlarged in scale, as compared with FIGS. 8 and 11, and adapted to be inserted in the apparatus of FIG. 8 for forming the fence member of a lock for use with a specific key;

FIG. 13 is a cross sectional view similar to FIG. 11, but showing the apparatus in its final forming position with the gatings formed in the fence blank,

FIG. 14 is a perspective view, similar to FIG. 12, but showing the completed fence after removal from the forming apparatus of FIG. 8.

Referring now more particularly to FIGS. 1 to 7 of the drawings, 15 generally designates a cylinder lock having the construction I prefer to utilize in my invention. The lock 15 has a cylinder 16 formed with a bore 17 in which is a longitudinal locking recess 18, and a key plug 19 which is rotatably mounted in the bore 17 and formed with a longitudinal keyway 20.

As is clearly shown in FIGS. 2, 4 and 7, the key plug 19 has a conventional enlarged head portion 21 which is covered by a circular scalp 22 having a peripheral channel 23 receiving the head portion 21 and covering the forward surface thereof. The scalp 22 is formed with a keyhole 24 registered with the keyway 20. As is quite usual, the head portion 21 of the key plug and the peripheral channel portion 23 of the scalp 22 are positioned in an enlarged annular recess 26 formed at the forward end of the bore 17 of cylinder 16. The key plug 19 is formed at its rear end with a stud 27, on which an arm 28 is retained by a washer 29 and a fastening screw 30, as is clearly shown in FIG. 4. The arm 28 rotates with the key plug 19 and may be associated with any conventional mechanism, for example, a door bolt-retracting mechanism, which may be actuated by rotating the key plug 19 with the proper key inserted in the keyway 20.

The key plug 19 is formed with a laterally opening slot 31, extending substantially perpendicular to the keyway 20. In the slot 31 is a laterally movable fence member 32 which forms a part of my invention. The fence member 32 is of substantial length and is formed at its opposite ends with the respective guide grooves 33 and 34 which are slidably engaged with respective guide ribs 35 and 36 formed in the ends of the laterally opening slot 31, as is clearly shown in FIG. 7. The outer portion of the fence member 32 is formed with longitudinal grooves 35a and 36a above and below, as shown in FIG. 7, defining a generally dovetail-shaped longitudinal outer rib 37 which is movable to locking position in the locking recess 18 of the lock cylinder 16, as shown in FIG. 3. The locking rib 37 is formed at its outer surface with the longitudinal groove 38, and engaging in said groove is a rod-like spring member 39. The spring member 39

has one end thereof slidably received in a bore 40 formed in the forward end portion of the key plug 19 and partially positioned in a longitudinal groove 41 at said forward end behind the head portion 21, as shown in FIG. 7, the rear end of the rod-like spring member 39 being secured in a recess 42 formed in the rear end portion of key plug 19 at the rib 36, as is clearly shown in FIG. 7. The recess 42 comprises a cylindrical bore having a longitudinal slot 44 opening at the outer surface of key plug 19, the lips of said slot being deformed inwardly to rigidly secure the rear end of the spring member 39 to the plug 19 at that point.

The spring rod 39 is formed at its intermediate portion with an inwardly directed loop 39' which is seated in a recess 40' formed in the intermediate portion of the floor of the groove 38. Spring rod 39 normally tends to assume a configuration wherein it is substantially straight, except for the loop 39', thus biasing the fence member 32 inwardly away from locking position and tending to retract the rib 37 inwardly from the locking recess 18.

I now call attention to the fact that I prefer to form the fence member 32 that I utilize in my invention with a series of grooves, as shown at 45, to define a series of longitudinally spaced, parallel vertical ribs 46 that lie in equally spaced transverse vertical planes perpendicular to the longitudinal vertical plane of the keyway 20.

I show each rib 46 formed with a plurality of spaced dummy notches 47 of relatively shallow depth. In keying the lock, as will appear, I further form each rib with a V-shaped gating 48 of substantial depth.

Designated at 49 is a series of tumblers that are identical in my preferred construction. Each tumbler 49 is mounted to slide in a corresponding vertical grooved recess 50 formed transverse to the fence 32 in the key plug 19, so as to move in the plane of one rib 46.

The vertical recesses 50 communicate with the longitudinally extending keyway 20, and the tumblers are formed with respective identical shoulder elements 51 engageable with a bitted edge 52 of a key 25 inserted in the keyway 20, whereby the tumblers 49 will be vertically positioned in accordance with the configuration of said bitted edge 52. The tumblers 49 are biased downwardly, as viewed in FIG. 7, by respective coiled springs 53 positioned in respective vertical recesses 54 formed in the key plug 19 at the intermediate portions of the vertical tumbler recesses 50, the top portions of the tumblers being formed with rectangular notches 55 receiving the lower end portions of the spring 53. A longitudinally extending arcuate cover plate 56 is secured on the key plug 19 over the tumbler recesses 50, covering same and being engaged by the top ends of the tumbler biasing spring 53, whereby the tumblers 49 are biased downwardly.

The tumblers are formed with stop shoulders 57 engageable with the floor of the keyway 20 to limit downward movement of the tumblers, the lower end portions of said tumblers being slidably received in the relatively narrow lower portions 58 of the respective tumbler recesses 50, as is clearly shown in FIG. 3.

Each tumbler 49 is formed with a generally triangular lug 59 which is receivable in a corresponding V-shaped gating 48 of the fence member 32 when the tumblers have been properly aligned with the gatings 48 by the insertion of a proper key 25 into the keyway 20. Normally, the tumbler springs 53 bias the tumblers to their lowermost positions, as shown in FIG. 3, wherein the lugs 59 engage the edges of the ribs 46 and maintain the fence member 32 in its locking position, shown in FIG. 3, wherein the rib 37 is held in the locking recess 18 against the biasing force of the rod-like spring 39. When a proper key 25 is inserted in the keyway 20, the identical tumblers 49 are elevated by different amounts, depending upon the bittings 52 of key 25, said amounts being such as to raise the lugs 59 into alignment with the corresponding gatings 48 of the fence member, whereby the lugs

59 are allowed to enter all the gatings 48 simultaneously, releasing the fence member and allowing the spring 39 to move the fence member to release position, so that the locking lug 37 is withdrawn from the locking recess 18. This allows the key plug 19 to be freely rotated by the key 25. Thus, as shown in FIG. 6, when the lugs 59 are engaged in the gatings 48, the fence member 32 is retracted by the rod-like spring 39, so that the key plug 19 may be rotated freely in the bore 17.

It will be noted that all the tumblers 49 are identical and that fence 32 is the only part of the lock assembly that need be particularly shaped to correspond to a key, the fence having ribs 46 that are gated at different locations thereon, in accordance with the bittings 52 of the associated key 25. By employing identical tumblers 49, the mass production of the locks is greatly facilitated, since facilitated, since in the prior art, the tumblers ordinarily have parts of different configuration in accordance with the bittings of the key to be employed with the lock.

Obviously, if so desired, tumblers may be employed wherein the lugs 59 are at different locations with respect to each other, but it is important to understand that my invention makes this unnecessary. That is because my fence can hold the combination of the lock, so that the tumblers may be identical.

In FIGS. 8 to 14, I show an apparatus 60 that can be used to form the gatings in the fence member 32. The apparatus 60 comprises a bottom supporting plate 61 on which is secured a block member 62 formed with a longitudinal channel 63, which may be defined by providing a rectangular, longitudinally extending recess in the block 62. Secured on the block 62 is a cover plate 64 and slidably mounted in the channel 63 are a plurality of transversely extending bottom die elements 65, said die elements being biased laterally toward a side wall 66 of the channel 63 by respective coiled springs 67 engaged in the opposite side wall 68 of the channel 63 and having their inner ends received in recesses 69 formed in the respective bottom die elements 65. As shown in FIGURE 13, the springs 67 act to bias the die elements 65 to the right, and act to urge the respective edge portions 70 of the respective die elements towards engagement with the side wall 66 of channel 63. Block 62 is formed with a horizontal key-receiving recess 71 opening into the channel 63 at the side wall 66 thereof, and each bottom die element 65 is formed with a positioning lug 72 which is engageable in the recess 71 and which is engageable by the bitted edge 52 of a key 25 inserted in the recess 71. Each bottom die element 65 is formed at its top edge with a generally triangular die projection 74 which is received in a longitudinal guide slot 75 formed in the cover plate 64, the cover plate being thickened to define a generally cylindrical convex rib 77 at the guide slot 75. The guide slot 75 is dimensioned to receive a fence blank, shown at 78 in FIG. 11, preliminary to forming the fence blank to its final configuration.

Secured to the block 62 over the margin of the cover plate 64 is a hinge bracket 79 provided with a pair of upstanding, parallel hinge lugs 80. Designated at 81 is a die lever which is pivoted to the bracket 79 between the hinge lugs 80, as by a transverse pivot pin 82. The bracket 79 is arranged parallel to the convex rib 77 and the guide slot 75. Transversely secured to the lever 81 at the same radial distance from pivot pin 82 as the guide slot 75 is a pressure die member 83 comprising a block formed with a groove 84 having a shape complementary to the convex rib 77 for accepting that rib when the lever 81 is rotated downwardly, for example, to the horizontal position thereof shown in FIG. 13. When thus positioned, the marginal surface portions 85 at the opposite sides of the groove 84 engage the horizontal top surface of the plate 64, acting to properly center the top pressure die 83.

As shown in FIG. 13, the top die member 83 is pivotally connected to the lever 81, as by a transverse pivot bolt 76 extending through the flattened lever portion 87 and

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respective pivot lugs 88 provided on the top die member 83.

In operation of the apparatus 60, a blank 73 is placed in the guide slot 75 with its ribs 46 facing downwardly and engaged on the die projections 74 of the bottom die elements 65. The key 25 is inserted in the recess 71, whereby the feeler elements 72 of the bottom die members 65 are engaged by the bitted edge 52 of the key, causing the die members 65 to be displaced in accordance with the key bittings. This positions the die projections 74 in accordance with the key contour. The top pressure die member 83 is then moved downwardly and engaged on the convex rib 77 by rotating the lever 81 from its vertical position to its lowered position, sufficient downward force being exerted on the lever 81 to cause the die projections 74 to indent the ribs 46. When the top die member 83 has been pressed into full contact with the plate 64, as shown in FIG. 13, the die projections 74 engage sufficiently in the ribs 46 to form the V-shaped gatings 48 therein required for the release of the associated lock by the key 25 employed in forming the fence member.

After the fence member has been formed, as above described, the lever 81 is elevated, disengaging the top die member 83 from the convex rib 77. By withdrawing the key 25, the bottom die members 65 are then displaced so as to cause their die projections 74 to cam the completed fence member upwardly a sufficient distance so that it may be grasped and removed from the guide slot 75.

I have described here the method that I prefer to utilize for making my novel lock, simply to facilitate an understanding of my invention. The particular method actually is covered in my co-pending application to which I referred earlier, and it is merely necessary here to understand that I have contributed an exceedingly novel cylinder lock having very considerable advantages over the locks of the prior art.

Thus, I contribute a lock that is rather simple and particularly well suited to mass production. In fact, the

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locks can be exactly identical as manufactured, whether they are to be keyed alike or differently, since a simple operation will suffice to key each lock. That is possible because I utilize in my novel lock a fence that will hold the combination represented by the key bittings, and that can very easily be assembled in the lock. Also, my lock requires relatively few parts and can be made at low cost, but nevertheless will have very satisfactory security. I believe, therefore, that those persons skilled in the art will appreciate fully the value of my invention.

I now claim:

A side bar lock having a cylinder, a key plug rotatable in a bore in said cylinder, a series of tumblers mounted in longitudinally spaced positions in said key plug for movement by a bitted key inserted in a longitudinal keyway formed in said key plug, a longitudinally positioned side bar mounted in said key plug for transverse movement toward and away from said tumblers and out of and into locking position, said tumblers being of identical construction and each having a control surface, said bitted key setting said tumblers so that the control surface of each tumbler is positioned relatively to the key plug and to the side of the side bar in accordance with the depths of the bittings of said key, and said side bar having a series of spaced control surfaces for coaction with the control surfaces of said tumblers, each of said spaced control surfaces on said side bar being spaced longitudinally of said side bar in direct correspondence to the longitudinal spacings of the bittings of said key while being spaced at the side of said side bar in accordance with the depths of the bittings of said key.

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