Nov. 29, 1966 L. YULKOWSKI 3,287,945

CYLINDER LOCK

Filed Sept. 2, 1964

FIG. 1

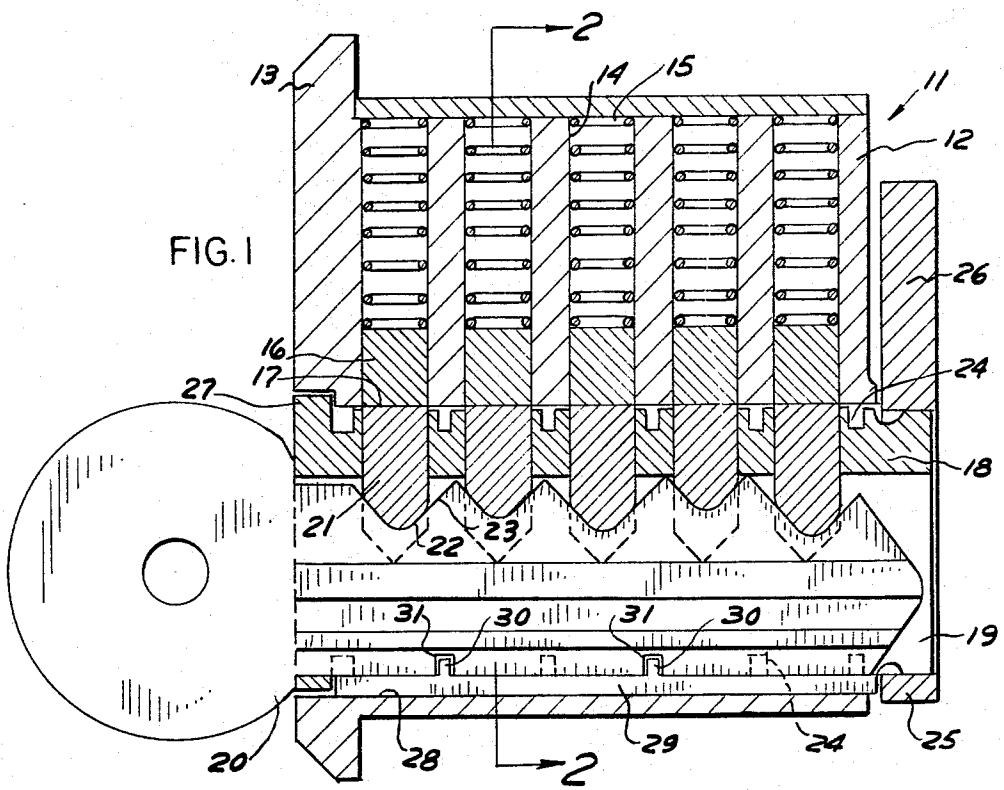
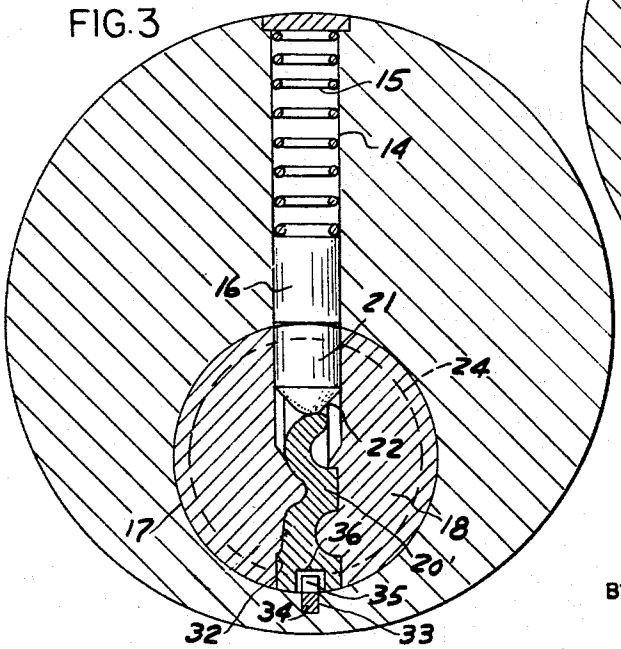


FIG. 3



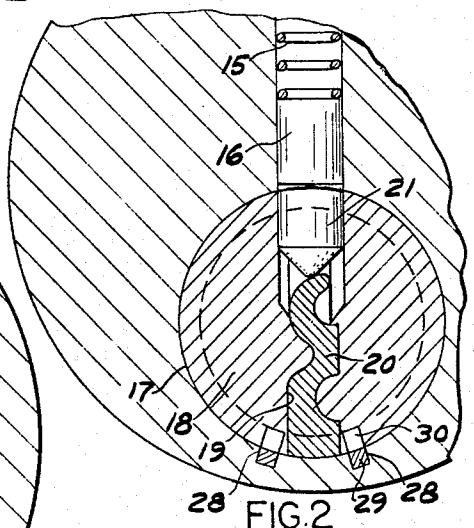


FIG. 2

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CYLINDER LOCK

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5 Claims. (Cl. 70—364)

The present invention relates to an improved cylinder lock having a novel ward construction.

It is an object of the invention to provide a novel cylinder lock with an elongated comb-like ward extending within and longitudinally through the lock shell and including one or more radial projections extending into the bore of the shell loosely registering within annular grooves in the outer surface of the rotary plug. This requires a key having the correct profile, the correct top surface indentations, but also in its undersurface a transverse notch or notches located relative to the key length for cooperative clearance registry with said ward projections to permit rotation of the key as inserted within the plug keyway.

It is another object to provide in a cylinder lock a novel form and location for a ward of comb-like form, with means to effectively nest and retain the ward body assembled within the lock shell, and with variably located ward projections on said body loosely nested within correspondingly spaced annular and circumferential grooves in the plug.

It is another object to provide an additional ward function, namely that the ward body and projections are arranged in alignment with and extend into the key-slot of the rotary plug. This requires a corresponding undercut longitudinal groove or slot in the undersurface of the key of the correct shape and size before the key may be inserted within said key slot.

The function of the keyway is to block entrance of all but the properly shaped key. The function of the pins in the rotary plug is to control the longitudinal position of the spring-biased drivers which normally extend into corresponding passages within the plug to prevent rotation thereof except for the properly bitted or cut key. The function of the wards is to block rotation of all keys with proper profile and proper biting unless the key had undercut slots to clear the wards. The location of the ward and projections within the cylinder body so as to project into the key slot of the plug requires furthermore that the key in order to function will also include in its undersurface an elongated groove of the correct size and shape to cooperatively receive the ward projections upon insertion of the key within the plug.

Thus, the present invention is directed to, not only a novel type of ward construction and method of assembly, but also to a novel location of any type of ward projection; thus requiring an additional elongated groove in the undersurface of the key for clearance registry with the ward projections. Thus, the ward projections will obstruct said keyway so that only keys of the correct profile and having the proper longitudinal groove in its undersurface may be inserted.

It is a further object to provide a ward arrangement for a cylinder lock wherein a single set of ward projections in substantial longitudinal alignment provides a double blocking function. A key is required having properly located transverse notches in its undersurface and also in its undersurface a longitudinal undercut slot.

This provides a theoretically limitless number of keyways and a corresponding number of keys or key combinations without drastically modifying the lock construction and without necessitating tighter manufacturing tolerances.

The present construction is adapted to increase security of the total locking system by reducing the number of master discs in the cylinders of large master key systems.

The present invention will reduce cylinder wear by reducing the number of pins normally required from seven or six to five. The invention will simplify maintenance and extension of master key systems wherein master keying possibilities can be expanded by a factor of 100 or more. The specific ward location in registry with the keyway slot effectively blocks all keys of prior or different manufacturer regardless of profile.

These and other objects will be seen from the following specification and claims in conjunction with the appended drawing in which:

FIG. 1 is a longitudinal section of the present cylinder lock with key inserted.

FIG. 2 is a transverse section taken in the direction of arrows 2—2 of FIG. 1.

FIG. 3 is a similar section of a modification.

It will be understood that the above drawing illustrates merely a preferred embodiment of the invention, and that other embodiments are contemplated within the scope of the claims hereafter set forth.

Conventional cylinder lock construction

The present cylinder lock **11** includes a cylindrical shell **12** having at its outer end an annular door engaging flange **13**. Bore **17** extends longitudinally through the shell, adapted to receive the key operated plug **18**. A series of longitudinally aligned parallel passages **14** are formed transversely through a portion of the shell, FIG. 1, and at their inner ends register with bore **17**. A cylindrical driver **16** is nested within each passage and is biased radially inward by spring **15**.

The cylindrical plug **18**, nested and journaled within bore **17**, has formed therein a series of longitudinally aligned radially extending slots which normally house the cylindrical pins **21** tapered at **22** at their lower ends. The plug slots for said pins are in respective longitudinal registry with the corresponding driver passages **14**, when the plug is in the position shown in FIGS. 2 and 3. In the conventional operation of locks of this type said drivers **16** are biased downwardly so as to extend partly into the pin slots of the plug for retaining the plug against rotation.

Plug **18** has an elongated upright key hole slot **19** of a predetermined profile or cross-sectional shape, FIGS. 2 and 3, and is adapted to thus receive key **20** having a corresponding profile, FIG. 1. Said key has upon its upper longitudinal surface a series of angular projections and inclined surfaces **23**, referred to as biting, adapted for cooperative registry with the lower ends of pins **21** whereby when the correct key has been fully projected within the plug, the lower ends **22** of said pins will so register with the key bitings **23** as to elevate the pins so that their upper ends are all in registry with the shear line or bore **17** in the shell. The drivers have also been individually elevated so that their lower ends are also in clearance registry with the shear line **17**.

The plug at one end has mounted and secured thereover a collar **25** which includes the radially extending cam **26** for normally operating a lock mechanism.

The other end of the plug, FIG. 1, has a slightly enlarged collar **27** which cooperatively registers with an undercut annular portion in flange **13**. The plug is retained assembled in the lock body by cam **26**.

Ward construction

A plurality of longitudinally spaced circumferential or annular channels **24** are formed in the outer surface of plug **18**. A pair of axially extending slots **28** are formed within shell **12** opening into bore **17** in registry with said plug. Slots **28** are normally arranged upon opposite sides of key slot **19** in the plug, when said opening is in the upright position shown in FIG. 2.

An elongated ward body **29** is snugly projected into and along the length of slot **28** and includes one or more radially inward extending projections **30** which loosely and cooperatively extend within the corresponding annular plug grooves **24**. Thus, normal rotation of the plug is not interfered with by the ward projections.

Said projections are variably spaced along the length of plug **18** corresponding to the spacing of channels **24**. These wards would normally interfere with rotation of key **20** but for the corresponding transverse notches **31** formed across its undersurface. Key **20** has one or more transverse notches **31** in its undersurface and longitudinally spaced for cooperative clearance registry with the ward projections **30**.

Even though the key **20** were of the correct profile and had the correct biting **23** to align pins **21** at their outer edges at shear line **17**, the key could not rotate but for the undercut transverse notches **31**. The ward construction is in the form of a comb, being entirely mounted, supported and anchored within the elongated axial channels **28** in shell **12**, FIGS. 1 and 2.

Ward modification

A modification in the ward construction is directed to the specific location of a single ward so as to lie in the plane of the key slot **32** when it is in the upright position shown in FIG. 3. An elongated slot **33** is formed in shell **12** centrally aligned with the vertical axis of key slot **32**. An elongated ward bar **34** of a cross-sectional shape corresponding to slot **33** is nested and retained within said slot and includes one or more inwardly and radially directed ward projections **35** which extend up into the plug bore and in corresponding clearance registry within one or more of the corresponding annular grooves, such as shown at **24**, FIG. 1.

This location of the ward bar **34** and its projections **35** requires a new construction of key **20'**. Its undersurface throughout substantially its length has an undercut elongated slot **36** slightly larger than and of a shape corresponding to projections **35**. Otherwise the key may not be inserted.

Thus, there is provided one additional requirement for the key, thus increasing the number of key combinations which may be employed in a locking system. The key in addition to the correct profile, correct biting, and correct transverse notches **31**, FIG. 1, must also have the correct slot **36** in its undersurface before the key can be projected into keyway **32**.

The proposed new location for the modified ward requires that the same project into the keyway space within the plug in such a way as to obstruct the key slot. Only a key having the appropriate longitudinal groove in its undersurface will clear the ward projections. The key must have not only the proper profile, undercut groove, and biting, but must also be properly notched for rotating past the ward projections. A single set of wards perform a double locking function. Thus, there is provided a theoretically limitless number of keys which will have a longitudinal groove in their undersurfaces to pass the ward projections extending into the keyway.

Having described my invention reference should now be had to the following claims.

I claim:

1. In a cylinder lock, including a shell, a rotatable plug, key operated movable pins in the plug, and spring-biased drivers in the shell bearing on the pins normally retaining the plug against rotation;

said plug having an elongated axial key slot of predetermined profile opening outwardly of one side of the plug and in registry with said pins;

the improvement comprising: an elongated ward body nested and retained in the shell and extending axially of said plug;

a plurality of longitudinally spaced ward projections on said body extending radially inward of said plug;

there being plurality of longitudinally spaced annular grooves in said plug in registry with and loosely receiving said ward projections;

and a key having a corresponding series of longitudinally spaced transverse notches in its undersurface, located in said key for cooperative clearance registry with said ward projections.

2. In the cylinder lock of claim **1**, there being a pair of parallel ward bars nested and retained in said shell spaced upon opposite sides of said key slot.

3. In the cylinder lock of claim **1**, said ward body being in radial alignment with said key slot and said ward projections extending into said key slot;

said key having an elongated longitudinal slot in its undersurface of a shape and size to cooperatively receive said projections.

4. In a cylinder lock having a shell, a plug with a keyway, a ward in said shell with a projection extending into said keyway, the improvement comprising: a key for said plug, including an elongated shank having a top edge and a bottom edge;

there being a series of irregular wedge-shaped indentations and ridges in said top edge;

there being at least one transverse slot extending through its bottom edge intermediate its ends adapted for clearance registry with said ward projection;

there being an elongated undercut slot formed into and along its bottom edge and extending to the free end thereof, adapted for slidably receiving said ward projection.

5. In a cylinder lock including a shell, a rotatable plug, key operative movable pins in the plug, and spring-biased drivers in the shell bearing on the pins extending into and normally retaining the plug against rotation;

said plug having an elongated axial key slot of predetermined profile opening outwardly of one side of the plug and in registry with said pins;

the improvement comprising a ward nested and retained in the shell;

and at least one projection on the ward extending radially inward of said plug;

there being at least one annular peripheral groove in said plug in registry with and loosely receiving said projection;

a key having a transverse notch in its undersurface, longitudinally arranged in said key for cooperative clearance registry with said projection;

said ward and projection being in radial alignment with and extending into said key slot;

said key being of a cross section corresponding to said profile and having an elongated longitudinal slot in its undersurface of a shape and size to cooperatively receive said projection.

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