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Krom et al.

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[54] **KEY INDICATING SWITCH**

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[73] Assignee: **General Motors Corporation**, Detroit, Mich.

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[52] **U.S. Cl.** **200/44**, 200/61.66

[51] **Int. Cl.** **H01h 27/06**

[58] **Field of Search** ..... 200/61.66, 42 R, 44; 70/237, 239

[56] **References Cited**

UNITED STATES PATENTS

3,520,161	7/1970	Jacobi	200/61.66 X
2,215,162	9/1940	Scott	200/44

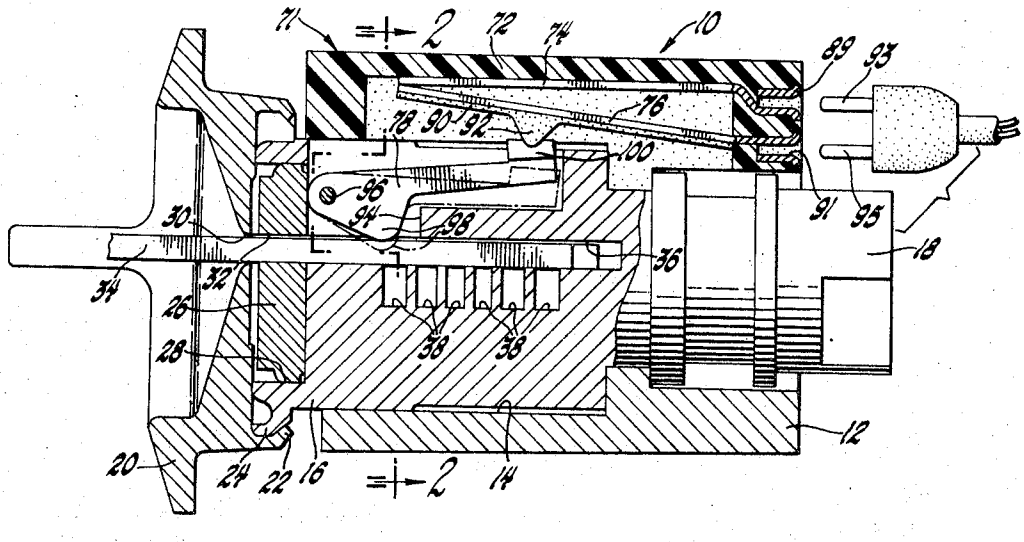
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[57] **ABSTRACT**

A key indicating switch is located in a dielectric housing mounted on the cylindrical casing of an ignition lock assembly. A first contact of the switch is mounted stationary on the switch housing and the second contact is mounted on an integral flexure finger of the housing. A core rotatable in the casing has a central key receiving slot and a passage communicating the key receiving slot to the switch housing. An actuating lever pivotally mounted to the core in the second slot includes a first abutment portion engaging an abutment of the flexure finger and a second abutment portion extending into the key receiving slot. When the key is inserted into the key receiving slot, the actuating lever is pivoted and deflects the flexure finger to carry the second contact into electrically conducting engagement with the first contact.

2 Claims, 4 Drawing Figures



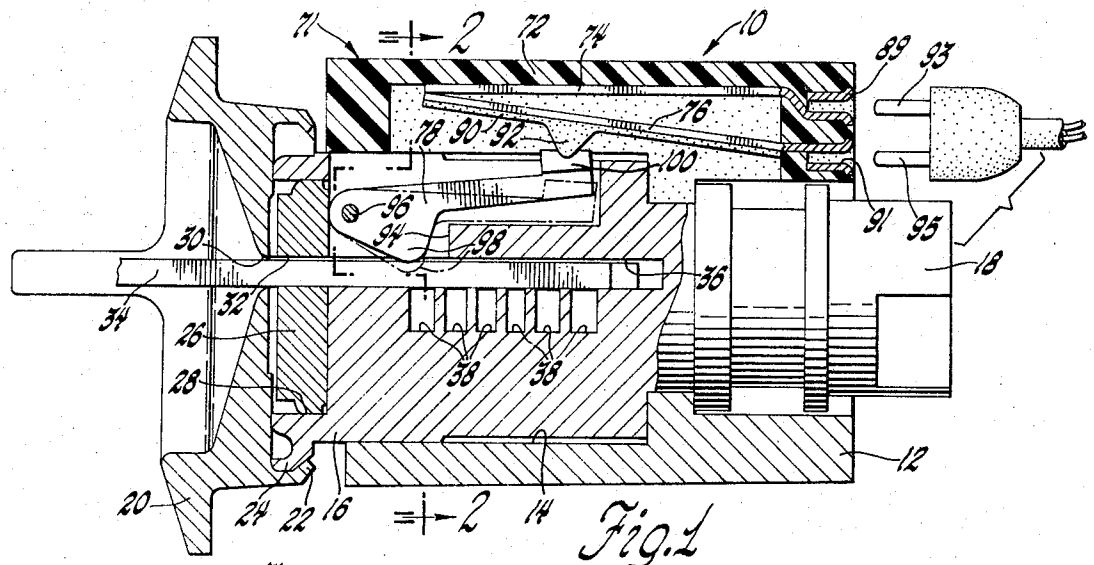


Fig. 1

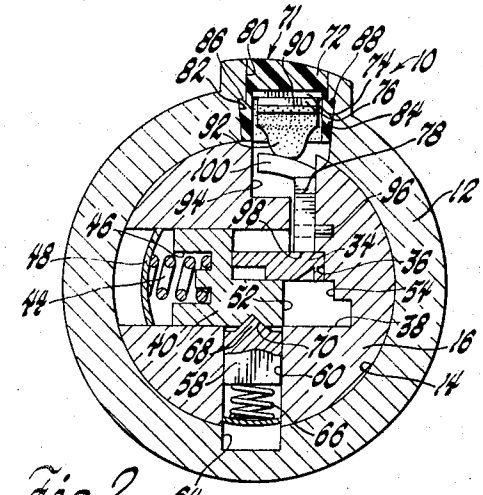


Fig. 2

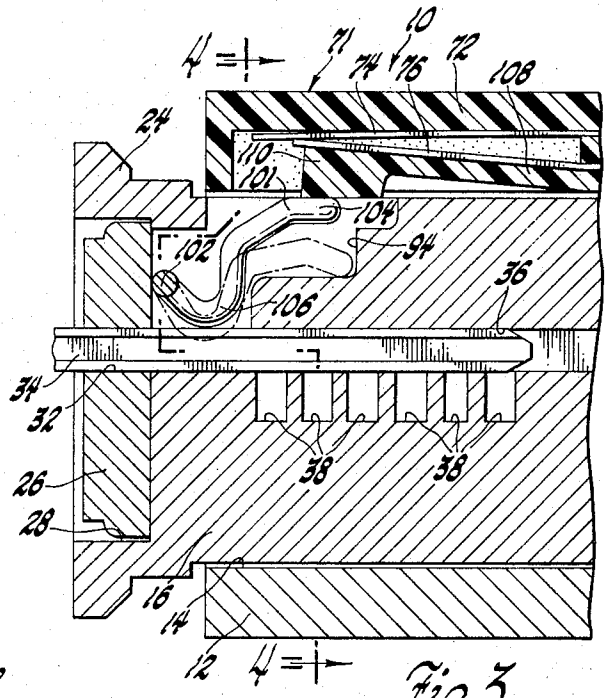


Fig. 3

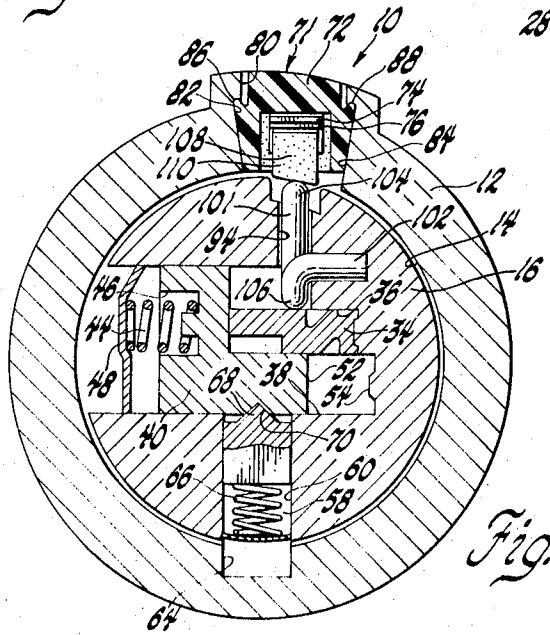


Fig. 4

KEY INDICATING SWITCH

The invention relates to a lock cylinder having a key indicating switch assembly.

It is known to provide an ignition lock having a switch which is closed upon insertion of the key into the lock. Such a switch is typically connected to an electrical buzzer circuit to indicate the presence of the key in the lock and thereby remind the vehicle operator to remove the key from the lock when exiting the vehicle.

According to the present invention, an improved key indicating switch for an ignition lock is provided. The key indicating switch according to the invention is located in a housing mounted on the cylindrical outer casing of the ignition lock assembly. The housing is constructed of dielectric material and mounts radially spaced first and second electrical contacts. The first contact is stationary and the second is mounted on an integral flexure finger of the housing for movement therewith. A lock core is rotatable within the casing and includes a central key slot and conventional side bar locking means which normally lock the core relative the housing and are moved to an unlocking position upon insertion of a properly bitted key into the key slot. A passage in the core communicates the key slot to the outer periphery of the core adjacent the housing. The flexure finger has an abutment portion which extends into the passage of the core. An actuating lever pivoted to the core within the passage engages the abutment of the flexure finger of the housing and is urged thereby into the key slot. When the key is thrust into the key slot, the side of the key pivots the actuating lever which in turn forces the abutment of the flexure finger out of the passage and carries the second contact into electrically conducting engagement with the stationary first contact, thus indicating presence of the key in the ignition lock.

One feature of the present invention is the provision of a dielectric switch housing having an integral finger which insulates a key actuated actuating lever from the movable contact of the switch.

Another feature of the invention is the provision of a dielectric housing having an integral flexure finger and a movable contact which bias an actuating lever into the key slot of the lock core for engagement by the key when inserted therein to move the actuating lever and flexure finger and thereby close the switch.

These and other features, objects and advantages of the invention will become apparent upon consideration of the specification and appended drawings in which:

FIG. 1 is a plan view of an ignition lock assembly according to the invention having parts broken away and in section;

FIG. 2 is a cross-section view taken in the direction of arrows 2—2 of FIG. 1;

FIG. 3 is a plan view of a second embodiment of the invention having parts broken away and in section; and

FIG. 4 is a sectional view taken in the direction of arrows 4—4 of FIG. 3.

Referring now to FIGS. 1 and 2 of the drawings, the lock cylinder and key indicating switch assembly generally indicated at **10** includes a cylindrical outer casing **12** which is adapted to be mounted by suitable means on a fixed support, not shown. The casing **12** has a

stepped bore **14** in which a core **16** is rotatable. The inner end **18** of the core **16** is connected to an ignition switch or equivalent device to be operated.

A bezel **20** is attached to the outer end of the core **16** by staking a flange **22** of the bezel **20** over flange **24** of the core **16.** A circular cover plate **26** is received in a recess **28** of the core **16** and captured in the recess by the bezel **20.** The bezel **20** and cover plate **26** have respective aligned slots **30** and **32** through which a key **34** is received. The core **16** has a central ribbed slot **36** which receives the key **34.** The key slot **36** of the core **16** is traversed by a number of slots **38.** A tumbler **40,** as best seen in FIG. **2,** is slidably mounted in each of the slots **38.** Coil compression springs **44** are engaged in recesses **46** of the tumblers **40** and are seated on a closure strip **48** to continually bias the tumblers to their locked positions wherein the shoulders **52** of the tumblers **40** engage respective shoulders **54** of the core **16.**

A side bar **58** locks the core **16** from rotation in the casing **12** when the tumblers **40** are in their locked positions. The side bar **58** is slidable in a slot **60** of the core **16** and an aligned slot **64** of the casing **12.** A spring **66** seated in a recess at each end of the side bar **58** and on a closure strip at each end of slot **60** biases the side bar **58** out of slot **64** and seats a triangular cross section rib **68** thereof against tumblers **40.** When a properly bitted key **34** is inserted in the key slot **36** of the core **16,** the tumblers are moved to their locked position, as shown in FIG. **2.** This aligns the notches **70** of the tumblers so that the rib **68** of the side bar **58** can fit therein and the side bar **58** is sufficiently retracted from the slot **64** of casing **12** to permit rotary movement of the core **16** relative the casing **12** and consequent operation of the connected ignition switch, not shown. The foregoing tumblers and side bar are conventional.

A key indicating switch, indicated generally at **71,** is provided which is closed upon entry of the key **34** into the key slot **36** of the core **16.** Generally, the switch includes a housing **72,** a first contact **74,** a second contact **76,** and an actuating lever **78.**

The housing **72** is constructed of dielectric material such as plastic and is received in a longitudinally extending slot **80,** FIG. **2,** of the casing **12.** The slot **80** has converging walls **82** and **84** which extend generally radially of the casing and undercut shoulders **86** and **88** which engage complementary mating ribs of the housing **72** so as to retain the housing **72** in the casing **12.** The housing **72** includes an integral flexure finger **90** which extends along the second contact **76** on the side thereof opposite the first contact and is normally self biased clockwise of its fixed end. Flexure finger **90** has an abutment **92** engageable by the actuating lever **78** as will be described hereinafter to move the flexure finger **90** and thereby move the second contact **76** into engagement with the stationary first contact **74** mounted on housing **72** as seen in FIGS. **1** and **2.** The contacts **74** and **76** have respective attached cup-shaped female connectors **89** and **91** which respectively receive male connectors **93** and **95** to connect the contacts **74** and **76** to a key reminder signal or other electrical circuit.

The actuating lever **78** is received in an L-shaped cross-section passage **94** of the core **16** and pivoted to a wall of the core **16** by a pivot pin **96.** The passage **94** communicates key slot **36** to the outer periphery of

core 16 and to switch housing 72. The actuating lever 78 has a first lateral abutment 100 which engages the abutment 92 of the flexure finger 90 of housing 72 and a second abutment 98 which is biased by the flexure finger and contact 76 into the key slot 36. When the key 34 is inserted into the key slot 36, the abutment 98 is engaged by the side of the key 34 to pivot lever 78 counterclockwise about the pivot pin 96. This causes abutment 100 to move the flexure finger 90 and move the second contact 76 into contact with the first contact 74 to complete the key reminder or other electrical circuit. The actuating lever 78 is located so that its abutment 98 is as close as possible to the outer end of key slot 36 so that the key reminder or other electrical circuit is closed even though the key 34 is only partially inserted into slot 36. When the key 34 and core 16 are rotated in the casing 12, the abutment 92 of the switch housing 72 rides on the outer periphery of the core 16 to maintain the key reminder switch in closed position. The outer periphery of the core 16 may of course have appropriately spaced depressions therein for receiving the abutment 90 when core 16 is in selected rotational positions to allow the key indicating switch to open. When the key 34 is removed from the slot, the flexure finger 90 and contact 76 bias the actuating lever 78 to its rest position, as shown in dash lines in FIG. 1 wherein abutment 98 enters slot 36.

Referring to FIGS. 3 and 4, a second embodiment of the invention is shown and like elements are designated by like numerals. In this embodiment, the actuating lever 101 is in the form of a bent rod having an integral lateral pivot pin 102 at one end thereof received in a recess of the core 16 to mount the lever within the passage 94. The lever 101 includes integral bent portions 104 and 106 providing the first and second abutments. The flexure finger 108 is again integral with the switch housing 72 and the abutment 110 thereof is located adjacent the free end thereof. This embodiment functions in substantially the same manner as the first embodiment.

As shown in FIG. 4, the side bar locking means is essentially the same as that of the first embodiment although the tumblers 40 are slightly wider and likewise the slots 38 are correspondingly wider. The escutcheon 20 is dispensed with and the cover plate 26 is suitably secured within the recess 28.

From the foregoing description, it can be seen that the key indicating switch can be applied to various types of side bar locks and, of course, can likewise be applied to various types of pin tumbler locks.

Thus, the invention provides an improved key indicating switch.

What is claimed is:

1. In a lock assembly having a casing, a core rotatable in the casing and having a central key receiving slot and locking means acting between the core and the casing to normally lock the core from rotation in the casing and to unlock the core to permit rotation when a properly bitted key is inserted into the key slot, a switch assembly for indicating presence of the key in the key slot of the core comprising: a switch housing of dielectric material mounted on the casing, a passage in the core communicating the key slot to the switch housing, a first electrical contact mounted stationary on the switch housing, an electrically insulative flexure finger in the switch housing having an abutment extending into the passage of the core, a second electrical contact carried on the flexure finger and spaced radially from the first contact when the flexure finger extends into the passage, and an actuating lever pivotally mounted in the passage of the core and having a first abutment portion engaging the flexure finger and a second abutment portion extending into the key slot, the key engaging and rotating the pivotally mounted actuating lever when inserted into the key slot to deflect the flexure finger and carry the second contact into electrically conducting engagement with the first contact.

2. In a lock assembly having a cylindrical casing, a core rotatable in the casing and having a central key receiving slot and locking means acting between the core and the casing to normally lock the core from rotation in the casing and to unlock the core to permit rotation when a properly bitted key is inserted into the key slot, a switch assembly for indicating the presence of the key in the key slot of the core comprising: a switch housing of dielectric material mounted on the casing, a passage in the core communicating the key slot to the switch housing, a first electrical contact mounted stationary on the switch housing, a flexure finger integral with the switch housing and having an abutment normally biased into the passage of the core, a second electrical contact movably mounted in the switch housing adjacent the flexure finger and radially spaced from the first contact when the flexure finger extends into the passage of the core, and an actuating lever pivotally mounted in the passage of the core and having a first abutment portion engaging the flexure finger and a second abutment portion extending into the key slot relatively near the outer end of the key slot whereby the key engages and rotates the pivotally mounted actuating lever when partially inserted into the key slot to deflect the flexure finger and carry the second contact into electrically conducting engagement with the first contact.

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