Feb. 12, 1935. W. J. McCORMAC 1,990,794

LOCK

Filed Jan. 31, 1933

Fig. 1.

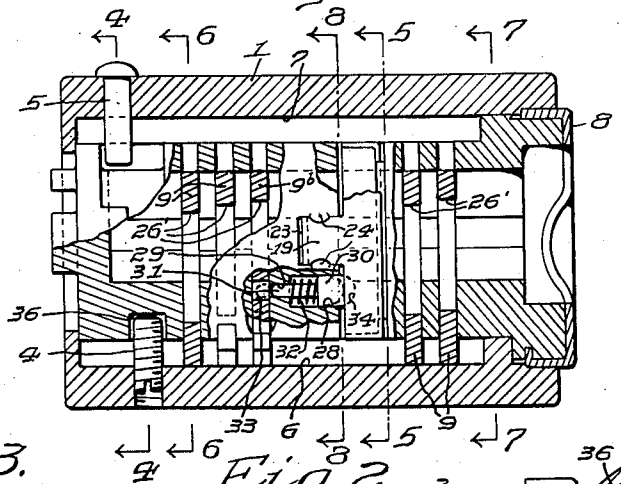


Fig. 4.

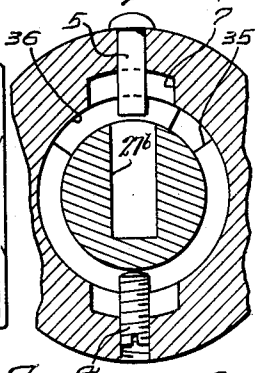


Fig. 3.

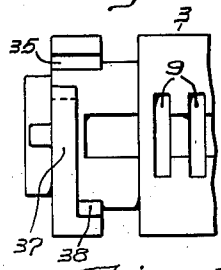


Fig. 2.

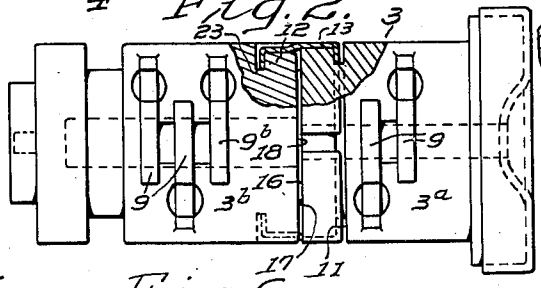


Fig. 5.

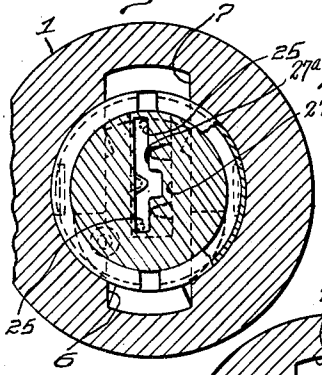


Fig. 6.

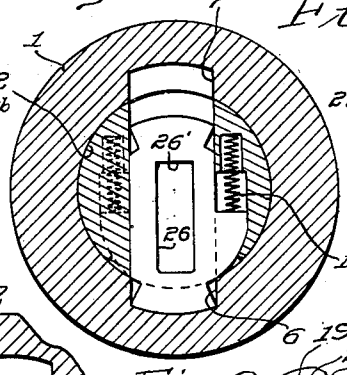


Fig. 7.

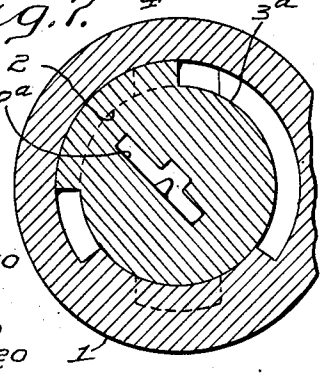


Fig. 8.

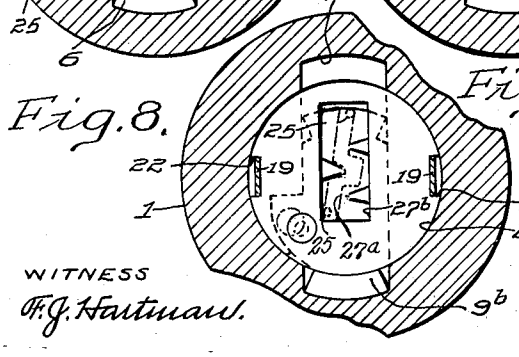
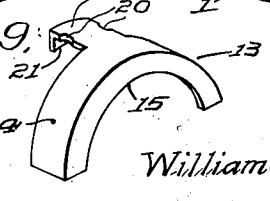


Fig. 9.



WITNESS

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UNITED STATES PATENT OFFICE

1,990,794

LOCK

William J. McCormac, Philadelphia, Pa.

Application January 31, 1933, Serial No. 654,369

10 Claims. (Cl. 70—46)

This invention relates to the construction of locks, and more particularly to the type known as slide tumbler locks, wherein are mounted a series of tumblers retracted into the cylinder upon the insertion of the key and projecting from the cylinder into a locking groove in the enclosing casing when the key is withdrawn and the cylinder is in locking position.

This type of lock is ordinarily employed for holding inoperative the ignition system of an automobile, but my invention is not particularly limited to that field for it is adaptable to this type of lock when used for locking doors or any other device to which such locks are adapted to be used.

In locks of this type as usually constructed, the lock barrel must be turned to the locked position to enable the owner to withdraw the key. In general, my improved lock may be and preferably is constructed to operate in like manner. It may be used to prevent the theft or unauthorized use of an automobile whether it be attached to the ignition system, the gear shifting lever, the brake lever or clutch, or the door of a closed car.

In general, the operation of my lock is preferably like that of locks of this type now on the market, that is to say, when the key is withdrawn from the tumbler cylinder, the lock is in locked position. When the key is inserted and the tumblers are thereby withdrawn from the locking slot in the casing, the axial rotation of the cylinder in one direction, e. g., to the right or clockwise, is effective to close an ignition circuit, and when the cylinder is rotated in the other direction, e. g., counterclockwise, to the limit of its movement, it permits of the withdrawal of the tumbler cylinder bodily from the casing, upon the removal of a retaining screw.

It is therefore one of the objects of this invention to provide a tumbler cylinder which may be operated in the conventional way for controlling the circuit of an automobile and which may be substituted in old locks for the tumbler cylinders with which they may have been equipped, so that my tumbler cylinder may be manufactured and sold as a unit and readily installed in existing equipment.

But heretofore all the locks of this sliding tumbler type have been ineffective to prevent the picking of the lock and the theft or unauthorized use of automobiles. They offer practically no protection against the professional thief or lock picker. These experts, with a piece of stiff wire, bent to the shape of a hairpin or with a tool comprising a ring with a radial handle and two stiff wire pins projecting outwardly from the face of the ring, as do the prongs of a spanner, insert such prongs into the opposite ends of the key slot of the barrel and apply a gentle pressure tending to rotate the barrel from locked to unlocked positions and consequently from open circuit to closed circuit position.

Pressure having thus been applied to the tumbler cylinder, the expert inserts a thin piece of stiff metal or a small rod with an upturned end and successively slides the tumblers from locked to unlocked position, that is, he presses the projecting ends of them back into the tumbler cylinder, and the slight pressure exerted on the end of the spanner-like tool causes the ends of the tumblers to bear against the wall of the locking slot with so much friction that the light springs, tending to thrust the tumblers outwardly, are unable to overcome it. Thus it is that with great ease and rapidity and with these simple tools and by suitable manipulations, all these locks heretofore used and of this type for the purpose of protecting an automobile, have been ineffectual. They can be picked in this way in a comparatively few minutes.

A further and more important object of my invention is therefore to provide a lock which cannot be picked in the manner above described or, for that matter, in any way without a key, that has yet been discovered.

A further object of this invention is to provide a lock of the type above described with a tumbler cylinder comprising two independently rotatable alined parts or sections, whereby even if the tumblers in the exposed end of the cylinder, where the key is inserted, are lifted by a lock picking tool, in the manner above described and the exposed end of the cylinder is slightly rotated, the rotation of the said part prevents a similar manipulation of the tumblers in the second or rear section of the cylinder and prevents access to that end for turning it.

A further object of this invention is to make the tumbler cylinder in two independently rotatable parts or sections whereby a slight rotation of the exposed forward end alone, effects a positive locking of one or more of the tumblers in the second or rear section of the cylinder by inserting a pin in the rear section through one or more of the tumblers of the second or rear section, thereby making it impossible to lift the tumblers out of the locking groove by inserting a wire or a stiff

flat strip of metal or to apply a pressure to the rear part tending to rotate it.

A further object of my invention is to make a tumbler cylinder of the characteristics above described and attributed thereto without making the structure substantially more complex or with a substantially greater number of parts than are present in existing tumbler cylinders thereby making it possible to produce tumbler cylinder units embodying my invention without substantial increase in the cost of manufacturing.

Other objects of my invention will appear in the specification and claims below.

In the drawing forming a part of this specification and in which the same reference characters are employed throughout the various views to designate the same parts,

Fig. 1, is, in general, a vertical longitudinal section through the axis of my improved tumbler cylinder, the same being shown as mounted within a substantially cylindrical casing in which the cylinder may be rotated on its axis by insertion of a key therein.

Fig. 2 is a plan view of the tumbler cylinder shown in Fig. 1 removed from the casing.

Fig. 3 is a fragmentary plan view of the underside of the rear end of the cylinder shown in Fig. 2.

Fig. 4 is a transverse vertical section on the line 4—4 of Fig. 1.

Fig. 5 is a similar cross-sectional view on the line 5—5 of Fig. 1.

Fig. 6 is a similar vertical cross-sectional view taken on the line 6—6 of Fig. 1.

Fig. 7 is a like sectional view taken on the line 7—7 on Fig. 1.

Fig. 8 is a similar vertical sectional view on the line 8—8 of Fig. 1; and

Fig. 9 is a perspective view of one of the coupling members.

In Figs. 5 and 8 is indicated how a pair of spaced pins inserted into the keyhole for the purpose of applying rotative pressure to the exposed end of the cylinder is not effective to apply said pressure to the rear section of the tumbler cylinder.

In Fig. 1 is shown in a conventional way, a lock casing 1 provided with a cylindrical bearing 2 in which the outer cylindrical surface of the tumbler cylinder 3 fits and is rotatable in the conventional manner, the casing being provided with a removable screw 4 and an irremovable stud 5, the latter being operative to positively prevent a removal of the tumbler cylinder 3 from the casing except upon the withdrawal of the tumblers into the tumbler cylinder and the rotation of the tumbler cylinder to a predetermined position referred to again below.

The casing 1 is also provided with longitudinally extending slots 6 and 7 diametrically opposite, into the former (6) of which the plungers are seated when the lock is locked and into the latter of which (7) the tumblers may project and reciprocate as a key is inserted or withdrawn from the tumbler cylinder.

When the lock is one from which the key, once inserted, cannot be withdrawn, except when the tumbler barrel is in locked position, these two grooves 6—7 are all the longitudinal grooves required, but this invention is not to be construed as limited to a lock operable in this manner unless so limited in the claims.

The exposed end of the cylinder may be provided with the usual hardened steel cap 8 having the usual slot therethrough of the shape shown in Fig. 7 for the insertion of a key. In this way the exposed end of the cylinder does not afford any extensive surface to which could be attached such a sturdy twisting tool, such as a Stillson wrench, in an attempt to shear the tumblers. The said end is smooth and may be flush with the end of the casing 1.

In the drawing I have indicated the tumbler cylinder as provided with four tumblers 9 and one tumbler 9^b, all of which may be of the usual construction except the tumbler 9^b as will be referred to again below. Each tumbler is provided with a light spring 10 tending to force the ends of the tumblers outwardly from the tumbler cylinder for engagement with the locking slot 6.

My invention therefore resides more particularly in the tumbler cylinder 3 which I construct in two parts, viz., the forward part or section 3^a and the rear part or section 3^b in each of which are mounted any suitable number of tumblers 9. The body portions of these sections 3^a and 3^b are, generally speaking, of the same diameter and fit within the cylindrical bearing 2 of the casing 1. The rear end of the forward section 3^a is provided with a narrow circumferential channel 11 and between said channel 11 and the rear end of said section, the diameter of the flange 12 so formed is slightly reduced. Around this flange 12 I fit two like coupling members 13, each having a substantially cylindrical section 14 fitting against the outer cylindrical surface of the flange 12 and having a flange 15 fitting into the groove or channel 11. These two coupling members 13 are diametrically oppositely positioned on the flange 12 with the flanges 15 fitting into channels 11 and providing a narrow space 16 between the rear end 17 of the cylinder section 3^a and the front end 18 of the rear cylinder section 3^b.

These coupling members are of preferably thin sheet metal and from the cylindrical section of each extends rearwardly a tongue 19 the sides of which may have recesses 20. The tongues 19 terminate each in a downturned flange 21.

The forward end of the rear section 3^b is preferably provided with diametrically disposed channels 22 extending longitudinally from the front face 18 of the rear section 3^b and these channels terminate in inwardly extending recesses 23 as clearly appears from Figs. 1 and 2.

It will thus be seen that when the coupling members 13 have been placed over the flange 12 to substantially enclose the flange the tongue 19 may be fitted into the channel or recess 20 of the rear member 3^b and the downturned ends 21 fitted into the recesses 23. To permanently assemble the parts in this relationship, the metal of the rear member 3^b adjacent the side recess 20 in the tongues 19 may be expanded by a suitable blow to form locking tongues 24 substantially fitting the contour of the side recess 20 and the parts are thus permanently secured together in unitary relationship. The unit as a whole forms the tumbler cylinder 3 for insertion into the casing 1 fitting into the cylindrical bearings 2 thereof.

With a tumbler casing 3 consisting of the two parts 3^a and 3^b thus connected together by the coupling members 13, I have thus provided a lock which is practically unpickable, for were two stiff wires to be inserted in the forward end of the key-slot 27^a of the forward member 3^a at 25 and the tumblers 9 in the section 3^a lifted, as above described, to bring the ends of the tumblers into registration with the circumferential surface of the section 3^a, this forward section 3^a might indeed be then rotated clockwise, or anticlockwise for that matter, depending upon the direction of the pressure exerted on the wires at 25

but without imparting any rotative movement to the rear end 3^b of the tumbler cylinder, and it is the rotation of the rear end which controls the locking bolt, the electric switch, or whatever other member that is controlled by the lock thereby. But such rotation of the forward portion 3^a of the tumbler cylinder cuts off access to the forward end of the rear section 3^b. It is practically impossible to insert a tool, like the wires 25, through the section 3^a, with the openings 26 through the tumblers 9 in different positions, as they are in these locks, to bring the ends of a stiff wire into operative engagement with the forward end of the key opening 27^b through the rear section 3^b. Because the opening 27^b in the rear section 3^b is wider than the opening 27^a in the forward section 3^a, a wire long enough to reach to the forward end 18 of the rear section 3^b would not contact with the wall of the slot 27^b to exert any substantial rotative pressure on the member 3^b. The wires at 25 would only engage the wall of the slot 27^b after the forward section 3^a has been rotated through a substantial angle with respect to the rear section 3^b as is clearly shown in Fig. 8.

I have, however, provided an additional mechanism in the rear section 3^b and operative, upon the slightest rotative movement of the portion 3^a with respect to the part 3^b to effect a positive locking of the forward tumbler 9^b of the tumblers in the rear section 3^b of the tumbler cylinder 3. In the forward face 13 of the rear section 3^b I provide a smaller cylindrical recess 28 extending parallel to the axis of the cylinder 3 at the bottom of which is a coaxial smaller hole 29 extending through the member 3^b to the slot in which the plunger 9^b slides. In these holes 28 and 29 I mount a plunger head 30 having a plunger stem extending rearwardly from the plunger head 30 and fitting the smaller hole 29, a light coiled spring 32 being in the hole 28 and surrounding the stem 31. I also provide the tumbler 9^b with a hole 33 of substantially the same diameter as the hole 29 and in alinement therewith when the tumbler 9^b is in locking position as shown in Figs. 5 and 8.

In the flat rear face of the forward member or portion 3^a of the tumbler cylinder, I provide a recess 34 having a substantially spherical surface in alinement with the outer substantially spherical surface 30' of the plunger 30 when the tumblers 9 and 9^b of both sections are seated in the locking groove or slot 6 as shown in Fig. 1. In this position, a proper key can be inserted into the keyhole 27^a—27^b through both sections 3^a and 3^b, and the key will lift all the tumblers out of the locking groove or slot and the cylinder will be free to rotate.

If, however, one undertook to pick the forward end section 3^a and even succeeded in rotating the forward section 3^a, the slightest rotation of the forward section will move the recess 34 out of registration with the plunger 30 thereby depressing it into the rear section 3^b against the tension of the spring 32, and the stem 31 entering the recess or hole 33 in the tumbler 9^b irremovably locks it so that it cannot be moved or withdrawn from its locking slot 6 no matter how much pressure may be applied against the surface 26' of the opening 26 in the tumbler 9^b by any instrument inserted through the openings 26 in the tumblers 9 of the forward section 3^a. It will be consequently impossible to rotate the rear section 3^b to open or close the circuit which may be controlled by the rear section 3^b.

In order that the construction illustrated in the drawing may be fully understood, I will briefly describe the manner of assembling the tumbler cylinder 3 within the casing 1.

A key having been inserted in the keyways 27^a—27^b to retract all the tumblers to a position wherein they are withdrawn flush with or below the outer cylindrical surface of the tumbler plunger, the tumbler cylinder, in substantially the position shown in Fig. 7, is inserted into the forward open end of the casing 1, for in that position the slot 35 at the rear end of the rear section will be in registration with the irremovable stud 5 thus permitting the cylinder to move to the position shown in Fig. 1. Thereupon the removable screw 4 may be inserted to project into the circumferential channel 36 also near the inner or rear end of the rear section 3^b. So assembled, the end of the stud 5 will be behind the flange 37 as shown in Fig. 3 except when the cylinder 3 is turned to the limit of its anti-clockwise movement with the stud 5 abutting against the shoulder 38.

From the foregoing it will now be apparent that I have provided a lock which, so far as has yet been discovered, cannot be unlocked except by the insertion of a proper key. If one undertakes to and succeeds in picking the tumblers of the forward section 3^a and rotating it, the rotation of that forward section with a smaller keyhole slot 27^a therethrough practically blocks access to the wider keyhole in the rear section 27^b in the rear section 3^b as the position of the two parts of the keyhole, as shown in Fig. 8, plainly demonstrate. It is substantially impossible to insert the prongs 25 so far through the key-slot 27^a and the key-slot 27^b to effect any rotative pressure against the walls of the keyhole or slot 27^b.

Moreover, as is usual in these locks, the openings 26 through the tumblers are disposed at different distances longitudinally of the tumblers and the tumblers 9 in the forward end or section 3^a of the cylinder will be in a position to interfere with the insertion of a wire or prong through the forward section 3^a to the forward end of the rear section 3^b. Thus it is my improved lock is practically unpickable even when the little locking bolt 30 is not employed, but I prefer to employ this locking bolt or plunger 30 because of the added security afforded by the positive locking of the tumbler 9^b to the rear section 3^b of the cylinder.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. In a locking element, the combination of a plurality of cylindrical sections in axial alinement and in end to end contact with each other, a lockable tumbler in one of said sections, and means, actuated by the rotation of one section with respect to the other section to lock said tumbler rigid with respect to the section in which it is mounted.

2. In a locking element, the combination of a cylinder having a plurality of cylindrical sections, tumblers in said sections, slidable in said sections, means for locking one or more of said tumblers against sliding movement, said locking means being operative upon the relative movement of one of said sections with respect to the other section.

3. In a tumbler cylinder lock, the combination of a casing, a tumbler cylinder and means to retain said cylinder within said casing, said

cylinder comprising a forward section, a rear section, tumblers in said sections, and means connecting the adjacent ends of said sections providing for the independent free rotation of said sections about a common axis when the sections are unlocked from said casing, and means to positively lock a tumbler of the rear section rigidly with respect to its section when said forward section is rotated in said casing with respect to said rear section.

4. In a tumbler cylinder lock, the combination of a casing, a tumbler cylinder and means to retain said cylinder within said casing, said cylinder comprising a forward section, a rear section, key controlled tumblers in said sections, means connecting the adjacent ends of said sections for the independent free rotation of said sections about a common axis, and means to positively lock a tumbler of the rear section rigidly with respect to said section when said forward section is rotated in said casing, independently with respect to said rear section, said means comprising a bolt mounted in the rear section and slidable longitudinally thereof and spring-pressed outwardly from the front end of said section against the rear end of said forward section, the rear end of the forward section being provided with a recess in which the head of said bolt rests when the tumblers of both sections are locked to said casing, the rotation of said forward section with respect to said rear section being operative to force the head of said bolt out of said recess and the bolt itself rearwardly and into positive locking engagement with a tumbler in said rear section.

5. In a tumbler cylinder lock, the combination of a casing, a tumbler cylinder and means to retain the cylinder within said casing, said cylinder comprising a forward section, a rear section and tumblers normally projecting from said sections, means connecting the adjacent ends of said sections and providing for the independent free rotation of said sections about a common axis when said sections are unlocked from said casing, and means to positively lock a tumbler projecting from the rear section rigidly with respect to its section when said forward section is rotated with respect to said rear section.

6. In a tumbler cylinder lock, the combination with a casing, a tumbler cylinder and means to retain said cylinder within said casing, said cylinder comprising a forward section, a rear section and tumblers in said sections, said sections being axially alined and substantially in abutting relationship and provided with alined slots extending through said sections and providing a keyway, the slot in the rear section being substantially wider than that in the forward section, whereby, except by the insertion of a proper key, pressure cannot be applied through the slot in the forward section to the side wall of the slot in the second section until the forward section shall have been first rotated substantially with respect to said second section.

7. In a tumbler cylinder lock, the combination with a casing, a tumbler cylinder and means to retain the said cylinder within said casing, said cylinder comprising a forward section and a rear section, tumblers in said sections and means connecting the adjacent ends of said sections for the independent rotation of said sections with respect to each other about a common axis when said sections are unlocked, said sections being provided with alined slots extending through said sections and providing a keyway, the slots in the rear being wider than that in the forward section, whereby, except by the insertion of a proper key, pressure cannot be applied through said slot in the forward section to the side wall of the slot in the rear section until the forward section shall have been unlocked and substantially rotated with respect to said second section.

8. A locking element comprising in combination a pair of relatively rotatable, alined, substantially abutting cylindrical sections having tumblers therein, and means for positively locking a tumbler of one section rigid with respect to the section in which it is mounted, upon the rotation of the other of said sections with respect thereto.

9. In a tumbler cylinder lock, the combination of a pair of cylindrical sections axially alined and rotatable with respect to each other and tumblers in said sections, said sections being provided with alined keyhole slots extending parallel to the axes thereof for receiving a key which, when inserted therein, holds said sections against rotation with respect to each other and holds the tumblers in retracted position, the side walls of the keyhole slot in the rear section being spaced further apart from each other than are the side walls of the keyhole slot in the forward section.

10. In a locking element, the combination of a casing, a cylinder mounted in said casing and having cylindrical sections axially alined and arranged so as to permit rotation thereof with respect to each other, alined keyhole slots in said sections for receiving a key, which, when inserted therein, holds the sections against relative movement, the side walls of the keyhole slot in the rear section being spaced further apart from each other than are the side walls of the said slot in the forward section, and tumblers in said section for holding said sections against rotation with respect to said casing, said key, when inserted being operative to retract said tumblers to permit of the simultaneous rotation of said section with respect to said casing, and lugs projecting inwardly from the side walls of the wide slot in the rear section to contact with opposite sides of said key when inserted in said keyhole slot.

WILLIAM J. McCORMAC.