Dec. 17, 1935. J. W. FITZ GERALD 2,024,441

LOCK

Filed Jan. 10, 1935 3 Sheets-Sheet 1

Fig. 1.

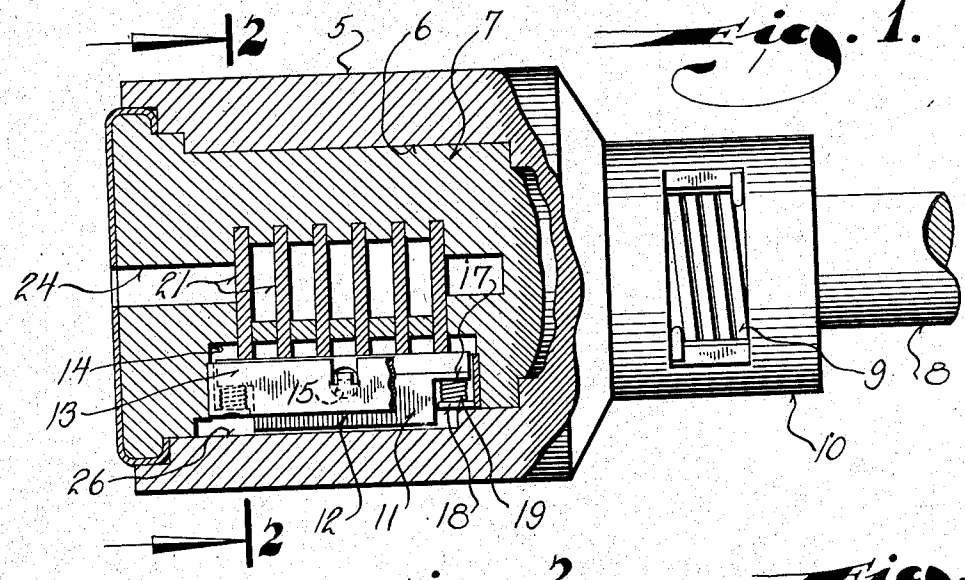


Fig. 2.

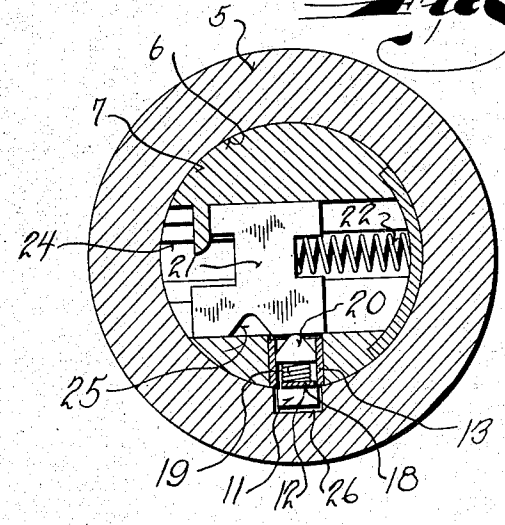


Fig. 3.

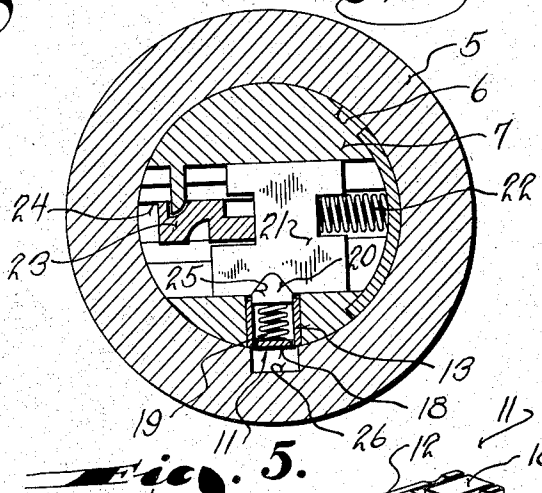


Fig. 5.

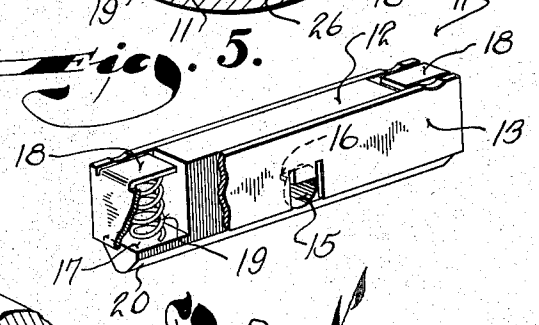
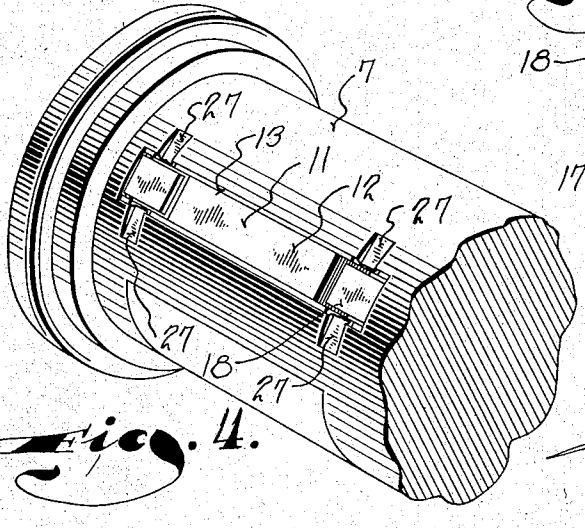


Fig. 4.



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By Dewitt & Jones
Attorneys

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LOCK

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Fig. 6.

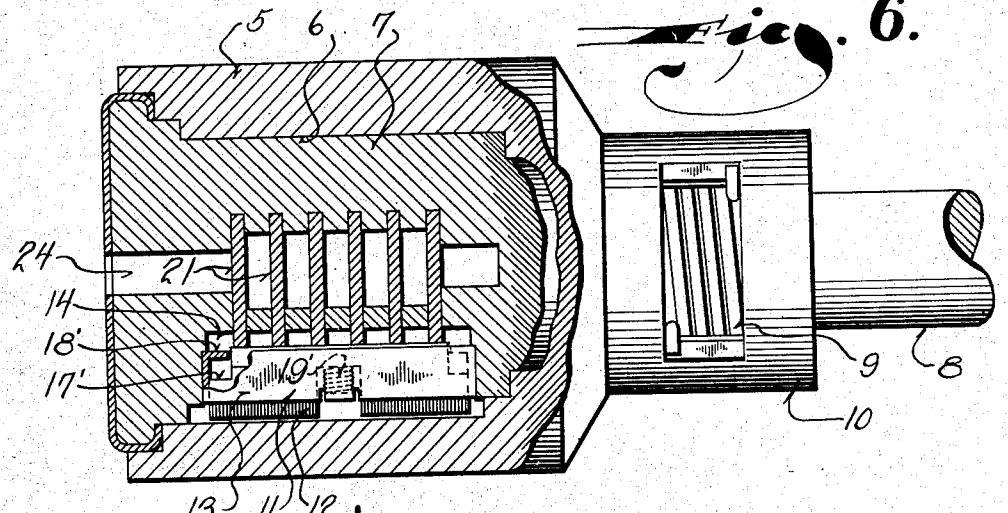
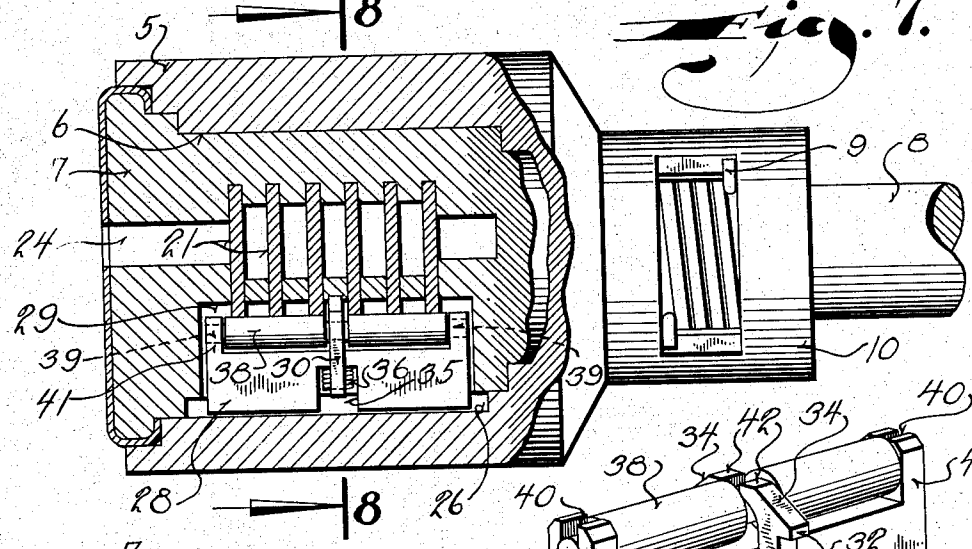


Fig. 7.



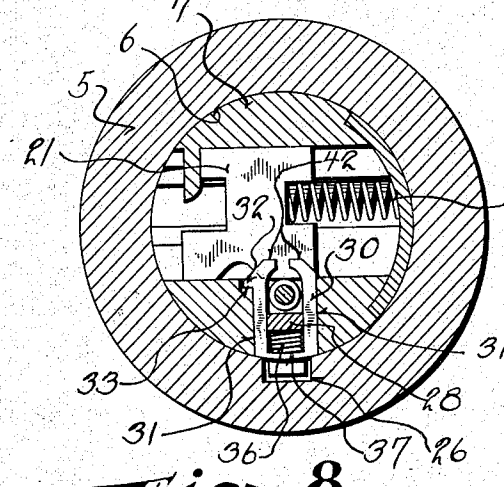


Fig. 8.

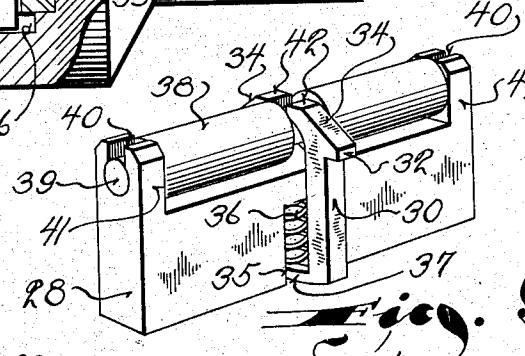


Fig. 9.

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Fig. 10.

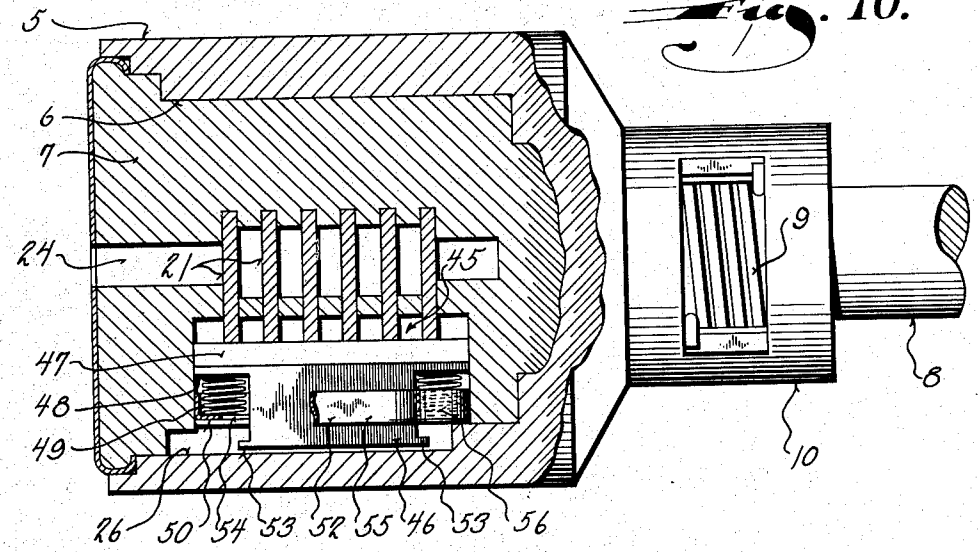


Fig. 11.

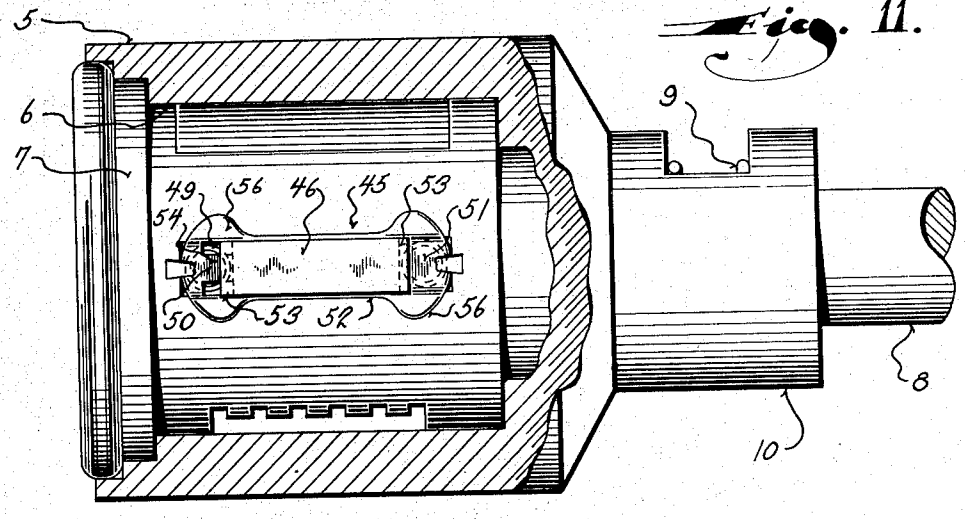
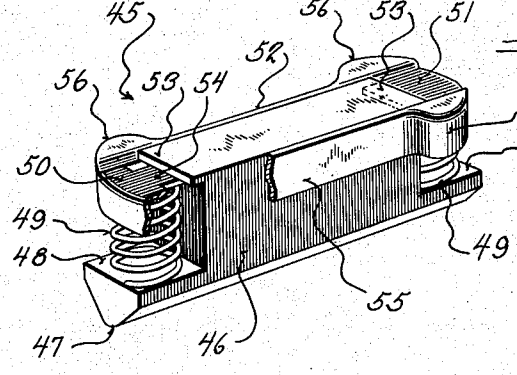


Fig. 12.



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Patented Dec. 17, 1935 2,024,441

UNITED STATES PATENT OFFICE

2,024,441

LOCK

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

Application January 10, 1935, Serial No. 1,096

20 Claims. (Cl. 70—46)

This invention relates to improvements in locks and refers more particularly to cylinder locks of the type forming the subject matter of the Patent No. 1,965,336, issued to John W. Fitz Gerald July 3rd, 1934.

As in the aforesaid patent, the lock of this invention embodies a cylinder secured against rotation by means of a locking member projectible radially from the side of the cylinder into a groove in the mounting member, the locking member being pushed to its operative position by the regular key operable tumblers, and it is a particular object of this invention to provide an improved locking member construction and novel means for retaining the same assembled with the cylinder.

More specifically, it is an object of this invention to provide a self-contained preassembled structure comprising the locking member per se and a cage or housing surrounding the locking member and pocket or recess in the cylinder, the cage containing the spring means to yieldably urge the locking member to a predetermined position.

Another object of this invention is to improve the operation of locks of this character by providing roller means between the edges of the tumblers and the locking member.

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 hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate several complete examples of the physical embodiments 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 view partly in longitudinal section and partly in elevation, illustrating a lock equipped with this invention;

Figure 2 is a section view through Figure 1 on the plane of the line 2—2;

Figure 3 is a view similar to Figure 2 but showing the key in place and the cylinder unlocked for rotation;

Figure 4 is a perspective view of the cylinder showing the manner of securing the locking member therein;

Figure 5 is a perspective view of the locking member assembly;

Figure 6 is a view similar to Figure 1, but illustrating a slightly modified form of locking member;

Figure 7 is also a view similar to Figure 1, but showing another modified embodiment of the locking member;

Figure 8 is a cross section view through Figure 7 on the plane of the line 8—8;

Figure 9 is a perspective view of the locking member shown in Figures 7 and 8;

Figure 10 is a view like Figure 1, partly in longitudinal section and partly in elevation illustrating a lock equipped with another modified embodiment of this invention;

Figure 11 is a side view of the lock shown in Figure 10 taken at right angles to the plane on which Figure 10 is taken; and

Figure 12 is a perspective view of the locking member employed in that modification illustrated in Figures 10 and 11 removed from the lock cylinder.

Referring now more particularly to the accompanying drawings, in which like numerals designate like parts throughout the several views, the numeral 5 designates the mounting member or casing of a lock, bored as at 6 to receive a lock cylinder 7. The cylinder has a rearwardly projecting stem 8 for driving lock mechanism (not shown). A torsion spring 9 coiled about the stem within a rearwardly extending skirt 10 yieldably maintains the cylinder in a predetermined locked position of rotation in which it is positively secured by the locking means of this invention, indicated generally by the numeral 11.

The locking means 11, in the embodiment shown in Figures 1 to 5 inclusive, comprises a flat bar 12, confined within a substantially rectangular box or cage 13 stamped of sheet metal and snugly fitted in a radial pocket or recess 14 in the cylinder.

As best illustrated in Figure 5, the bar 12 has a central aperture 15 into which a tang 16 struck from one side wall of the cage 13 projects to maintain the bar assembled with the cage while permitting a degree of transverse motion on the part of the bar.

The opposite ends of the bar are stepped as at 17 and the end walls of the cage have inwardly directed tongues 18 overlying the stepped portions 17. Springs 19 are confined between the tongues 18 and the stepped portions 17 to yieldably urge the bar 12 outwardly of the cage in one direction.

The edge of the bar 12 projected from the cage by the springs 19 is V-shaped as at 20, and when

the locking member is assembled with the cylinder by inserting the cake in the pocket 14, this V-shaped edge 20 contacts the side edges of the key operable tumblers 21 transversely slidable in the cylinder and yieldably urged to predetermined positions by springs 22.

The tumblers are operable by a proper key 23 inserted into the keyway 24 and when the key is in place, all of the tumblers are brought to positions at which V-shaped notches 25 in their edges engaged by the bar 12 are in line and so located that the springs 19 project the bar 12 into the aligned notches 25 and thereby retract the opposite edge portion of the bar wholly within the periphery of the cylinder. When projected by the springs 19, the locking member extends into a longitudinal groove 26 formed in the mounting member in open communication with its bore 6.

The springs 19 are comparatively light and any one of the tumbler springs 22 is of sufficient strength to overcome their combined force so that any free tumbler through the cam action of the inclined sides of the notches 25 acting on the V-shaped edge 20 will project the bar 12 to its operative locking position engaged in the groove 26.

To secure the locking member assembly in the cylinder, portions of the cylinder are swedged over notches in the outer edges of the cage side walls as at 27.

If desired, a single spring 19' located at the center of the locking bar may be used, as illustrated in Figure 6, in place of the two springs 19. In this embodiment of the invention, the overhanging tongues 18' on the end walls of the cage by engaging the stepped portions 17' serve to limit the movement of the bar with respect to the cage under action of the spring 19' when the locking means is removed from the cylinder and thus takes the place of the tang 16 projecting into the aperture 15.

In the embodiment of the invention illustrated in Figures 7, 8 and 9, the locking means consists of a bar 28 slidable radially in a pocket 29 formed in the cylinder to be projected by the key operable tumblers into operative locking engagement in the groove 26.

To retain the locking bar 28 assembled with the cylinder, a retaining member 30 in the form of a U-shaped clip having spring arms, is engaged over the central portion of the bar and received in guide-grooves 31 in the side walls of the pocket 29. As stated, the arms of the retaining member 30 are spring tensioned and one of the arms has a hook 32, which engages over an abutment 33 at the inner end of one of the grooves 31, the extremities of the arms being inclined as at 34 to facilitate engagement of the retaining member with the cylinder.

The central portion of the bar 28 adjacent the retaining member 30 is cut out as at 35 and a spring 36 is confined between the bottom of the cut-out portion 35 and the closed outer end 37 of the retaining member, so that the bar 28 is yieldably urged inwardly toward the key operable tumblers.

To improve the operation of the lock and preclude sticking, the bar 28 carries at its inner edge a roller 38 which engages the adjacent edges of the tumblers and thereby reduces the degree of friction between the tumblers and the locking bar.

To mount the roller, trunnions 39 extend from its opposite ends to be received in notches 40 formed in arms 41 projecting from the bar, and to retain the roller assembled with the bar, the inner ends of the arms of the retaining member 30 are extended inwardly as at 42, the space therebetween being less than the adjacent reduced diameter of the roller so that when the retaining member is in its normal position, the roller is held against detachment from the bar.

Obviously, the provision of the roller reduces the friction in the engagement between the locking means and the tumblers and thus affords a smoother operating lock.

In the embodiment of the invention illustrated in Figures 10, 11 and 12, the cylinder construction as well as that of the mounting member, is the same as described in conjunction with the embodiment of the invention illustrated in Figure 1, but the locking means per se is of different construction.

The locking means in this embodiment of the invention is indicated generally by the numeral 45. It comprises a solid locking bar 46 substantially rectangular in cross section with one edge 47 V-shaped to fit in the V-shaped notches of the key operable tumblers. Like the locking bar 12, which is employed in the modification shown in Figure 1, the bar 46 has its opposite ends stepped as at 48 to provide abutments or projections against which expansive springs 49 engage to yieldingly urge the locking bar toward the tumblers.

The opposite ends of the springs bear against walls 50 and 51 which form part of a housing or cage 52 stamped from a single piece of sheet metal.

The housing or cage 52 is substantially channel-shaped in cross section with its web cut out to permit the projection of the locking bar 46 therethrough. The portions of the web of the housing or cage which remain at the opposite ends of the opening through which the bar projects form the walls 50 and 51. The distance between the inner edges of these walls is but slightly greater than the length of the adjacent portion of the bar and as clearly shown in Figure 10, the opposite ends of this portion of the bar have overhanging ledges 53 to engage the walls 50 and 51 and prevent disassembly of the locking bar from the housing or cage.

Assembly of the parts is effected by forming the wall 50 with a tongue 54 which, prior to assembly is bent out of the plane of the channel web to increase the distance between the inner edges of the walls 50 and 51 and permit the passage of the locking bar therebetween. After assembly, the tongue 54 is bent back into place to engage under the adjacent ledge 53.

It is to be observed that the housing or cage 52 has a flange 55 about its entire periphery and that at its opposite ends it has sidewise projections 56 to add strength to the structure and permit its formation from a single piece of sheet metal.

The assembly of the locking means with the cylinder is effected in a manner similar to that hereinbefore described. The cylinder wall is provided with a pocket conforming in size and shape to the size of the housing 52 into which the housing is pressed, and if desired the cylinder may be staked over the ends of the housing as shown in Figure 11.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art to which this invention appertains, that this

invention materially improves the construction of locks of the character described, and affords smoother operation, and facilitates manufacture.

What I claim as my invention is:

1. In a lock, a bored mounting member, a lock cylinder in the mounting member bore, key operable tumblers in the cylinder, a locking member in the cylinder and projectible outwardly therefrom by the key operable tumblers into locking engagement with the mounting member, spring means to urge the locking member toward the tumblers, and common means to retain the locking member assembled with the cylinder and to take the reaction force of the spring means, said common means embracing the locking member and extending into the interior of the cylinder.

2. In a lock having a bored mounting member, and a lock cylinder mounted therein, a locking member projectible from the cylinder into locking engagement with the mounting member to secure the cylinder against movement, spring means to yieldably urge the locking member toward the cylinder and out of locking engagement with the mounting member, and a cage enclosing the locking member and said spring and being secured in a recess in the cylinder.

3. In a lock, a bored mounting member, a cylinder in the mounting member bore, key operable tumblers carried by the cylinder, a locking member projectible outwardly of the cylinder into locking engagement with the mounting member by said tumblers, spring means to yieldably urge the locking member out of locking engagement with the mounting member, and a cage enclosing the locking member and secured in a recess in the cylinder to maintain the locking member assembled with the cylinder, said cage providing a support for the spring means.

4. In a lock, a bored mounting member having a longitudinal groove opening to its bore, a lock cylinder rotatable in the bore and having a longitudinal pocket adapted to lie opposite the groove in the mounting member, key operable tumblers carried by the cylinder and having portions extending into said pocket, a locking member movable radially of the cylinder in said pocket and movable by any key operable tumbler into the groove in the mounting member to secure the cylinder against rotation, spring means to yieldably urge the locking member toward the tumblers and out of said groove, and a cage enclosing the locking member and the spring and being secured in said pocket to hold the locking member and spring assembled with the cylinder.

5. In a lock, a bored mounting member having a longitudinal groove opening to its bore, a lock cylinder rotatable in the bore and having a longitudinal pocket adapted to lie opposite the groove in the mounting member, key operable tumblers carried by the cylinder and having portions extending into said pocket, a locking member movable radially of the cylinder in said pocket and movable by any key operable tumbler into the groove in the mounting member to secure the cylinder against rotation, spring means to yieldably urge the locking member toward the tumblers and out of said groove, and a cage enclosing the locking member and the spring and being secured in said pocket to hold the locking member and spring assembled with the cylinder, and means to retain the locking member assembled with the cage, said means permitting a degree of relative movement to enable projection of the locking member into the mounting member groove and retraction thereof out of said groove.

6. In a lock, a bored mounting member having a longitudinal groove communicating with its bore, a lock cylinder rotatable in the mounting member bore and having an open radial pocket to align with the groove in the mounting member, key operable tumblers carried by the cylinder and having portions thereof disposed in said pocket, a locking member projectible radially from said pocket into the groove to secure the cylinder against rotation, a cage snugly received in the radial pocket and surrounding the locking member, said cage being formed of sheet metal and having four walls to define a substantially rectangular space in which the locking member is received, means carried by said cage to retain the locking member therein while permitting a degree of transverse flatwise movement of the locking member with respect to the cage, a spring confined between a part carried by the cage and a part on said locking member to yieldably urge the locking member toward the tumblers, and means to secure the cage in the cylinder pocket.

7. In a lock of the character described having a bored mounting member and a cylinder in the mounting member bore, a locking member radially projectible from a pocket in the cylinder into locking engagement with the mounting member, key operable tumblers carried by the cylinder and operable to push the locking member outwardly of the cylinder to its operative position, and anti-friction means between the locking member and the key operable tumblers.

8. In a lock of the character described having a bored mounting member and a cylinder in the mounting member bore, a locking member radially projectible from a pocket in the cylinder into locking engagement with the mounting member, key operable tumblers carried by the cylinder and operable to push the locking member outwardly of the cylinder to its operative position, and roller means to reduce friction between the locking member and the key operable tumblers.

9. In a lock of the character described, a bored mounting member, a lock cylinder therein having a radially extending pocket opening to its outer surface, key operable locking tumblers in the cylinder with portions thereof extending into said pocket, a locking member movable radially in said pocket and projectible outwardly thereof into locking engagement with the mounting member by said key operable tumblers, and roller means carried by the locking member and contacting the tumblers.

10. In a lock of the character described, a bored mounting member, a lock cylinder therein having a radial pocket opening to its outside surface, key operable locking tumblers in the cylinder with certain of their side edge portions extending into the radial pocket, said side edge portions of the tumblers having notches adapted to be aligned upon actuation of the tumblers to a predetermined unlocked position by a proper key, a locking member disposed in said radial pocket and projectible outwardly thereof into locking engagement with the mounting member, and roller means carried by the locking member and riding on said side edges of the tumblers, said roller means being receivable in the aligned notches of the tumblers to enable retraction of the locking member out of locking engagement with the mounting member.

11. In a lock of the character described, a bored mounting member, a lock cylinder therein hav-

ing a radial pocket opening to its outside surface, key operable locking tumblers in the cylinder with certain of their side edge portions extending into the radial pocket, said side edge portions of the tumblers having notches adapted to be aligned upon actuation of the tumblers to a predetermined unlocked position by a proper key, and a locking member disposed in said radial pocket and projectible outwardly thereof into locking engagement with the mounting member, roller means carried by the locking member and riding on said side edges of the tumblers, said roller means being receivable in the aligned notches of the tumblers to enable retraction of the locking member out of locking engagement with the mounting member, and spring means to yieldably urge the locking member toward the tumblers to maintain the roller means in contact with the edges of the tumblers and move the locking member out of locking engagement with the mounting member upon actuation of the tumblers to their unlocked positions.

12. In a lock of the character described, a bored mounting member, a lock cylinder therein, key operable tumblers carried by the cylinder, a locking member operable by the tumblers into operative locking engagement with the mounting member to secure the cylinder against movement in the mounting member, said locking member being radially movable in a pocket in the cylinder, a roller carried by the locking member and engageable with the tumblers to reduce friction therebetween, and common means to retain the roller assembled with the locking member and the assembled locking member and roller in the cylinder pocket.

13. In a lock of the character described, a bored mounting member, a cylinder therein, a locking member to secure the cylinder against rotation comprising an elongated bar, a roller extending along one longitudinal edge of the bar, means to freely rotatably support the roller from the bar, and a clip member embracing the bar and extending over a portion of the roller to hold the roller assembled with the bar.

14. In a lock of the character described, a bored mounting member, a cylinder therein, a locking member to secure the cylinder against rotation comprising an elongated bar, a roller extending along one longitudinal edge of the bar, means to freely rotatably support the roller from the bar, a clip member embracing the bar and extending over a portion of the roller to hold the roller assembled with the bar, and spring means confined between part of the bar and said clip member to maintain the bar in a predetermined relative position with respect to said clip member.

15. In a lock of the character described, a bored mounting member, a lock cylinder rotatable in the mounting member bore and having a radial pocket opening to the outside surface thereof, key operable tumblers within the cylinder having side edge portions projecting into the said pocket, a locking member radially movable in said pocket and projectible therefrom into locking engagement with the mounting member, a roller extending along the inner edge of said locking member and engageable with the side edge portions of the tumblers so that the tumblers are operable on said locking member to push the locking member to its operative position, a substantially U-shaped clip engaged over the locking member and secured in the cylinder, and spring means confined between part of the locking member and said clip to yieldably urge the locking member toward the tumblers and out of locking engagement with the mounting member.

16. In a lock of the character described, a bored mounting member, a lock cylinder rotatable in the mounting member bore and having a radial pocket opening to the outside surface thereof, key operable tumblers within the cylinder having side edge portions projecting into the said pocket, a locking member radially movable in said pocket and projecting therefrom into locking engagement with the mounting member, a roller extending along the inner edge of said locking member and engageable with the side edge portions of the tumblers so that the tumblers are operable on said locking member to push the locking member to its operative position, a retaining member having spaced spring arms engaged over the locking member, a hook on one of said arms adapted to snap in back of an abutment in the cylinder to secure the retaining member assembled with the cylinder, means on said arms of the retaining member engageable with the roller to hold the roller assembled with the locking member, and spring means confined between part of the locking member and part of said retaining member to yieldably urge the locking member toward the tumblers and out of operative locking engagement with the mounting member.

17. A locking bar assembly for locks of the character described comprising a carrier housing having substantially a channel-shaped cross section with an opening through its web, a locking bar having a part projected through said opening, spaced projections on each end of said locking bar part, the projections of each pair lying at opposite sides of the web of the carrier housing defining the ends of the opening therein, and expansive springs confined between one side of the carrier housing web and the locking bar projections on said side of the web to yieldingly maintain the locking bar and carrier housing in relative positions defined by the engagement of the opposite sides of said web with the other locking bar projections.

18. A locking bar assembly for cylinder locks of the character described comprising a locking bar, longitudinally aligned projections one on each end of the bar, overhanging ledges one on each end of the bar and spaced from said projections, a carrier housing embracing the portion of the locking bar between said projections and ledges, and expansive springs confined between the projections and the carrier housing to yieldingly maintain the locking bar and carrier housing in relative positons defined by the engagement of said overhanging ledges with adjacent parts of the carrier housing.

19. A locking bar assembly for cylinder locks of the character described comprising a solid locking bar, a projection and a ledge spaced therefrom extending from each end of the bar, a carrier housing having a wall apertured to receive the locking bar part between the projections and ledges, expansive springs confined between the projections on the locking bar and said wall of the carrier housing to yieldingly urge the locking bar and housing to relative positions defined by the engagement of said ledges with the wall adjacent the end of the aperture in which the locking bar moves.

20. A locking bar assembly for cylinder locks of the character described comprising a solid locking bar, a projection and a ledge spaced there-

from extending from each end of the bar, a carrier housing having a wall apertured to receive the locking bar part between the projections and ledges, expansive springs confined between the projections on the locking bar and said wall of the carrier housing to yieldingly urge the locking bar and housing to relative positions defined by the engagement of said ledges with the wall adjacent the end of the aperture in which the locking bar moves, and said wall adjacent one end of the aperture being formed with a tongue readily bent out of planar alignment with the wall to enable assembly and disassembly of the locking bar and carrier housing.

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