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54 **Self-holding type key switch device.**

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Description

The invention relates to a self-holding key switch, wherein a switch is combined with a lock adapted to be released by inserting a key and the switch is turned on or off by rotating the inserted key.

In a key switch according to the Japanese Utility Model Laid-Open No. 1341/1981, a rotor or rotatable cylinder of a lock main body is rotated by means of a key inserted into the cylinder, and a microswitch fitted to the rear of the lock main body is turned on and off by a cylindrical cam that rotates integrally with the cylinder. The cylinder and the cam being freely rotatable in both directions by means of the key, accidental or unintentional rotation of the inserted key by an operator can lead to the switch being turned on or off, there being no necessity of rotating the key up to 360° in order to turn of the switch. In particular, when the key has been rotated in the normal operating direction to turn on the switch and is then unintentionally rotated in the reverse direction through a small angle, the switch can return to the off state easily within a short period of time.

The document DE—B—1 131 464 describes a key-operated combined ignition and starter switch for an engine of a motor vehicle, the switch having the features described in the prior art portion of claim 1. Insertion of a key into a cylinder lock and rotation of the key in one direction brings a rotary switch from an off position into an ignition position and then into an engine starting position, at which stage a spring mechanism rotates the cylinder in the reverse direction to bring the switch back to the ignition position. In order to prevent the switch from being inadvertently rotated a second time to the starting position before being first returned to the off position, a separate ratchet mechanism is provided, wherein two cam discs are fitted coaxially onto a rear extension of the lock cylinder, the rear cam disc being rotated integrally with the cylinder and the front cam disc being free to rotate with respect to the cylinder and the rear cam disc within a limited angular range. In the off position of the switch, two spring-loaded pawls, pivotally supported at the lock main body, each engage with one of two slight recesses formed on opposite perimeter portions of the front cam disc. Rotation of the cylinder to the ignition and engine starting positions first allows only the rear cam disc to rotate, whereafter the front cam disc is constrained to rotate in the same direction, the pawls being slid out of the slight recesses and then dropping into cutout portions of the perimeter of the front cam disc to abut against the perimeter of the rear cam disc. The subsequent spring-urged return of the cylinder to the ignition position causes the rear cam disc to rotate and one of the pawls to engage immediately with a tooth of the rear cam disc, so as to block a return of the cylinder to the starting position. Further rotation of the cylinder to the ignition position causes the other pawl to engage

with a second tooth portion of the rear cam disc, so as to block a return of the cylinder to the starting position from a position close to or at the ignition position. Return of the cylinder to the off position then rotates the front cam to slide the pawls out of engagement with the rear cam disc and to engage the pawls with the slight recesses of the front cam disc.

It is the object of the present invention to provide a self-holding key switch of the type in which a cylindrical cam rotates integrally with the lock cylinder to push or release the actuator of a switch to turn the switch on or off, wherein the switch in the on state is prevented from being returned quickly to the off state owing to an erroneous operation by an operator, so that the switch can be kept reliably in the on state for a predetermined period of time, as necessary for the equipment for which the key switch is used.

This object is achieved by a self-holding key switch having the features given in claim 1.

Hereinafter, one preferred embodiment of the invention will be described with reference to the accompanying drawings, in which:

Figure 1 is a front view of a key switch;

Figure 2 is a right-hand side view showing a part of the key switch in a longitudinal section;

Figure 3 is a rear view with a rear seat plate being omitted; and

Figure 4 is a transverse sectional view of a cam used for the key switch.

Briefly stated, the invention resides in that a pawl 6 is disposed sideways of a switch operating cam 5 for a switch 2 and is urged to rotate towards the peripheral side surface 5a of the cam 5, and a tooth 7 for meshing with the tip of the pawl 6 is disposed on the peripheral side surface 5a of the cam 5, so that reverse rotation of the cam 5 is prevented by the engagement of the pawl 6 with the tooth 7 when the switch 2 is turned on by rotation of the cam 5 in the normal operating direction.

A fitting base plate 8 is fixedly mounted to the rear of a lock main body 1 by a screw 9, and the microswitch type switch 2 is fixed to the fitting base plate 8 by a rear seat plate 10 in cooperation with a nut 11. The front end portion of an interlocking plate 13 is slidably inserted into the rear end portion of a key groove 12 formed in a lock cylinder 3 in its axial direction, and the rear end portion of this interlocking plate 13 is fitted into a split groove 14 of the cylindrical cam 5 that extends in the radial direction of the cam 5. The rear end portion of the interlocking plate 13 is fixed to the cam 5 by a spring pin 15. A compression spring 17 and a small ball 18 are disposed in a centre through-hole 16 of the cam 5. The front end portion of the compression spring is in pressure contact with the interlocking plate 13, and the small ball 18 is in pressure contact with a receiving hole 19 that is disposed on the rear seat plate 10. Accordingly, the cam 5 is urged to slide towards the rear surface of the lock main body 1.

The switch 2 is adapted to be turned on and off by engagement with the suitably formed peri-

peripheral side surface 5a of the cam 5. On the peripheral side surface 5a of the cam 5 a step portion 21 is formed into which an actuator 20 of the switch 2 fits. When the actuator 20 is positioned at the innermost portion of the bottom surface 21a of the step portion 21, the switch 2 is kept off. The tooth 7 described above is formed at a portion of the peripheral side surface 5a of the cam 5 with which the actuator 20 does not come into sliding contact, that is, at the front end portion of the peripheral side surface 5a of the cam 5. The base end portion of the pawl 6 is rotatably fitted to a bolt 22 which is interposed between the fitting base plate 8 and the rear seat plate 10. One of the ends of the pawl 6 is thus anchored to the fitting base plate 8, with the other being urged to rotate towards the peripheral side surface 5a of the cam 5 by a twist coil spring 23 which is in contact with a side surface at the tip of the pawl 6.

A spacer cylinder 24 is fitted onto the portion of the bolt 22 between the pawl 6 and the rear seat plate 10. Locking of the cylinder 3 to the lock main body 1 is effected by use of a known disc tumbler mechanism, pin tumbler mechanism, or the like. This embodiment employs the pin tumbler mechanism. A follower pin 27 and a driving pin 28 disposed in pin receiving holes 25, 26 in the radial direction of the cylinder 3 and the lock main body 1, respectively, are urged to slide by a compression spring 29 in the axial direction of the cylinder 3.

Next, the operation of the key switch will be described.

When the key 4 is inserted into the key groove 12 of the cylinder 3 to a predetermined length, the contact surfaces of the follower and driving pins 27, 28 coincide with the outer peripheral surface of the cylinder 3, so that lock of the cylinder 3 to the lock main body 1 is released. When the key 4 is pushed in the axial direction of the cylinder 3, the interlocking plate 13 and the cam 5, that have been placed at the positions represented by dash lines in Figure 2, are pushed by the tip 4a of the key 4 and move backwards to the position represented by solid lines in Figure 2. Next, when the cylinder 3 is rotated clockwise in the normal operating direction by the key 4, as shown by arrows in Figure 1, the interlocking plate 13 and the cam 5 follow the rotation of the cylinder 3 and are rotated in the same direction, so that the tip of the pawl 6 sequentially comes into sliding contact with slope surfaces 7a, 7b, 7c of the tooth 7 and then with the peripheral side surface 5a of the cam 5. During the period in which the pawl 6 passes through the portion of the tooth 7 in this manner, the actuator 20 is pushed by the bottom surface 21a of the step portion 21 at the position P_1 in Figure 1, so that the switch 2 is turned on. The switch is kept turned on as the actuator 20 comes into sliding contact with the peripheral side surface 5a of the cam 5. When the cam 5 thus rotates the step portion 21 to the position P_2 in Figure 1, the actuator 20 drops into the step portion 21, so that the switch 2 is turned off. When

rotation in normal operating direction is further continued until the step portions 21 reaches the position P_0 in Figure 1, the pin receiving holes 25 and 26 are aligned on the same line, so that the key 4 can be removed from the cylinder 3.

After the switch 2 has been turned on at the position P_1 of the step portion 21, even if an attempt is made to rotate the key 4 counter-clockwise, as seen in Figure 1, and thus to rotate the cam 5 in the reverse direction, the cam 5 cannot be rotated reversely to the OFF range between the positions P_0 and P_1 , because the pawl 6 meshes with the tooth 7 and engages with the restricting slope surface 7b thereof before the actuator 20 drops into the step portion 21. For this reason, the operator must rotate the key in the normal operating direction in order to remove the key 4 at the position P_0 of the step portion 21.

As described above, the present invention guides or forces the operator to fully rotate the cam 5 to 360° because of a ratchet mechanism that includes the pawl 6 and the tooth 7. Thus, the switch 2 is reliably kept in the ON state from the position P_1 to the position P_2 in Figure 1 for a predetermined period of time required for equipment with which the key switch is used.

Claims

1. A self-holding key switch equipped with

—a lock main body having a rotatable cylinder (3) adapted to be unlocked from the lock main body (1) by the insertion of a key (4) into a key groove (12) of the cylinder (3) and to be rotated by means of the key (4), a fitting base plate (8) being mounted to the rear of the lock main body (1),

—a switch (2) fixed to the rear of the lock main body (1) and adapted to be turned on and off by rotation of the cylinder (3),

—a cam (5) adapted to rotate integrally with the rotatable cylinder (3) and having a tooth (7) formed on its peripheral side surface (5a), and

—a pawl (6) disposed at the side of the cam (5), one of the ends of the pawl (6) being rotatably fitted at the fitting base plate (8) and the other being urged to be swivelled against the peripheral side surface (5a) of the cam (5) by spring (23), the tooth (7) of the cam (5) being adapted to engage with the pawl (6) at a predetermined switch position when the cam (5) rotates in a normal operating direction and being formed in such manner that a reverse rotation of the cam (5) is prevented by the engagement of the pawl (6) with the tooth (7),

characterized in that

—the cam (5) is a switch operating cam (5) having a step portion (21) into which an actuator (20) of the switch (2) fits, the step portion (21) is formed on the peripheral side surface (5a) of the cam (5), the switch (2) being kept off when the actuator (20) is positioned at the innermost portion of the bottom surface (21a) of the step portion (21),

—tooth (7) is formed at a front end portion of the peripheral side surface (5a) of the cam (5) with

which the actuator (20) does not come into sliding contact,

the arrangement is such that

—when the key (4) is inserted into the key groove (12) and the cylinder (3) is rotated in the normal operating direction, the cam (5) being rotated in the same direction, the tip of the pawl (6) sequentially comes into sliding contact with slope surfaces (7a, 7b, 7c) of the tooth (7) and then with the peripheral side surface (5a) of the cam (5), and when the pawl (6) passes through the portion of the tooth (7) the actuator (20) is pushed by the bottom surface (21a) of the step portion (21), so that the switch (2) is turned on, and

—the switch (2) is kept turned on when the actuator (20) comes into sliding contact with the peripheral side surface (5a) of the cam (5) and until the cylinder (3) has been rotated in the normal operating direction almost to the position in which the key (4) may be withdrawn from the cylinder (3), when the actuator (20) drops into the step portion (21) on the peripheral side surface (5a) of the cam (5), so that the switch (2) is turned off.

2. A self-holding key switch according to claim 1, characterized in that the front end portion of an interlocking plate (13) is slidably inserted into the rear end portion of the key groove (12) of the cylinder (3) and the rear end portion of the interlocking plate (13) is fitted into a split groove (14) of the cylindrical cam (5) extending in the radial direction of the cam (5) and is fixed to the cam (5), the front end portion of a compression spring (17) being in pressure contact with the interlocking plate (13), so that the interlocking plate (13) is urged to slide towards the rear surface of the lock main body (1), and when the key (4) is inserted into the key groove (12) and pushed in the axial direction of the cylinder (3), the interlocking plate (13) and the cam (5) are pushed by the tip (4a) of the key (4) and move backwards, and when next the cylinder (3) is rotated in the normal operating direction by the key (4), the interlocking plate (13) and the cam (5) follow the rotation.

Patentansprüche

1. Selbsthaltender Schlüsselschalter, ausgestattet mit

—einem Schloßhauptkörper mit einem drehbaren Zylinder (3), der durch Einführen eines Schlüssels (4) in einen Schlüsselschlitz (12) des Zylinders (3) vom Schloßhauptkörper (1) entriegelbar und mittels des Schlüssels (4) drehbar ist, wobei eine Befestigungsgrundplatte (8) an der Rückseite des Schloßhauptkörpers (1) montiert ist,

—einem Schalter (2), der an der Rückseite des Schloßhauptkörpers (1) festgelegt und durch Drehen des Zylinders (3) ein- und ausschaltbar ist,

—einem Nocken (5), der gemeinsam mit dem drehbaren Zylinder (3) drehbar und an dessen Umfangsseitenfläche (5a) ein Zahn (7) ausgebildet ist, und

—einer an der Seite des Nockens (5) angeordneten Rastklinke (6), wobei eines der Enden der Rastklinke (6) drehbar an der Befestigungsgrundplatte (8) angebracht ist und das andere von einer Feder (23) gegen die Umfangsseitenfläche (5a) des Nockens (5) verschwenkt gehalten wird, und wobei der Zahn (7) des Nockens (5) bei einer vorbestimmten Schalterstellung mit der Rastklinke (6) in Eingriff kommt, wenn sich der Nocken (5) in normaler Betätigungsrichtung dreht, und in der Weise ausgebildet ist, daß eine Drehung des Nockens (5) in der umgekehrten Richtung durch den Eingriff des Rastklinke (6) mit dem Zahn (7) verhindert wird,

dadurch gekennzeichnet, daß

—der Nocken (5) ein Schalterbetätigungsnocken (5) ist, der einen stufenförmigen Teil (21) aufweist, in den ein Betätigungsglied (20) des Schalters (2) hineinpaßt, der stufenförmige Teil (21) an der Umfangsseitenfläche (5a) des Nockens (5) ausgebildet ist und der Schalter (2) ausgeschaltet gehalten wird, wenn das Betätigungsglied (20) an der innersten Stelle der Bodenfläche (21a) des stufenförmigen Teils (21) positioniert ist,

—der Zahn (7) an einem vorderen Endteil der Umfangsseitenfläche (5a) des Nockens (5) ausgebildet ist, mit dem das Betätigungsglied (20) nicht in gleitender Berührung kommt,

wobei die Anordnung derart ist, daß

—wenn der Schlüssel (4) in den Schlüsselschlitz (12) eingeführt und der Zylinder (3) in normaler Betätigungsrichtung gedreht wird, wobei der Nocken (5) in gleicher Richtung gedreht wird, die Spitze der Rastklinke (6) aufeinanderfolgend mit geneigten Flächen (7a, 7b, 7c) des Zahns (7) und dann mit der Umfangsseitenfläche (5a) des Nockens (5) gleitend in Berührung kommt, und wenn die Rastklinke (6) den Teil mit dem Zahn (7) durchläuft, das Betätigungsglied (20) von der Bodenfläche (21a) des stufenförmigen Teils (21) angedrückt wird, so daß der Schalter (2) eingeschaltet wird, und

—wenn das Betätigungsglied (20) gleitend in Berührung mit der Umfangsseitenfläche (5a) des Nockens (5) kommt, der Schalter (2) eingeschaltet gehalten wird bis der Zylinder (3) in der normalen Betätigungsrichtung fast bis zu der Stellung, in der der Schlüssel (4) aus dem Zylinder (3) herausziehbar ist, gedreht worden ist, wobei das Betätigungsglied (20) in den stufenförmigen Teil (21) an der Umfangsseitenfläche (5a) des Nockens (5) hineinfällt, so daß der Schalter (2) ausgeschaltet wird.

2. Selbsthaltender Schlüsselschalter nach Anspruch 1, dadurch gekennzeichnet, daß der vordere Endteil einer Verriegelungsplatte (13) gleitbar in den rückwärtigen Endteil des Schlüsselschlitzes (12) des Zylinders (3) eingeführt und der rückwärtige Endteil der Verriegelungsplatte (13) in eine spaltartige Nut (14) des zylinderförmigen Nockens (5), die sich in Radialrichtung des Nockens (5) erstreckt, eingesetzt und am Nocken (5) festgelegt ist, wobei der vordere Endteil einer Druckfeder (17) sich in Druckkontakt mit der Ver-

riegelungsplatte (13) befindet, so daß die Verriegelungsplatte (13) zur rückwärtigen Fläche des Schloßhauptkörpers (1) hin verschoben wird, und daß, wenn der Schlüssel (4) in den Schlüsselschlitz (12) eingeführt und in der Axialrichtung des Zylinders (3) gedrückt wird, die Verriegelungsplatte (13) und der Nocken (5) von der Spitze (4a) des Schlüssels (4) geschoben werden und sich nach hinten bewegen, und wenn danach der Zylinder (3) vom Schlüssel (4) in der normalen Betätigungsrichtung gedreht wird, die Verriegelungsplatte (13) und der Nocken (5) der Drehung folgen.

Revendications

1. Un interrupteur à clé à auto-maintien équipé

—d'un corps principal de verrou comportant un cylindre tournant (3) agencé pour être déverrouillé par rapport au corps principal de verrou (1) par l'insertion d'un clé (4) dans une rainure de clé (14) du cylindre (3) et pour être tourné au moyen de la clé (4), une plaque de base (8) de montage étant montée à l'arrière du corps principal de verrou (1),

—un interrupteur (2) fixé à l'arrière du corps principal de verrou (1) et agencé pour être mis en position fermée et en position ouverte par rotation du cylindre (3),

—une came (5) agencée pour tourner solidairement avec le cylindre tournant (3) et présentant une dent (7) formée sur sa surface latérale périphérique (5a), et

—un cliquet (6) disposé sur le côté de la came (5), l'une des extrémités du cliquet (6) étant montée à rotation sur la plaque de base (8) de montage et l'autre étant sollicitée pour basculer contre la surface latérale périphérique (5a) de la came (5) par un ressort (23), la dent (7) de la came (5) étant agencée pour coopérer avec le cliquet (6) pour une position prédéterminée de l'interrupteur quand la came (5) tourne dans le sens normal de fonctionnement et étant formée de telle manière qu'une rotation de la came (5) en sens inverse est empêchée par la coopération du cliquet (6) avec la dent (7), 1

caractérisé en ce que

—la came (5) est une came (5) d'actionnement de l'interrupteur présentant une partie en gradin (21) dans laquelle s'adapte un élément d'actionnement (20) de l'interrupteur (2), la partie en gradin (21) est formée sur la surface latérale périphérique (5a) de la came (5), l'interrupteur (2) étant maintenu ouvert quand l'élément d'action-

nement (20) est placé dans la partie la plus intérieure de la surface de fond (21a) de la partie en gradin (21),

—la dent (7) est formée à la partie extrême avant de la surface latérale périphérique (5a) de la came (5) avec laquelle l'élément d'actionnement (20) ne vient pas en contact de glissement, l'agencement étant tel que

—quand la clé (4) est insérée dans la rainure de clé (12) et que le cylindre (3) est tourné dans le sens normal de fonctionnement, la came (5) étant tournée dans le même sens, l'extrémité du cliquet (6) vient séquentiellement en contact de glissement avec des surfaces inclinées (7a, 7b, 7c) de la dent (7), puis avec la surface latérale périphérique (5a) de la came (5) et, quand le cliquet (6) traverse la partie de la dent (7), l'élément d'actionnement (20) est poussé par la surface de fond (21a) de la partie en gradin (21), de sorte que l'interrupteur (2) se ferme, et

—l'interrupteur (2) est maintenu fermé quand l'élément d'actionnement (20) vient en contact de glissement avec la surface latérale périphérique (5a) de la came (5) et jusqu'à ce que le cylindre (3) ait été tourné dans le sens normal de fonctionnement presque jusqu'à la position pour laquelle la clé (4) peut être retirée du cylindre (3) quand l'élément d'actionnement (20) tombe dans la partie en gradin (21) de la surface latérale périphérique (5a) de la came (5), de sorte que l'interrupteur (2) s'ouvre.

2. Un interrupteur à clé à auto-maintien selon la revendication 1, caractérisé en ce que la partie extrême avant d'une plaque d'interverrouillage (13) est insérée de manière coulissante dans la partie extrême arrière de la rainure de clé (12) du cylindre (3) et la partie extrême arrière de la plaque d'interverrouillage (13) est adaptée dans une gorge fendu (14) de la came cylindrique (5) s'étendant dans la direction radiale de la came (5) et est fixée à la came (5), la partie extrême avant d'un ressort de compression (17) étant en contact de pression avec la plaque d'interverrouillage (13), de sorte que la plaque d'interverrouillage (13) est sollicitée à glisser vers la surface arrière du corps principal de verrou (1) et, lorsque la clé (4) est insérée dans la rainure de clé (12) et poussée dans la direction axiale du cylindre (3), la plaque d'interverrouillage (13) et la came (5) sont poussées par l'extrémité (4a) de la clé (4) et se déplacent vers l'arrière et, lorsque le cylindre (3) est à nouveau tourné dans le sens normal de fonctionnement par la clé (4), la plaque d'interverrouillage (13) et la came (5) suivent la rotation.

FIG.1

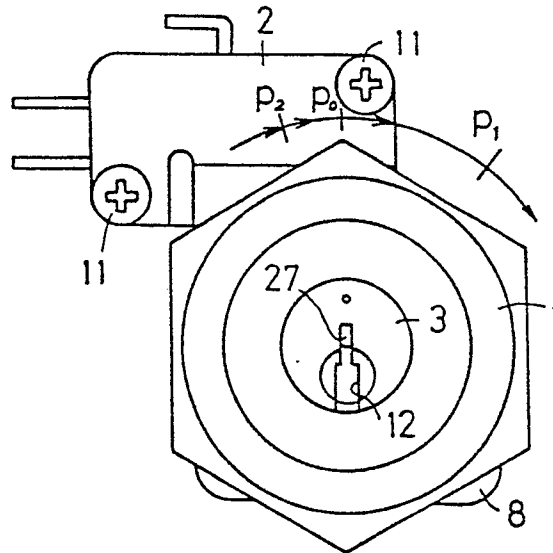


FIG.3

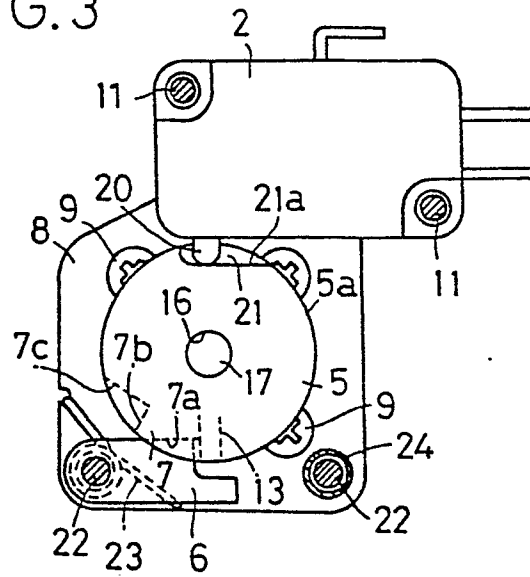


FIG.2

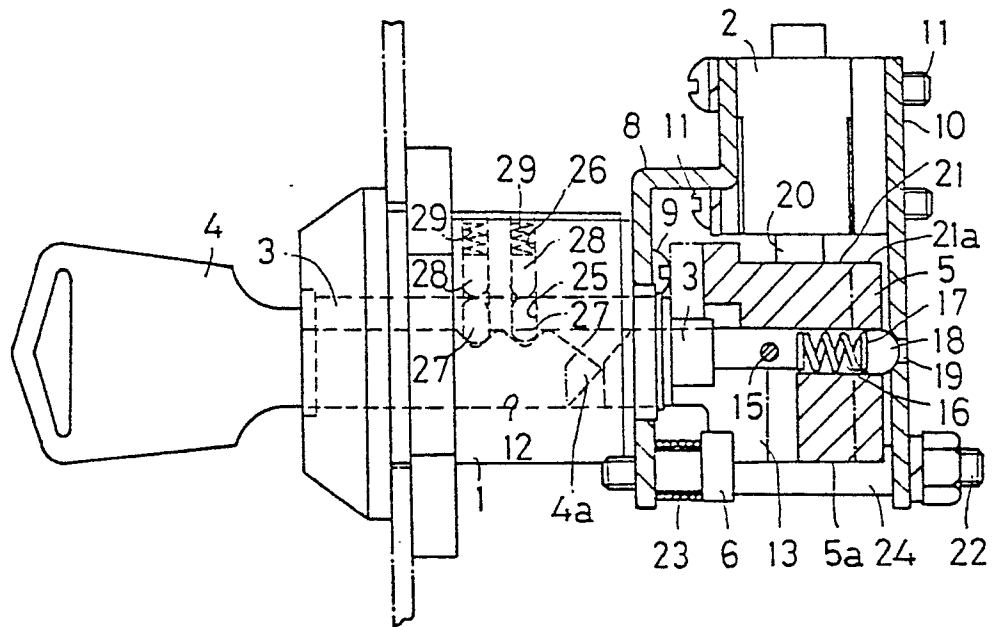


FIG.4

