

Dec. 1, 1953

R. C. SPAIN

2,660,876

SIDE BAR CYLINDER LOCK

Filed May 10, 1949

Fig. 1.

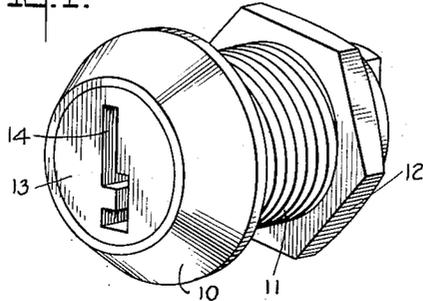


Fig. 2.

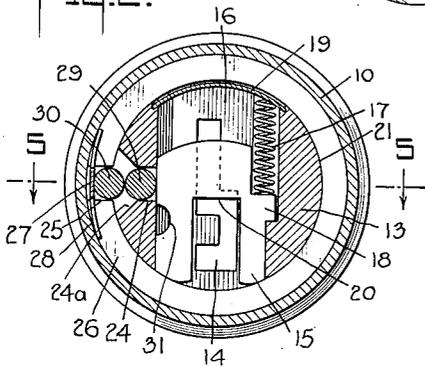


Fig. 3.

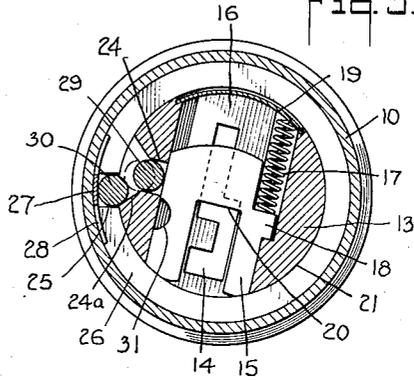


Fig. 5.

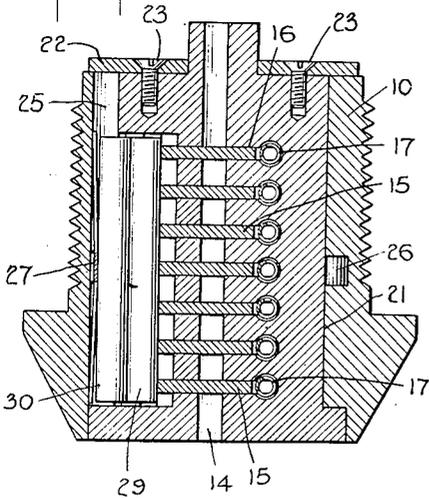


Fig. 4.

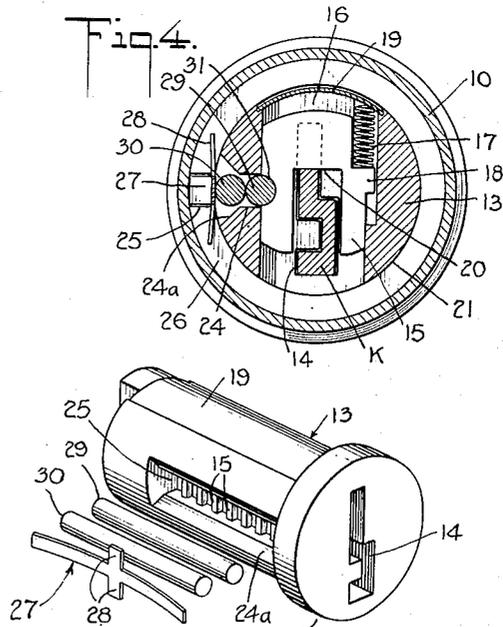


Fig. 6.

INVENTOR  
R. C. Spain  
BY  
H. Golden  
ATTORNEY

# UNITED STATES PATENT OFFICE

2,660,876

## SIDE BAR CYLINDER LOCK

Roy C. Spain, Salem, Va., assignor to The Yale & Towne Manufacturing Company, Stamford, Conn., a corporation of Connecticut

Application May 10, 1949, Serial No. 92,370

15 Claims. (Cl. 70-362)

1

This invention relates to a lock of the type in which a key plug is rotatable relatively to a cylinder upon the positioning of tumblers carried by the key plug in proper relation to the key plug. More particularly, my invention relates to a lock of the particular class in which a side bar is controlled by the positioning of the tumblers to release or lock the key plug relatively to the cylinder. My invention is particularly an improvement over the structure shown in my application Serial No. 38,969, filed July 16, 1948, now Patent No. 2,578,211, issued December 11, 1951.

It is the object of my present invention to contribute a lock of the particular class described in which it will be impossible to apply picking pressure to the tumblers through the application of picking torque to the key plug. As a feature of my invention whereby this objective is attained, I provide means whereby upon application of picking torque to the key plug, all pressure is removed from the tumblers, thereby making it impossible to hold the tumblers in any picked position. As a particular feature of this part of the invention, I utilize a surface of the key plug for holding the locking side bar away from the tumblers while the side bar itself functions to lock the key plug against rotation relatively to the cylinder.

It is a further object of the invention to provide a lock of the class described that may be manufactured very economically and through the utilization of extremely simple parts. As a feature of my invention whereby the results set forth are attained, I utilize a simple rotating key plug having a series of tumblers, these tumblers merely controlling a pair of locking pins or side bars that in one position maintain the key plug locked and in another position release the key plug. As a particular further feature of the invention, the lock is so arranged that the tumblers may be all of the same configuration when assembled within the key plug, the tumblers being grooved for coaction with the pins or side bars by the cutting of gatings in the tumblers after the tumblers are positioned relatively to the key plug by a particular key.

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 claims appended hereto. Those skilled in the art will ap-

2

preciate 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 to be granted me shall be of sufficient breadth to prevent the appropriation of my invention by those skilled in the art.

Referring now to the drawings, Fig. 1 is a perspective view of a typical cylinder lock in which my invention may be embodied. Fig. 2 is a vertical section through the cylinder of Fig. 1. Figs. 3 and 4 are views similar to Fig. 2, but showing the parts in different positions. Fig. 5 is a section taken along lines 5-5 of Fig. 2. Fig. 6 is an exploded view of the key plug and the side bars utilized therewith.

Referring now more particularly to the drawings, reference numeral 10 indicates the cylinder lock of my invention, having a screw threaded body 11 on which may be fitted a securing nut 12. Of course, the cylinder may be part of a handle or a knob or any other part, as those skilled in the art will appreciate, being here shown in the form of a separate sleeve-like housing in order to simplify the description of my invention.

The key plug is designated by reference numeral 13, and is formed with a keyway 14 for the insertion of a key K shown in section in Fig. 4. Mounted within the key plug are tumblers 15, there being in the form of my invention here illustrated seven of these tumblers. Each tumbler is placed in a chamber 16 of the key plug, after which a spring 17 is applied against a shoulder 18 of each tumbler. A curved plate 19, best seen in Fig. 6, is then placed over all the chambers 16 to hold in place the several springs 17 and thereby to contain within the key plug the tumblers 15. The tumblers are, of course, adapted to be set by the application of the upper edge of the key K to each surface 20 of the several tumblers.

The key plug 13 is mounted for rotation in a bore 21 of the cylinder 10 and is retained within the bore by a retaining plate 22 best seen in Fig. 5, fitted over the end of the key plug and held assembled thereto by screws 23.

The key plug 13 is formed with a flared longitudinal groove 24 that in one position of the key plug 13, illustrated in Fig. 2, is in alignment with a groove 25 formed in the bore 21 of the cylinder 10. Communicating with the groove 25 is a transverse groove 26 and within the said groove 25, 26 there lies a spring 27 best seen in Fig. 6. Of course, the cross legs 28 of the spring 27 lie in the groove 26, while the long main legs of the

3

spring lie within the groove 25. Positioned within the aligned grooves 24 of the key plug and 25 of the cylinder 10, are the side bars 29 and 30. These side bars preferably take the form of cylindrical pins for simplicity of manufacture and for ease of operation, the bar 29 being hereinafter known as the inner pin or side bar, while the side bar 30 is known as the outer pin or side bar.

Each tumbler is formed with a gating 31, it being obvious that when the gatings of the several tumblers are aligned as shown in Fig. 4, through the setting of the tumblers by the key K, the spring 27 will urge pins 29, 30 into the release position illustrated in said Fig. 4. Thereupon, it is obvious that the key plug will be free for rotation relatively to the cylinder 10. Let us examine what happens when picking torque is applied to the key plug 13 tending to rotate it to the position of Fig. 3 from the position of Fig. 2. Upon such rotation, the flared surface 24a of the groove 24 will be applied against the pin 30. Obviously, the pin 30 will prevent any further rotation of the key plug in a clockwise direction from the position of Fig. 3. Furthermore, it will be noted that the surface 24a not only coats with the pin 30 to limit rotation of the key plug, but also forces the pin 30 radially outwardly toward the cylinder and away from the key plug. This prevents any application of pressure against the tumblers since pin 29 then merely rides freely between its full line position of Fig. 3 and its dotted line position of that figure, there being nothing but gravity tending to move it toward the tumblers.

Since it is impossible to apply pressure to the tumblers 15, it is impossible to align the tumbler gatings 31 by a picking tool and to hold those gatings in aligned position. Thus, it is only by the use of the key as in Fig. 4 that the tumbler gatings may be aligned to allow entry of the pin 29 into those gatings and the movement of the pin 30 out of the slot 25 of the cylinder 10. Incidentally, while I prefer to use the spring 27, it is obvious that by forming the slot 25 somewhat differently, it might be arranged that upon the setting of the tumblers in the aligned position of Fig. 4, the two pins would be urged as by camming into the tumbler grooves. This might conceivably also be accomplished through gravity, but I do prefer to utilize the spring 27.

In the manufacture of my lock it is possible to utilize tumblers all of the same size and shape, these tumblers being easily assembled in the key plug 13. Thereafter, by putting the key K into the key plug and setting the tumblers, it is possible to cut the tumbler gatings 31 by means of a fast rotating cutting tool. Naturally, these gatings will be cut in properly aligned relation to one another and for ready coaction with side bar or pin 29. While tumblers have been cut previously by others to create aligned gatings, my invention lends itself particularly to this operation because of the arrangement of the flared groove 24 formed in the key plug.

I believe that with the general description presented and with the detailed description now set forth, the operation and contribution of my invention will be quite apparent to those skilled in the art.

I now claim:

1. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and

4

cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, outer and inner cylindrical pins lying in said grooves, said tumblers coating with said inner pin in said key plug groove to hold at least one of said pins in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow said one of said pins to move entirely out of said cylinder groove as the inner pin moves into said tumbler gatings whereby to release said key plug for rotation.

2. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, outer and inner cylindrical pins lying in said grooves, said tumblers coating with said inner pin in said key plug groove to hold said outer pin in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow the outer pin to move entirely out of said cylinder groove as the inner pin moves into said tumbler gatings whereby to release said key plug for rotation, and a spring pressing against said outer pin and urging said inner pin thereby into said tumbler gatings.

3. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, an outer cylindrical pin, an inner cylindrical pin juxtaposed to said outer pin and lying entirely within said key plug groove, said tumblers coating with said inner pin in said key plug groove to hold one of said pins in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow each of said pins to move into a position entirely in one of said grooves as the inner pin moves into said tumbler gatings whereby to release said key plug for rotation.

4. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, an outer cylindrical pin, an inner cylindrical pin juxtaposed to said outer pin and lying entirely within said key plug groove, said tumblers coating with one of said pins in said key plug groove to hold the other of said pins in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow each of said pins to move into a position entirely in one of said grooves as the inner pin moves into said tumbler gatings whereby to release said key plug for rotation, and said key plug groove being flared whereby said key plug and inside pin rotate to a limited extent relatively to said cylinder and outside pin in either of opposed directions when said tumbler gatings are not aligned.

5. In a lock of the class described, a key plug,

5

a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, an outer cylindrical pin, an inner cylindrical pin juxtaposed to said outer pin and lying entirely within said key plug groove, said tumblers coacting with said inner pin in said key plug groove to hold said outer pin in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow the outer pin to move entirely out of said cylinder groove as the inner pin moves into said tumbler gatings whereby to release said key plug for rotation, and an outer portion of said key plug groove being flared whereby said key plug and inside pin rotate to a limited extent relatively to said cylinder and outside pin when said tumbler gatings are not aligned, the said flared portion of said key plug groove camming the outside pin toward said position partially in the cylinder groove so that the outside pin is positioned between the key plug and cylinder to lock the key plug against rotation.

6. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, an outer cylindrical pin, an inner cylindrical pin juxtaposed to said outer pin and lying entirely within said key plug groove, said tumblers coacting with said inner pin in said key plug groove to hold said outer pin in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow the outer pin to move entirely out of said cylinder groove as the inner pin moves into said tumbler gatings whereby to release said key plug for rotation, and said key plug groove being flared at both sides thereof whereby said key plug and inside pin rotate to a limited extent relatively to said cylinder and outside pin when said tumbler gatings are not aligned, the said flared portion of said key plug groove camming the outside pin toward the cylinder groove whereby to remove all pressure against said inside pin.

7. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, an outer side bar, an inner side bar juxtaposed to said outer side bar and lying entirely within said key plug groove, said tumblers coacting with said inner side bar in said key plug groove to hold said outer side bar in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow the outer side bar to move entirely out of said cylinder groove as the inner side bar moves into said tumbler gatings whereby to release said key plug for rotation, and said key plug groove being flared at opposed sides thereof whereby said key plug and inside side bar rotate to a limited extent relatively to said cylinder and outside side bar in either of opposed

6

directions when said tumbler gatings are not aligned.

8. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, an outer side bar, an inner side bar juxtaposed to said outer side bar and lying entirely within said key plug groove, said tumblers coacting with said inner side bar in said key plug groove to hold said outer side bar in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow the outer side bar to move entirely out of said cylinder groove as the inner side bar moves into said tumbler gatings whereby to release said key plug for rotation, and said key plug groove being flared whereby said key plug and inside side bar rotate to a limited extent relatively to said cylinder and outside side bar when said tumbler gatings are not aligned, the said flared portion of said key plug groove camming the outside side bar toward said position partially in the cylinder groove so that the outside side bar is positioned between the key plug and cylinder to lock the key plug against rotation.

9. In a lock of the class described, a cylinder, a key plug rotatable in a bore of said cylinder, a series of tumblers carried by said key plug and movable relatively thereto by a key so as to be positioned in accordance with the bittings of said key, said tumblers having gatings and said key plug having a groove in its periphery relatively to which said gatings are aligned when said tumblers are set by a properly bitted key, an outer cylindrical pin positioned in a locking groove in the bore outlining surface of said cylinder and also partially in said key plug groove, an inner cylindrical pin entirely in said key plug groove, said tumblers coacting with said pins to hold said outer pin against full entry into said key plug groove until the tumbler gatings are placed in alignment with said inner pin.

10. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, an outer cylindrical pin, an inner cylindrical pin juxtaposed to said outer pin and lying entirely within said key plug groove, said tumblers coacting with said inner pin in said key plug groove to hold said outer pin in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow the outer pin to move entirely out of said cylinder groove as the inner pin moves into said tumbler gatings whereby to release said key plug for rotation, a spring pressing against said outer pin and urging said inner pin thereby into said tumbler gatings, and said key plug groove being flared whereby said key plug and inside pin rotate to a limited extent relatively to said cylinder and outside pin in either of opposed directions when said tumbler gatings are not aligned.

11. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key

plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, an outer cylindrical pin, an inner cylindrical pin juxtaposed to said outer pin and lying entirely within said key plug groove, said tumblers coacting with said inner pin in said key plug groove to hold said outer pin in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow the outer pin to move entirely out of said cylinder groove as the inner pin moves into said tumbler gatings whereby to release said key plug for rotation, a spring pressing against said outer pin and urging said inner pin thereby into said tumbler gatings, and said key plug groove being flared at the key plug periphery whereby said key plug and inside pin rotate to a limited extent relatively to said cylinder and outside pin when said tumbled gatings are not aligned, the said flared portion of said key plug groove camming the outside pin toward said position partially in the cylinder groove so that the outside pin is positioned between the key plug and cylinder to lock the key plug against rotation.

12. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, an outer cylindrical pin, an inner cylindrical pin juxtaposed to said outer pin and lying entirely within said key plug groove, said tumblers coacting with said inner pin in said key plug groove to hold said outer pin in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow the outer pin to move entirely out of said cylinder groove as the inner pin moves into said tumbler gatings whereby to release said key plug for rotation, a spring pressing against said outer pin and urging said inner pin thereby into said tumbler gatings, and an outer portion of said key plug groove being flared at both sides thereof at the key plug periphery whereby said key plug and inside pin rotate to a limited extent relatively to said cylinder and outside pin when said tumbler gatings are not aligned, the said flared position of said key plug groove camming the outside pin toward the cylinder groove, whereby to remove all pressure against said inside pin.

13. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, an outer cylindrical pin, an inner cylindrical pin juxtaposed to said outer pin and lying entirely within said key plug groove, said

tumblers coacting with said inner pin in said key plug groove to hold said outer pin in a position partially in said cylinder groove and partially in said key plug groove, said tumblers having gatings adapted for alignment with said key plug groove so as to allow the outer pin to move entirely out of said cylinder groove as the inner pin moves into said tumbler gatings whereby to release said key plug for rotation, a spring pressing against said outer pin and urging said inner pin thereby into said tumbler gatings, and said key plug groove being flared outwardly of said inside pin whereby said key plug and inside pin rotate to a limited extent relatively to said cylinder and outside pin in either of opposed direction when said tumbler gatings are not aligned, and with the outside pin positioned partially in said cylinder groove and between the key plug and cylinder to lock the key plug against rotation while the inner pin floats freely relatively to said tumblers.

14. In a lock of the class described, a cylinder, a key plug mounted for movement in said cylinder, a series of tumblers movably mounted in said key plug, each of said tumblers having a gating and said gatings being adapted for alignment when said tumblers are properly key set, outer and inner cylindrical pins, said tumblers holding said pins in juxtaposed relation with said outer pin positioned partially in a groove in said cylinder, said inner pin moving into said tumbler gatings upon alignment of said tumbler gatings, and means whereby said outer pin moves out of said groove in said cylinder to release said key plug for rotation upon movement of said inner pin into said gatings.

15. In a lock of the class described, a key plug, a series of tumblers movably mounted in said key plug, a cylinder having a bore in which said key plug is rotatably mounted, said key plug and cylinder having grooves that are aligned in one rotated position of said key plug relatively to said cylinder bore, a cylindrical pin lying partially in said key plug groove, said tumblers holding said cylindrical pin partially in said cylinder groove for locking said key plug against rotation, said tumblers having gatings adapted for alignment with said key plug groove so as to allow the pin to move entirely out of said cylinder groove whereby to release said key plug for rotation, and said key plug groove being flared whereby said key plug may rotate to a limited extent relatively to said cylinder in either of opposed directions when said tumbler gatings are not aligned, the said flared portion of said key plug groove camming the pin toward the cylinder groove and away from the tumblers.

ROY C. SPAIN.

References Cited in the file of this patent  
UNITED STATES PATENTS

| Number    | Name        | Date          |
|-----------|-------------|---------------|
| 1,965,336 | Fitz Gerald | July 3, 1934  |
| 2,021,185 | Hurd        | Nov. 19, 1935 |