

May 13, 1952

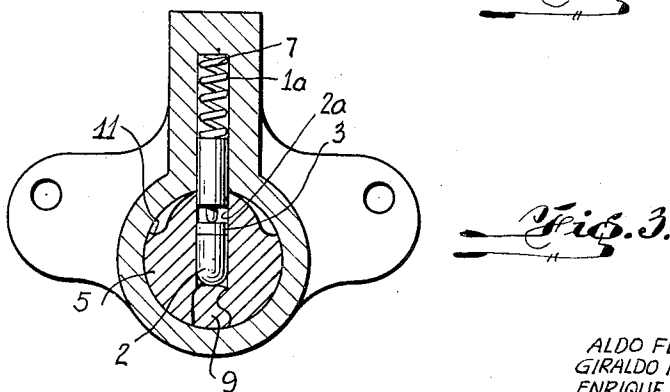
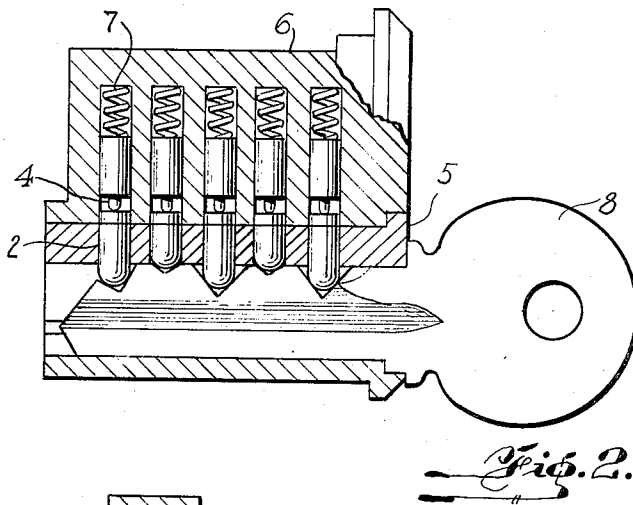
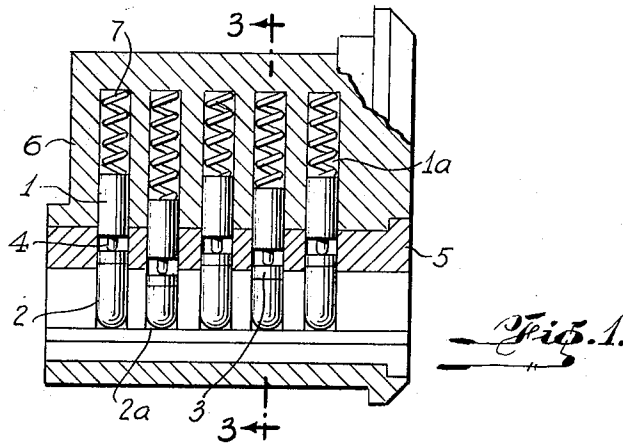
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2,596,720

CYLINDER LOCK

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2 SHEETS--SHEET 1



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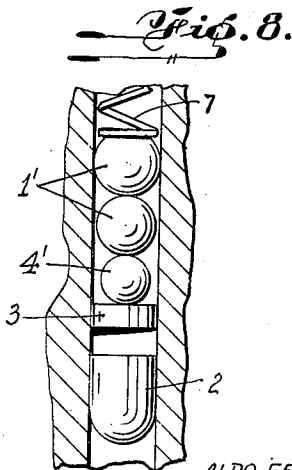
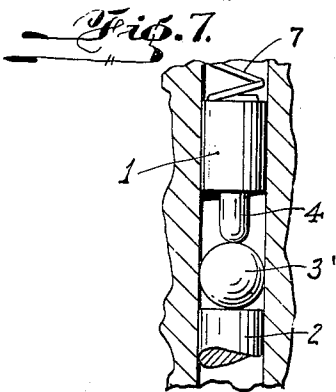
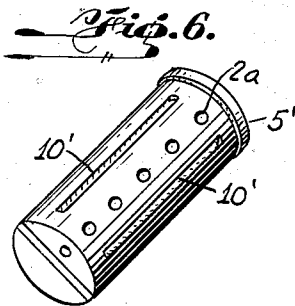
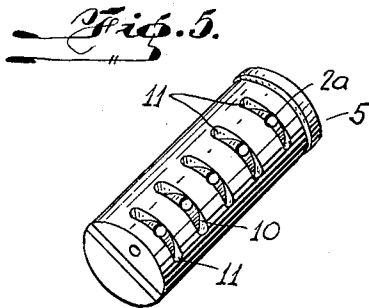
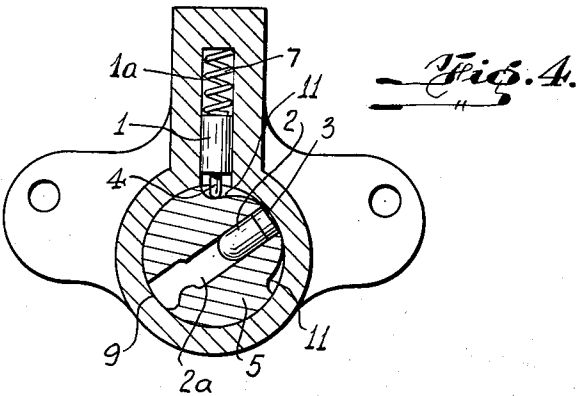
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2 SHEETS—SHEET 2



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2,596,720

CYLINDER LOCK

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1

Our invention relates to locks of the type having a key-receiving barrel rotatable inside a shell, the barrel being normally locked against rotation by means of a set of tumbler pins which are radially displaceable in aligned bores of the shell and the barrel and upon which act respective spring-urged driver pins tending to displace the tumblers toward the center of the barrel.

Locks of this description may be picked with relative ease by inserting into the key slot of the barrel an instrument whereby pressure tending to rotate the barrel may be exerted upon the latter, and by simultaneously locating the tumblers with the aid of a suitable tool (e. g. a wire) and displacing them radially outwardly until the boundary line between tumbler and driver becomes flush with the periphery of the barrel.

Various expedients have been proposed before for the purpose of rendering such locks difficult to pick, involving in most cases substantial modifications of the fundamental structure such as the insertion of sleeves, plates or the like. Other systems devised to this end require a not inconsiderable weakening of the barrel through the provision of slots, cutouts and so forth.

An important object of the present invention is to provide an improved pickproof lock of the character described in which, however, the drawbacks outlined above are substantially avoided.

Another object of the present invention is to provide locking means which, upon substitution thereof for the conventional driver pins of an ordinary lock of the character described, will serve to render the same pickproof after a simple machining operation on the barrel.

The above and other objects of this invention will become apparent from the following description, reference being had to the accompanying drawing in which:

Fig. 1 is a longitudinal section through the shell and the barrel, showing the locking elements according to the invention in operative position;

Fig. 2 is a view similar to Fig. 1 but showing the proper key inserted into the barrel slot, thereby rendering the locking elements inoperative;

Fig. 3 is a cross-section on the line 3-3 of Fig. 1;

Fig. 4 is a view similar to Fig. 3 but with the barrel displaced from normal position after a futile attempt to pick the lock;

Fig. 5 is a perspective view of the barrel removed from the lock;

Fig. 6 is a view similar to Fig. 5 but showing a modified form of barrel;

2

Fig. 7 is an enlarged view of a set of locking elements adapted to co-operate with the barrel of Fig. 6; and

Fig. 8 is a view similar to Fig. 7, showing a modified form of locking elements according to the invention.

Referring first to Figs. 1 through 5, there is shown a cylindrical barrel having the usual key slot 9, the barrel being rotatably seated in a shell 6. Radial bores 1a in the shell 6 are normally aligned with similar bores 2a in the barrel 5 to form channels within which tumbler pins 2 and driver pins 1 are displaceable. Each driver pin terminates at its end facing the associated tumbler pin in a point 4 of reduced diameter, this pin bearing upon a spacer or disk 3 which separates the pins 1, 2 from each other and is of the same diameter as these pins. It is important to note that the disks 3 are connected with neither the driver pins 1 nor the tumbler pins 2. Springs 7, lodged in the bores 1a, bear upon the drivers 1 in the well known manner, thereby normally causing these drivers partially to protrude into the bores 2a of the barrel so as to lock the latter against rotation relative to the shell 6; this position is illustrated in Figs. 1 and 3.

When the proper key 8 (Fig. 2) is introduced into the slot 9, the tumblers 2 are raised until the drivers 1 together with their points 4 as well as the disks 3 are entirely received by the bores 1a, the upper edges of the tumblers being then flush with the periphery of the barrel 5; this enables the barrel to be rotated freely inside the shell 6, permitting the release of the lock.

As best seen in Fig. 5, each of the bores 2a of the barrel 5 is flanked by two relatively shallow recesses or grooves 10 extending over a limited arc of the periphery of the barrel, the depth of these recesses or grooves increasing toward their extremities remote from the bore 2a. These extremities form sharp steps or abutments 11, best seen in Figs. 3 and 4, adapted to come to rest against the points 4 of the pins 1 if the corresponding tumblers were raised only to the position shown in Fig. 4 (with the top of disk 3, rather than of pin 2, flush with the periphery of the barrel). If, therefore, an intruder tries to pick the lock in the manner previously described, the barrel 5 will start to yield, and rotate, as soon as the top of a disk 3 lies flush with its periphery. The maximum angle of rotation, which will be reached after all the tumbler pins 2 have been picked in this manner, is fixed by the abutments 11 and will be insufficient to retract the latch (not shown) controlled by the

3

lock. It will be understood that the grooves 10, while being wide enough to be penetrated by the points 4, must have a width less than the diameter of bore 2a so that the disks 3 will be unable to enter them after insertion of the key 8 has enabled an authorized person to displace the barrel 5 from its normal position.

Fig. 6 shows a modified barrel 5' whereon the grooves 10 have been replaced by a pair of longitudinal recesses or grooves 10' extending on both sides of the row of bores 2a, the points 4 of the pins 1 dropping into one or the other of these grooves when the barrel is rotated after an attempt to pick the lock. In this case it will be preferable to replace the disks 3 with balls 3', as shown in Fig. 7, these balls by virtue of their larger diameter (equaling that of the pins) passing readily over the grooves 10' when the lock is released in the proper manner. Balls 3' may, of course, also be used with a barrel of the type shown in Fig. 5.

Fig. 8 shows the driver pin 1 of the preceding figures replaced by a plurality of larger balls 1' (two in this case) bearing upon a smaller ball 4', the latter taking the place of point 4. In this case it will be necessary to make the depth of grooves 10, or 10', slightly greater than the radius of the smaller ball 4' (to prevent dislodement thereof by cam action) but less than the diameter of this ball, so that the latter will effectively block rotation of the barrel when the lock is tampered with. It will also be understood that with this arrangement care must be taken to have preferably just a little more than the lower half of a ball 1' project into the channel 2a in the normal position of the tumblers 2, i. e. when the latter occupy the position shown in Fig. 1, for the purpose of effectively locking the barrel in place when the key is withdrawn. It should be noted, however, that the small ball 4', or some similar independent intermediate element of reduced diameter, may be used in conjunction with a driver pin 1 in lieu of the internal point 4 thereof.

The invention is not limited to the specific forms thereof shown and described, which have been given merely by way of illustration, but is on the contrary capable of numerous adaptations and modifications without exceeding the scope of the appended claims. Thus it will be understood, for example, that a single set of recesses 10 or a single groove 10' will suffice if some other means are provided to permit rotation of the barrel in one direction only.

We claim:

1. A lock comprising a shell, a cylindrical barrel rotatable in said shell, said barrel having a longitudinal slot adapted to receive a key, a set of radial bores in said barrel communicating with said slot, a set of radial bores in said shell, the bores of said two sets being aligned in a predetermined angular position of said barrel and forming a set of channels of constant diameter, an elongated tumbler element in the part of each channel adjacent said slot, spring means in the part of each channel remote from said slot, and locking means in each channel positioned between said tumbler element and said spring means and urged by said spring means toward said slot, each of said locking means including a driver element nearest said spring means, a spacer element nearest said tumbler element, said driver element and said spacer element fitting closely inside said channel, and an intermediate element of reduced section between said driver element and said spacer element, said spacer element be-

4

ing independent of said tumbler element and of said intermediate and driver elements, said barrel being provided with recesses angularly displaced from the bores thereof and adapted to receive said intermediate elements, said recesses limiting rotation of said barrel relative to said shell by co-operation with said intermediate elements upon partial displacement of said tumbler elements against the action of said spring means by introduction into said slot of an instrument other than a mating key, said spacer elements being large enough to pass over said recesses without substantial hindrance upon rotation of said barrel following insertion of the proper key.

2. A lock according to claim 1 wherein said recesses extend circumferentially on either side of the bores of said barrel.

3. A lock according to claim 2 wherein said recesses gradually deepen with increasing distance from the bores of said barrel.

4. A lock according to claim 1 wherein said spacer member is a disk.

5. A lock according to claim 1 wherein said spacer member is a ball.

6. A lock according to claim 1 wherein said intermediate element is a ball having a diameter greater and a radius less than the depth of said recesses at a point remotest from the bores of said barrel.

7. A lock according to claim 6 wherein said ball is independent of said driver element.

8. A lock according to claim 7 wherein said driver element comprises a ball of larger diameter than said intermediate element.

9. A lock according to claim 1 wherein said intermediate element is independent of said driver element, the length of said intermediate element being greater than the depth of said recesses at a point remotest from the bores of said barrel.

10. In a lock comprising a shell and a cylindrical barrel in said shell, said barrel having a longitudinal slot adapted to receive a key and further having a first radial bore communicating with said slot, said shell having a second radial bore of the same diameter as said first bore and aligned therewith in a predetermined angular position of said barrel, thereby forming a continuous channel therewith, the combination, with a tumbler pin in the part of said channel adjacent said slot, of locking means in the part of said channel remote from said slot and spring means urging said locking means into contact with said tumbler pin and the latter toward said slot, said locking means including a driver element nearest said spring means, a spacer element nearest said tumbler pin, said driver element and said spacer element fitting closely inside said channel, and an intermediate element of reduced section between said driver element and said spacer element, said spacer element being independent of said tumbler pin and of said intermediate and driver elements, said barrel being recessed adjacent said first bore, thereby forming an abutment angularly displaced from said first bore and adapted to limit rotation of said barrel relative to said shell by engagement of said intermediate element upon a relatively short displacement of said tumbler pin against the action of said spring means, said spacer element being large enough to pass over said recess without substantial hindrance upon a relatively large displacement of said tumbler pin sufficient to position the outer end of the latter flush with the periphery of said barrel.

5

11. A lock according to claim 10 wherein said recess extends circumferentially of said barrel and gradually deepens on passing from said first bore toward said abutment.

12. A lock according to claim 10 wherein said intermediate element is independent of said driver element, the length of said intermediate element being greater than the depth of said recess adjacent said abutment.

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6

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