

May 22, 1962

F. J. TESTA
LOCK MECHANISM

3,035,433

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3 Sheets-Sheet 1

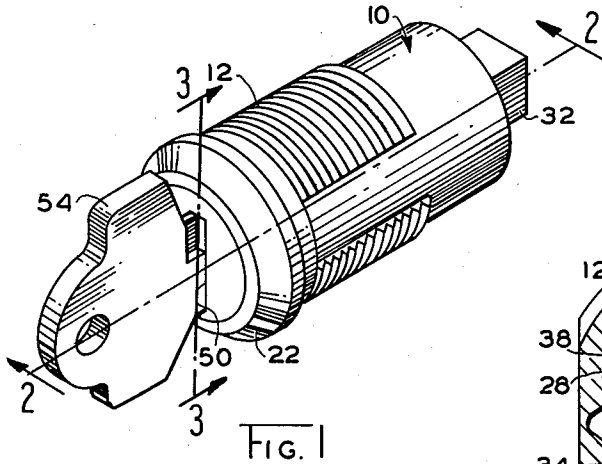
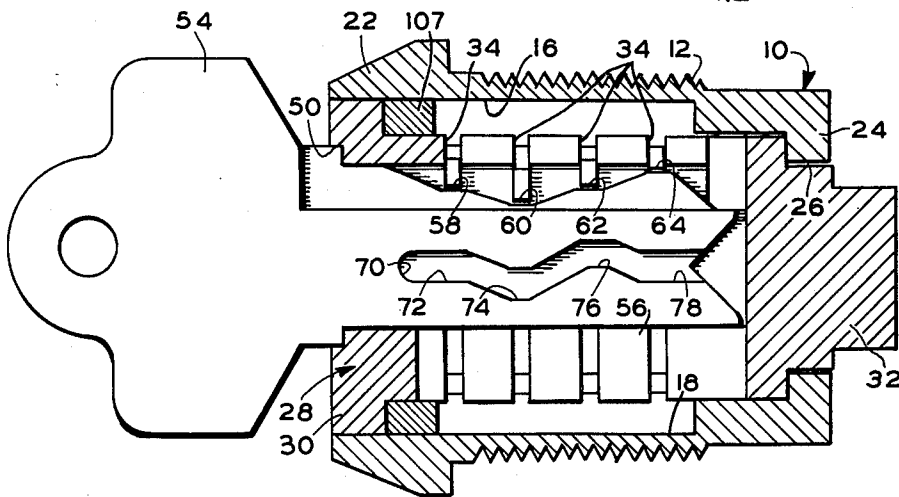
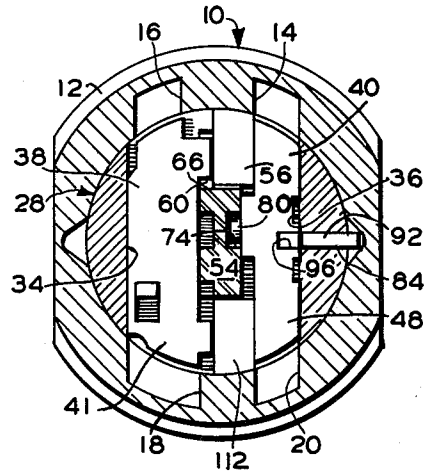


FIG. 3



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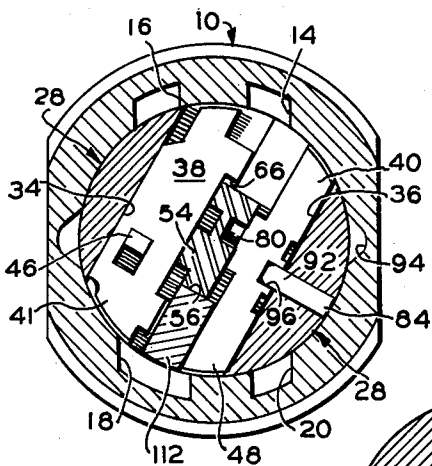


FIG. 6

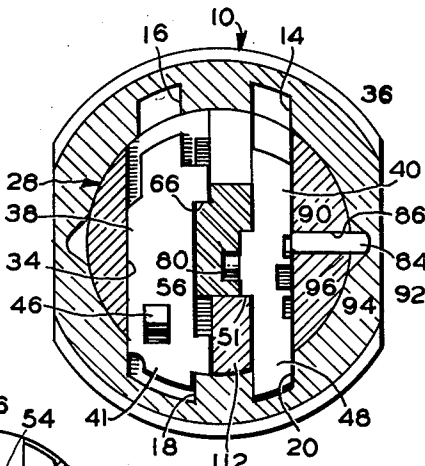


FIG. 5

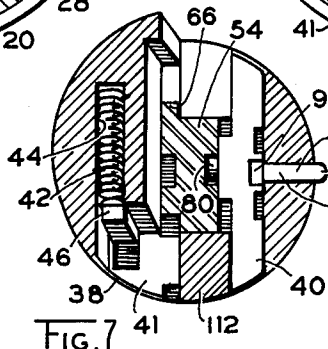


FIG. 7

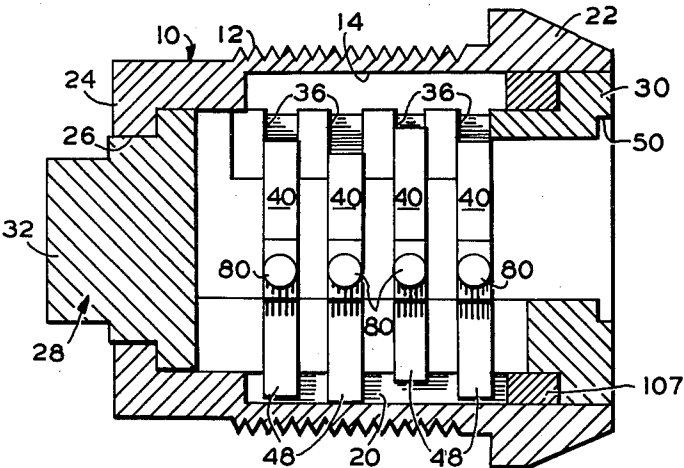


FIG. 4

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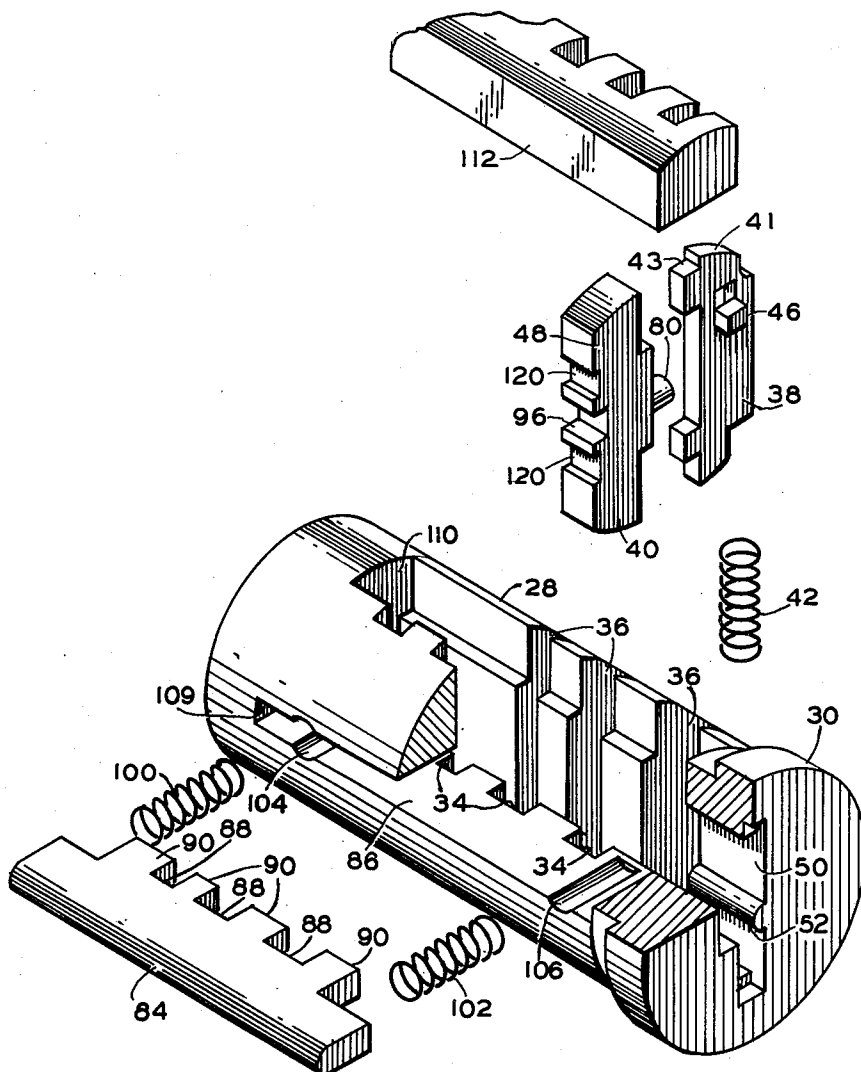
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3 Sheets-Sheet 3



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3,035,433

LOCK MECHANISM

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3 Claims. (Cl. 70—364)

This invention relates to a lock mechanism and more specifically to a cylinder cam lock having auxiliary internal locking means.

Heretofore, locks of the general type of this invention were provided with different types of releasing members which were actuated only partially by the key bittings and for additional security internal means were included which operated in conjunction with the key bittings for releasing the locking members. This arrangement is not desirable since a simplified key may be made or duplicated to operate and release the lock.

It is an object of the present invention to provide an intricate locking mechanism which is operative by a key in such manner that duplication is not readily permitted.

It is another object of the invention to provide an internal locking means in conjunction with a cylinder cam lock and which is operative independently of the key to prevent release of the lock unless the tumblers or locking elements are in a precise position.

It is another object of the invention to discourage tampering of the lock by providing a plurality of locking tumblers which are locked by two distinct means one of which is directly operated by a key, and the other of which is not under direct operation of the key. This greatly complicates the "picking" of the lock.

As an added feature of the invention, certain "false" release positions may be provided of the tumblers or locking elements to further complicate the true release positions of the tumblers and thereby discourage tampering.

It is a further object of the invention to provide added security to the lock by provision of means within the cylinder to support the key plug at each end to preclude fracture of the lock by insertion of a tool within the key slot and tapping the end thereof.

Another important feature of the invention is that the internal locking means may be made operative with each of a plurality of sets of tumblers to provide a locking effect which is released only when each of the tumblers is in its respective release position.

The above and other objects and features of the invention will become apparent from a consideration of the following description wherein one selected example embodiment of the invention is chosen for illustration. The description refers to the accompanying drawings, wherein:

FIGURE 1 is a perspective view of the lock construction;

FIGURE 2 is an enlarged longitudinal vertical sectional view taken on the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged transverse vertical sectional view taken on the line 3—3 of FIGURE 1, the key being in the lock to bring the tumblers into their unlocked position;

FIGURE 4 is an enlarged longitudinal vertical sectional view taken on the line 4—4 of FIGURE 1;

FIGURE 5 is an enlarged transverse vertical sectional view showing the releasing members in their locked position;

FIGURE 6 is an enlarged transverse vertical sectional view showing the key in the lock and the releasing members in their unlocked position and rotated from the position shown in FIGURE 3;

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FIGURE 7 is an enlarged transverse vertical sectional view taken on the line 7—7 of FIGURE 8; and,

FIGURE 8 is an exploded perspective view of the key plug showing the various components in their respective positions, a portion of the key plug being broken away to show the interior thereof. The view is inverted or in unlocked position to provide clearer details of the plug structure.

Referring now to the drawings, the cylinder which is designated generally by reference numeral 10 may be formed of a die casting and is provided at its outer surface with threads 12 which are suitable for mounting the lock in a door or gate (not shown). The cylinder has at its inner surface longitudinal slots 14, 16, 18 and 20 with straight sides. The head end 22 of the cylinder is tapered to prevent gripping the cylinder for removal, and the inner end 24 of the cylinder has a journal opening 26 for a purpose to be later described.

A key plug 28, which also may be die cast, is received within cylinder 10 for rotation therein (FIGURES 2, 4) and is mounted at the head end 22 of the cylinder by means of a flange 30 and its reduced diameter end 32 is journaled within opening 26 at cylinder inner end 24. The key plug 28 is provided with a number of spaced vertical guide ways 34 and 36 (FIGURES 3, 5) wherein are mounted for slidable movement tumblers 38 and 40 respectively, the tumblers 38, 40 forming a tumbler set; a plurality of identical tumbler sets being disposed at spaced points along the length of the key plug 28. Each of the tumblers 38 is biased to a locking position wherein its portion 41 enters slot 18 with the notch 43 bottoming on the corner of the slot (FIGURE 5), the biasing effect being obtained by means of a spring 42 which is located within a cored recess 44 (FIGURES 7, 8), and compressed against lug 46 of tumbler 38. A comparison of FIGURES 3 and 5 will show the tumbler 38 or locking member in its released and locking positions respectively.

Each tumbler 40 has an end 48 (FIGURES 3, 5) which is proportioned to fit within slot 20 of the cylinder 10 to be in locking relation therewith and thereby preventing rotation of the key plug.

A key hole 50 at the end of the key plug, and having a key guide 52, receives a key 54 which passes within a keyway 56, there being bitting steps 58, 60, 62 and 64 (FIGURE 2) along one edge of the key to be in contact with tumblers 38 and their respective cam surfaces 66 to move them into a released position wherein their portions 41 disengage the straight sides of a slot 18. A transverse groove 70 in the key 54 and having bitting steps 72, 74, 76 and 78 contacts the respective lugs 80 of tumblers 40 to move them into their released positions wherein portions 48 disengage the straight sides of slot 20.

An internal auxiliary locking member in the form of a locking bar 84 is received within a longitudinal slot 86 in plug 28 and along one edge are a plurality of indentations 88 (FIGURE 8), which permit the portions 90 to extend into thrusting engagement against tumblers 40 (FIGURE 5). The locking bar 84 is proportioned so that its outer edge 92 extends through the key plug and beyond its outer periphery (FIGURES 5, 7). The rounded outer edge 92 of the locking bar 84 is received within a cam groove 94 in the inner wall of cylinder 10. A notch 96 in each tumbler 40 is so proportioned and located that as the tumbler 40 is moved to its released position (FIGURE 5 to FIGURE 3), the notch 96 can receive edge 92 of the locking bar 84 sufficiently therein so that the locking bar can clear the cam groove 94. The radially inward movement of the locking bar is effected by camming of the locking bar radially inwardly

along the edges of groove 94 during rotation of lock plug 28.

As clearly shown in FIGURE 6, the outer edge of the locking bar 84 can clear the edges of groove 94 when all of the tumblers 40 are in released position wherein their notches 96 are in position to receive the locking bar for its radially inward movement. The locking bar 84 is biased radially outwardly by springs 100 and 102 which are received within two cored holes 104 and 106 of key plug 28 and it is held against lengthwise movement within the cored slot 86 (FIGURE 8). Flanged guide 107 (FIGURES 2, 4) serves to retain the locking bar 84 within the key plug (FIGURE 6) and preventing its entrance within any of slots 18 or 20.

In assembling the lock, a pocket or open space 110 permits insertion of the tumblers 38 and 40 within their guideways and the pocket 110 is then closed by an insert 112 which may be held in place by staking the outer edges of the pocket at spaced points. The insert 112 limits slidable movement of tumblers 40 within their respective guideways.

Once the lock is in its locked position (FIGURE 5), it is virtually impossible to "pick," since the breaking point of the lock must be obtained with tumblers 40 at their respective positions wherein portions 48 clear slot 20 and recesses 96 must be in position to receive edge 92 of the locking bar 84 constituting an auxiliary lock means. In other words, all of the tumblers 40 must be simultaneously in their released positions such that portions 48 are out of their locked position before the key plug can be rotated since any turning of the key plug will cam the locking bar 84 inwardly to bind any non-released tumblers 40. From this, it can be seen that "picking" the lock involves not only selecting the proper breaking points of tumblers 38 but the breaking points of tumblers 40 must also be determined and simultaneously obtained or else the key plug cannot be turned.

To further discourage attempts at "picking," false or dummy slots 120 (FIGURE 8) may be added to tumblers 40, one on each side of the notch 96, so that at certain non-releasing positions of the tumbler 40 it may be capable of receiving portions 90 of the locking bar to partially release the auxiliary lock but the incomplete retraction of the locking bar 84 maintains interference with V slot 94. The result is that portion 48 of the tumbler 40 remains in contact with slot 20 although slot 120 is registered with portion 90 of the locking bar 84.

The lock has further security in that the key plug is supported at each of its opposite ends to prevent breakage by inserting a tool within key slot 50 and tapping the end.

Although operation of the lock is believed to be evident from the foregoing description, the following will serve to summarize:

A properly bitted key 54 when inserted through key hole 50 and into keyway 56 will move the tumblers 38 by contact of biting steps 58, 60, 62 and 64 with their respective surfaces 66 so that each of the tumblers 38 is moved from its locked position (FIGURE 5) to its released position (FIGURE 3). Simultaneously, the transverse groove 70 having steps 72, 74, 76 and 78 will contact the respective lugs 80 of the tumblers 40 to move them from their locked position (FIGURE 5) to their released position (FIGURE 3). At the released positions of the tumblers 40, their respective notches 96 are in registry with portions 90 of the locking bar 84 so that rotation of the key plug (FIGURE 3 to FIGURE 6) will effect inward camming movement of the locking bar by contact of its outer edge 84 in groove 94.

Since the tumblers 40 are locked both at their periphery (through portions 48) and at their sides, by the binding effect from the locking bar against the side edges of the tumblers 40, then this provides a dual locking action on each tumbler 40. This, of course, is in addition to the locking action obtained from tumblers 38, for which

an internal locking means may likewise be provided, if desired. The action of the internal locking bar, as described, is independent of the key and this provides an added factor of security.

Picking of the lock is virtually impossible because the breaking point of the tumblers 40 is dependent upon two entirely separate locking means which may be further complicated by false or dummy slots permitting only partial release of the locking bar and tumblers 40.

While only one selected embodiment of the invention has been chosen to illustrate the invention, this is not to be interpreted as restrictive of the invention. Those skilled in the art can be expected to make numerous adaptations and revisions of the invention to suit particular requirements. It is intended that such revisions and adaptations of the invention as incorporate the herein disclosed principles will be incorporated within the scope of the following claims as equivalents of the following invention.

I claim:

1. A key-operated, high security, multiple set tumbler lock, extremely difficult to pick, with a blocking movable side bar, said key having a top edge and a flat side with top and side bittings and with the top and side bittings of the key operating different sets of tumblers, the top bittings being along and on the top edge of the key and the side bittings being on the side of the key and taking the form of an irregular elongated longitudinally extending groove in the flat side of the key, said lock being of the type having at least two sets of tumblers independently actuated by a double bitted key, both sets being necessarily aligned before opening, comprising an outer cylinder and a rotatable plug, said plug having a central longitudinally extending elongated aperture for the key, tumblers arranged in at least two sets carried by and positioned in closely spaced parallel slots in the rotatable plug, and a blocking bar having side edges, one side edge being carried in a slot in the rotatable plug and in slots in at least one set of tumblers and the other side edge being carried in a receiving slot in the outer cylinder, said blocking bar serving to prevent likelihood of moving the tumblers into proper breaking position without the use of the proper bitted key and also to prevent movement of the tumblers to true breaking position by picking or decoding devices.

2. The tumbler lock of claim 1, the slots in the tumblers to receive one edge of the locking bar being arranged in sets and the slot in the outer cylinder receiving the opposite edge of the blocking bar having oblique camming sides, one effective set of the slots in the tumblers being effective to receive the blocking bar when the tumblers are moved to proper true breaking position, whereupon the blocking bar moves into the effective slots actuated by the oblique camming sides of the cylinder slot when the key is turned within the plug with both sets of tumblers in precise alignment with the periphery of the plug for opening.

3. The tumbler lock of claim 2, wherein another set of tumbler slots being spaced apart from the effective slots and serving to receive the edges of the blocking bar to block the movement of the tumblers to the true breaking position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,035,181	Molinare	Mar. 24, 1936
2,039,126	Svoboda	Apr. 28, 1936
2,375,682	Olson	May 8, 1945
2,629,247	Deutsch	Feb. 24, 1953
2,666,322	Uher	Jan. 19, 1954
2,690,070	Spain	Sept. 28, 1954
2,879,658	Johnstone	Mar. 31, 1959