July 19, 1966 F. E. BEST 3,261,189

SINGLE SHEAR LINE LOCK

Filed Dec. 10, 1963 2 Sheets-Sheet 1

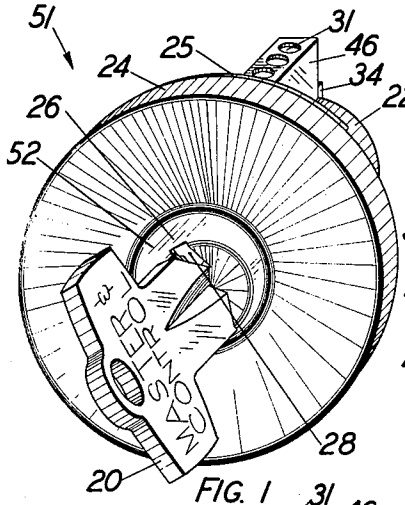


FIG. 1

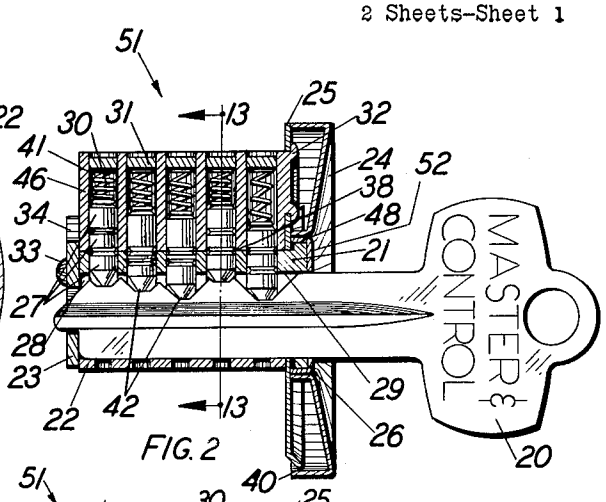


FIG. 2

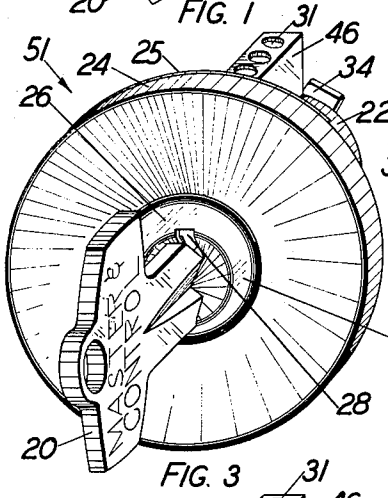


FIG. 3

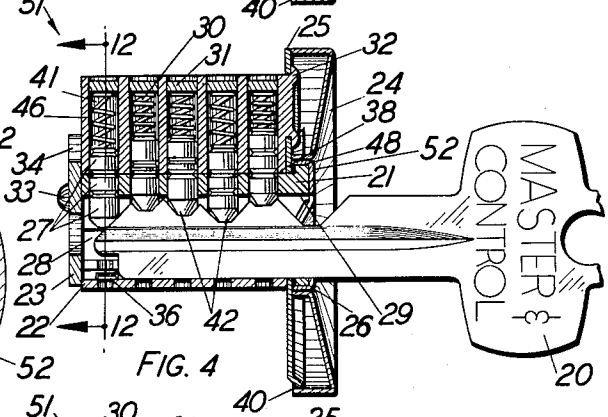


FIG. 4

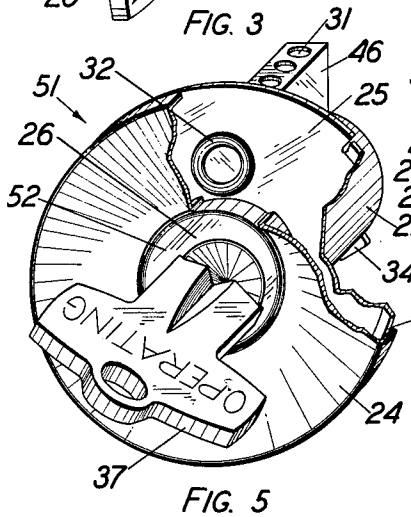


FIG. 5

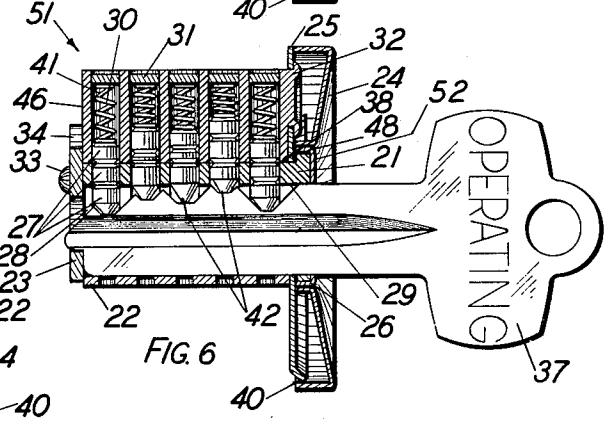


FIG. 6

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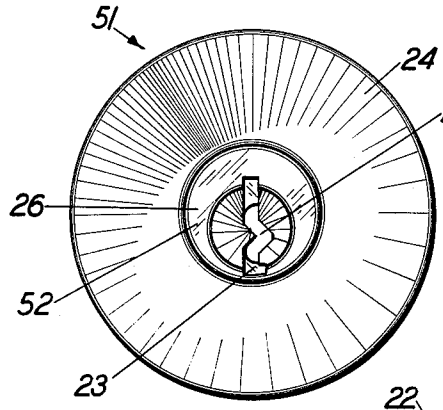


FIG. 7

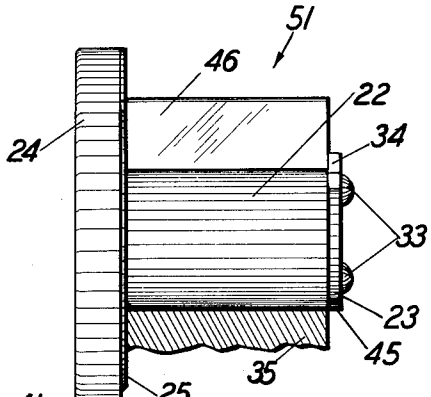


FIG. 8

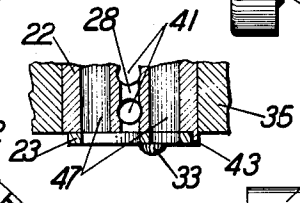


FIG. 14

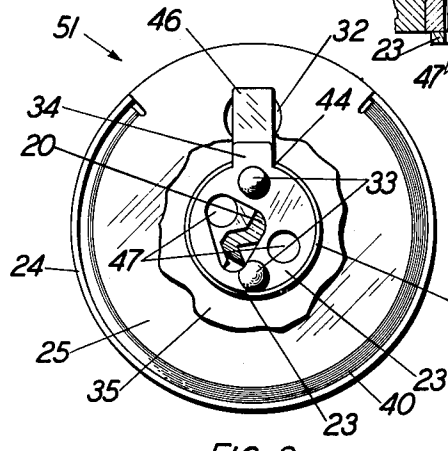


FIG. 9

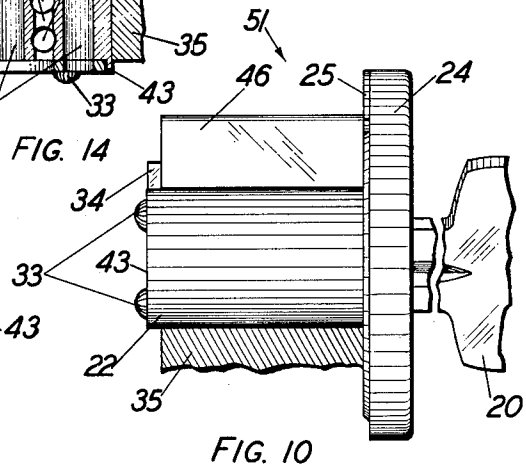


FIG. 10

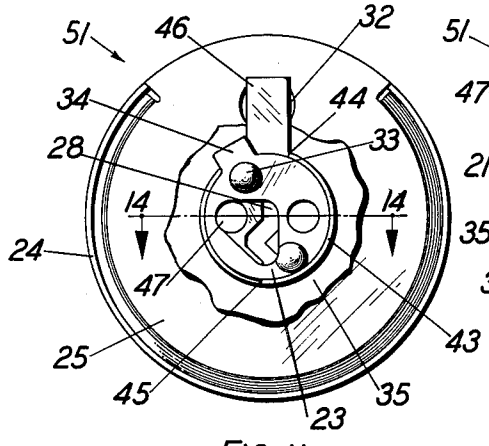


FIG. 11

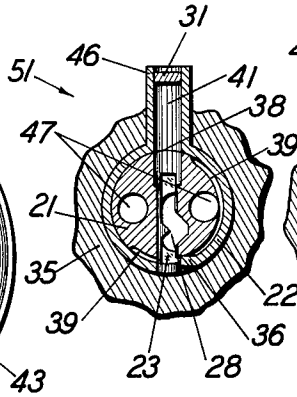


FIG. 12

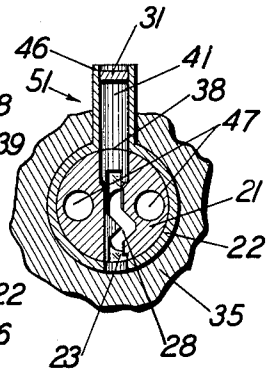


FIG. 13

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3,261,189

SINGLE SHEAR LINE LOCK

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Filed Dec. 10, 1963, Ser. No. 329,527
7 Claims. (Cl. 70—364)

Nature and objects

This invention relates to master keyed systems of pin-tumbler locks having key-removable cores and mating secondary housings.

Locks of such systems ordinarily require two classes of keys, one designated "operating" for unlocking the secondary locks and the other designated "control" for releasing and removing the cores from their housings.

Heretofore, the problem has been solved by using double shear line locks, the two shear lines being separated by a "sleeve," the upper shear line being used for core removal and the lower shear line for the ordinary unlocking functions of the lock.

I herein accomplish both functions in a single shear line lock dispensing with the costly sleeve, by turning the key in a counter-clockwise direction from key-insertion position for core insertion and removal and in a clockwise direction for unlocking the lock. This would normally require two keys, a control key and an operating key.

But here again I accomplish both functions, using a single key, by so combinating the pin-tumbler stacks, as to match a certain key when inserted to full depth and also when said certain key is retracted one notch back of full depth. Thus this certain key, which I call a "master and control" key can match the combination pattern of the segmented pin-tumblers and thus operate the lock in each of two different depth insertion positions. Now by providing a short inwardly directed lug, near the rear of, integral with, the body to guide along the side of the key near its end when the key is in its fully inserted position, to form a rotative stop against counter-clockwise motion of said key, but which is short enough so as not to thus restrict the rotation of keys which have been retracted one full notch from full insertion; I have solved my problem.

Thus various combinated keys of a system when fully inserted in a core combinated to function with said keys can turn clockwise to unlock the lock but none of them can turn counter-clockwise to release the core and only one of them, the control and master key, when retracted one notch, can turn counter-clockwise to release and remove the core.

Other objects will appear as the description unfolds.

General description

In the accompanying drawings, FIG. 1 is a front cabinet projection showing a lock core constructed in accordance with any invention with the master control key inserted in plug face **26** in said core and turned slightly, counter-clockwise to the position it would occupy preparatory to inserting said core into a housing. The rear view of this is shown in FIG. 9.

FIG. 2 is a longitudinal vertical cross section of the said core with the master-control key fully inserted in the lock up against key stop **23** in the position it would occupy preparatory to operating the lock.

FIG. 3 is a front cabinet projection of the same with the master-control key inserted in the core in the position it would occupy preparatory to operating the lock by clockwise movement.

FIG. 4 is a longitudinal vertical cross section of the same with the master-control key inserted in the core and retracted to the position it would occupy preparatory to rotation of said key counter-clockwise for the insertion

of the core into a housing and the removal of the core from said housing.

FIG. 5 is a front cabinet projection with a partial cutaway with the operating key inserted to full depth in the lock and turned clockwise to the position it would occupy when the lock is unlocked.

FIG. 6 is a longitudinal cross section with the operating key **37** inserted in the core in the position it would occupy preparatory to operating the lock.

FIG. 7 is a front orthographic projection of the core.

FIG. 8 is a side orthographic projection of the core in a cutaway section of the housing in its locked-in position.

FIG. 9 is a rear orthographic projection of the core in the housing with the master-control key in the lock in the position it would occupy preparatory to removal of said lock from said housing.

FIG. 10 is a side orthographic projection of the lock in the same position as FIG. 9 with the housing partly in cross section and partly cutaway.

FIG. 11 is a rear orthographic projection of the lock in a cutaway portion of the housing in a locked-in position.

FIG. 12 is a cross section of the core in a broken away portion of the housing taken on line **12—12** of FIG. 4 revealing shear line **38** and channel **39** and with pin-tumblers and springs removed.

FIG. 13 is a cross section of the core in a broken away portion of the housing taken on line **13—13** of FIG. 2 with pin-tumblers and springs removed.

FIG. 14 is a fragmentary cross section of the rear portion of the lock as taken on line **14—14** of FIG. 11.

Detailed description

My invention comprises a key-removable lock core **51** adapted to form-fit and complement a core housing **35**.

The core frame consists of body **22**, key plug **21**, FIGS. 12 and 13, and key stop **23**, FIG. 2, all riveted or otherwise secured together by rivets **33**, FIG. 9, preferably integral with key plug **21**.

Secured to the body **22**, preferably by rivet **32**, FIG. 5, with plug **21** is an inner face plate **25**, FIG. 2, staked to body **22** at **32**, which inner face plate **25** in turn is secured to outer face plate **24** as by induction brazing or otherwise at **40**.

The key plug **21** has a false face **52** secured thereto preferably by crimping at **48**.

Key plug **21** is broached at **29** forming a keyway **28** for the reception of various keys of the system such as master-control key **20**, FIGS. 2 and 4, having combination notches **42**.

Pin-tumblers **27**, springs **30** and caps **31** complete the core which is releasably retained in housing **35**, FIGS. 8, 9, 10, 11, 12 and 13.

FIGS. 14 and 11 show an arcuate extension **43** of body **22** which cooperates with projection **34** of key stop **23** to limit the rotative movements both ways of key plug **21** relative to body **22**. The terminals **44** and **45** of said arcuate extension **43** are shown in FIGS. 9 and 11.

FIGURES 4 and 12 show lug **36** which extends inwardly from the body **22** to form a rotative stop to fully inserted keys but which is too short, lengthwise of the core, to form such a rotative stop to a key **20**, as in FIG. 4 that has been retracted one notch from fully bottoming insertion.

This permits the control key as shown in FIG. 4 to turn counter-clockwise, which will permit projection **34**, as viewed in FIG. 11, to move over to the position shown in FIG. 9 which thus orientally lines up said projection **34** with body extension **46** and thus unlocks the breech lock for core removal.

Longitudinal key plug holes 47, FIGS. 9, 11, 12 and 13, are used to receive the end of a pronged throw member, not shown, to communicate key actuated rotary movement to a secondary lock mechanism not shown.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States of America is:

1. In a pin-tumbler lock having the lock-controlled assembly feature, in a core having a core body and a core face, the combination of elements comprising hollow rivet extension means on said core body, a circular base face plate eccentrically staked on said extension means and a covering face plate joining said base face plate at its periphery.

2. In a pin-tumbler lock, having lock-controlled assembly, comprising a key-removable core and a mating housing, said core having a body of cylindrical form integrally joined with a rectangular portion extending outward and lengthwise along one side thereof, said housing having an opening lengthwise thereof form-fitting in cross section, in part, the cross section of said core, said cylindrical portion of said body having a concentric bore lengthwise therethrough, a counterbore in one end thereof leaving a thin-walled extension to the end of said body, part of said extension being cut away, a key plug in said bore having a head portion of enlarged diameter at one end and a washer of greater diameter nestled in said counterbore and secured to said key plug at the other end, said washer having a breech-locking extension rotatively operative in the cut away portion of said body extension, said head portion and said washer trapping said key plug against endwise motion in said bore and allowing said plug free rotative motion in said bore, said body and said plug jointly having a number of transverse pin-tumbler barrels provided therein, segmented pin-tumblers, springs and caps in said barrels, said washer and said key plug having common throw pin holes longitudinal of said plug, a key way longitudinal of said key plug, an inwardly extending lug carried by the body near an end thereof, the key plug being cut away in part thereby escaping said lug, keys operable in said keyway, said core body having hollow rivet extension means at the face end thereon, a face plate member staked on said extension, a covering face plate joining said face plate member at its periphery, said face plate and said breech-lock projection trapping the core in the housing, the combination of elements comprising said thin-walled extension, said washer with its breech-locking extension and said inwardly extending lug all cooperative in the limited movements of said keys.

3. In a pin-tumbler lock having a key-removable cylindrical core, the combination comprising: a cylindrically hollow core body, a cylindrical core plug journaled within said core body, a keyway extending into said core plug, a hollow extension outwardly extending along the length of said core body, said core plug extending beyond the inner end of said core body and having a projection fixed to its inner end which overlaps the perimeter of said core body and is adapted for passage through said core body hollow extension upon alignment therewith, a lug inwardly extending from said core body and contiguous to said core plug keyway, the pin-tumblers having a first combination for providing a shear line upon full insertion of a master and control key into said keyway, said fully inserted key having a portion of its length in abutment with said lug and restricted to rotary movement in one direction, said pin-tumblers having a second combination for providing said shear line upon partial insertion of said key, said partially inserted key being free of said lug for rotary movement in two directions.

4. A lock according to claim 3 in which rotation of said partially inserted key in one direction effects locking and unlocking of said lock and rotation of said partially inserted key in said second direction effects alignment of said core plug projection with said core body hollow extension for removal of said core plug.

5. A lock according to claim 4 in which an external arcuate channel extends partially around said key plug adjacent its inner end with said lug extending therein.

6. A lock according to claim 5 in which said lug is integrally formed from said hollow core body.

7. A lock according to claim 6 in which said core plug projection is connected to said core plug by forming a part of a key stop fixed over the inner end of said plug keyway.

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