March 1, 1927. 1,619,252

H. F. GEORGE

TUMBLER LOCK

Filed Dec. 12, 1921

Fig. 1.

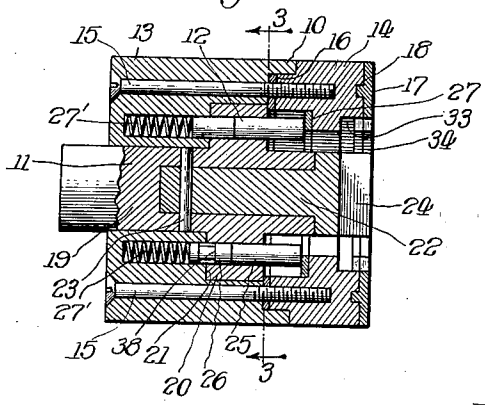


Fig. 2.

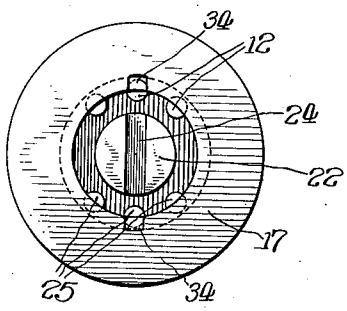


Fig. 3.

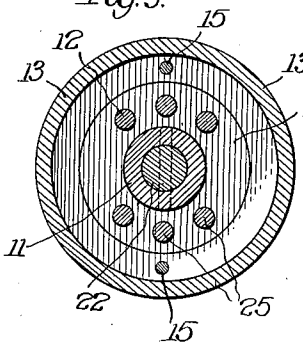


Fig. 4.

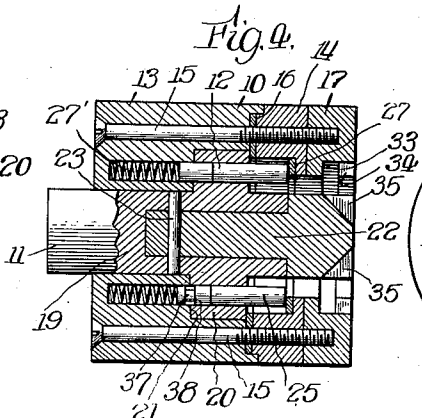


Fig. 5.

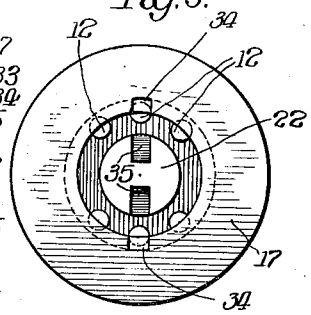


Fig. 9.

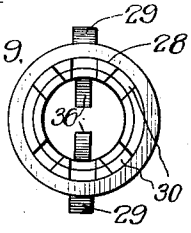


Fig. 10.

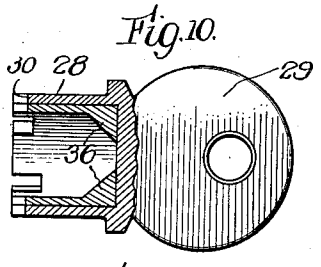


Fig. 6.

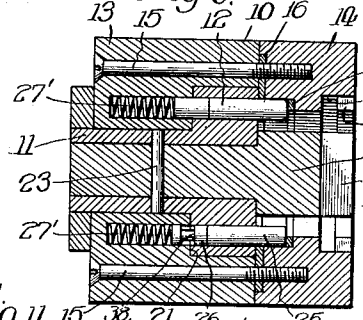


Fig. 7.

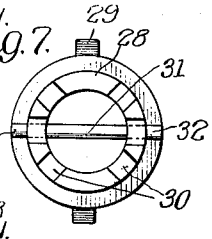


Fig. 8.

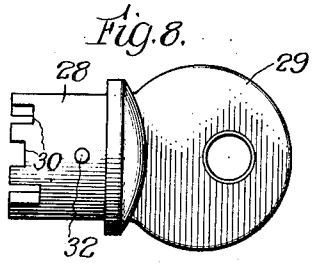


Fig. 11.



Fig. 12.

Fig. 13.



Fig. 14.

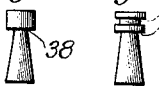


Fig. 15.



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UNITED STATES PATENT OFFICE.

HARRY F. GEORGE, OF CHICAGO, ILLINOIS.

TUMBLER LOCK.

Application filed December 12, 1921. Serial No. 521,607.

The present invention relates to tumbler locks.

An object of the present invention is to provide a lock which is very difficult to pick and which presents a great deal of difficulty to any thief who attempts to open the lock by drilling into same.

A further object is to provide a lock having tumblers of the plunger type which are arranged in parallel relation with one another, said tumblers being so mounted that an unauthorized operation thereof is rendered very difficult.

A further object is to provide an armored lock which will effectually baffle thieves and which is protected against corrosion.

Further objects will appear as the description proceeds.

Referring to the drawings,

Figure 1 is a longitudinal sectional view illustrating one embodiment of the present invention;

Figure 2 is an end elevation looking at the front end of the mechanism shown in Figure 1;

Figure 3 is a sectional view taken along the line 3—3 of Figure 1;

Figure 4 and Figure 5 are longitudinal sectional and end elevational views respectively of a slightly modified embodiment of the present invention;

Figure 6 is a longitudinal sectional view of another modification;

Figure 7 and Figure 8 are end and side views respectively of a key for co-operation with a lock according to the present invention;

Figures 9 and 10 are end elevational and sectional elevational views respectively of a modified type of key;

Figures 11 to 15 inclusive are views of various forms of tumbler pins which may be used.

Referring first to the Figures 1, 2 and 3, a lock is provided made up of three essential elements, to wit: a barrel 10, a plug 11, and tumblers 12—12. As indicated in Figure 1, the barrel 10 comprises the cylindrical member 13 of non-rusting material such as brass, and the cylindrical member 14 of hardened steel, which members may be securely held together in axial alignment by means of screws 15—15. Placed between the shells 14 and 15 is the washer 16, which may be of brass or other non-rusting material, which washer 16, as will hereinafter appear, provides a bearing for the brass portion of the plug 11. An annular collar 17 is provided for the front end of the shell 14, having a tongue 18 pressed into a corresponding groove in the shell 14, whereby to hold the collar 17 securely in place.

The plug 11 consists of a member 19, which may be of brass and which should have a running fit with the shell 13. Said member 19 will have an annular shoulder 20 for abutting against a shoulder 21 of the member 13. The abutting faces of shoulders 20 and 21 should lie in a plane at right angles to the axis of plug 11. The annular shoulder 20 will lie between and will be held against longitudinal movement by the shoulder 21 on one side and the collar 16 on the other side. Plug 11 is provided with a hardened portion 22 which is secured to the brass portion 19 by means of the pin 23, said hardened steel portion 22 being protected at its outer end by an end member 24 of brass or other non-rusting material.

The tumblers above referred to are mounted in the annular shoulder 20 of the plug 11 and the shoulder 21 of the member 13 of the barrel. Each of said tumblers comprises a plunger 25 and a plunger 26, which are placed end for end and which are urged toward the front of the lock by means of a spring 27′. The front end of each of the plungers 25 abuts against the brass washer 27, which is mounted in the hardened steel shell 14. As shown in Figure 1, the tumblers 12—12 have their axes in parallel relation with one another and with the axis of plug 11. The rear ends of each of the plungers 25—25 should be a plane surface normal to the axis of said plunger 25, whereby the inner ends of all of said plungers 25—25 may be moved to a position lying in the plane of the front side of the shoulder 21.

For the purpose of manipulating the plungers 25—25, a key, such as illustrated in Figures 7 and 8, may be used. Said key comprises a cylindrical portion 28 and grip portion 29. The inner end of the cylindrical portion 28 is provided with a plurality of serrations having seats 30—30 of different depths. The inner end of the cylindrical portion 28 may lie in a plane normal to the axis of said key whereby said inner end of the cylindrical portion 28 may ride against the front side of the annular shoulder 20,

limiting the inward movement of the key. The seats 30—30 will engage the plungers 25—25 to move same inwardly when the key is being inserted. The serrations providing the seats 30—30 will be so designed that when the key is in its home position, the plungers 25—25 will all lie with their inner ends in the plane of the rear face of shoulder 20, which is substantially the same as the front face of shoulder 21. At this time the plug 11 may be turned within the barrel 10. For this purpose the key is provided with a diametrically placed operating pin 31 which is adapted to ride in the slot 32 at the outer end of the plug 11, which pin 31 has diametrically extending ends 32—32 adapted to ride in an undercut groove 33 in the shell 14. The diametrically placed slots 34—34 will permit entrance of the ends 32—32 of the operating pin 31.

Each key will, of course, be designed with reference to the particular design of tumblers 12 with which said key is meant to co-operate. If preferred, the tumblers on one side of the diameter marked by the slots 34—34 may be symmetrical with the plungers located on the other side of said diameter. Correspondingly, the serrations of the key will be symmetrical. By this expedient the key may be removed at the end of any half turn and may be replaced without requiring any great care on the part of the operator as to which end 32 he shall put in either slot 34.

Referring now to Figures 4 and 5, the structure disclosed therein is fundamentally the same as that disclosed in Figures 1, 2 and 3. The shape of the outer end of the plug 19 differs, however, from that shown in the first three figures, in that said plug, instead of having a transverse slot for receiving the key as illustrated in Figures 1 and 2, has a pair of notches 35—35. The key for co-operating with the plug shown in Figures 4 and 5 is illustrated in Figures 9 and 10. The cylindrical portion 28 of said key has mounted therein a pair of fins 36—36, which correspond with the notches 35—35. The manner in which the key illustrated in Figures 9 and 10 co-operates with the plug as shown in Figures 4 and 5 will be apparent from the drawing. The notched plug illustrated in Figures 4 and 5 has the advantage over the slotted plug shown in Figures 2 and 3 in that there is no chance that a thief will attempt to turn the plug by inserting a screw-driver and attempt to operate the lock by applying considerable force thereto. Obviously such a procedure would not result in opening the lock, but might result in marring the end of the plug, particularly the brass end member thereof.

Figure 6 discloses a modification of the locks illustrated in Figures 4 and 5 in which the brass collar 17 for the end of the barrel and the brass member 24 for the end of the plug are dispensed with.

Each of the modifications contemplates the protection of bearing surfaces against rust, that is to say, the bearing surface of the shoulder 20 of the plug 19 co-operates with the brass washer 16, whereby there will be no tendency for the lock to stick, due to rust. Similarly, the plungers 12—12 co-operate with the washer 27, whereby there will be no sticking due to rust.

The invention contemplates the use of plungers of a type which will baffle thieves who may attempt to pick the lock. For this purpose certain of the plungers 26 may be provided with a groove 37 providing an abrupt shoulder 38. If an attempt is made to pick the lock by exerting a turning force on the plug while the plungers are manipulated longitudinally for the purpose of so locating them that the front ends of said plungers 26 will lie in the plane of the rear face of shoulder 21, such attempt will fail for the reason that the abrupt shoulder 38 of the groove 37 will hook over the adjacent parts of the shell 13, whereby said plunger may not be moved to its proper position while pressure is thus being exerted upon the plug. It will therefore be very difficult for a thief to move the plungers to the proper position for opening by any such method of procedure. In order that the plug may be held in its proper position relative to the barrel under normal conditions, one or more of the plungers should be without the groove 37. Such straight pins, such as illustrated in the upper half of Figure 1 and the upper half of Figure 4, will hold the plug in proper relation with the remainder of the lock, whereby, when the proper key is inserted, there will be no tendency for the shoulders 38 to hook over the shoulder 20 of the shell 13. After the plungers have all been moved to the proper position, a turning movement on the key will result in turning the plug for operating the lock.

Figures 11 to 15 inclusive illustrate various types of shouldered plungers 26 which may be used. Each of said types provides a shoulder 38 which will hook over the stationary part of the barrel in case the plug is turned slightly from its normal position and the tumblers are manipulated while the turning force is being exerted.

The structure illustrated has decided advantages over many locks now known and used. The structure lends itself readily to commercial manufacture wherein accuracy of workmanship is essential. The holes in the barrel and the plug which contain the tumblers may be drilled together, whereby a high degree of accuracy may be had. In certain other types of locks as now known

and used the holes in the co-operative parts of the locks are necessarily drilled separately so that considerable tolerance must be allowed, making the lock much easier to pick. Applicant's improved lock is doubly safeguarded against picking by the type of plungers used and by the fact that the construction of the lock permits such accuracy in drilling the holes in the co-operating shoulders 20 and 21 that very small turning movement of plug 19 is permitted in the unauthorized manner referred to, so that picking of the lock is rendered very difficult.

The lock has decided advantages in view of the fact that it is armored by hardened steel protecting members, thereby resisting drilling operations. However, entirely independently of this armored feature, the improved lock, according to the present invention, resists drilling operations very effectually. If a hole should be started in line with a plunger for the purpose of removing said plunger, drilling would be rendered very difficult for the reason that the lengths of cutting area on the two sides of the slot between the plug and barrel would be unequal, whereby the drill would run off from its course. Furthermore, it is impossible to drill away the plungers by inserting a drill through the slot between the plug and the barrel, for the reason that only a very small area of the top of each tumbler is exposed, most of said area being overlapped by the hardened steel member 14 and washer 27.

Referring to the armoring features, it will be noted that the plug is composite in its nature, having hardened steel members protected by brass or other non-rusting material for preventing corrosion. The member 14 of the barrel, being composed of hardened steel, will effectually prevent drilling, while the protecting washers 16 and 27 will prevent difficulties due to sticking in case the interior of the lock should tend to rust. All the bearing parts of the lock are protected against rust or other corrosion, whereby smooth operation is assured.

The illustrated embodiments of the present invention have been described, more or less, in detail for the purpose of explaining the invention. Many modifications will occur to those skilled in the art. It is intended in this patent to cover all such modifications that fall within the scope of the invention as defined by the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A tumbler lock having a plurality of tumblers arranged parallel with one another, a barrel including an annular member of hardened steel, a rotatable plug including a protecting member of hardened steel, said barrel and said plug providing between them an annular space communicating with said tumblers, said barrel having a portion including a non-corrosive member for overlying and forming an abutment for a portion of the end of each of said tumblers.

2. A tumbler lock having an annular barrel and a rotatable plug therein, tumblers arranged in parallel relation with one another for controlling relative movement of said plug and barrel, said plug and barrel having an engaging surface lying substantially in a plane normal to the axes of said tumblers, certain of said tumblers having means for limiting movement thereof in case said tumblers are manipulated while a turning force is being applied to said plug.

3. A tumbler lock having an annular barrel and a rotatable plug therein, tumblers arranged in parallel relation with one another for controlling relative movement of said plug and barrel, said plug and barrel having an engaging surface lying substantially in a plane normal to the axes of said tumblers, certain of said tumblers having means for limiting movement thereof in case said tumblers are manipulated while a turning force is being applied to said plug, certain of said tumblers having a contour to hold said plug and barrel against relative movement.

4. In combination, a tumbler lock having an annular barrel, a rotatable plug therein, tumblers for controlling relative movement between said plug and said barrel, said tumblers being arranged in parallel relation with one another, said barrel and plug providing between them an annular space communicating with an edge portion only of the end of each of said tumblers, the outer end of said plug being provided with key abutting means and a key having a cylindrical part provided with an end portion for engaging said tumblers for locating same longitudinally of their axes, said key having other means co-operating with said key abutting means for exerting turning movement on said plug.

5. In combination, a tumbler lock having an annular barrel, a rotatable plug therein, tumblers for controlling relative movement between said plug and said barrel, said tumblers being arranged in parallel relation with one another, said barrel and plug providing between them an annular space communicating with said tumblers, the outer end of said plug being provided with key abutting means and a key having a cylindrical part provided with an end portion for engaging said tumblers for locating same longitudinally of their axes, said key having other means co-operating with said key abutting means for exerting turning movement on said plug, said barrel having a portion bounding said annular space, which portion overlies part of the edge portion of the end of each of said tumblers.

6. A tumbler lock, having an annular bar-

rel and a rotatable plug therein, tumblers arranged in parallel relation with one another for controlling relative movement of said plug and barrel, said barrel and plug having an engaging surface lying substantially in a plane normal to the axes of said tumblers, said tumblers being adapted to have their extremities brought into substantial coincidence with said plane, certain of said tumblers having means for limiting movement thereof in case said tumblers are manipulated while a turning force is being applied to said plug.

7. A tumbler lock, having an annular barrel and a rotatable plug therein, tumblers arranged in parallel relation with one another for controlling relative movement of said plug and barrel, said barrel and plug having an engaging surface lying substantially in a plane normal to the axes of said tumblers, said tumblers being adapted to have their extremities brought into substantial coincidence with said plane, certain of said tumblers having means for limiting movement thereof in case said tumblers are manipulated while a turning force is being applied to said plug, certain of said tumblers having a contour to hold said plug and barrel against relative movement.

8. A tumbler lock having a barrel, a plug and tumblers arranged in parallel relation with one another for controlling relative movement between said barrel and plug, said barrel including a cylindrical member of non-rusting material and a cylindrical member of hardened steel placed in axial alignment therewith, said plug having a member of non-rusting material having an annular shoulder for receiving said tumblers, said plug having a hardened steel portion, said barrel having shouldered portions to hold said plug against endwise movement, said hardened steel cylindrical member having a non-rusting washer applied thereto to provide a bearing for said plug.

9. A tumbler lock having a barrel, a plug and tumblers arranged in parallel relation with one another for controlling relative movement between said barrel and plug, said barrel including a cylindrical member of non-rusting material and a cylindrical member of hardened steel placed in axial alignment therewith, said plug having a member of non-rusting material having an annular shoulder for receiving said tumblers, said plug having a hardened steel portion, said barrel having shouldered portions to hold said plug against endwise movement, said hardened steel cylindrical member having a non-rusting washer applied thereto to provide a bearing for said plug, said hardened steel member having a portion overlying a part of the end of each of said tumblers, said portion being provided with a non-rusting washer for providing a bearing for the ends of said tumblers.

10. A tumbler lock having a barrel, a plug and tumblers arranged in parallel relation with one another for controlling relative movement between said barrel and plug, said barrel including a cylindrical member of non-rusting material and a cylindrical member of hardened steel placed in axial alignment therewith, said plug having a member of non-rusting material having an annular shoulder for receiving said tumblers, said plug having a hardened steel portion, said barrel having shouldered portions to hold said plug against endwise movement, said hardened steel cylindrical member having a non-rusting washer applied thereto to provide a bearing for said plug, said hardened steel member having a portion overlying a part of the end of each of said tumblers, said portion being provided with a non-rusting washer for providing a bearing for the ends of said tumblers, certain of said tumblers being provided with shouldered portions for limiting movement of same in case an attempt to manipulate said tumblers is made while turning movement is being exerted on said barrel.

11. A tumbler lock having an annular barrel and a rotatable plug therein, tumblers arranged in parallel relation with one another for controlling relative movement of said plug and barrel, said barrel and plug having an engaging surface lying substantially in a plane normal to the axes of said tumblers, said tumblers being adapted to have their extremities brought into substantial coincidence with said plane, said tumblers being provided with means for limiting movement thereof in case said tumblers are manipulated while a turning force is being applied to said plug and means for holding said plug and barrel against relative movement.

12. A tumbler lock having a plurality of tumblers arranged parallel with one another, a barrel, a plug rotatable within said barrel, tumblers arranged in parallel relation with one another for controlling relative movement of said plug and barrel, said plug and barrel having an engaging surface lying substantially in a plane normal to the axes of said tumblers, said plug and barrel providing between them an annular space communicating with said tumblers, said barrel having a portion overlying all but an edge portion of the end of each of said tumblers.

13. A tumbler lock having an annular barrel and a rotatable plug therein, tumblers arranged in parallel relation with one another for controlling relative movement of said plug and barrel, said plug and barrel having an engaging surface lying substantially in a plane normal to the axes of said tumblers, certain of said tumblers having means for limiting movement thereof in case said tum-

blers are manipulated while a turning force is being applied to said plug, said barrel and plug providing between them an annular space communicating with said tumblers, said barrel having a portion overlying all but an edge portion of the end of each of said tumblers.

14. A tumbler lock having an annular barrel and a rotatable plug therein, tumblers arranged in parallel relation with one another for controlling relative movement of said plug and barrel, said plug and barrel having an engaging surface lying substantially in a plane normal to the axes of said tumblers, certain of said tumblers having means for limiting movement thereof in case said tumblers are manipulated while a turning force is being applied to said plug, certain of said tumblers having a contour to hold said plug and barrel against relative movement, said barrel and plug providing between them an annular space communicating with said tumblers, said barrel having a portion overlying all but an edge portion of the end of each of said tumblers.

15. A tumbler lock having an annular barrel and a rotatable plug therein, tumblers arranged in parallel relation with one another for controlling relative movement of said plug and barrel, said tumblers being provided with means for limiting movement thereof in case said tumblers are manipulated while a turning force is being applied to said plug and means for holding said plug and barrel against relative movement, said barrel and plug providing between them an annular space communicating with said tumblers, said barrel having a portion overlying all but an edge portion of the end of each of said tumblers.

16. A tumbler lock having a plurality of tumblers arranged parallel with one another, a barrel, a rotatable plug having its axis parallel with said tumblers, said barrel and plug having an engaging surface lying substantially in a plane normal to the axes of said tumblers, said tumblers being adapted to have their extremities brought into substantial coincidence with said plane, said barrel and plug providing between them an annular space communicating with said tumblers, said barrel having a portion overlying all but an edge portion of the end of each of said tumblers.

17. In combination, a tumbler lock having an annular barrel, a rotatable plug therein, tumblers for controlling relative movement between said plug and said barrel, said tumblers being arranged in parallel relation with one another, said barrel and plug having an engaging surface lying substantially in a plane normal to the axes of said tumblers, said tumblers being adapted to have their extremities brought into substantial coincidence with said plane, said barrel and plug providing between them an annular space communicating with said tumblers, the outer end of said plug being provided with key abutting means and a key having a cylindrical part provided with an end portion for engaging said tumblers for locating same longitudinally of their axes, said key having other means co-operating with said key abutting means for exerting turning movement on said plug, said barrel having a portion bounding said annular space, which portion overlies part of the edge portion of the end of each of said tumblers.

18. A tumbler lock having a plurality of tumblers arranged parallel with one another, a barrel, a plug rotatable within said barrel, tumblers arranged in parallel relation with one another for controlling relative movement of said plug and barrel, said plug and barrel having an engaging surface lying substantially in a plane normal to the axes of said tumblers, said tumblers being adapted to have their extremities brought into substantial coincidence with said plane, said plug and barrel providing between them an annular space communicating with said tumblers, said barrel having a portion overlying all but an edge portion of the end of each of said tumblers.

Signed at Chicago, Illinois, this 9th day of December, 1921.

HARRY F. GEORGE.