July 2, 1963 T. UNSWORTH 3,095,725

NON-TUMBLER LOCK FOR TUMBLERLESS KEY

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Fig. 1.

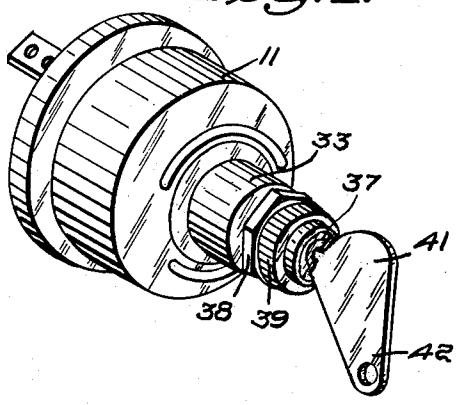


Fig. 2.

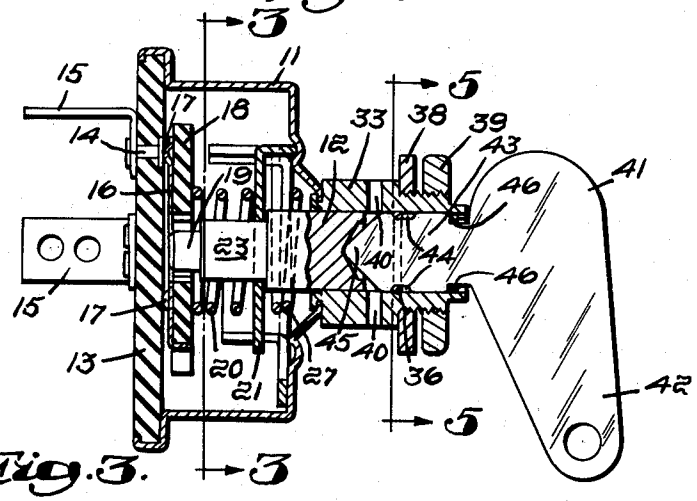
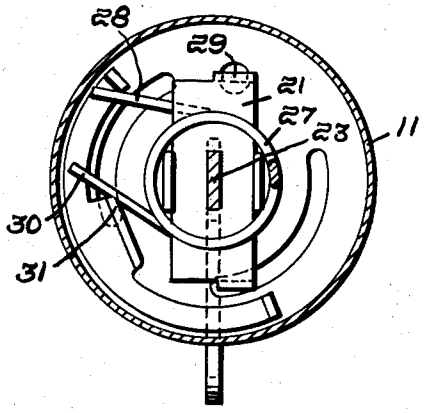


Fig. 3.



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Fig. 4.

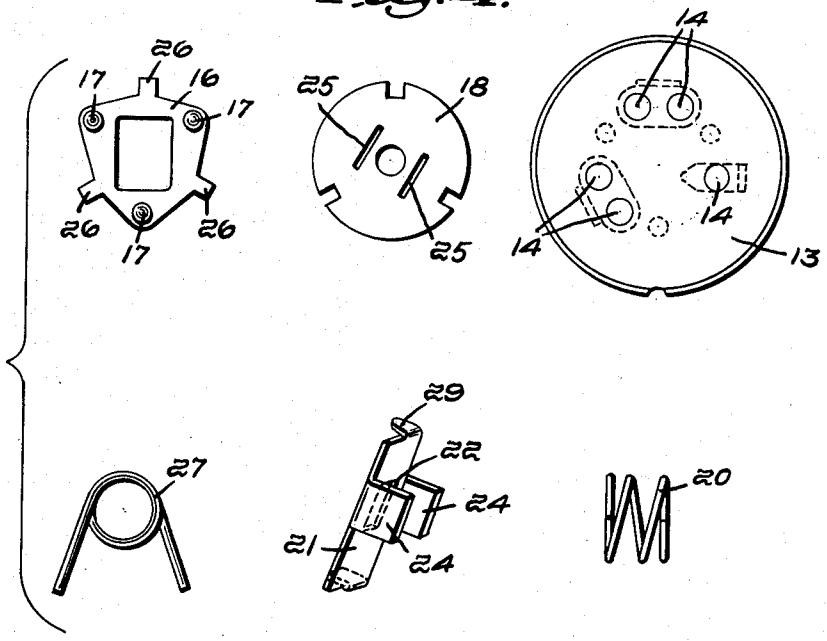


Fig. 5.

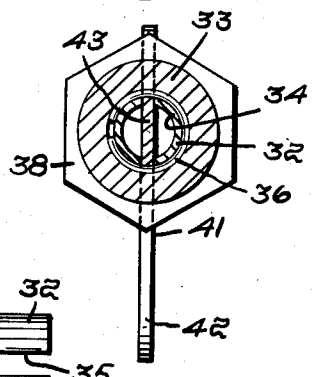


Fig. 7.

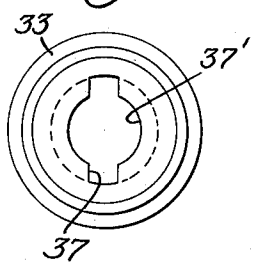
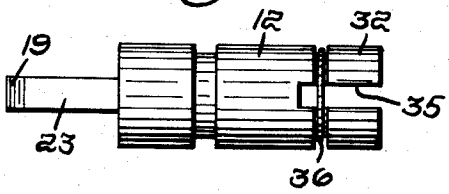


Fig. 6.



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NON-TUMBLER LOCK FOR TUMBLERLESS KEY

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1 Claim. (Cl. 70—346)

This invention relates to non-tumbler locks and keys therefor, and pertains more particularly to improvements in the lock portion of an automotive ignition switch adapted for use with a tumblerless key for operating the switch.

Heretofore, tumblerless keys for ignition switches and other non-tumbler locks have been of two general types: a so-called central type key having a substantially straight and solid shank portion; and a forked type key having a longitudinally slotted shank portion. Each type has operated satisfactorily in the lock, but the lock receiving that key may also be operated by a screwdriver, or similar flat and stiff implement which will fit in the lock chamber, so that the switch is subject to tampering by unauthorized persons.

The forked type key and complemental lock socket obviate the tampering objection, yet keys and locks of this type are more difficult and expensive to produce, and do not afford the simplicity of manufacture and operation afforded by the solid central type of tumblerless key.

It is accordingly the principal purpose of the present invention to provide a non-tumbler lock, for ignition switches or the like, having a rotatable shaft which may be operated by a complemental key having a straight and solid shank, and which cannot be operated by a screwdriver or other simple instrument.

A recommended embodiment of the invention will be described in connection with the accompanying drawings illustrating a heavy-duty, automotive ignition-starter switch providing three positions; an "off" position, an "ignition" position and a "start" position. It will be understood however, that the invention may be embodied in other forms of switches or non-tumbler locks, and that the structural details of the mechanisms herein illustrated and described may be varied to suit particular conditions or installations, without departing from the essence of the invention as set forth in the appended claim.

In the drawings:

FIG. 1 is a perspective view of an ignition-starter switch provided with a lock incorporating the improved features, with the tumblerless key in operative position;

FIG. 2 is a diametrical section of the switch, with the key and certain switch parts in elevation;

FIG. 3 is a section on line 3—3 of FIG. 2;

FIG. 4 is a composite view of certain removable elements of the switching mechanism;

FIG. 5 is a section on line 5—5 of FIG. 2;

FIG. 6 is a side view of the switch-operating shaft, turned 90° from the shaft position in FIG. 1; and

FIG. 7 is a face view of the outer end of a bushing formed with a key slot to receive the tumblerless key as shown in FIG. 1.

In the embodiment chosen for the purpose of illustration, the switch comprises a generally cylindrical casing **11** of conventional or known type, housing conventional switching mechanism for operating the ignition and starting circuits of a motor vehicle upon rotation of an axial shaft **12** from an "off" position (as shown) to an "ignition" position or to a "start" position.

Although the particular construction and operation of such mechanism is immaterial to the present invention, the elements thereof may comprise a base member **13** of insulating material, suitably fastened to the rearward end

of casing **11** and carrying suitably spaced contacts **14** and terminals **15**; a switch plate **16** having depressed contact buttons **17**, mounted upon a disc **18** of insulating material, which is apertured to fit on the inner end **19** of shaft **12**, and which is normally urged toward the base **13** by a spring **20**, to ensure engagement of the switch contacts; an actuator **21** having a central slot **22** receiving a flat portion **23** of the rotatable shaft, and having legs **24** (FIG. 4) received in complemental slots **25** of the disc **18**, so that rotation of the shaft causes corresponding rotation of the actuator and disc, and the switch plate **16** which is locked to the disc by the ears **26**; and a second spring **27** having a leg portion **28** engageable by a tab **29** of the actuator **21** and tending to restore the switch shaft to "ignition" position after it has been turned by the key to "start" position and then released; the other leg **30** of restoring spring **27** engaging a stationary stop member **31**.

For the purposes of this invention, the outer end portion **32** of shaft **12** is rotatable in a bushing **33**, and said end portion is hollow, providing a substantially cylindrical chamber or cavity **34** (FIG. 5), and the walls of said chamber are formed with opposed slots **35**. The walls of the hollow shaft end are also grooved peripherally to receive a spring C-ring **36** (FIG. 6) which resiliently retains the removable key in the switch lock as hereinafter explained.

The outer end of bushing **33** has a key slot **37**, formed with an enlarged cylindrical center opening **37'** as best shown in FIG. 7. The narrow ends of slot **37** are normally aligned with the shaft slots **35** when the key is to be inserted in the lock portion of the switch. The bushing may be externally screw threaded at its outer end, to receive one or more nuts **38**, **39** for securing the switch to a dashboard or panel; the inner end of the bushing being suitably affixed to the casing **11**, and the bushing preferably having axial openings **40** providing drain holes from the chamber **34**.

The key **41** has a handle portion **42** and a straight, solid, fin like shank **43** of the "central" type of tumblerless key. The width of the flat, fin shank is such that its edge portions may slide through the narrow end portions of the key slot **37** of the stationary bushing **33** and into the slots **35** in the cylindrical wall of the hollow end portion **32** of the switch shaft **12**. The sides of the key shank **43** are notched or recessed at **44** to receive the retaining spring **36**, and the inner end of the shank may be tapered at **45** to engage in a conical recess in the shaft **12** at the inner end of the chamber **34**.

Remote from its inner end, the key shank is notched or recessed at **46**, so that the reduced width may be rotated in the enlarged central opening **37'** of the key slot **37**, after the key has been fully inserted in the lock. In that position, rotation of the tumblerless key will rotate the shaft **12** and operate the switch mechanism, by reason of the engagement of the shank edges in the shaft slots **35**. However, when the wide portion of the key shank is disposed in the key slot **37** of the bushing **33**, it is not possible to rotate the key to turn the shaft.

Hence, the lock cannot be operated by a screw driver or other flat blade of substantially uniform width. If the blade is rotatable in the opening **37'** of the key slot of the bushing, it will turn freely in the hollow chamber at the end of the shaft; whereas, if the blade is wide enough to engage in the operating slots **35** of the shaft end, it cannot be rotated in the key slot **37** of the bushing. The improved non-tumbler lock is accordingly substantially tamper proof, yet it may easily be operated by a simple and inexpensive, central type key having a straight and solid shank or blade, provided with a portion of reduced width at the notches **46**.

I claim:

A non-tumbler lock operable by a tumblerless key having a central, straight, solid shank provided with a portion of reduced width remote from its inner end, said lock comprising a cylindrical shaft and a bushing in which the shaft is rotatable, the outer end of the shaft having a hollow portion, providing a chamber defined by a substantially cylindrical wall, and said wall having opposed slots therein adapted to receive the opposite edges of the key shank, and the bushing having a key-receiving slot consisting of relatively narrow end portions in which the edges of the key shank are freely slidable and an enlarged central opening in which the reduced width of the key shank is adapted to rotate when the key is inserted in the lock and turned therein; said narrow end portions of the slot being normally aligned with said opposed slots in the wall of the hollow portion of the shaft; and said shaft wall having a peripheral groove intersecting said wall slots, and a spring ring in said groove adapted resiliently to retain the key shank in the lock.

References Cited in the file of this patent

UNITED STATES PATENTS

528,114	Schade	Oct. 23, 1894
2,062,440	Beal	Dec. 1, 1936
2,894,082	Collotta	July 7, 1959