(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 662 077 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
16.11.2011 Bulletin 2011/46

(51) Int Cl.:
E05B 19/06 *(2006.01)*

(21) Application number: **04468022.1**

(22) Date of filing: **30.11.2004**

(54) **A flat key with an additional security element**

Flachschlüssel mit zusätzlichem Sicherheitselement

Clé plate avec un élément de sécurité additionnel

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LU MC NL PL PT RO SE SI SK TR

(43) Date of publication of application:
31.05.2006 Bulletin 2006/22

(73) Proprietor: **Titan Tovarna kovinskih izdelkov in livarna d.d.,**
Kamnik
1241 Kamnik (SI)

(72) Inventors:
- **Vrtacnik, Rudi**
  1241 Kamnik (SI)
- **Paradiz, Pavel**
  1217 Vodice (SI)

(74) Representative: **Bertrand, Didier**
S.A. Fedit-Loriot
38, avenue Hoche
F-75008 Paris (FR)

(56) References cited:
WO-A-03/064795 **DE-C1- 10 058 590**
FR-A- 2 762 345

EP 1 662 077 B1

Description

Subject of Invention

[0001] The subject of the present invention is a flat key for a lock cylinder having a blade with two wide surfaces having longitudinal grooves, and two narrow surfaces having profiled notches transversely to a longitudinal blade axis, whereby said blade has at least one extra element for increasing safe usage of the key. More in particular it concerns a key according to the preamble of claim 1. Such a key is known from each of the documents WO 03/064795 A1, DE 100 58 590 C1 and FR 2 762 345 A1.

Technical problem

[0002] The technical problem is to design such flat key having longitudinal grooves on at least one wide blade surface, and transverse notches on a narrow blade surface usually used for a lock cylinder with a determined number of vertical pins in a cylinder housing which comprises security elements in the shape of inserted additional elements in the key blade , whereby such key can be produced by conventional processing machines without using demanding computer controlled machines, like CNC machines, with as few operations as possible and with simple assembly, which will not substantially increase production costs, however, such key will prevent an unauthorized person from producing an additional key by means of simple machinery.

Prior Art

[0003] A lock cylinder can be easily unlocked by a key manufactured without the owner's knowledge at one of street key makers. Manufacturing or forgery of an additional key is easily solved by removing the material by the principle of copying. Such processes and machines are well-known and enable quick manufacturing of additional keys for lock cylinders.

[0004] Different combinations and shapes of removed material on the key blade can hinder manufacturing of a key, yet do not prevent production thereof. One of such embodiments is described in the patent SI 9400135 of the same applicant, in which a lock cylinder contains additional side blocking pins. In case of proper key dimensions and shapes of key cavities side blocking pins are pushed aside and aligned with longitudinal grooves in cylinder casing. The lock cylinder is unlocked. Keys equipped by elements produced by way of removing the material do unlocking of a lock cylinder more difficult but do therefore not allow any supervision over the production of additional keys, which should be done only by the producer of the original key or authorized dealers. Supervision over production and thus prevention of forgery of a key is possible with such keys that have an extra element in a key blade representing an additional level for a corresponding pin in a lock cylinder.

[0005] EP 0983411 (Dermanin) describes a key having a through borehole in the part of a blade positioned away from the grip part, said borehole extending transversely to a longitudinal key blade axis and parallel to a middle blade plane. The borehole has additionally formed openings opened toward each wide blade surface. This borehole acts as a bearing to the element having a limited movement area in its longitudinal axis direction. It has several surfaces with different inclinations on its circumference. The surfaces of the moving key element arranged in the lock cylinder determine the position of two additional side blocking pins extending through side openings of the borehole. The moving key element inserted into the key has a very complicated shape because each element has many surfaces, biased to each other with predetermined angel.

[0006] WO 03/064795 as well as DE 10058590C1 (Braun) describe a rotating key having an inclined slot at one end of a blade in which a ring having a central borehole is clamped by a pin. The pin is placed in a blade borehole which is located perpendicular to the biased slot of the blade and simultaneously biased to a plane of the wide blade surface. The pin diameter is essentially smaller than that of a borehole of the inserted ring, which allows the ring limited movement in its radial direction which is inclined for 45° to the plane of wide blade surface of the key. This inserted ring in the key determines a deviation of an extra blocking pin in the lock cylinder to the zero position, thereby allowing the cylinder plug to turn. The pin borehole and the slot each are inclined for a 45° according to the wide surface of the key blade and perpendicular to each other. The large number of elements has demanding shapes, said elements possessing numerous surfaces inserted in the key, and special openings on the key. The manufacturing of such elements and/or openings needs special tools, and specially adapted machines like computer controlled CNC machines. All these contributes to the increase of manufacturing costs and is therefore adequate for keys and lock cylinders of the highest price class.

[0007] FR 2762345 (Lenotre) describes a flat key having longitudinal profiled grooves on a wide blade surfaces and transversely notches on a narrow blade surface where a through hole, transversely to a blade centre line, is placed at the end of the key blade. A sliding element having a borehole is inserted into the through hole so that an outer part of an element's circumference slides inside the through hole in its longitudinal direction and perpendicular to a key central line. A pin is going through the borehole of the sliding element whereby a pin diameter is essentially smaller than the diameter of sliding element. The pin determines remote positions of the sliding element. The sliding element with its outside diameter in a transverse direction to the key central line determines a spacing between two side blocking pins displaced in an axis in the lock cylinder whereby one of the side blocking pin is fixed accommodated in the lock cylinder and

the other one is accommodated in a null position by the sliding element. The lock cylinder is in the position to be unlocked. The diameter of the sliding element borehole is bigger then the diameter of the pin. An engagement between the key through hole and the sliding element prevents a rotation of the sliding element. A minimal rotation of the sliding element presented causes a shift of lock cylinder side blocking pins out of their opening position.

[0008] The scope of present invention is to design such key for a lock cylinder with an optional number of longitudinal grooves on wide blade surfaces and transverse notches on a narrow blade surface that will be provided with such additional element on at least one optional place of the key blade that will not allow manufacturing of an extra key to unauthorised persons with simple machinery like street key manufacturers and individuals and it would be possible to manufacture it only at the producer's of the key or authorised dealers; such key would allow supervision over the production of keys and contribute to better security. At the same time the additional element will not render the production and assembly of key elements into the key complicated and will not call for extra machines with expensive computer technology. Manufacture will be economically justified even for keys of lower price classes.

Solution to the Technical Problem

[0009] The described technical problem is solved by a key according to claim 1. According to the the invention and embodiments thereof the key has a blade with longitudinal grooves on wide blade surfaces and transversal notches of different heights on a narrow blade surface. The key has in a blade on an optional place, preferably at the top of the blade, a through hole in which an element is inserted, which can freely rotate around its axis. The rotating element is a ring in the form of a cylinder with a base surface being preferably annular. The rotating element is secured against falling out by a pin tightly fitting with the key blade and loosely fitting with the rotating element. The diameter of the rotating element is bigger than the thickness of the key blade, the lock cylinder should therefore have an additional groove in the longitudinal key channel of the lock cylinder, into which the key can be inserted, said additional groove corresponding to the element both in shape and dimensions. Besides plug pins in the cylinder casing the lock cylinder should have a pair of side blocking pins on an adequate place as described in the patent SI 9400135. The additional groove in the cylinder plug of the lock cylinder serves also as a track when inserting the key blade into the lock cylinder. The rotating element and the pin which both are located on the key are not complicated in shape and can be produced by standard machines usually used in the manufacturing of lock cylinders and keys without a need for expensive CNC machines. Inserting of the rotating element and the pin into the key blade can be solved by a minor mounting devices allowing exact positioning, which is needed upon insertion of the key into the lock cylinder for the rotating element not to cause additional friction in the lock cylinder and not to cause stopping of side blocking pins in the circumference of the lock cylinder.

[0010] The present invention will now be described in more detail on the basis of an embodiment and the accompanying drawings in which:

Fig. 1 shows an explosion figure of the key of the invention

Fig. 2 shows a cross-section of the key of the invention inserted into the lock cylinder

[0011] A key 1 for a lock cylinder 2 with having in a blade 10 longitudinal grooves 13 on at least one wide blade surface 12, transversal notches 15 of different heights and shape on a narrow blade surface 14, and at least one through hole 16. A rotating element 18 inserted in the through hole 16 with constant cross-section has its openings in a plane of wide surfaces 12 of the blade 10 of the key 1 and the rotating element 18 is inserted into the through hole 16 by means of a key pin 19 to freely rotate in the hole 16 while its moving in direction of the key pin 19 is impossible The rotating element 18, which basic surface is a ring, has a central borehole 181. The diameter of the centre borehole 181 is bigger of the pin 19 diameter in such a measure that a rotation of the rotation element 18 is allowed around the pin 19 inside the through hole 16. The pin 19 is positioned in the key blade 10 in a manner of tight fit. The diameter of the rotating element 18 is bigger than is the thickness of the blade 10.

[0012] The through hole 16 is located on the blade 10 of the key 1 preferably in the part more distant from a grip portion 11 of the key 1. The shape and the diameter of the through hole 16 depend on the shape of cross section of the inserted rotating element 18 but should be such to meet all strength requirements needed in repeated unlocking of the lock cylinder. The shape of the through hole 16 is preferably rectangular, whereby the longer side of the opening of the through hole 16 is parallel to the longitudinal axis of the blade 10 of the key 1. The position of the through hole 16 according to the height of the wide surface 12 of the blade 10 depends on positioning of side blocking pins 21 in the lock cylinder 2.

[0013] The rotating element 18 inserted in the blade 10 of the key 1 is a cylinder with a central borehole. The diameter of the rotating element 18 is smaller than the longer side of the opening of the hole 16 in the blade 10 of the key 1 to enable its free rotation in the through hole 16 without friction and bigger than the thickness of the blade 10 of the key 1. The height of the rotating element 18 is smaller than its diameter. The edges between the basic surfaces of the rotating element 18 and the casing should preferably not cause stopping or additional friction between the rotating element 18 and the longitudinal

groove 22 of the cylinder plug 23 of the lock cylinder 2 when the key 1 is inserted into the lock cylinder 2.

[0014] The key pin 19 is formed as a narrow long cylinder and is simultaneously loosely fit with the centric borehole 181 of the rotating element 18 and tightly fit with the borehole 17 lying in a plane of the blade 10 of the key 1, and having an opening on the narrow surface 14 of the blade 10 of the key 1.

[0015] The through hole 16 in the blade 10 of the key 1 is produced by cutting preferably by stamping and simultaneous forming of the basic shape of the key out of a blank because it is no need to do it in precise tolerance, or subsequently, if this is more convenient for the producer. Both built-in parts, the rotating element 18 preferably in the shape of a cylinder, and the pin 19, are of simple shapes and working out in the same tolerances as other parts of the lock cylinder. Therfore, their production does not require special demanding machines. The rotating element 18 with the diameter bigger than its height and bigger than the thickness of the blade of the key simultaneously fulfils a need for additional parts or elements which are more difficult to be added in the key as to be taken away from the key blade to imitate the proper thickness and shape of the key. An advantage of a rotating element in a shape of a cylinder over other shapes of elements, e.g. a ball is also making the borehole for the pin and later on assembly. The positioning and the clamping of the cylindrical rotating element into a clamping device is much easier. When manufacturing the rotating element and the pin, it is important that both are produced within dimensions and tolerance demanded for lock cylinders.

[0016] The production of the borehole for the pin in the blade and the mounting of both elements into the key blade is solved by a minor mounting device which is not the subject of the present invention and which ascertains the needed precision in the manufacturing of such key despite its simplicity.

[0017] For the lock cylinder to accept a key with an additional built-in rotating element it must have, apart from its usual blocking pins, also an adequate number of side pins equalling the number of rotating elements which act together with the aforementioned rotating elements.

Claims

1. A key for a lock cylinder with standard dimensions provided in a blade with longitudinal grooves on at least one wide blade surface, transversal notches of different heights and shapes on a narrow blade surface, at least one through hole with a constant cross-section having its openings in a plane of wide surfaces of the blade of the key, and an element inserted into the through hole by means of a key pin, **characterized in that** the element (18) is a rotating cylinder with a central borehole (181), and the key pin (19) is a narrow long cylinder inserted in a second borehole (17) lying in a plane of the blade (10) of the key (1) and having an opening on the narrow surface (14) of the blade (10) of the key (1), whereby the key pin (19) formes a loose fit with the centric borehole (181) of the element (18) to enable a free rotation of the element (18) in the through hole (16) while the movement of the element (18) in direction of the key pin (19) is not possible, and whereby the key pin (19) forms a tight fit with the second borehole (17).

2. A key according to claim 1, **characterized in that** the element (18) has a diameter smaller than the longer side of the opening of the hole (16) in the blade (10) of the key (1) and longer than the thickness of the blade (10) of the key (1).

Patentansprüche

1. Schlüssel für einen Schlosszylinder mit Normabmessungen, der in einem Blatt mit Längsrillen auf wenigstens einer breiten Blattoberfläche, Querkerben mit verschiedenen Tiefen und Formen auf einer schmalen Blattoberfläche, wenigstens einem Durchgangsloch mit konstantem Querschnitt, das seine Öffnungen in einer Ebene der breiten Oberflächen des Schlüsselblatts hat, und einem Element, das mit Hilfe eines Schlüsselstifts in das Durchgangsloch eingesetzt ist, versehen ist, **dadurch gekennzeichnet, dass** das Element (18) ein sich drehender Zylinder mit einem zentralen Bohrloch (181) ist und der Schlüsselstift (19) ein schmaler langer Zylinder ist, der in ein zweites Bohrloch (17) eingesetzt ist, das in einer Ebene des Blatts (10) des Schlüssels (1) liegt und eine Öffnung auf der schmalen Oberfläche (14) des Blatts (10) des Schlüssels (1) hat,
wobei der Schlüsselstift (19) eine Spielpassung mit dem zentralen Bohrloch (181) des Elements (18) hat, um eine freie Drehung des Elements (18) in dem Durchgangsloch (16) zu ermöglichen, während die Bewegung des Elements (18) in der Richtung des Schlüsselstifts (19) nicht möglich ist, und wobei der Schlüsselstift (19) eine enge Passung mit dem zweiten Bohrloch (17) bildet.

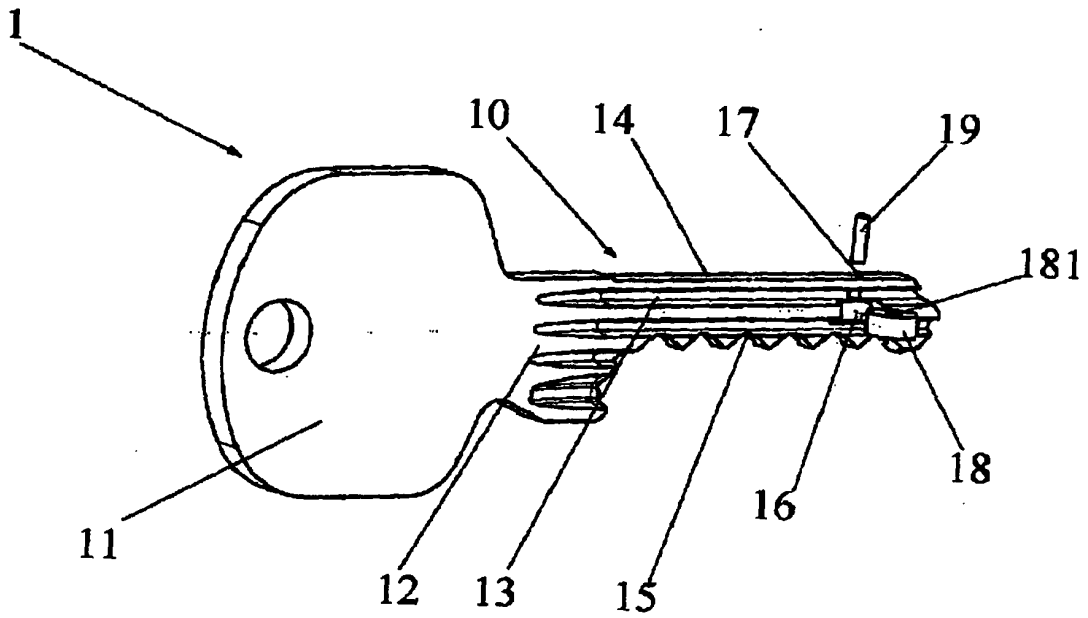
2. Schlüssel nach Anspruch 1, **dadurch gekennzeichnet, dass** das Element (18) einen Durchmesser hat, der kleiner als die längere Seite der Öffnung des Lochs (16) in dem Blatt (10) des Schlüssels (1) und länger als die Dicke des Blatts (10) des Schlüssels (1) ist.

Revendications

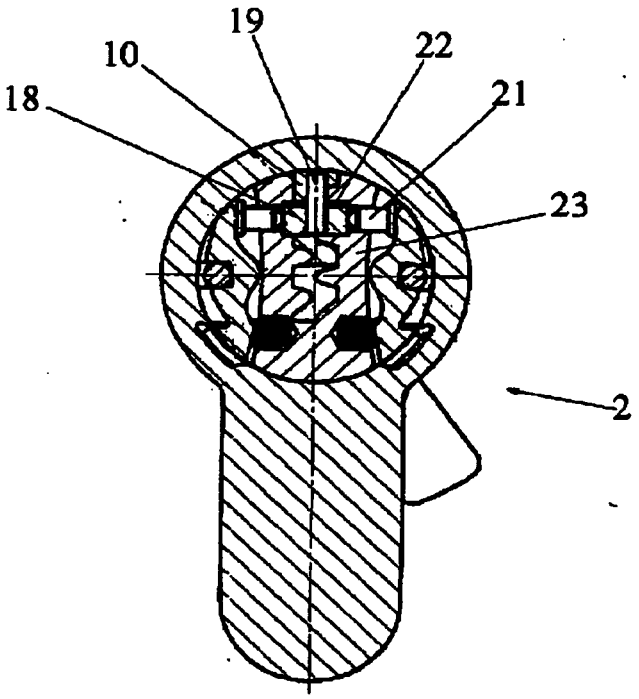
1. Clef pour un cylindre de serrure présentant des di-

mensions standard formée en une lame avec des rainures longitudinales sur au moins une surface large de lame, des encoches transversales de différentes hauteurs et formes sur une surface étroite de lame, au moins un orifice traversant avec une section transversale constante dont les ouvertures sont sur un plan de surfaces larges de la lame de la clef, et un élément inséré dans l'orifice traversant au moyen d'une goupille, **caractérisée en ce que** l'élément (18) est un cylindre tournant avec un alésage profond central (181), et la goupille (19) est un long cylindre étroit inséré dans un second alésage profond (17) situé dans un plan de la lame (10) de la clef (1) et présentant une ouverture sur la surface étroite (14) de la lame (10) de la clef (1),
de telle sorte que la goupille (19) forme un assemblage glissant avec l'alésage profond central (181) de l'élément (18) afin de permettre la rotation libre de l'élément (18) dans l'orifice traversant (16) alors que le mouvement de l'élément (18) dans la direction de la goupille (19) n'est pas possible, et de telle sorte que la goupille (19) forme un assemblage serré avec le second alésage profond (17).

2. Clef selon la revendication 1, **caractérisée en ce que** l'élément (18) présente un diamètre inférieur au côté le plus long de l'ouverture de l'orifice (16) sur la lame (10) de la clef (1) et supérieur à l'épaisseur de la lame (10) de la clef (1).



Sl. 1



Sl. 2

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 03064795 A1 **[0001]**
- DE 10058590 C1 **[0001] [0006]**
- FR 2762345 A1 **[0001]**
- SI 9400135 **[0004] [0009]**
- EP 0983411 A, Dermanin **[0005]**
- WO 03064795 A **[0006]**
- FR 2762345, Lenotre **[0007]**