Aug. 4, 1936. G. E. SWANSON 2,049,548

LOCK

Filed Aug. 16, 1933

Fig. 1.

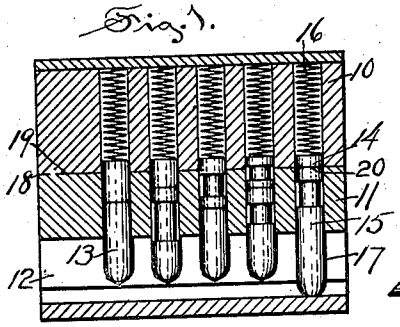


Fig. 2.

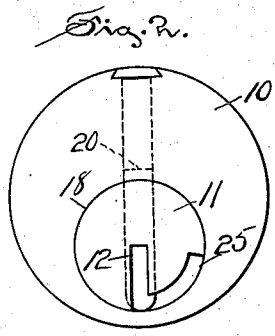


Fig. 3.

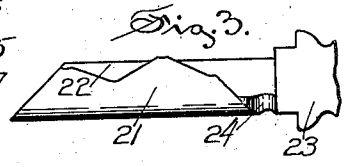


Fig. 5.

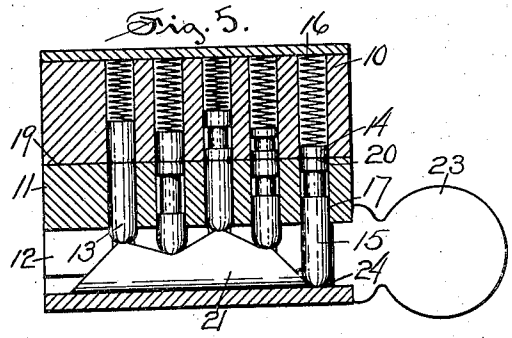


Fig. 4.

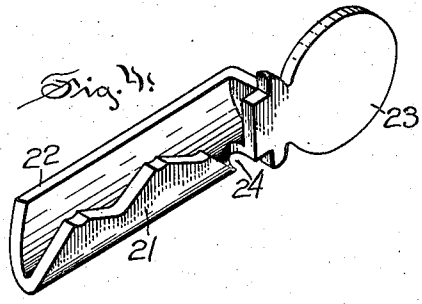


Fig. 6.

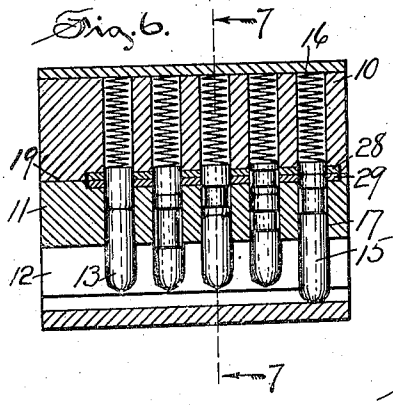


Fig. 7.

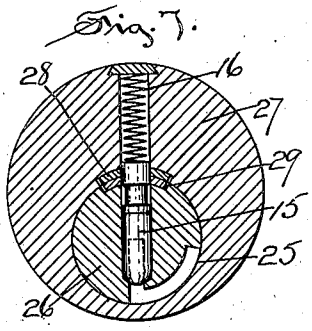


Fig. 9.

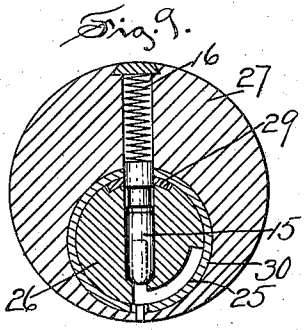


Fig. 8.

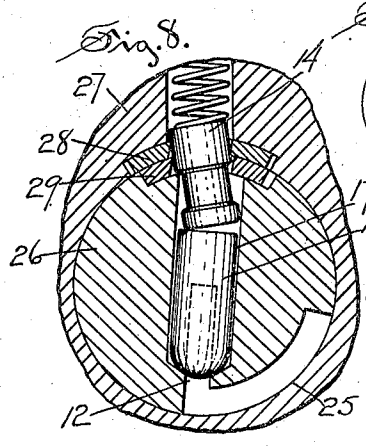


Fig. 10.

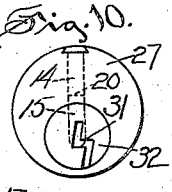


Fig. 11.

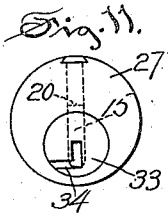
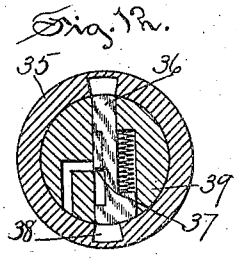


Fig. 12.



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Patented Aug. 4, 1936

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UNITED STATES PATENT OFFICE

2,049,548

LOCK

Gunnard E. Swanson, New Britain, Conn.

Application August 16, 1933, Serial No. 685,306

7 Claims. (Cl. 70—47)

My invention relates to that type of locks having a key plug normally locked against rotation but which is released for rotation upon the insertion of a key therein, and an object of my invention, among others, is the production of a lock of this type which shall have means to prevent positioning of the locking elements to release the key plug by surreptitious and unauthorized methods.

One form of a lock embodying my invention and in the construction and use of which the objects herein set out, as well as others, may be attained, is illustrated in the accompanying drawing in which—

Figure 1 is a view in central lengthwise section through the cylinder and plug of my improved lock.

Figure 2 is an end view of the same.

Figure 3 is a side view of a portion of my improved key.

Figure 4 is an isometric view of said key.

Figure 5 is a view similar to Fig. 1 but showing the key in position in the lock.

Figure 6 is a view similar to Fig. 1 showing a modified form of the invention.

Figure 7 is a view in cross section on a plane denoted by the dotted line 7—7 of Fig. 6.

Figure 8 is a view in cross section, scale enlarged, through a portion of the cylinder and through the plug illustrating the action of a tumbler in an effort to release the plug in an unauthorized manner.

Figure 9 is a view similar to Fig. 7 showing a little different construction.

Figure 10 is an end view of the cylinder and the plug of the lock showing another modified construction.

Figure 11 is a similar view showing still another modified form.

Figure 12 is a detail view in cross section through the cylinder and plug of a lock showing my invention as applied to the so-called "disk" form of tumbler.

Experienced operators find it possible to position the locking elements in a lock of the type herein illustrated and described without the use of a key, this being accomplished by the insertion of a picking tool within the key slot and also by a succession of blows delivered against the structure while pressure is placed upon the key plug. The arrangement forming the subject matter of my present invention is for the purpose of preventing such unauthorized operation of a lock, such structure being illustrated in the drawing herein in which the numeral 10 denotes the cylinder of a cylinder type of lock, 11 the key plug of such lock which has a slot 12 to receive a key, and the numeral 13 denotes pin tumblers some of which, as herein shown, are of the spool type of tumblers. All of the parts thus far described, as to their general arrangement, may be constructed and arranged in any well-known manner. It will be understood, however, that my invention is not limited to use in a lock of that type of pin tumbler herein shown, as it may be embodied in other forms of tumbler locks, as in so-called "disk" locks in which the tumblers operate in a manner similar to pin tumblers for controlling operation of the plug as shown in Fig. 12 of the drawing. The tumblers, with the exception of one hereinafter described, are arranged in pairs, one member of each pair being located in the cylinder and the other member of each pair being located in the plug, springs in the tumbler recesses in the cylinder pressing the tumblers toward the key slot 12.

In carrying my invention into effect I provide a guard which, in the structure herein shown, is composed of two members 14—15 spring pressed toward the key slot by a spring 16. This guard is of similar construction to that of the pin tumblers except that it is longer than said tumblers and the hole 17 which receives it is extended to the bottom of the key slot, as shown in Fig. 1, whereas the holes for the other pin tumblers terminate a short distance above the bottom of said slot so that the guard members and the pin tumblers normally rest in the position shown in Fig. 1.

The members of the guard are of such length that the dividing line between them is at the joint 18 between the plug and the inner wall of the plug opening 19 in the cylinder when the guard rests on the bottom of the slot as seen in Fig. 1.

It may now be noted that if a picking tool be inserted into the slot 12 for the purpose of surreptitiously manipulating the tumblers to effect rotation of the plug without the use of a key, the moment the guard is raised to any degree the joint 20 between the two members of the guard will be raised above the joint 18 and it will therefore be impossible to rotate the key plug even though the other tumblers may be positioned so that the joints between the two members will register with the joint 18. The guard therefore effectually prevents positioning of the tumblers by the use of a picking tool so that the lock may be released without the use of a key.

In order to effect release of the key plug I

employ a key of peculiar form such key having a notched lip 21 and a supporting wing 22, these two parts forming a grooved structure with a thumb piece 23 in the end thereof. The lip 21 is provided with notches in a manner common to keys for operating the tumblers of pin tumbler locks and a guard releasing notch 24 is formed in the inner end of the lip 21, between said lip and the thumb piece 23, and as shown in Fig. 4 of the drawing.

In order to permit entrance of this key into the lock a recess 25 is provided extending lengthwise of the plug, and preferably in the plug, as shown in Fig. 2 of the drawing. This recess is of such dimensions that the key will nicely fit therein.

In operation the lip 21 of the key is inserted in the slot 12, the wing 22 entering the recess 25. As the lip 21 engages the guard the latter is lifted thereby holding the plug from rotation. Upon the key being fully inserted the tumblers are all properly positioned with their lines of separation registering with the joint 18. As the key reaches its innermost position the notch 24 is located underneath the guard and the latter drops into the notch thereby registering the joint between its two members with the joint 18 between the plug and the wall of the opening in the cylinder. The plug is now released and may be turned by rotating the key in the ordinary manner.

Heretofore, in order to obtain sufficient strength in the key the distance between the deepest notch and the back of the key is controlling, this being the weakest part of the key, and this has compelled a key to be made of a certain width in order to provide sufficient strength. By the use of my improved key having the wing 22 the notches in the lip 21 may be cut deeper which is of advantage in locks of this type.

While I have shown herein the guard as located nearest the front end of the lock, it will be understood that the guard may occupy the position of any of the tumblers and yet perform its function and, in fact, in some cases, the arrangement may be such that more than one guard may be employed.

The structures shown in Figs. 6 and 7 embody all of the elements shown in the preceding figures, and in addition thereto I have provided a set of dogging plates located in the joint between the plug 26 and the inner wall of the cylinder 27 and having openings through which the tumblers and the guard extend, these plates having a slight lateral movement as well as some freedom for endwise movement. These plates may be provided in such numbers as may be desired and may be of different forms. In a satisfactory arrangement and as herein shown two plates are provided, the plate 28 being located in a recess in the wall of the plug opening and the plate 29 being located in a recess in the outer surface of the plug, the two plates resting one against the other and extending from a point in front of the guard to a point back of the rear tumbler.

With this arrangement, if an effort be made to position the tumblers for release of the plug and by the use of means other than a key, and in which operation a lateral pressure is applied to the tumblers by a force applied to the plug to rotate it, in a manner readily understood by those skilled in the art, as a shoulder created by the spool shape of the tumblers reaches the joint between the plates, or between the plates and the supporting plug or the cylinder, said plates will move slightly, as shown in Fig. 8, and the shoulder on the plug contacting with the shoulder thus created by the plates obstructs movement of the tumbler. This permits a slight yielding rotatable movement of the plug which with ordinary pin tumblers would indicate that one set of tumblers has reached the releasing position. With my structure, however, this movement is deceptive and the operator cannot tell just what the position of the tumblers is and it therefore creates a very difficult problem to open the lock with means other than a key, if it does not entirely prevent such unauthorized operation.

In the form of the lock shown in Fig. 9 instead of the plate 28 a hollow cylinder 30 is provided which completely encloses the plug 26, the cylinder, however, performing all of the functions of the plate 28 in the structure of the preceding figures and having a limited rotating movement.

In Fig. 10 my invention is shown as applied to one form of an angularly shaped key slot 31 in the plug 32, the releasing notch for the guard member 14 being located in the upper edge of the key which bears the tumbler notches.

Figure 11 shows the application of my idea to a plug having another form of angularly shaped key slot 34 in a plug 33 in a manner that will be readily understood from the foregoing description.

The structure shown in Fig. 12 illustrates the application of my invention to the well-known form of "disk" tumblers located in the cylinder 35. These tumblers are composed usually of a single member, each of a length equal to the diameter of the plug, and as will be readily understood by those skilled in the art, said tumblers normally resting with their ends in different positions in the slot 38 in the cylinder. The guard tumbler 36 is also preferably composed of a single member but is provided with an actuating shoulder 37 as in the case of other tumblers upon which the bit or notched lip of the key operates.

It will be noted from this structure that as soon as the key encounters the guard 36 it is raised and thereby prevents rotating movement of the plug 39. However, as the key is fully inserted and the tumblers are all properly positioned, the shoulder 37 comes opposite a notch in the key, as hereinbefore explained, and the guard 36 is pressed downwardly by its spring to the position shown in Fig. 12 so that the plug 39 may be rotated.

It will be noted that the solid portion of the guard 36 is located opposite the key slot as shown in Fig. 12, so that any attempt to insert a picking tool underneath the shoulder 37 will raise the guard 36 into locking position and thereby prevent any rotating movement of the plug 39.

It will be noted that the key slot 31 in the structure shown in Fig. 10 is of such angular shape as to prevent the entrance of a picking tool to the tumblers behind the guard, the upper and lower portions of the slot being widely enough separated to effect this purpose, and the guard therefore effectually prevents access to the tumblers by such means. The lower portion of the key which is made of the shape of the slot 31 effects the same purpose as the wing 22 in the device first hereinbefore described, and the same is true of the horizontal portion of the slot 34.

In accordance with the provisions of the patent statutes I have described the principles of operation of my invention, together with the device which I now consider to represent the best embodiment thereof; but I desire to have it understood that the device shown is only illustrative

and that the invention may be carried out by other means and applied to uses other than those above set out.

I claim:

1. A lock including a cylinder, a plug rotatably mounted in said cylinder and having a key slot, and a tumbler mounted in said cylinder and seated substantially at the bottom of said key slot at the outer surface of said plug, said cylinder and plug having between them registering guard openings and a laterally extending recess for the wing of a key, said tumbler extending completely through said plug and being of a length substantially the same as that of the diameter of the plug.

2. A lock including a cylinder, a plug rotatably mounted in said cylinder and having a key slot, and a tumbler mounted in said cylinder and seated substantially at the bottom of said key slot at the outer surface of said plug, said cylinder and plug having between them registering guard openings with a recess opening from the key slot at the line of separation between the plug and the cylinder to receive the wing of a key, said tumbler being normally located in said plug with one end flush with the mouth of the guard opening in the cylinder whereby movement from its normal position will enter it into said opening in the cylinder.

3. A lock including a cylinder, a plug rotatably mounted in said cylinder and having a key slot, and a tumbler mounted in said cylinder and seated substantially at the bottom of said key slot at the outer surface of said plug, said cylinder and plug having between them registering guard openings and a laterally extending recess for the wing of a key, said tumbler extending to the bottom of said key slot and being normally located in said plug and of a length substantially the same as the diameter of said plug.

4. A lock including a cylinder, a plug rotatably mounted in said cylinder and having a key slot, and a tumbler mounted in said plug and seated substantially at the bottom of said key slot at the outer surface of the plug, said cylinder and plug having between them a recess for the wing of a key, said recess extending laterally from said key slot.

5. A lock including a cylinder having a guard opening and tumbler openings, a plug rotatably mounted in said cylinder and having a key slot, tumblers mounted in said cylinder and plug, a recess at the line of separation between the plug and cylinder for the wing of a key, said recess extending laterally from said key slot, and a guard member normally located in said plug with one end flush with the mouth of the guard opening in the cylinder whereby movement from its normal position will enter it into said opening in the cylinder, the opposite end of said guard member being seated in said recess.

6. A lock including a cylinder having a guard opening and tumbler openings, a plug rotatably mounted in said cylinder and having a key slot with a recess opening therefrom for the wing of a key, tumblers mounted in said cylinder and plug, and a guard member normally located in said plug with one end flush with the mouth of the guard opening in the cylinder and with its opposite end seated in said recess whereby movement from its normal position will enter it into said opening in the cylinder.

7. A lock including a cylinder having a guard opening and tumbler openings, a plug rotatably mounted in said cylinder and having an angularly shaped key slot comprising a horizontal and a vertical portion extending parallel with each other and adapted to receive a similarly shaped key having a releasing notch cutting through its vertical portion and bridged by said wing, tumblers mounted in said plug, and a guard member normally located in said plug with one end flush with the mouth of the guard opening in the cylinder whereby movement from its normal position will enter it into said opening in the cylinder, said guard being adapted to enter said notch to release said cylinder.

GUNNARD E. SWANSON.