United States Patent [19]

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[11] **3,787,812**

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[54] **PICK-PROOF LOCK**

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[21] Appl. No.: **190,905**

[52] **U.S. Cl.** ..... **340/164 R,** 70/278, 70/283, 200/44, 340/274

[51] **Int. Cl.** **E05b 47/00,** E05b 45/10

[58] **Field of Search** ..... 70/277, 278, 282, 283, 356, 70/358, 416, 419, 421, DIG. 49; 200/44; 340/164 R, 274

[56] **References Cited**

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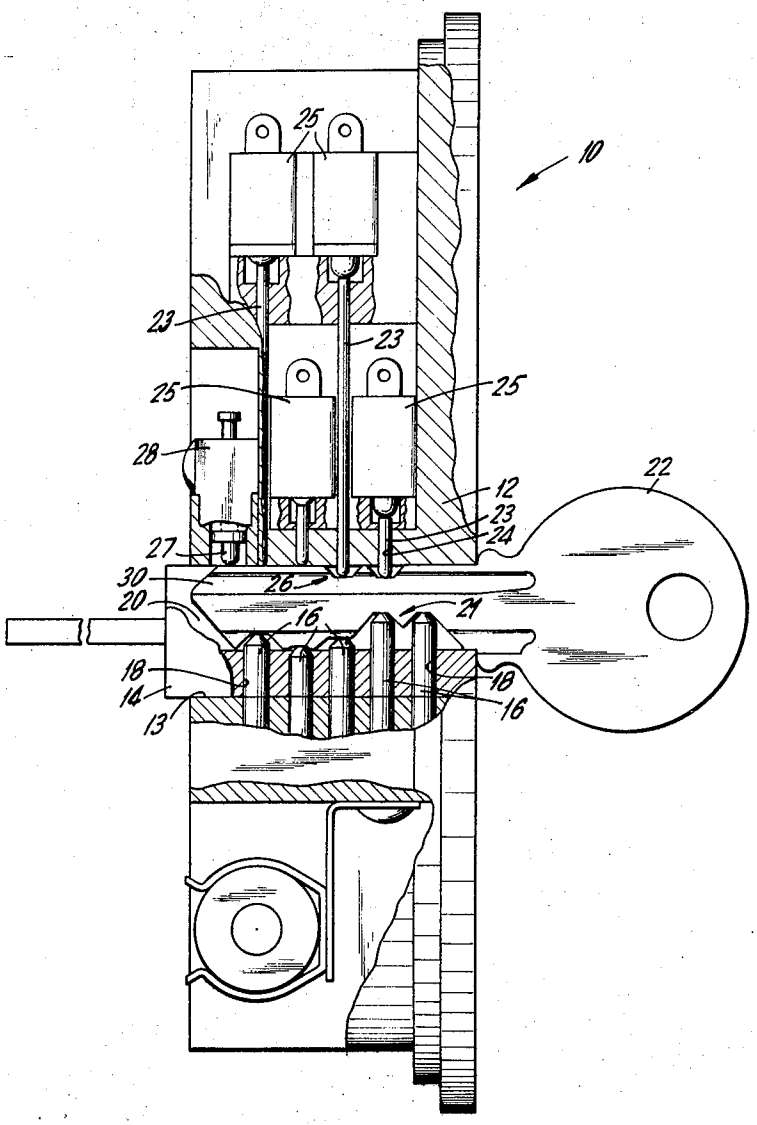
[57] **ABSTRACT**

A pick-proof lock for use with a key having a double bitting. First means is included for reading the first bitting. Second means is included for reading the second bitting to open the lock only when the first bitting reading means and second bitting reading means are enabled by a key having the proper bittings. Unlocking preventing means prevents unlocking of the lock until the second bitting reading means is enabled. Responsive means disables the unlocking preventing means when the second bitting reading means is enabled.

6 Claims, 3 Drawing Figures



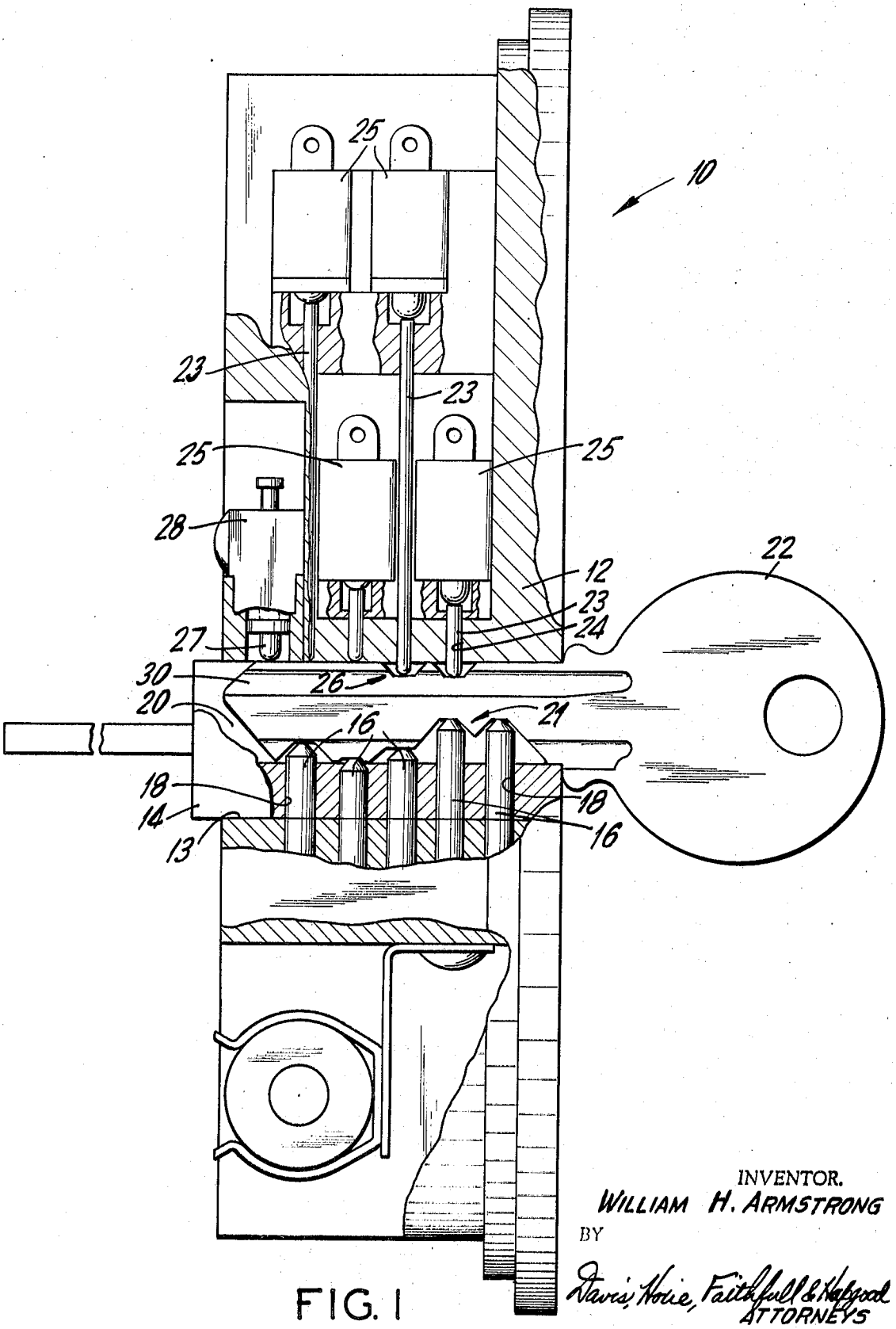


FIG. 1

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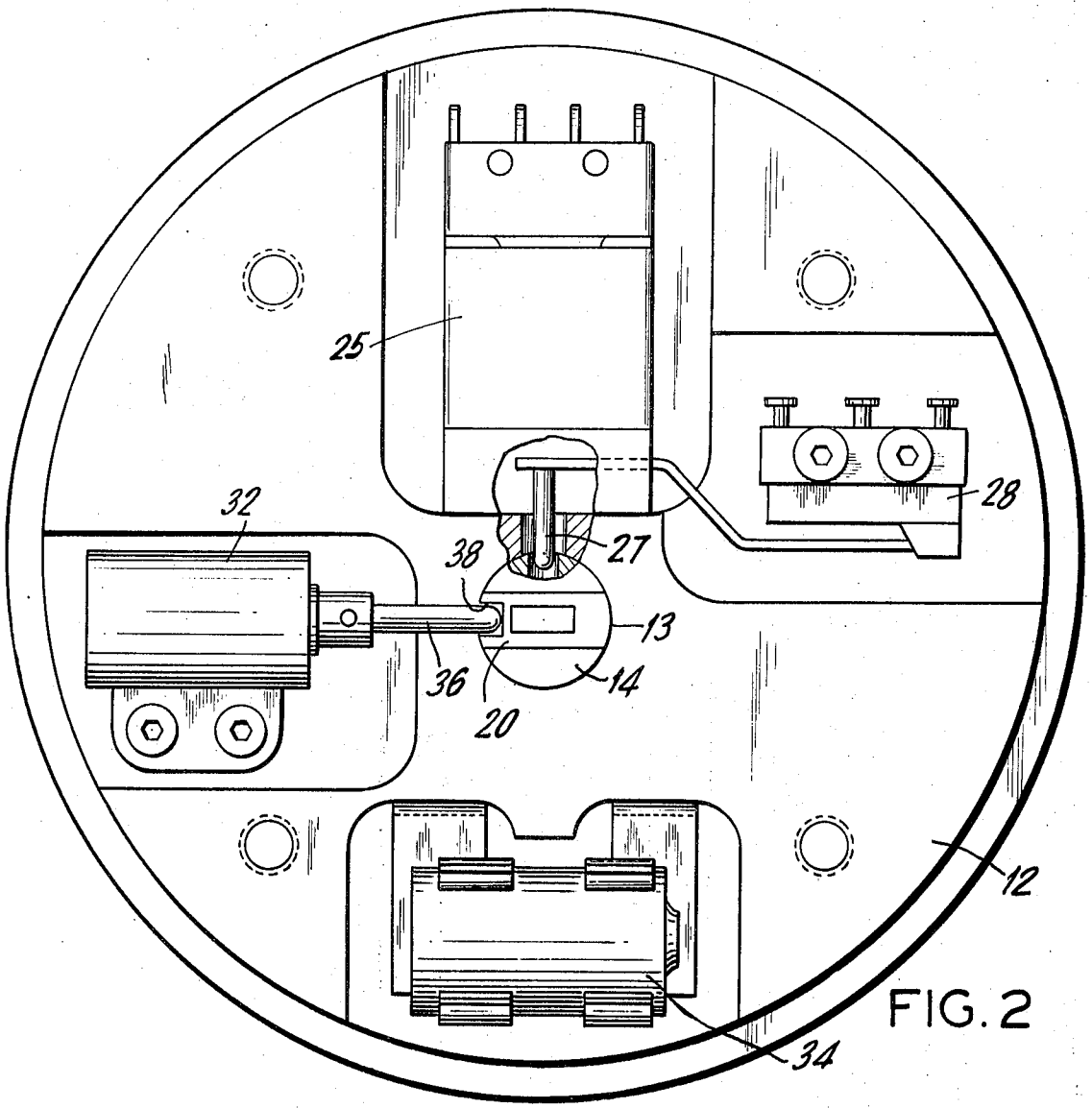

FIG. 2

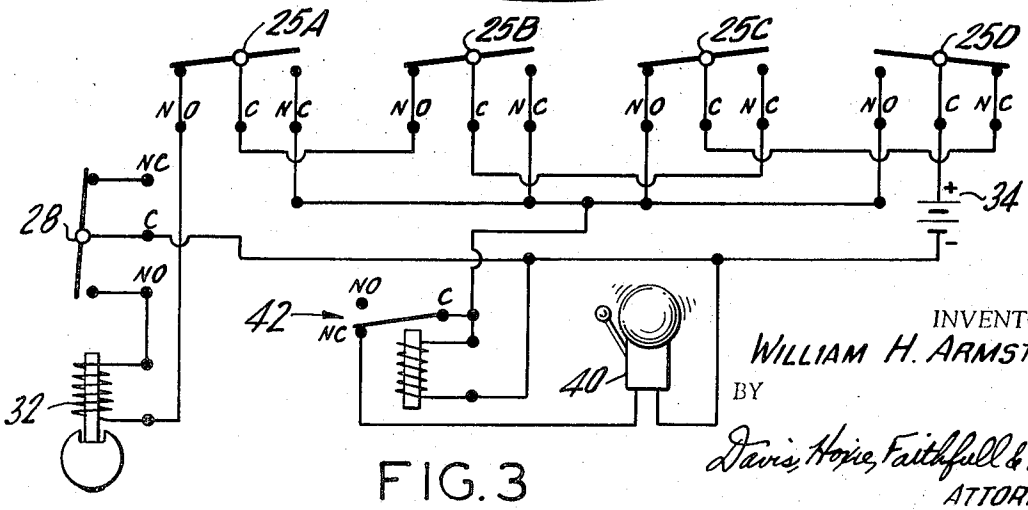

FIG. 3

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PICK-PROOF LOCK

The present invention relates to locks and more specifically, to a pick-proof lock for use with a key having a double bitting.

Various devices known in the art have been used with locks for actuating alarms to indicate attempts at improper access. For example, U.S. Pat. No. 3,427,413 and 2,057,301 disclose the utilization of electric switches with locks having standard pin tumblers for actuating an alarm to signal an attempt at improper access. However, none of the prior art devices disclose a pick-proof lock for actuation by a key having a double bitting.

It is an object of the present invention to provide a pick-proof lock.

It is a further object of the present invention to provide a lock for use with keys having double bittings to enhance the number of different key changes possible.

It is a further object of the present invention to provide a pick-proof with alarm signal means.

Briefly, the pick-proof lock of the present invention includes a first means for reading the first bitting and a second means for reading the second bitting to open the lock only when the first bitting reading means and second bitting reading means are enabled by a key having the proper bittings. Unlocking preventing means prevents unlocking of the lock until the second bitting reading means is enabled. Responsive means disables the unlocking preventing means when the second bitting reading means is enabled.

Other objects, aspects and advantages of the present invention will be more fully understood when the detailed description is considered in conjunction with the drawings as follows:

FIG. 1 is a partial sectional view of a pick-proof lock according to the present invention;

FIG. 2 is a top plan view of the lock of FIG. 1; and

FIG. 3 is a schematic diagram illustrating one possible circuit arrangement for the enabling switch, the alarm actuating switches, and the alarm circuitry, in use with a key having the improper bitting.

Referring to FIGS. 1 and 2, the pick-proof lock **10** includes a housing **12** having a recess **13** and a cylinder or barrel **14** positioned in the recess **13** for rotational movement therein in a conventional manner.

A first bitting reading means or tumblers **16** are positioned in the housing **12**, e.g. by springs (not shown), and extend into bores **18** arranged in the cylinder **14** transversely to the direction of longitudinal key slot **20**. A key **22** having the proper bitting **21** will, upon insertion into slot **20**, move the tumblers **16** upward to the desired position for enabling the barrel **14** to rotate.

Disposed 180° opposite to the tumblers **16** is a second bitting reading means or plungers **23** positioned for reciprocating movement in housing **12** and extending into bores **24**. The plungers **23** are in contact with microswitches **25** and act to open or close the microswitches **25** in response to a key **22** having the proper second bitting **26**. An additional plunger **27** is arranged at the opposite end of slot **20** for actuation of microswitch **28**.

Microswitch **28** which may be arranged to be normally closed is opened by the downward movement of plunger **27** when engaged by the end **30** of the second bitting **26**. The plunger **27** thus in a sense reads the length of the key **22** to determine if the key **22** is of the proper length.

As shown in FIG. **3**, a solenoid **32** is electrically connected in series with the terminals of microswitches **25A**, **25B**, **25C**, **25D** and **28** to a source of power, shown as a battery **34**. (The terminals are designated as normally open [NO], common [C], and normally closed [NC].) Utilizing the proper key **22** having the proper bit length and second bitting **26** will open microswitch **28** and close normally open microswitches **25C** and **25D** and open normally closed microswitches **25A** and **25B** allowing the solenoid **32** to be energized. Energization of the solenoid **32** retracts movable core arm **36** from core slot **38**, allowing the barrel **14** to rotate to retract a bolt (not shown) for unlocking the door, see FIG. **2**.

Further, a conventional bell alarm **40** and relay **42** may be electrically connected to the second bitting reading means for actuation should the microswitches **25** be partially actuated by having one or more of the microswitches improperly opened or closed, e.g., by insertion of a key having the improper bitting. As shown in FIG. **3**, microswitch **25C** remains in a normally open state due to use of a key with the improper bitting **26** thereby preventing energization of the solenoid **32** and also causing energization of the alarm **40**.

In the normal, inoperative, position the tumblers **16** and plungers **23** and **27** extend into the cylinder **14** and the core arm **36** is positioned within the core slot **38** to prevent rotation of the cylinder **14** within the housing **12** and unlocking of the lock. When a key having the proper bittings **21** and **26** is inserted into the key slot **20**, the tumblers **16** move upward in bores **18**, thereby enabling the first bitting reading means. Further, the required plungers **23** and **27** are also depressed, thereby closing microswitches **25** and **28** and enabling the second bitting reading means. The lock **10** is opened by simply rotating the key **22** and barrel **14** as with conventional locks.

At least one of the microswitches **25** and **28** should be normally open. When a key **22** having the proper bitting **26** is inserted into the key slot **20** the end **30** of the key **22** will be read by microswitch **28**. The desired microswitches **25** and **28** must all be closed to complete the circuit to the solenoid **32** for retraction of core arm **34** from core slot **36**, thereby disabling the core arm **34** and allowing the barrel **14** to rotate within the housing **14** to open the lock.

By arranging the microswitches **25** (shown as four in the drawing) and microswitch **28** in open or closed positions, **70** combinations are proper, thereby multiplying the conventional number of key combinations by **70**.

What is claimed is:

1. A lock of the type having a rotatable cylinder arranged within a housing and tumblers extending into the key slot of the cylinder to receive the biting of a key, wherein the improvement comprises:

means for preventing the rotational movement of said cylinder to prevent unlocking of said lock even when a key with the proper bitting is read by the tumblers; and

means including a microswitch for simultaneously reading a second bitting of the key arcuately disposed from the tumblers to disable said rotation preventing means in response to a key with the proper second bitting, whereby the lock may be immediately opened.

2. A lock as claimed in claim **1** including:

an alarm;

means electrically coupled to said disabling means for actuating said alarm when said disabling means is partially disabled.

3. A pick-proof lock comprising:

a lock housing having a recess arranged therein;

a cylinder positioned in said recess for rotation therein, said cylinder having a longitudinal key slot arranged therein;

tumblers positioned in said housing and extending into spaced slots arranged transversely to said key slot and adapted for reciprocal movement allowing said cylinder to rotate within said housing when engaged by a key having a proper first bitting;

means for preventing rotational movement of said cylinder to normally prevent unlocking of said lock; and

means including a microswitch for simultaneously engaging a second bitting of the key to disable said rotation preventing means in response to a key having the proper second bitting, whereby the lock may be immediately unlocked.

4. A pick-proof lock as claimed in claim **3** including:

an alarm;

means electrically coupling said alarm to said disabling means for actuation of said alarm when said disabling means is partially disabled.

5. A pick-proof lock comprising:

a lock housing having a recess arranged therein;

a cylinder positioned in said recess for rotation therein, said cylinder having a longitudinal key slot arranged therein;

tumblers positioned in said housing and extending into spaced slots arranged transversely to said key slot and adapted for reciprocal movement allowing said cylinder to rotate within said housing when engaged by a key having a proper first bitting;

means for preventing rotational movement of said cylinder to normally prevent unlocking of said lock, said rotation preventing means including a solenoid with a movable core arm and a core slot arranged in said cylinder into which said core arm is normally positioned; and

means for disabling said rotation preventing means in response to a key having a proper second bitting, whereby the lock may be unlocked only with a key having the proper double bitting, said disabling means including a plurality of microswitches electrically coupled to said solenoid, and a source of electric power connected in series with said solenoid and said microswitches, whereby actuation of said microswitches energizes said solenoid causing retraction of said movable core arm from said core slot.

6. A lock of the type having a rotatable cylinder arranged within a housing and tumblers extending into the key slot of the cylinder to receive the bitting of a key, wherein the improvement comprises:

means for preventing the rotational movement of said cylinder to prevent unlocking of said lock even when a key with the proper bitting is read by the tumblers, said rotation preventing means including a solenoid having a movable arm and a slot arranged in said cylinder for engagement with said movable arm; and

means for simultaneously reading a second bitting arcuately disposed from the tumblers to disable said rotation preventing means in response to a key with the proper second bitting, whereby the lock may be immediately opened.

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