June 11, 1935. J. W. FITZ GERALD 2,004,432

LOCK

Original Filed March 12, 1934 2 Sheets-Sheet 1

Fig. 1.

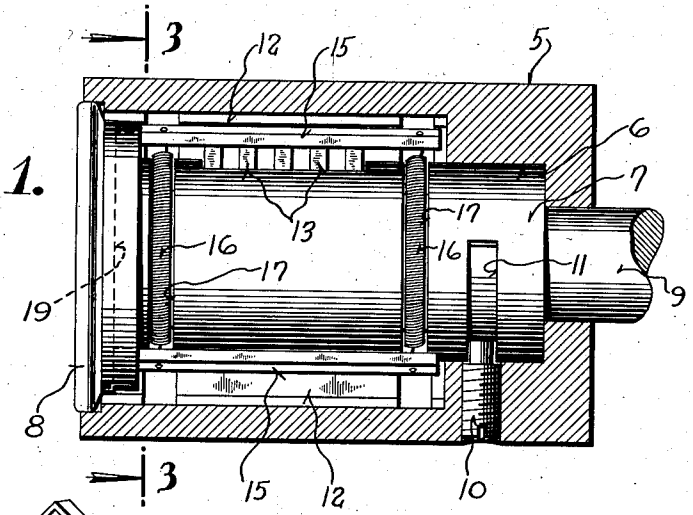


Fig. 2.

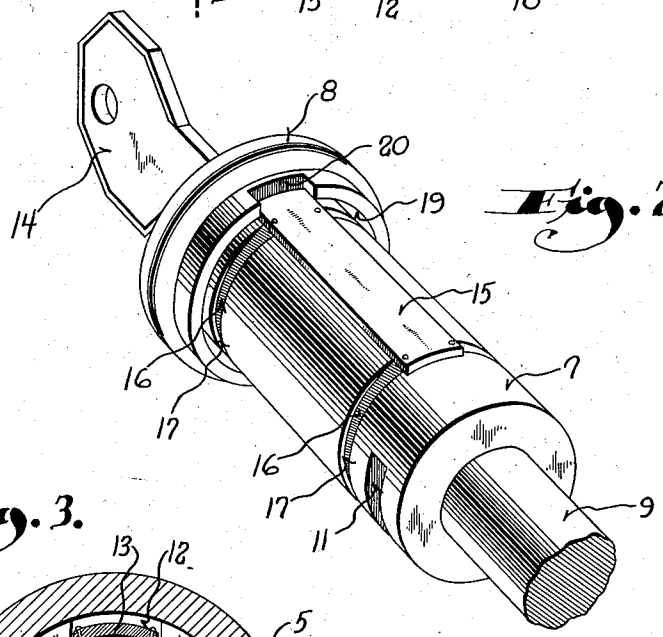
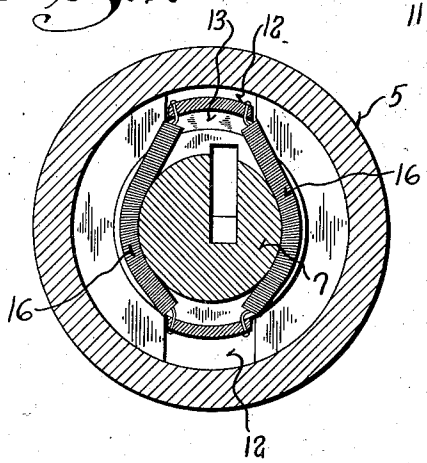


Fig. 3.



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Fig. 4.

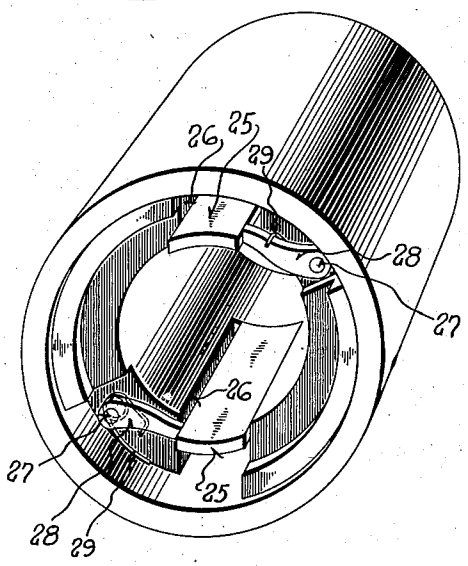


Fig. 5.

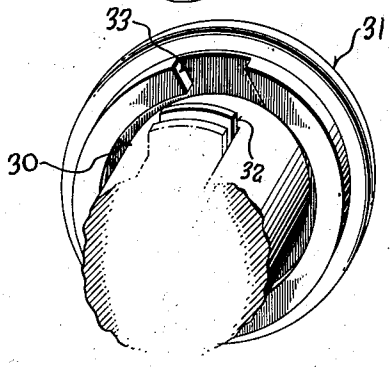


Fig. 7.

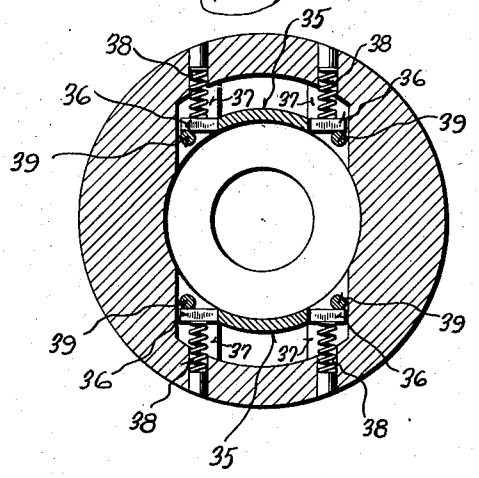
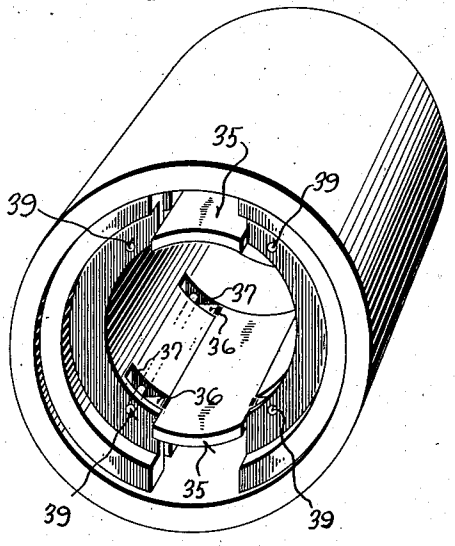


Fig. 6.



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2,004,432

UNITED STATES PATENT OFFICE

2,004,432

LOCK

John W. Fitz Gerald, Milwaukee, Wis., assignor to Briggs & Stratton Corporation, Milwaukee, Wis., a corporation of Delaware

Original application March 12, 1934, Serial No. 715,135. Divided and this application July 2, 1934, Serial No. 733,378

9 Claims. (Cl. 70—46)

This invention relates to new and useful improvements in locks and is a division of the application which resulted in Patent No. 1,965,336, issued to John W. Fitz Gerald, July 3rd, 1934.

As in the aforesaid patent, it is a general object of this invention to provide a cylinder lock having added security against picking.

More specifically it is an object of this invention to provide a lock in which the cylinder is secured against rotation by a locking member held in its operative locking position as long as any one of the regular key operable tumblers is in any but its fully retracted position.

Another object of this invention is to provide a locking member at all times operatively engaged with the casing or mounting member of the lock and movable into operative locking engagement with a portion of the cylinder by the key operable tumblers.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate several complete examples of the physical embodiment of the invention constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a longitudinal section view through a lock embodying this invention;

Figure 2 is a perspective view of the cylinder per se;

Figure 3 is a cross section view through Figure 1 on the plane of the line 3—3;

Figure 4 is a perspective view of the casing or mounting member of a modified embodiment of the invention;

Figure 5 is a perspective view showing the forward end portion of the cylinder employed with the casing shown in Figure 4;

Figure 6 is a perspective view of the casing of another modified embodiment of the invention; and

Figure 7 is a cross section view through the casing shown in Figure 6.

Referring now more particularly to the accompanying drawings in which like numerals designate like parts throughout the several views, and particularly to Figures 1 to 3 inclusive, the numeral 5 designates the mounting member or casing of a lock bored as at 6 to receive a lock cylinder 7.

The lock cylinder is equipped with the usual enlarged head 8 received in a counter bore in the casing and a stem 9 projected from its inner end to actuate lock mechanism not shown.

Any means, such as a screw 10 secured in the mounting member and extending into an arcuate groove 11 in the cylinder may be employed to hold the cylinder against endwise movement in the mounting member bore.

Communicating with the bore 6, the casing or mounting member has two diametrically opposite longitudinal grooves 12 into which the ends of the key operable tumblers 13 are projectible. The tumblers 13 are mounted in the cylinder in the conventional manner to be retractible entirely within the periphery of the cylinder by the insertion of a proper key 14. When the cylinder is in its locked position of rotation, the tumblers are spring urged into one of the longitudinal grooves 12 and as in the conventional type of cylinder lock, secure the cylinder against rotation.

To add to the security of the lock, the present invention provides additional locking members 15 in the form of longitudinal bars at all times disposed in the longitudinal grooves 12 and positioned over the ends of the tumblers when the cylinder is in its locked position of rotation so that when the key is removed and the tumblers are spring pressed to their normal positions projected into one of the grooves 12, the locking member 15 in said groove 12 will be held in the bottom of the groove by the tumblers 13.

Springs 16 having their ends attached to the locking members 15 and disposed in circumferential channels 17 in the cylinder connect the locking members and cause the same to follow the tumblers toward the cylindrical surface of the cylinders upon retraction of the tumblers by the insertion of the key 14.

The forward ends of the locking members 15 are received either in an annular channel 19 cut into the inner wall of the flanged head 8 of the cylinder or in recesses or pockets 20 communicating with the annular channel 19 and preferably extending entirely through the outer wall of the channel. As long as the forward ends of the locking members 15 are received in the annular channel 19, it follows that the locking members will not prevent rotation of the cylinder, but when the forward end of either one of the locking members is disposed in a recess or pocket 20, the locking member so positioned will

interlock the cylinder and mounting member and prevent rotation of the cylinder.

Inasmuch as the thickness of the locking members is just slightly less than the width of the annular groove 19 and as the inner wall of the groove 19 is flush with the cylindrical surface of the cylinder, it follows that the locking members must be flush against the cylindrical surface of the cylinder to completely disengage their forward ends from the recesses or pockets 20 and free the cylinder for rotation.

Consequently, as long as any one tumbler remains in its projected position or even if it is but partially projected, one of the locking members will remain in a position with its forward end portion received in a pocket or recess 20. Hence, until all of the tumblers are properly retracted as by the insertion of the proper key, the cylinder will not be free for rotation.

Picking of this lock by those methods employing friction produced on the tumblers by tortional stress on the cylinder is thus impossible in that the required frictional engagement between the tumblers and the edges of their grooves in the casing cannot be obtained through the application of tortion on the cylinder.

This fact can be further assured by having the locking members 15 of greater width than the tumblers so that a clearance exists between the sides of the tumblers and the walls of the longitudinal tumbler receiving grooves.

The modification of the invention illustrated in Figures 4 and 5 differs from that shown in Figures 1 to 3 inclusive, primarily with respect to the mounting of the locking members which in this instance are indicated by the numeral 25. Instead of being carried by the cylinder as in the embodiment described, the locking members 25, which again are in the form of bars and are received in the longitudinal tumbler receiving grooves 26 of the casing, are carried by the casing itself being pivotally mounted as at 27 by arms 28 which extend laterally from the sides of the locking members at their forward ends. Springs 29 coiled about the pivots 27 yieldably project the locking members 25 to their inoperative positions to cause them to follow the retraction of the tumblers upon insertion of a proper key.

The forward end portions of the locking members 25 like in the embodiment shown in Figures 1 to 3 inclusive, are arranged to travel in an annular groove 30 in the head 31 of the cylinder when the locking bars are in their inactive positions lying flush against the surface of the cylinder. When the tumblers 32 are projected to their operative positions, the locking members 25 are moved thereby into positions at which their forward end portions engage in recesses or pockets 33. A locking action is thus established in the same manner as that hereinbefore described.

In Figures 6 and 7, the longitudinal locking members 35 are also carried by the casing but are mounted in a slightly different manner. As here shown the locking members 35 are provided with laterally projecting arms 36 which extend into recesses 37 in communication with the bore of the casing and its tumbler receiving grooves.

Compression springs 38 bear against the outer face of these laterally extending arms 36 and yieldably urge the locking members to their inoperative positions defined by the engagement of their lateral arms with longitudinal pins 39 secured in the casing as shown.

As in the modifications earlier described, the forward ends of the locking members are adapted for interengagement with locking recesses in the head of the cylinder which interlocking engagement is released by retraction of the key operable tumblers to permit the springs 38 to act and press the locking members to their inactive positions.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art, that this invention affords a very secure manner of locking a cylinder against rotation in its casing and that picking or decoding of the lock by any known method is impossible.

What I claim as my invention is:

1. In a lock, a bored mounting member, a lock cylinder rotatable in the mounting member bore, key operable tumblers carried by the cylinder yieldably projectible into a groove in the mounting member, a locking bar disposed within the groove in the mounting member and having a part engageable with a recess in the cylinder to positively restrain rotation of the cylinder, said locking bar being projected by any tumbler toward the bottom of the groove in the mounting member in which position it engages in the cylinder recess, and spring means to move the locking bar toward the cylinder and out of engagement with the cylinder recess upon retraction of the tumblers by a proper key to free the cylinder for rotation.

2. In a lock, a bored mounting member having a longitudinal groove communicating with its bore, a lock cylinder in the bore, a plurality of key operable tumblers spring pressed to project one end thereof into said longitudinal groove, said lock cylinder having a part provided with a recess in line with the groove when the cylinder is in its locked position, a locking bar disposed in the groove and projectible into the recess in said cylinder part by the spring actuated motion of any key operable tumbler, and spring means operable upon said locking bar to cause the locking bar to follow the tumblers upon their retraction by a proper key to a position at which the locking bar is disengaged from the recess in said cylinder part.

3. In a lock, a bored mounting member having a longitudinal tumbler receiving groove communicating with its bore, a lock cylinder rotatable in the mounting member bore and having an enlarged head to close the outer end of the bore, said head having an annular groove directly adjacent the cylindrical surface of the cylinder proper and having a recess communicating with said annular groove outwardly of the groove, a locking bar disposed within the longitudinal tumbler receiving groove with one end portion arranged for disposition in the annular groove of the cylinder or the recess communicating with said annular groove, said bar being projectible by the key operable tumblers to its position engaging its end portion in the recess so as to positively secure the cylinder against rotation, and spring means to move said locking bar into engagement with the cylindrical surface of the cylinder in which position its said end is received in the annular groove of the cylinder so that the cylinder is free for rotation.

4. In a lock, a bored mounting member, a lock cylinder rotatable in the mounting member bore, key operable tumblers carried by the cylinder and yieldably projectible from the cylinder, a locking bar overlying the ends of the tumblers to be projected thereby into a position having locking engagement with the cylinder and mounting

member to positively restrain rotation of the cylinder, and spring means to cause the locking bar to follow the tumblers upon their retraction within the cylinder to move the locking bar out of its position having interlocking engagement with the cylinder and mounting member and thereby free the cylinder for rotation.

5. In a lock, a bored mounting member having a longitudinal groove communicating with its bore, a lock cylinder in the mounting member bore, an enlarged head on the cylinder having an annular channel and a recess communicating therewith, key operable locking tumblers carried by the cylinder and yieldably urged to an operative position projecting from the cylinder into said longitudinal groove, and a locking member disposed in said longitudinal groove with an end portion thereof received either in said annular channel or the recess in the cylinder head, said locking member being movable by the outward projection of the key operable tumblers to move its end portion from the annular channel into said recess.

6. In a lock of the character described, a bored mounting member having a longitudinal groove communicating with its bore, a lock cylinder in the mounting member bore, key operable tumblers carried by the cylinder yieldably projected therefrom to engage in said longitudinal groove, a locking member at all times disposed in said longitudinal groove and movable by the yieldable projection of the tumblers toward the bottom of the groove, and an enlarged head on the cylinder having an annular channel and a recess communicating therewith to receive an end portion of the locking member, said channel and recess being so located that the end portion of the locking member is movable from engagement in the channel to engagement with the recess upon movement of the locking member by the tumblers.

7. In a lock of the character described, a bored mounting member, a lock cylinder rotatable in the mounting member bore, key operable tumblers yieldably projectible from the cylinder to have an interlocking engagement with the mounting member, a locking member non-rotatable but radially movable with reference to the mounting member, means on said cylinder having a recess to receive part of the locking member and effect a non-rotatable connection therebetween, spring means yieldably maintaining the locking member flat against the surface of the cylinder and disengaged from said recess to permit free rotation of the cylinder, and said locking member being projectible outwardly of the cylinder to engage its portion in said recess by the yieldable projection of any one tumbler.

8. In a lock, a bored mounting member having a longitudinal groove communicating with its bore, a cylinder rotatable therein, locking tumblers yieldably projectible from the cylinder to engage in said groove, an enlarged head on the cylinder having an annular channel the inner wall of which is substantially coextensive with the surface of the cylinder and a recess in its outer wall, a locking member extending longitudinally along the cylinder within the longitudinal groove and with an end portion receivable either in said annular channel or the recess communicating therewith, and spring means connected to said locking member and disposed in annular channels in the cylinder to hold the locking member flat against the cylinder wall and over the ends of the tumblers when the cylinder is in its locked position of rotation to be movable by any one tumbler deeper into the longitudinal groove with its end portion engaging in said recess.

9. In a lock, a bored mounting member having a longitudinal groove communicating with its bore, a lock cylinder therein, key operable locking tumblers projectible from the cylinder into said longitudinal groove, a locking member carried by the mounting member with its major portion received in the longitudinal groove, spring means to yieldably urge the locking member toward the cylinder whereby said locking member lies flat against the cylinder when the key operable tumblers are retracted, said spring means being weaker than the spring of any individual tumbler whereby the locking member is moved by any free tumbler deeper into the groove, and means on the cylinder to have a non-rotatable connection with the locking member in any position except that at which the locking member is flat against the cylinder surface.

JOHN W. FITZ GERALD.