Dec. 29, 1936. A. GAHAGAN 2,065,683

LOCKING DEVICE

Filed Nov. 6, 1928

Fig. 1

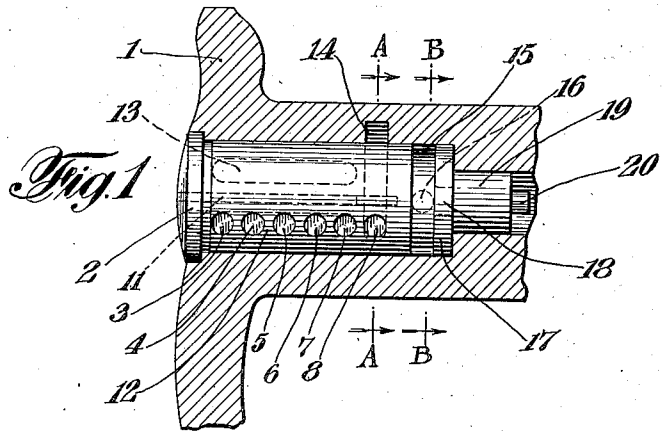


Fig. 2.

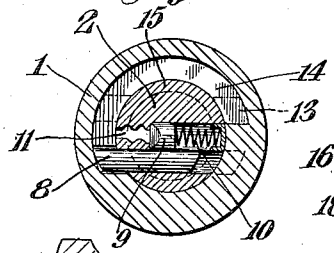


Fig. 3.

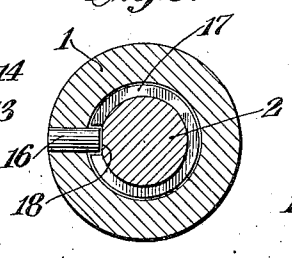


Fig. 4.

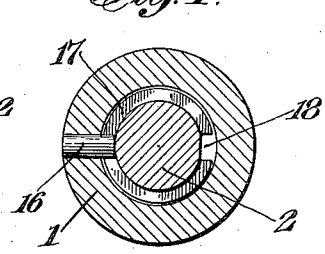


Fig. 5

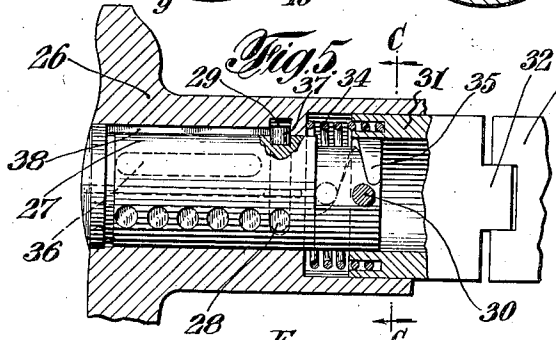
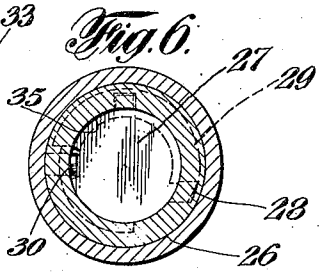


Fig. 6.



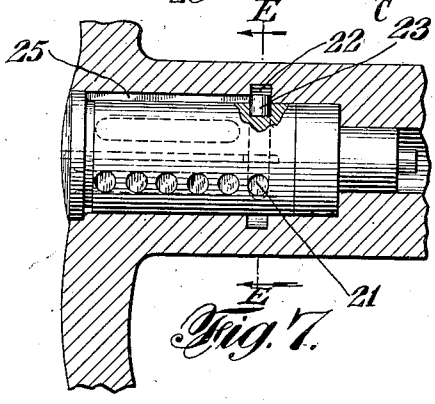
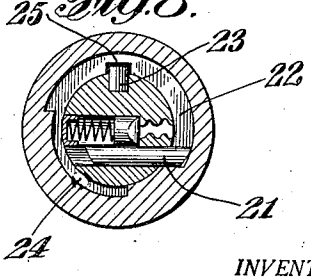


Fig. 7.

Fig. 8.



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Patented Dec. 29, 1936 2,065,683

UNITED STATES PATENT OFFICE

2,065,683

LOCKING DEVICE

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Application November 6, 1928, Serial No. 317,638

9 Claims. (Cl. 70—91)

My invention relates to locks and more particularly to locks of the type wherein the cylinder is removable independently of the remainder of the parts of mechanism.

There are many advantages in having the lock cylinder capable of being removed so that cylinders may be changed for servicing, fitting of additional or new keys, replacing of cylinders and for any other reason. However, such removal should only be possible in one position of the cylinder, preferably the unlocked position, and then only by special provision. The unlocked position of the cylinder is selected because then the locked position gives complete security and the lock cannot be tampered with by taking out the cylinder or otherwise.

The form of lock by which I choose to illustrate my invention is one having a cylinder in which are tumblers actuated by the key. By placing one or more of the innermost tumblers beyond the range of the change or operating key and providing a suitable annular groove in the lock housing, these tumblers prevent the withdrawal of the cylinder until a special or pick key is inserted which lifts one or more of these retaining or pick tumblers and permits the cylinder to be removed. In order that such removal can take place only in a selected position, such as the unlocked, a pin is provided which may rotate in cooperation with a retaining means such as a groove, a cam, etc. Then by providing an exit opening which will register with the pin, in the unlocked position of the cylinder, the cylinder may be withdrawn. This cannot occur in any other position whether the pick tumblers be retracted or not for the pin is always in engagement with its retaining means except in the unlocked position.

Furthermore, it is often desirable to have the handle, or other structure containing the locking device, freely rotatable in the locked position in order that the lock cannot be forced or the lock mechanism broken by the application of force and the door opened in that manner. One way in which I accomplish this is to have a separable member in the mechanism which is connected in the unlocked position and is disconnected in the locked position; the movement preferably being made by a cam action between the cylinder and an element of the separable member which is advanced to engagement or retracted to disengagement by the rotation of the cylinder.

Other and further advantages will appear in the following specification and drawing. In the drawing:

Fig. 1 is a longitudinal section through a handle or housing carrying a cylinder and its associated parts.

Fig. 2 is a section through A—A of Fig. 1.

Fig. 3 is a section through B—B of Fig. 1.

Fig. 4 is Fig. 3 in the locked position.

Fig. 5 is a longitudinal section through a handle or housing carrying a cylinder and showing the cam relation between the cylinder and separable element.

Fig. 6 is a section through C—C of Fig. 5.

Fig. 7 is the same as Fig. 1 except that the pin is on the cylinder instead of projecting from the housing and works in the same groove as the pick tumbler.

Fig. 8 is a section through E—E of Fig. 7.

In Fig. 1, a door handle 1 is shown by way of illustration as forming a housing in which is the cylinder 2 of the type described in the Patent 1,514,659 for Cylinder lock, dated Nov. 11, 1924. The change tumblers 3, 4, 5, 6 and 7 are identical with the pick tumbler 8 (Fig. 2), having offsets identical with 9 and actuating springs similar to 10. The key way is shown at 11. Cut in the housing 1 are two longitudinal grooves 12 and 13 which receive the change tumblers 3 to 7 inclusive. Fig. 1 shows the position of the parts when the locking element is in unlocked position and it will be noted that the change tumblers are extended into groove 12. Upon insertion of the key and rotation of the cylinder to the locked position, the change tumbler 6 would extend into grove 13. The pick tumbler 8 differs from the change tumblers only to the extent that it is longer and therefore will extend further into the housing 1 and to provide for this a circular groove 14 is present in the housing in which the pick tumbler 8 moves as the cylinder turns and normally is inoperative.

On the inner end of the cylinder is an annular groove 15 into which a pin 16 projects from the housing 1. The flange 17, forming the inner wall of the grove 15, has a cut 18 so located as to register with the pin 16 in the unlocked position (Fig. 3). In all other positions of the cylinder, the pin works between the walls of groove 15 (Fig. 4). The innermost end of the cylinder is formed of a reduced portion 19 having a pin 20 eccentrically located upon its face. The pin 20 may be attached to means by which the locking element is thrown or retracted.

In Fig. 1, the parts are in the unlocked position with the change tumblers 3 to 7 inclusive

in the slot 12 of the housing 1. Pick tumbler 8 is in groove 14 and pin 16 is in groove 15 opposite cut 18 in flange 17 (Fig. 3). Even though pin 16 would pass through cut 18, the cylinder cannot be withdrawn because pick tumbler 8 is held by groove 14 and is inoperative because the regular or change key is only long enough to affect the change tumblers 3 to 7; the pick tumbler 8 is beyond its range. When the change key is inserted, the change tumblers are retracted and the cylinder turned to the locked position where the change tumblers enter groove 13 upon withdrawal of the key. In going from the unlocked to the locked position, it will be noticed that pick tumbler 8 travels in its groove 14 and pin 16 travels in groove 15 and at the same time cut 18 goes out of registration with pin 16 (Fig. 4). Therefore, in the locked position there is a double safeguard against removal of the cylinder—the pick tumbler 8 and the pin 16 in their respective grooves and even if means were found to retract pick tumbler 8, the cylinder would still be safely held in place by the pin 16 in its groove (Fig. 4). Inasmuch as the pin 16 and cut 18 only register in the unlocked position of the cylinder, the cylinder must be turned to that position before it can be removed. To retract the pick tumbler 8, a pick key is used which is not normally employed as an operating key but which retracts the change tumblers enough to clear the housing in a longitudinal direction and which is long enough to operate the pick tumbler and retract it from groove 14. Therefore, pick tumbler 8 being retracted and pin 16 opposite cut 18, the cylinder is removed with its inserted key. To replace the cylinder, the pick key is inserted, the cylinder put in the housing in the unlocked position and as the key is withdrawn, pick tumbler 8 enters its groove 14.

If so desired, the pick tumbler and the retaining pin may work in the same groove and the latter be on the cylinder instead of in the housing. Such a construction is shown in Figs. 7 and 8 and is identical with Fig. 1 except as follows: The pick tumbler 21 works in its groove 22. Seated in the cylinder and in register with groove 22 is a pin 23. It is to be noted that groove 22 has a circumferentially extended portion 24 (Fig. 8) and the reason for this is that pin 23, in this instance being at approximately 90° to pick tumbler 21, must travel a corresponding distance beyond the limit of groove 22 although groove 24 need not be as deep owing to the shorter distance which pin 23 projects from the cylinder as compared with pick tumbler 21. Corresponding to the position of pin 23 in the unlocked position of Figs. 7 and 8 is a longitudinal groove 25 in the housing and as it connects with the groove 22, this allows the pin 23 to pass when the pick tumbler 21 is retracted by the pick key and the cylinder withdrawn. In all other positions, pin 23 and groove 25 will not register and the cylinder cannot be removed whether or not the pick tumbler 21 is retracted.

Another form of the device is shown in Figs. 5 and 6. The housing 26 contains a cylinder 27 with a pick tumbler 28 and pin 37 in groove 29, all as previously described. A pin 30, instead of being fixed to the housing or to the cylinder, projects inwardly from a sleeve 31. This sleeve fits within an enlarged seat in the housing and has an off center projection 32 which enters a corresponding cut in element 33 of the locking mechanism. In fact, the sleeve 31 and part 33 are to be considered as the separable elements of a locking mechanism member. The advantage of having projection 32 offset is that then there is only one position—the unlocked, for instance—when these parts 32 and 33 will engage. Acting between the housing 26 and the sleeve 31 is a compression spring 34 which tends to force this sleeve out. Around the inner end of cylinder 27 is a cam element 35 arranged to cooperate with pin 30 on sleeve 31 and so located with respect to the pin that, in the unlocked position shown, the cam element can pass by the pin without interference.

In the unlocked position of the mechanism shown in Figs. 5 and 6, the mechanism can be operated because parts 32 and 33 are in engagement. However, when the cylinder 27 is rotated by the change key, the pick tumbler 28 and pin 37 will move in their groove 29 and at the same time the cam element will engage pin 30. As the rotation continues toward the locked position, pin 30 will ride upon the cam surface of 35 and as it does so, sleeve 31 will be moved against spring 34 and projection 32 of the sleeve will move out of engagement with part 33. At the completion of the movement to the locked position, the pin 30 will have been carried by the cam to the position shown in dotted lines at which time projection 32 and part 33 will have entirely separated. As a result, when in the locked position, the change tumblers will be in their groove 36 and the housing with the cylinder and associated parts can be freely rotated without connection with and entirely independent of the locking mechanism. When so freely rotatable, no force can be applied to the housing to force the bolts or damage the mechanism. Furthermore and in similarity with the other forms, the cylinder 27 has a multiple safeguard against being taken out in the locked position. One is the pick tumbler 28 and pin 37 in their groove 29 and this is the same as before. The other is the pin 30 which, instead of working in a groove as previously, works against the surface of cam 35 and as long as they are in contact, the cylinder cannot be withdrawn because pin 30 would draw sleeve 31 against the housing 26 and prevent further movement. This would securely retain the cylinder even though, in some manner, pick tumbler 28 should be retracted. In going to the unlocked position, spring 34 forces sleeve 31 out, pin 30 rides down the cam 35 and projection 32 and part 33 re-engage until the movement is completed and pin 30 and cam 35 are entirely out of contact as shown in Fig. 5. Then, if a pick key is inserted, the pick tumbler 28 will be retracted, pin 37 will register with its groove 38, cam 35 will pass pin 30 and the cylinder can be removed.

It will be obvious that the form of cam 35 may be any such as will move pin 30 the required distance during the rotation of cylinder 27 in going between the unlocked and locked positions and this may even be 360° in which event an additional benefit would accrue in that only one groove (similar to 36) would be needed in the housing to retain the change tumblers because the cylinder would make a complete revolution and the tumblers return to register with the same groove.

Also, I may have more than one pick tumbler in the same or separate grooves as additional safeguards against removal of the cylinder and the pins 16, 23 and 37 need not be in any spaced relation with the pick tumbler but may have any suitable location on the circumference. In like manner, the pin of Figs. 5 and 7 need not be in

the same groove as the pick tumbler but may equally well have its own groove.

For purposes of illustration I have selected a handle of the automobile door type in which to house the locking device but it can equally well be applied to all classes of locks or in any place where operations of locking and unlocking are to be performed.

Having illustrated my invention in a preferred form, I am aware that many changes and variations may be made therein without departing from that invention and I include all such changes and modifications within the scope of my claims.

I claim:

1. In a locking device, the combination with a housing and a lock cylinder, of a normally inoperative tumbler coacting with the housing, a cam on the cylinder, a sleeve connecting the housing and a member of the locking mechanism and a pin on said sleeve in cooperative relation with the cam.

2. In a locking device, a housing, a cylinder mounted in the housing, change tumblers and a pick tumbler mounted in the cylinder, the housing having a circumferential groove into which the pick tumbler extends, said pick tumbler being normally inoperative but being operable to permit the withdrawal of the cylinder from the housing, and said housing and cylinder having a cooperative groove and pin to retain the cylinder in the housing except when the cylinder is in a predetermined position.

3. In a locking device, a housing, a cylinder mounted in the housing, change tumblers and a pick tumbler mounted in the cylinder, said housing having a groove into which the pick tumbler extends, a cam formed on the inner end of the cylinder, a sleeve slidably mounted in the housing, said sleeve having a part adapted to cooperate with a lock mechanism, and a pin on the sleeve adapted to cooperate with the cam to effect the disengagement of the sleeve from the lock mechanism.

4. In a locking device, a housing, a cylinder mounted in the housing, a sleeve slidably mounted in the housing and having a part adapted to cooperate with a lock mechanism, a spring for urging the sleeve toward the lock mechanism, a pin on the sleeve, and a cam carried by the cylinder for engaging with the pin to withdraw the sleeve from the lock mechanism.

5. In a locking device, a housing, a cylinder mounted in the housing, a normally inoperative tumbler mounted in the cylinder, the housing having a circumferential groove into which the tumbler extends, withdrawal of the tumbler from the groove permitting the removal of the cylinder from the housing, means carried by the housing having a part for engagement with a lock mechanism, and means on the cylinder for withdrawing said means out of engagement with the lock mechanism.

6. In a locking device, a housing, a cylinder mounted in the housing, a normally inoperative tumbler mounted in the cylinder, the housing having a circumferential groove into which the tumbler extends, a pin on the cylinder extending into the same groove, the housing having a longitudinal groove so located as to register with the pin in a predetermined position of the cylinder, means carried by the housing having a part adapted to engage with a lock mechanism, and means on the cylinder for disengaging said means from the lock mechanism.

7. In a locking device, a housing, a cylinder mounted in the housing, a normally inoperative tumbler mounted in the cylinder, the housing having a circumferential groove into which the tumbler extends, said tumbler being operable to permit the withdrawal of the cylinder from the housing, a separable lock element seated in the housing, a resilient member acting to force the separable lock element into engagement with a lock mechanism, and positive means on the cylinder for disengaging said element from the lock mechanism.

8. In a locking device, a housing, a cylinder mounted in the housing, said housing and cylinder having cooperating means permitting the withdrawal of the cylinder from the housing by the use of a special key, means carried by the housing having a part adapted to engage with a lock mechanism, and means carried by the cylinder for disengaging said means from the lock mechanism.

9. In a locking device, a housing having a circumferential groove and a longitudinal groove, a cylinder mounted in the housing, a series of change tumblers mounted in the cylinder, a normally inoperative tumbler mounted in the cylinder and extending into the circumferential groove, said normally inoperative tumbler being operable to permit the withdrawal of the cylinder from the housing, a pin on the cylinder extending into the circumferential groove and adapted to register with the longitudinal groove in a predetermined position of the cylinder to permit the withdrawal of the cylinder from the housing, a sleeve carried by the housing and having a part adapted to engage with a lock mechanism, a spring acting against the sleeve to force it toward the lock mechanism, a pin carried by the sleeve, and a cam formed on the cylinder for engaging with the pin to withdraw the sleeve from the lock mechanism, said pin and said cam being disengageable to permit the withdrawal of the cylinder from the housing.

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