Aug. 7, 1951 D. R. CRUMB 2,563,215

CYLINDER LOCKING DEVICE

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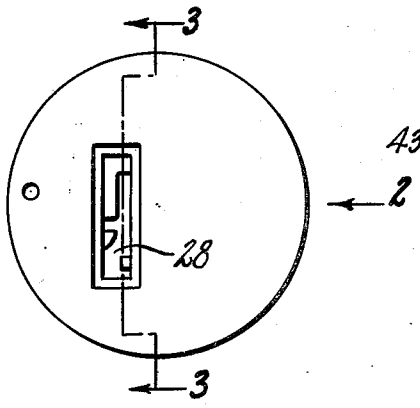


Fig. 1.

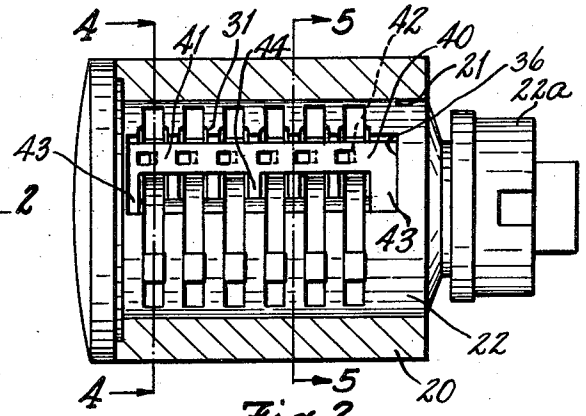


Fig. 2.

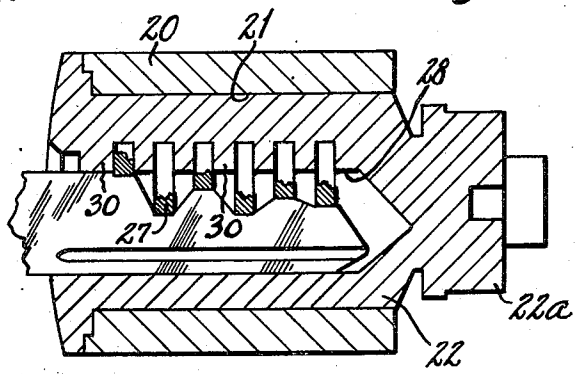


Fig. 3.

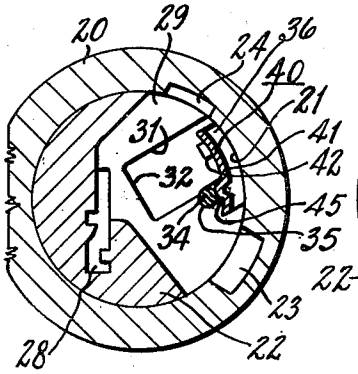


Fig. 4

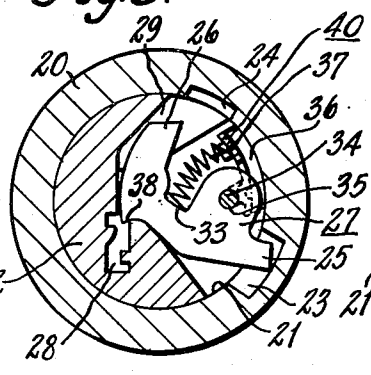


Fig. 5.

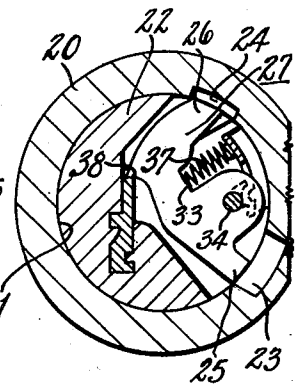


Fig. 6.

INVENTOR
DUANE R. CRUMB

BY Willits, Hardman & Fehr
HIS ATTORNEYS

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CYLINDER LOCKING DEVICE

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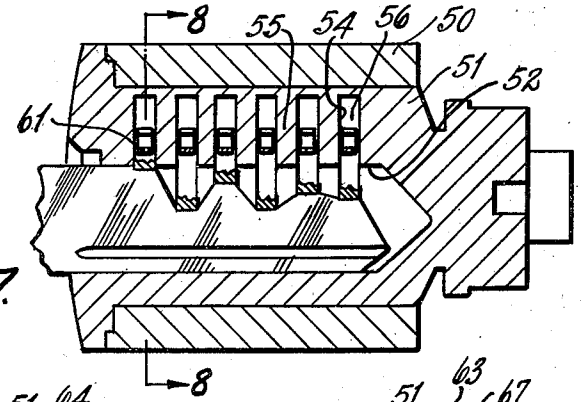


Fig. 7.

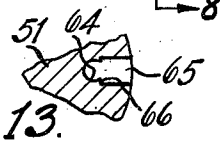


Fig. 13.

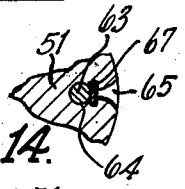


Fig. 14.

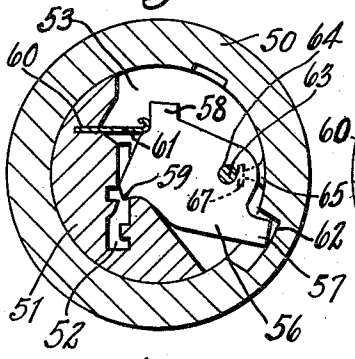


Fig. 8.

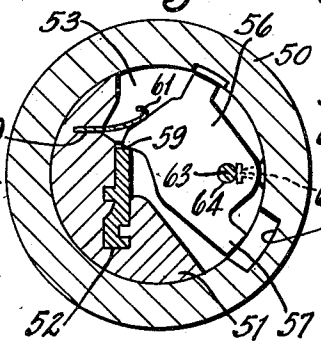


Fig. 9.

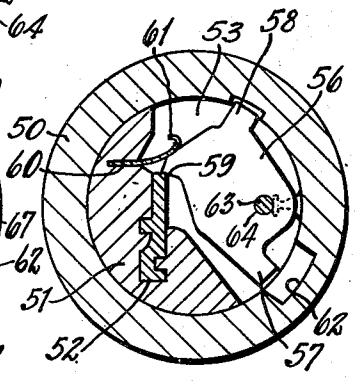


Fig. 10.

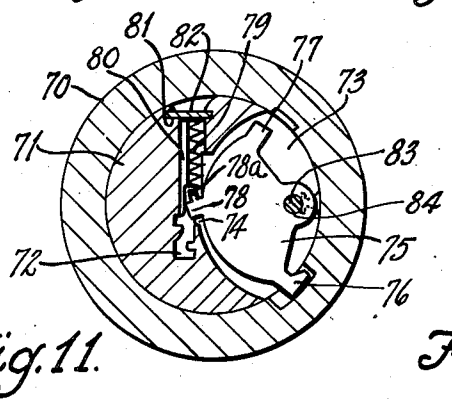


Fig. 11.

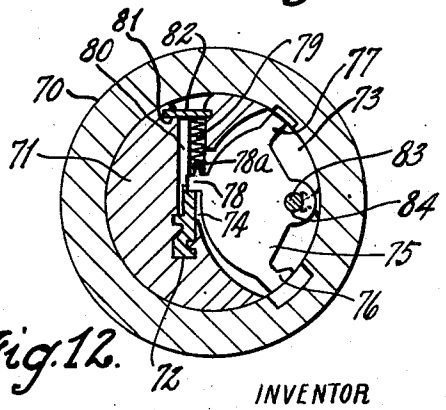


Fig. 12.

INVENTOR
DUANE R. CRUMB
BY Willits, Hardman & Fales
HIS ATTORNEYS

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2,563,215

CYLINDER LOCKING DEVICE

Duane Roger Crumb, Webster, N. Y., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application February 23, 1950, Serial No. 145,870

3 Claims. (Cl. 70—366)

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This invention relates to improvements in locks and more particularly to that type employing a sleeve, a plug, and pivoted tumblers.

An object of the present invention is to improve the construction and arrangement of a plurality of springs and tumblers, pivoted within the plug to thereby enable the parts to be more compactly arranged in a smaller plug.

Another object of the present invention is to provide a lock of the character described in which the parts that prevent rotation of the plug are all mounted in the plug assembly so that a close fit between the plug and the casing is eliminated.

Another object of this invention resides in the provision of improved means of the character described including a pivot rod, tumblers and springs adapted to be secured over the outer portions of the tumbler slots after the said elements have been inserted therein to retain said elements with the plug.

Further objects and advantages of the present invention will be apparent from the following description reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is an end view of the lock embodying the present invention.

Fig. 2 is a side view of the lock cylinder or plug embodying this invention and received within a sleeve.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 2 with tumbler removed.

Fig. 5 is a sectional view taken on line 5—5 of Fig. 2, showing tumbler in locking position.

Fig. 6 is a view similar to Fig. 5 but showing a key in place and the plug unlocked for rotation.

Fig. 7 is a sectional view of a modified form of the invention.

Fig. 8 is a sectional view taken on line 8—8 of Fig. 7.

Fig. 9 is a view similar to Fig. 8 but showing a proper key in place.

Fig. 10 is a view similar to Fig. 8 but showing the position of a tumbler when a wrong key is used.

Fig. 11 is a sectional view of a lock showing a modified form of the invention and showing the parts in their locked position.

Fig. 12 is a view similar to Fig. 11 but showing the parts in their unlocked position.

Fig. 13 is a fragmentary sectional view showing a slot in the barrel.

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Fig. 14 is a fragmentary sectional view showing a method of securing a pin in a slot.

Referring to the drawing 20 designates a casing or sleeve of a lock device which may be of any desired exterior contour and may form part of a device with which the lock is used, for example, automotive lock sets, household equipment, office furniture, vending machines and the like. The casing 20 has a longitudinal bore 21 to receive a rotatable plug 22 and has spaced longitudinal barriers or grooves 23 and 24 to receive ends or projections 25 and 26 respectively of flat plate tumblers 27 pivotally supported within the plug 22. Rotation of the plug may control or operate any suitable device. In this instance the plug has an extension 22a so that rotation of plug operates a locking element.

The plug 22 has a longitudinal keyway 28 which communicates with a tumbler cavity opening to the side of the plug. The cavity has transversely disposed tumbler receiving slots 29 formed by partitions 30 between the slots. The opposite sides of the partitions are preferably enlarged as at 31 to provide spring pockets 32. The slots receive flat plate tumblers 27 each tumbler has a notch 33 located between the arms or projections 25, 26. All of the tumblers are pivotally mounted on a pin 34 inserted in a rounded channel 35 extending inwardly from a recess 36, see Fig. 13, formed in the outer periphery of the plug. Similar recesses traverse the webs or partitions 30. Each tumbler 27 is urged in a counterclockwise direction, as viewed in Fig. 5 by an individual coil compression spring 37 located within the spring pockets 32. The cross dimension of the springs are slightly larger than the width of the tumblers and are guided by the pockets 32. Obviously, the action of the springs yieldingly urges each individual tumbler in a counterclockwise direction so that the end portion 25 will project beyond the cylindrical surface of the plug and into locking engagement with the groove or barrier 23 in the casing 20. The tumblers also have lugs or projections 38 that extend into the keyway 28 to be engaged by surfaces of a key inserted in the keyway which limits the movements of the tumblers in their counterclockwise direction as shown in Fig. 6.

The springs 37 and the pivot pin 34, which forms the pivot for all the tumblers, are held in assembled relation within the plug by a retainer member 40. In this instance the retainer member is formed of sheet metal stamping comprising an elongated strip 41 which is greater in length than the width of the tumbler cavity.

The strip has a plurality of ears 42 formed thereon, pierced from the strip 41 and extend at an angle to the normal plane of the strip and are so spaced and arranged that each ear 42 will extend into a pocket. One end of each spring 37 fits over an ear 42 to guard against displacements of said end. The strip 41 is also formed with end arms 43 and an intermediate arm 44. The arms 43 and 44 are indented at 45. The retainer 40 is secured to plug 22 by press fitting the same within the recess 36. When the retainer is assembled to the plug the detents 45 of the arms 43, 44 will engage the pin 34 to hold same within the channel 35. If desired the retainer may be secured in the recess 36 by swedging the material of the plug over the ends of the strip.

In the modification of the lock shown in Figs. 7 through 10, the sleeve 50 is adapted to receive a plug 51 which has a longitudinal keyway 52 and a tumbler cavity 53 opening to the cylindrical surface of the plug 51. The cavity has transversely disposed tumblers receiving slots 54 formed by spaced partitions 55. The slots communicate with the keyway 52 and receive plate tumblers 56 having ends 57 and 58 and a lug or projection 59. The lugs extend into the keyway 52. The rear of the slots 54 above the keyway have slits 60 each of which receive one end of a leaf spring 61 the other end is turned back upon itself to provide a rounded surface which engages a surface on the tumbler above the projection 59. Each spring acts to urge its respective tumbler in a counterclockwise direction so that the arm 57 will normally project into the barrier or groove 62 as shown in Fig. 8.

It is to be understood that a one-piece spring member could be used instead of individual spring members. For example, a comb-like spring member could be used. When a comb-like member is used the untoothed portion would fit into the slits 60 and the resilient teeth or arms would engage the surfaces on the tumblers above the projections 59.

All of the tumblers are pivotally mounted on a pin 63 inserted in a rounded bottom 64 of a channel 65 which traverses the partitions. In this instance the channel is formed with shoulders 66 beyond the rounded bottom upon which rests a metal strip 67 inserted therein. The strip 67 operates to hold the pin 63 in the rounded portion of the recess. The plate is secured within the channel, by swedging the material of the plug over the strip as shown in Fig. 14.

In the modification shown in Figs. 11 and 12 the bore of sleeve 70 is adapted to receive a plug 71 which has a keyway 72 and a tumbler cavity 73 opening to one side of the plug. The cavity 73 has transversely disposed tumbler receiving slots 74 formed by partitions, not shown, between the slots. These slots communicate with the keyway and receive tumblers 75 having arms 76 and 77 and a lug or projection 78 which extend into the keyway. In this instance each projection is formed with a post 78a over which one end of a compression spring 79 fits and rests on the lug 78. The plug is provided with a series of radial bores 80 above the keyway which are equal in number to the slots. A recess 81 in the outer surface of the plug 71 traverses the bores and provides shoulders upon which a strip of metal 82 rests. Before the metal strip 82 is secured, a coil compression spring 79 is inserted in each bore then the strip 82 is nested in the recess 81 and held in place by staking over a portion of the plug 71.

All of the tumblers are pivotally mounted on a pin 83 resting in the rounded portion of a recess 84 provided in the side of the plug which extends across all the partitions, and is secured in the same manner as pin 63 shown in Fig. 14.

When a serrated key is inserted in the keyway thus engaging the lower surfaces of the lugs or projections and if the code of the key and the code tumblers are the same the tumblers will be rotated about the pin against the action of its urging springs in a clockwise direction to retract the ends normally in the groove 23 into the confines of the plug. For example from the position shown in Fig. 5 to that position shown in Fig. 6 which shows both arms 25 and 26 within the confines of the plug 22. When this occurs the plug is free to rotate in either direction of rotation. If the key code does not agree with the tumbler code then one of the arms 25 will either not be rotated enough to be out of the barrier 23 or one of the arms of the tumblers will be rotated too much so that the other arm 26 will project into the barrier 24 and will in both cases prevent rotation of the plug thus resisting the use of any unauthorized key.

While the embodiment of the present invention as herein disclosed, constitutes preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In a key operated lock the combination of a cylinder provided with a pair of barriers formed in the interior surface of the cylinder, a plug rotatably mounted within the cylinder, said plug having a series of tumbler transverse slots therein and having a longitudinal keyway in communication with the slots; tumblers pivotally mounted in the slots, said tumblers having spaced ends for movement into and out of engagement with the barriers to lock and retain the plug; spring means supported within the plug and acting on the tumblers so that one arm of each tumbler will be located within its respective slot while the other arm will engage one of the barriers when the plug is in its normal position, said other arm will engage the other barrier in event of their being moved out of the slot; lugs on the tumblers extending into the keyway and engageable by surfaces of the key inserted in the keyway and so located that the proper key moves all of the arms out of engagement from both barriers.

2. In a key operated lock, the combination of a cylinder provided with spaced longitudinal grooves in its inner surface; a plug rotatably mounted within the cylinder, said plug having a series of transverse slots intermediate its ends and having a longitudinal keyway extending from its front end and to the rear of said slots, said keyway communicating with said slots; a series of flat plate tumblers located in the slots, each tumbler having two spaced arms; a common pivot for all the tumblers; individual spring means supported within the plug acting on said tumblers so that one arm of each tumbler will extend into one of the grooves when the plug is in its normal position and the other arm will extend into the other groove and prevent rotation of the plug in the event of their being moved beyond the external surface of the plug; a lug on each tumbler extending into the keyway, the lugs of each tumbler being in a different plane

and adapted to engage surfaces of keys inserted into the keyway and so located that a proper key causes a partial rotation of the tumblers and in positions that all arms are out of the grooves of the cylinder thereby permitting rotation of the plug.

3. In a lock of the character described, the combination of a plug having a plurality of transverse slots and having a longitudinal recess in its periphery; tumblers located in the slots; a common pivot rod for all the tumblers located within the recess; individual coil compression springs for the tumblers; a retainer member secured within the recess, said member having a portion extending across all of the slots against which the other ends of the springs abut to hold the springs under compression and said

member also having arms engaging parts of the rod to hold the rod within the recess.

DUANE ROGER CRUMB.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,226,257	Ritzert	May 15, 1917
1,376,256	Conte	Apr. 26, 1921
1,883,326	Thor	Oct. 18, 1932
2,182,588	Jacobi	Dec. 5, 1939

FOREIGN PATENTS

Number	Country	Date
551,876	France	Jan. 15, 1923