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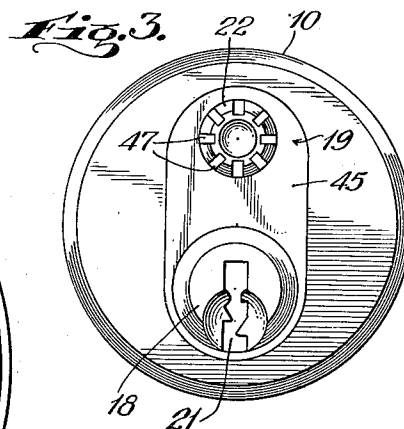
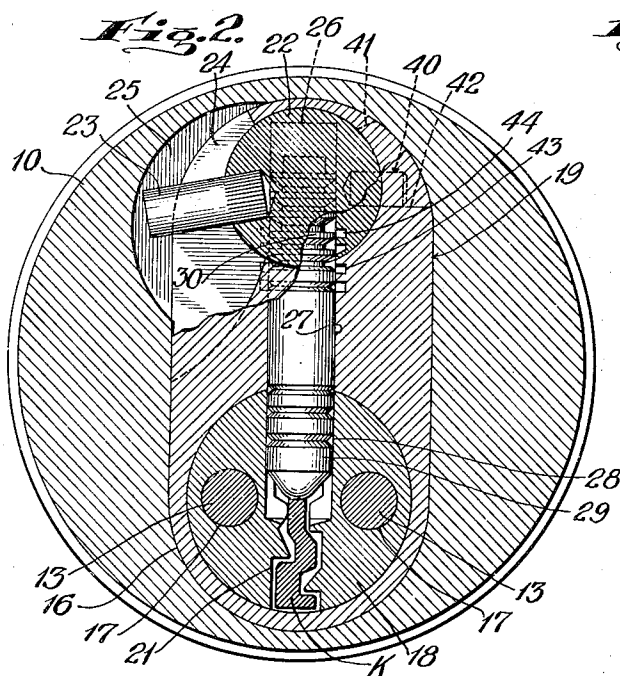
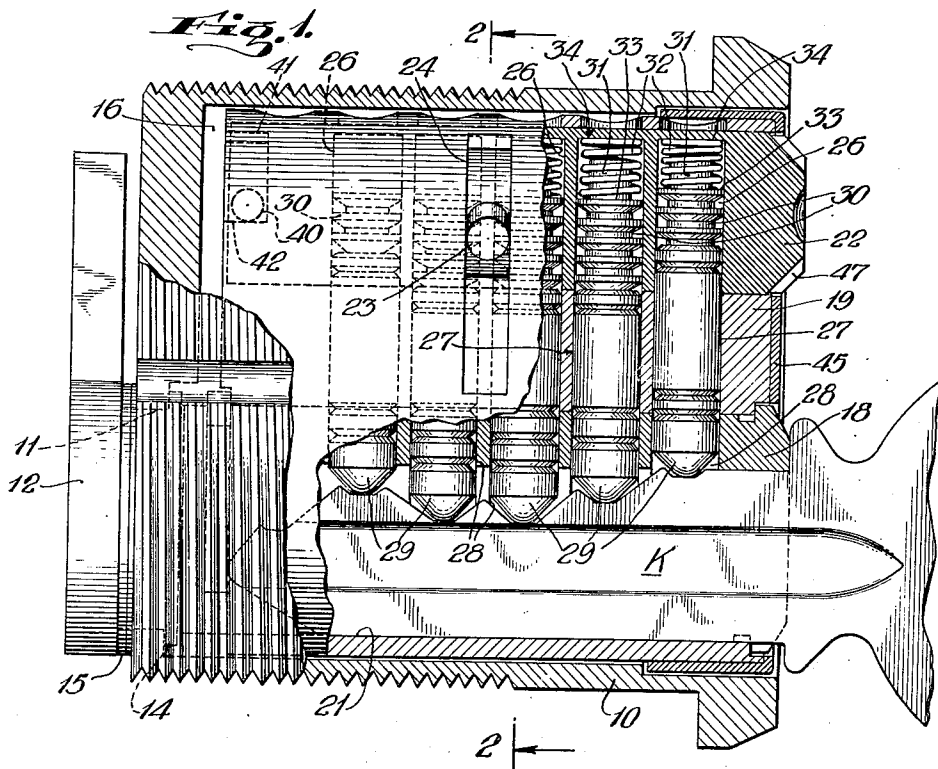
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2,391,833

REMOVABLE CORE CYLINDER

Filed Feb. 5, 1943

2 Sheets-Sheet 1



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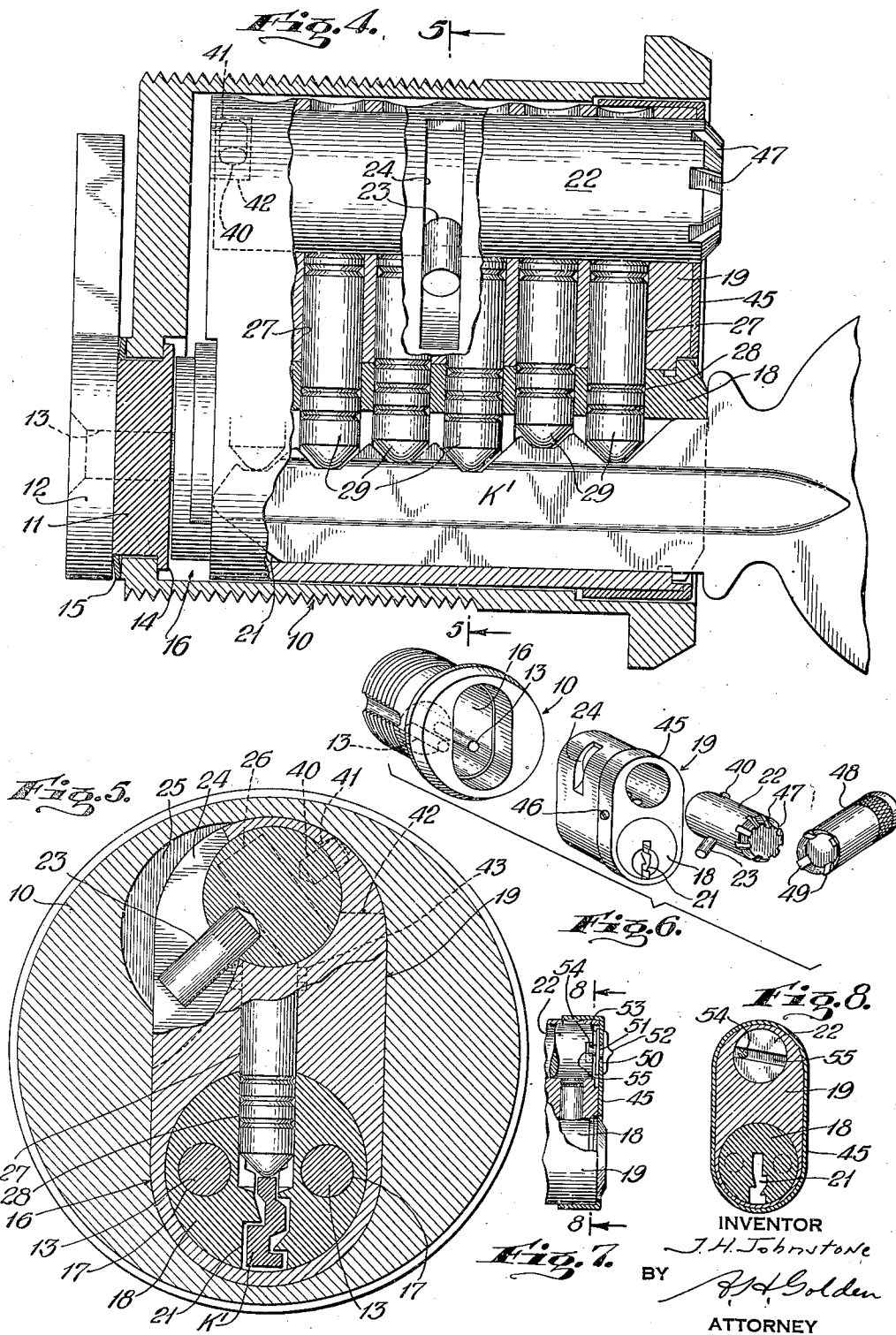
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,391,833

REMOVABLE CORE CYLINDER

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Application February 5, 1943, Serial No. 474,806

22 Claims. (Cl. 70-367)

This invention relates to a lock mechanism known in the art as a removable core cylinder. A lock mechanism of the particular type may comprise a core housing that is formed with screw threads whereby to be screwed into assembled relation to a lock casing, and with a cam thereon adapted for rotation by a removable cylinder lock core. This cylinder lock core is adapted for insertion into the core housing, and means are provided for retaining it in the core housing and for readily releasing it for removal from said core housing.

The cylinder lock core is generally of the type having a key plug mounted for rotation therein, the key plug being adapted to actuate the cam on the core housing through a connection that is effected when the lock core is inserted into the core housing. Tumblers are provided to lock the key plug relatively to the cylinder portion of the cylinder lock core, and these tumblers are adapted to be set by a key inserted in the keyway of the key plug. My invention relates more particularly to a new and novel means for retaining the cylinder lock core within the core housing, and for effecting its removal from said core housing.

An understanding of the more prominent prior art constructions will be helpful in leading to an understanding of my invention. In one construction of the prior art, a sleeve is mounted about a portion of the key plug and is adapted for rotation with the key plug when the tumblers are set in a particular position. The movement of the sleeve with the key plug is adapted to move a retainer to and from retaining position. In another construction of the prior art, a retainer is adapted to be moved out of retaining position by rotation of the key plug to a predetermined position by a predetermined key, the key being cut away to permit the said movement of the retainer. The structure of my invention is novel in that it uses unique movable means within the cylinder lock core adapted for movement independently of the key plug to effect the withdrawal of the retainer from retaining position. As a feature of my invention, I utilize a pair of plugs, both of which are mounted in the cylinder lock core, one plug, called the key plug, operating the usual cam mechanism of the core housing, while the other, called the retainer plug, controls the cylinder lock core retaining means.

More particularly, it is a feature of my invention that the plugs are not movable except when certain tumblers that control the plugs are set in a predetermined position. As a further feature

of my invention, the tumblers are set through a keyway in but one of the plugs, and the tumblers are preferably adapted for setting in two positions. Thus, one setting of the several tumblers effects the release of the key plug for rotation, or for push pull movement as the case may be, while a second setting of the tumblers makes it possible to move the retainer plug to effect movement of the retainer out of retaining position independently of any movement of the key plug.

It is a further feature of my invention that the retainer plug and key plug are controlled through the setting of tumblers that lie in aligned bores formed in the plugs, and in the cylinder lock core in which the plugs are mounted.

A further feature resides in that the springs used to project the tumblers are preferably mounted in the bores of the retainer plug; while the tumblers are actuated by a key in a keyway formed in the key plug.

As still a further feature of my invention, the movement of the retainer plug locks the tumblers against movement and therefore locks within the key plug the key used for setting the tumblers. The key may then be used quite readily to move the entire cylinder lock core out of the core housing.

In the general description of my invention, and in the more detailed description that follows, I shall describe my cylinder lock core as retained in a core housing of the type adapted to be assembled to a door lock casing. However, the cylinder lock core of my invention is adapted for assembly in a core housing that is part of a night latch cylinder, or part of a padlock casing as will be quite apparent to those skilled in the art. As a matter of fact, an important reason for the adoption of the cylinder lock core and housing combination in commercial locks resides in the adaptability of a cylinder lock core for mounting within any one of a series of different types of lock, all as will be fully appreciated by those skilled in the art.

While I have thus described my invention generally, and have pointed out certain important features of its construction, additional important features will be apparent upon a reading of the specification that follows, and these additional features will be covered in the claims appended hereto. It should also be understood that the conception on which my invention is based may readily be embodied in structures other than those that I shall herein show and describe, so that

the claims to be allowed me should not be limited to the particular apparatus herein set forth.

Referring now to the drawings,

Fig. 1 is a vertical section through a removable core housing and the cylinder lock core therein contained, the particular core housing being of that type adapted to be screwed into assembled relation to a lock plate.

Fig. 2 is a section taken along lines 2—2 of Fig. 1.

Fig. 3 is a view of the front of the assembly of Fig. 1 with the key removed.

Fig. 4 is a view similar to Fig. 1 but showing the tumblers positioned so that the retainer plug may be rotated, and with the plug actually rotated.

Fig. 5 is a section taken along lines 5—5 of Fig. 4.

Fig. 6 is an exploded view of the parts of my invention, showing also an operating member for the retainer plug.

Fig. 7 is a partial section similar to that of Fig. 4 showing a different form of operating member for the retainer plug mounted on the scalp of the core housing.

Fig. 8 is a section taken along lines 8—8 of Fig. 7.

Referring now more particularly to the drawings, the core housing of my invention is designated by reference numeral 10 and has mounted at one end thereof a disc-like member 11 assembled to a cam 12 by a pair of pins 13. The disc 11 is flanged at 14 so that it cannot move to the left from its position of Fig. 4 relatively to the core housing 10 and therefore holds the cam 12 securely assembled to the core housing. A spring washer 15 may be placed between the cam 12 and the end surface of the core housing 10 so as to take up any play between the parts, all as will be appreciated.

The pins 13 extend endwise into an opening 16 in the core housing 10 as is probably best seen in Fig. 6, and are adapted to enter bores 17 in a key plug 18 of the cylinder lock core 19, when that cylinder lock core is inserted into the opening 16 of the core housing 10. The purpose of this relationship of the parts is to effect an assembly between the key plug 18 and the cam 12 through the pins 13 when the cylinder lock core is inserted into the core housing, and to allow for a ready separation of the key plug 18 from the cam 12 when the cylinder lock core is removed from the core housing. I have described the particular parts thus far set forth in order that my invention may be clearly understood, but it will be well to indicate that the parts described are conventional and are not per se part of my invention to be herein claimed.

The key plug 18 already referred to is formed with a key way 21 and is adapted for rotation in the cylinder core 19 when certain tumblers hereinafter to be described are properly positioned by a key within the said keyway 21. Also mounted within the cylinder lock core 19, and in parallel relation to the key plug 18, is what I term a retainer plug 22. This retainer plug has secured thereto, and extending therefrom, a retainer pin 23 that protrudes through a slot 24 in the cylinder lock core 19 and into a slot 25 in the core housing 10. It is quite obvious that when the pin 23 is in its position of Fig. 2; that is, within the slot 25 of the core housing 10, the cylinder lock core 19 cannot be withdrawn from the core housing 10. If the pin 23 is rotated with the retainer plug 22 to the position of Fig. 5, under conditions to be described presently, it is obvious that the

cylinder lock core 19 may be withdrawn from the core housing 10. This is of course true because the retainer pin 23 will then be entirely within the slot 24 of the cylinder lock core 19 and entirely outside the slot 25 in the core housing 10.

This rotation of the retainer plug is controlled by a series of tumbler pins that are adapted to be set preferably by a key inserted into the keyway 21 of the key plug 18. These tumblers are mounted in a series of aligned bores formed in the retainer plug 22, the cylinder lock core 19, and the key plug 18. The bores in the retainer plug 22 are designated by reference numeral 26, the bores in the cylinder lock core are designated by reference numeral 27, and the bores within the key plug 18 are designated by reference numeral 28. The bores 28 are of course in communication with the keyway 21 so that the lowermost tumblers 29 positioned in the bores 28 may be set by a key K as is clearly illustrated in several of the figures.

The uppermost tumblers extend into the bores 26 of the retainer plug 22 and are designated by reference numeral 30. Tumblers 30 are formed with upper pin portions 31 about which are mounted the compression springs 32 that press against the shoulder portions 33 of the tumblers for urging the tumblers downwardly. Those skilled in the art will of course appreciate that the springs 32 through the tumblers 30, maintain the several tumblers within the aligned bores pressed downwardly against the bitted edge of the key K, the key K being adapted to move the tumblers upwardly to the position of Fig. 1 against the resistance of the several springs 32.

In the particular modification shown, the ends of the springs 32 abut surfaces 34 defining the ends of the several bores 26 of the retainer plug 22. If desired, the bores 26 may extend entirely through the retainer plug 22 to allow for what is termed "end loading," that is, insertion of the pins and springs vertically from the top of the cylinder into the aligned bores 26, 27, 28. Those skilled in the art will fully appreciate the significance of this detail and no further emphasis is placed thereon in this application.

In Fig. 1, the key K is shown setting the series of tumblers so that a parting line is established between the tumblers along the periphery of the key plug 18. Those skilled in the art will of course appreciate that with the tumblers so set the key plug 18 may be rotated, and through the pins 13 rotate the cam 12. The particular position of the several tumblers is shown also in Fig. 2 in which the key K is shown in section. In this position of the parts, the upper tumblers do not however present a parting line to the periphery of the retainer plug 22 as will be readily apparent from the drawings, and is therefore impossible to rotate the retainer plug 22. The cylinder lock core 19 is thus securely retained within the core housing 10 by the retainer pin 23.

If it is desired to remove the cylinder lock core, a special key called a removal or control key must be used. This key is designated by reference numeral K' in Figs. 4 and 5. Referring to Figs. 4 and 5, it will be noted that with the key K' in the keyway 21, the tumblers are set to present solid tumbler sections at the line of the periphery of the key plug 18, so that the key plug is not rotatable. The upper tumblers have however been set in Figs. 4 and 5 so as to present a parting line corresponding to the periphery of the retainer plug 22, releasing that retainer plug for rotation from the position of Figs. 1 and 2

to the position of Figs. 4 and 5. In other words, whereas the key K was bitted to align the tumblers to release the key plug 18 for rotation, the control key K' is bitted to align the tumblers to release the retainer plug 22 for rotation while setting the tumblers to hold the plug 18 against rotation.

For limiting the rotation of the retainer plug 22 and for retaining it within the cylinder lock core 19, I utilize a pin 40 held in the retainer plug 22 and operating in a slot of the cylinder lock core 19 defined by end surfaces 41 and 42 all as will be fully appreciated from the drawings.

In Fig. 2 of the drawings, parallel grooves 43 are shown formed in each of the bores 27 of the cylinder lock core while similar parallel grooves 44 are shown formed in the bores 26 of the retainer plug 22. These grooves are adapted for cooperation with the peculiarly shaped tumbler pins to render it relatively impossible to "pick" the tumblers and surreptitiously release the retainer plug 22. In the drawings also, a plurality of tumbler parts are shown in the several bores, the plurality of tumblers being required for master key work. Of course, so far as the present invention is concerned, it is merely necessary to consider that when the tumblers are aligned so as to present a parting line on the periphery of the key plug 18, the key plug 18 is free to rotate, and that when the tumblers are aligned to present a parting line to the periphery of the retainer plug 22, the retainer plug is free to rotate to the release position of Figs. 4 and 5.

At the front of the cylinder lock core 19 I mount a decorative scalp 45 that is maintained assembled to the cylinder lock core 19 by screws 46, there being one screw at each side of the core, a screw 46 at one side being well shown in Fig. 6.

The front end of the retainer plug 22 extends outwardly of the scalp 45 and is formed with a tapered periphery serrated as at 47 so that it may be readily rotated by a special tool designated by reference numeral 48 in Fig. 6. This tool has a series of lugs 49 adapted to enter the several serrations of the end of the retainer plug as will be readily appreciated.

Figs. 7 and 8 show a modification of my invention in which the means for rotating the retainer plug 22 are actually held always assembled relatively to the cylinder lock core 19. Thus, in the particular modification the end of the retainer plug 22 is inwardly of the scalp 45 and the scalp is slotted at 50 for the mounting of a pin 51, to the outer side of which is secured a button 52. A disc 53 is secured to the pin 51 at the inside of the scalp 45 and extending from this disc is a pin 54 that rides within a slot 55 in the end of the retainer plug 22. It is readily seen that if the retainer plug 22 is released for rotation, a downward push on the button 52 will, through the pin 54 and the slot 55, effect the rotation of the retainer plug to the position of Fig. 5. Thereafter, the button 52 may be moved upwardly to rotate the retainer plug 22 to restore the retainer pin 23 to its position of Fig. 2.

As has already been indicated, when the retainer plug 22 is released for rotation, the key plug 18 remains locked against rotation. It is obvious moreover that with the retainer plug 22 rotated to the position of Fig. 5 the several tumblers within the bores 28 of the key plug 18 will be locked against upward movement. Therefore, the key K' will be locked in Figs. 4 and 5 against movement outwardly of the key plug 18. This relationship of the parts is very desirable

since it makes it possible to use the key K' as a pull element with which to pull the cylinder lock core 19 out of the core housing 10 when the retainer plug 22 has been rotated to the position of Fig. 5. I believe that the operation of my invention will now be fully appreciated.

I now claim:

1. In a lock of the class described, a housing, a cylinder lock core in said housing having a front face, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core having its front end accessible for operation at said front face, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug, said key plug having a key way accessible at said front face through which said tumblers are positioned to release the key plug and said second plug for movement relatively to said cylinder lock core.

2. In a lock of the class described, a housing, a cylinder lock core in said housing having a front face, a key plug movable in a bore in said cylinder lock core extending inwardly from said front face, a second plug movable in a second bore in said cylinder lock core having its front end accessible for operation at said front face, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug to lock said key plug and second plug against movement, said tumblers being adapted to release said key plug and second plug when positioned with their parting lines corresponding to the peripheries of said plugs.

3. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug, and said key plug having a key way through which said tumblers are positioned, said tumblers when in one position releasing said key plug for movement in said cylinder lock core and in a second position releasing said second plug for movement relatively to said cylinder lock core.

4. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core having a portion extending outwardly of said cylinder lock core for manual rotation, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug, said key plug having a key way through which said tumblers are positioned to release the key plug and said second plug for movement relatively to said cylinder lock core and a retainer for retaining said cylinder lock core in said housing adapted to be moved to release position when said second plug is moved relatively to said cylinder lock core.

5. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core, tumblers mounted for movement in bores formed in said key plug, said cylinder lock core and said second plug, said key plug having a key way through which said tumblers are positioned, said tumblers when positioned with their parting line corresponding to the periphery of the key plug releasing the key plug for rotation, said tumblers when positioned with their parting line corresponding to the periphery of the second plug releasing the second plug for

rotation, and a portion of said second plug extending for access at the front end of said cylinder lock core whereby to be manually movable when released by said tumblers.

6. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug, said key plug having a key way through which said tumblers are positioned to release the key plug and said second plug for movement relatively to said cylinder lock core, and a retainer for retaining said cylinder lock core in said housing adapted for movement out of retaining position through movement of said second plug.

7. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug, said key plug having a key way through which said tumblers are positioned to release the key plug and said second plug for movement relatively to said cylinder lock core, and a retainer secured to said second plug and extending into coaction with the housing to retain the cylinder lock core in said housing until said second plug is moved to effect the withdrawal of the retainer from coaction with said housing.

8. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug, said key plug having a key way through which said tumblers are positioned to release the key plug and said second plug for movement relatively to said cylinder lock core, and a retaining pin fixed to said second plug and extending therefrom through a slot in said cylinder lock core into an opening in said housing for retaining said cylinder lock core in said housing, said pin moving with said second plug out of said opening in the housing when said second plug is moved.

9. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug, said key plug having a key way through which said tumblers are positioned, said tumblers when in one position releasing said key plug from said cylinder lock core and in a second position releasing said second plug for movement relatively to said cylinder lock core, and a retainer for retaining said cylinder lock core in said housing adapted for movement out of retaining position incidental to movement of said second plug.

10. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug, said key plug having a key way through which said tumblers are positioned, said tumblers when positioned with their parting line corresponding to the periphery of the key plug releasing the key plug for rotation, said tumblers when positioned with their parting line corresponding to the pe-

riphery of the second plug releasing the second plug for rotation, and a retainer for retaining said cylinder lock core in said housing adapted for movement out of retaining position incidental to movement of said second plug.

11. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug, said key plug having a key way through which said tumblers are positioned, said tumblers when in one position releasing said key plug from said cylinder lock core and in a second position releasing said second plug for movement relatively to said cylinder lock core, and a retainer secured to said second plug and extending into coaction with the housing to retain the cylinder lock core in said housing until said secondary plug is moved to withdraw the retainer from coaction with said housing.

12. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug, said key plug having a key way through which said tumblers are positioned, said tumblers when positioned with their parting line corresponding to the periphery of the key plug releasing the key plug for rotation, said tumblers when positioned with their parting line corresponding to the periphery of the second plug releasing the second plug for rotation, a slide piece on the front of said cylinder lock core, means whereby said slide piece rotates said second plug, and a retainer for said cylinder lock core operated through rotation of said second plug.

13. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core having a portion extending outside said cylinder lock core for manual rotation, tumblers mounted for movement in aligned bores formed in said key plug, said cylinder lock core and said second plug, said key plug having a key way through which said tumblers are positioned to release the key plug and said second plug for movement relatively to said cylinder lock core, and a retaining pin fixed to said second plug and extending therefrom through a slot in said cylinder lock core into an opening in said housing for retaining said cylinder lock core in said housing, said pin moving with said second plug out of said opening in the housing when said second plug is moved.

14. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movably mounted in said cylinder lock core, a second plug movably mounted in said cylinder lock core for movement independently of said key plug, key set tumblers for locking said plugs until said tumblers are properly positioned as by a key, a retainer for retaining said cylinder lock core in said housing, and means whereby movement of said second plug independently of said key plug effects movement of said retainer out of retaining position to allow withdrawal of said cylinder lock core from said housing.

15. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug in said cylinder lock core, a second plug mounted in said cylinder lock core, key set tumblers in said

plugs for controlling the rotation of said plugs, a retainer for retaining said cylinder lock core in said housing, and means whereby movement of said second plug effects movement of said retainer out of retaining position to allow withdrawal of said cylinder lock core from said housing.

16. In a lock of the class described, a housing, a cylinder lock core in said housing, a cylindrical key plug rotatable in said cylinder lock core, a second cylindrical plug rotatably mounted in said cylinder lock core, key set tumblers for locking said plugs until said tumblers are properly positioned as by a key and a retainer secured to said second plug and extending into coaction with the housing to retain the cylinder lock core in said housing until said second plug is moved to withdraw the retainer from coaction with said housing.

17. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug in said cylinder lock core, a second plug mounted in said cylinder lock core, key set tumblers in said plugs for controlling the rotation of said plugs, and a retainer secured to said second plug and extending into coaction with the housing to retain the cylinder lock core in said housing until said second plug is moved to withdraw the retainer from coaction with said housing.

18. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug in said cylinder lock core, a second plug mounted for rotation in said cylinder lock core having a portion extending outwardly of said cylinder lock core for manual rotation, key set tumblers for locking said plugs until said tumblers are properly positioned as by a key and a retaining pin fixed to said second plug and extending therefrom into an opening in said housing for retaining said cylinder lock core in said housing, said pin moving with said second plug out of said opening in the housing when said second plug is moved.

19. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug rotatable in said cylinder lock core, a second plug rotatable in said cylinder lock core, a series of aligned tumbler bores formed in said key plug, said cylinder lock core and said second plug, tumblers in said aligned bores for controlling the ro-

tation of said plugs, said key plug having a key way in communication with ends of the aligned bores therein for setting the tumblers in said bores by a key in said key way, and springs mounted in the bores of said second plug for projecting the tumblers in said aligned bores against the key in said key way.

20. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug movable in said cylinder lock core, tumblers for controlling the movement of said plugs, said key plug having a key way through which said tumblers are positioned to release the key plug and said second plug for movement relatively to said cylinder lock core, and a retainer for retaining said cylinder lock core in said housing adapted for movement out of retaining position through movement of said second plug.

21. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug movable in said cylinder lock core, tumblers for controlling the movement of said plugs, said key plug having a key way through which said tumblers are positioned to release the key plug and said second plug for movement relatively to said cylinder lock core, a portion of said second plug extending for access at the front end of said cylinder lock core whereby to be manually movable when released by said tumblers, and a retainer for retaining said cylinder lock core in said housing adapted for movement out of retaining position through movement of said second plug.

22. In a lock of the class described, a housing, a cylinder lock core in said housing, a key plug movable in said cylinder lock core, a second plug in said cylinder lock core, tumblers mounted for movement in aligned openings formed in said key plug, said cylinder lock core and said second plug, and said key plug having a keyway through which said tumblers are set in one position to release the key plug, and in a second position to release said second plug for movement relatively to said cylinder lock core while locking said key plug against rotation.

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