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PATENT REQUEST : STANDARD PATENT

I/We, being the person/s identified below as the Applicant, request the grant of a patent to the person/s indicated below as the Nominated Person/s, for an invention described in the accompanying standard complete specification.

Full application details follow.

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[54] Invention Title:  
Locking system

[72] Name/s of actual inventor/s: (optional)  
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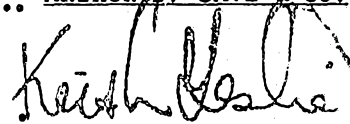
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DATED this SECOND day of JULY 1991

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**NOTICE OF ENTITLEMENT**

ERNST KELLER, the Applicant/Nominated Person in respect of Application No. 80136/91 states the following:-

The Applicant/Nominated Person is the inventor.

DATED this 17th day of August, 1993.



.....  
a member of the firm of DAVIES  
COLLISON CAVE for and on  
behalf of the applicant(s).

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(12) PATENT ABRIDGMENT (11) Document No. AU-B-80136/91  
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(54) Title  
LOCKING SYSTEM

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(56) Prior Art Documents  
US 3349587  
US 1678135

(57) Claim

1. A lock system comprising:

at least one flat safety key, two lock cylinders, each of which have at least one rotor with a key channel for introduction of said at least one flat safety key, said at least one rotor of a first lock cylinder of said two lock cylinders is rotated 180° about an axis of rotation with respect to a first corresponding cylinder housing of said first lock cylinder in comparison to said at least one rotor within a second corresponding cylinder housing of a second lock cylinder of said two lock cylinders when said at least one rotor of said first lock cylinder and said at least one rotor of said second lock cylinder are respectively fixed by lock rows in said first corresponding cylinder housing and said second corresponding cylinder housing;

the lock rows being aligned and the corresponding rotor turnable within the cylinder when the key is introduced into the key channel;

said at least one flat safety key being a non-reversible key in that it is operable in one orientation only with respect to both cylinders, and having a plurality of bores with one lock code for alignment with the lock rows of said first lock cylinder or with the lock rows of said second lock cylinder;

or having a plurality of bores with two lock codes, one code for alignment with the lock rows of said first lock cylinder and the other code for alignment with the lock rows of said second lock cylinder.

Our Ref: 365834

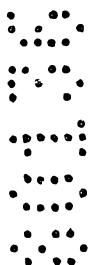
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Regulation 3:2

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ORIGINAL  
COMPLETE SPECIFICATION  
STANDARD PATENT



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Invention Title:

Locking system

The following statement is a full description of this invention, including the best method of performing it known to me:-

## LOCKING SYSTEM

The invention concerns a locking system with a key and two locking cylinders each of which has at least one rotor with a key profile to insert a flat security key.

5 Locking systems of the type mentioned are generally known. As a rule, these have hierarchically organised flat keys, which can be used for a corresponding large number of locking cylinders. The keys are flat keys, as this is known, for example, from the German patent specification 3 021 334 by the applicant. From this patent  
10 specification it is also known, that the number of locking combinations can be used considerably increased by holes with several control surfaces and corresponding tumblers. The number of locking combinations can be increased by other measures also, for example, by shifting the linear pattern.

The object of the invention is to produce another means to increase the number of locking combinations of a locking system of the type mentioned. This should be  
15 feasible in a simple constructional manner and without impairing the operational security.

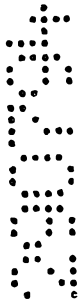
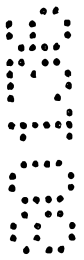
In accordance with the invention there is provided a lock system comprising:

at least one flat safety key, two lock cylinders, each of which have at least one rotor with a key channel for introduction of said at least one flat safety key, said at least one rotor of a first lock cylinder of said two lock cylinders is rotated 180° about an axis  
20 of rotation with respect to a first corresponding cylinder housing of said first lock cylinder in comparison to said at least one rotor within a second corresponding cylinder housing of a second lock cylinder of said two lock cylinders when said at least one rotor of said first lock cylinder and said at least one rotor of said second lock cylinder are respectively fixed by lock rows in said first corresponding cylinder housing and said  
25 second corresponding cylinder housing;

the lock rows being aligned and the corresponding rotor turnable within the cylinder when the key is introduced into the key channel;

said at least one flat safety key being a non-reversible key in that it is operable in one orientation only with respect to both cylinders, and having a plurality of bores  
30 with one lock code for alignment with the lock rows of said first lock cylinder or with the lock rows of said second lock cylinder;

or having a plurality of bores with two lock codes, one code for alignment with the lock rows of said first lock cylinder and the other code for alignment with the lock



rows of said second lock cylinder.

In case of the locking system according to the invention the security keys are so called non-double-sided or non-reversible keys and can be recognised immediately by shaping the key head accordingly. Therefore, to open a lock the key has to be inserted into the key profile in one of the possible turning positions. Furthermore, a part of the locking cylinder has rotors, which are rotated in the cylinder housing about their longitudinal axis relative to the other rotors at 180°. The rotors may have an open or closed key profile. A considerable advantage of the locking system according to the invention is that two completely independent locking codes can be provided on one key.

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By lowering the rotational symmetry of the key and of the respective tumblers the number of locking combinations can be practically doubled. This is compatible with other steps known to increase the locking combinations. For example, the holes can be stepped holes and simultaneously a linear shifting of the hole pattern is also feasible.

The measure required on the locking cylinders are comparatively simple and do not change the design principle of the locking cylinders. In particular, the number of the tumblers in the locking cylinders need not be increased relative to comparable cylinders. The manufacture of the key at a reasonable price is also assured.

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A key for use in the system of the present invention may be in the form of a master key that has, for example, two independent locking codes or in the form of a slave key that has one code only. A key of the system according to the invention in the form of a master key has preferably at least two different series of holes, which are provided on the oppositely situated wide sides of the key shaft. Thus, such a key can open two different locking cylinders having the same or different locking codes without being turned around.

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Further advantageous features become obvious from the following non-limiting embodiment described with reference to the accompanying drawings, in which:

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Figs. 1a and 1b show side views of a key for the system according to the invention,

Fig. 1c is a cross-section of a key along the line 1c-1c of Fig. 1a,

Fig. 2 is a front view of a locking cylinder of the locking system according to the invention, and

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Fig. 3 shows a further locking cylinder of the locking system according to the invention.

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Figs. 1a to 1c show a flat key with a shaft 2 and a key head 3. The shaft 2 has six different series of holes A to F with, for example, five holes each. These holes are simple countersunk holes or stepped holes, which interact



with the respective tumblers in the locking cylinders.

The key has two independent locking codes, which are formed by the series of holes A, E, D and B, C, F, respectively. Each group of the series of holes consists of a series of holes E or F with upright holes on the narrow sides 13 and 14, respectively, as well as lateral holes on the wide sides 15 and 16. As it can be seen, the holes will not coincide by rotating the key about its longitudinal direction, as would be the case for a double-sided key.

To enable the immediate orientation of the key 1, the key head 3 may have, for example, an assymetrically provided orifice 4. Naturally, other markings or shapes are also feasible, for example, the key 1 may have an L-shape.

In Figs. 2 and 3 different locking cylinders 5 and 6 of a system according to the invention are illustrated. These locking cylinders may be simple locking cylinders or twin locking cylinders, or other special cylinders. Different cylinder sections are also feasible. In case of a cylinder according to Fig. 2 a conventionally orientated rotor 9 is used in the cylinder housing 11. Pins a, e and d protrude into a key profile 7 in a conventional manner. This cylinder can be a known cylinder. In the case of cylinder 6, according to Fig. 3, a rotor 10 is provided in a cylinder housing 12, which is rotated at  $180^\circ$  about its longitudinal axis relative to the rotor 9. Thus the side of the key profile 8 of the rotor is open to the top. The pins b, c and f, which are also conventionally shaped, protrude into the key profile 8.

If the key 1 is now inserted into the key profile 7 of the locking cylinder 5 in the position shown in Fig. 1a, the search position with the pins a, d and e will be such, that the rotor 9 can be rotated and the lock can be opened. If the key 1 is inserted cylinder 6, then the pins b, c and f are positioned by the series of holes B, C and F, so that this rotor 10 can be also rotated.

If the key, not illustrated here, has only the series of holes B, C and F, then this slave key will open a lock with the locking cylinder 6, but not a lock with the locking cylinder 5. The reverse is valid for another key, not



illustrated here either, having the series of holes A, D and D. As an example, in case of a plant all internal doors may be fitted with locking cylinders 5 and all external doors with locking cylinders 6. Naturally, by commuting the holes many locking cylinders 5 and 6 may be produced with many locking combinations. The number of locking combinations can be considerably increased. particularly by providing the locking cylinders 5 and 6 with different permutations.

The above embodiment result in a locking system, where in a simple constructional manner and consequently at a reasonable price, the number of locking combinations and therefore the security of the locking can be increased to a considerable extent.



The claims defining the invention are as follows:-

1. A lock system comprising:

at least one flat safety key, two lock cylinders, each of which have at least one rotor with a key channel for introduction of said at least one flat safety key, said at least one rotor of a first lock cylinder of said two lock cylinders is rotated 180° about an axis of rotation with respect to a first corresponding cylinder housing of said first lock cylinder in comparison to said at least one rotor within a second corresponding cylinder housing of a second lock cylinder of said two lock cylinders when said at least one rotor of said first lock cylinder and said at least one rotor of said second lock cylinder are respectively fixed by lock rows in said first corresponding cylinder housing and said second corresponding cylinder housing;

the lock rows being aligned and the corresponding rotor turnable within the cylinder when the key is introduced into the key channel;

said at least one flat safety key being a non-reversible key in that it is operable in one orientation only with respect to both cylinders, and having a plurality of bores with one lock code for alignment with the lock rows of said first lock cylinder or with the lock rows of said second lock cylinder;

or having a plurality of bores with two lock codes, one code for alignment with the lock rows of said first lock cylinder and the other code for alignment with the lock rows of said second lock cylinder.

2. A locking system as claimed in claim 2, wherein each of said rotors have different basic codes or lock codes.

3. A locking system according to claims 1 or 2, wherein a non-double-sided key is a master key and that for the locking cylinders double-sided keys are also provided as slave keys.

4. A key for a locking system according to claim 1, wherein it can be recognised as a non-double-sided key by the assymetrical shape of the key head.

5. A key according to claim 4, wherein it has one or two groups of a series of holes, each of which represents a key code and which are provided along the narrow



sides of the key shaft.

6. A key according to claim 5, wherein at least one group contains three series of holes, where two series of holes are formed by lateral holes on the wide sides of the key shaft and one series of holes are formed at substantially 90° to the lateral holes on a narrow side of the key shaft.

7. A key according to any one of the claims 4 to 6, wherein it is a master key and it has two independent key codes.

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8. A locking system as substantially herein described and with reference to the accompanying illustrations.

DATED this 27th day of July, 1994.

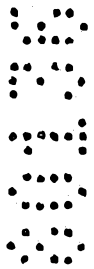
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KELLER, ERNST  
By His Patent Attorneys  
DAVIES COLLISON CAVE



Abstract

The locking system has locking cylinders (5), where the rotor (9) is inserted in the usual manner into the cylinder housing (11) and in addition it has the locking cylinder (6), where the rotor (10) is rotated at 180° about its longitudinal axis relative to the other above mentioned rotor (9). The respective security keys are flat keys and non-double-sided ones, and have, if this is required, two locking codes completely independent from each other. The invention makes it further possible to increase the locking combinations thus increasing the security of locking.



(Figs.2 and 3)



Fig. 1a

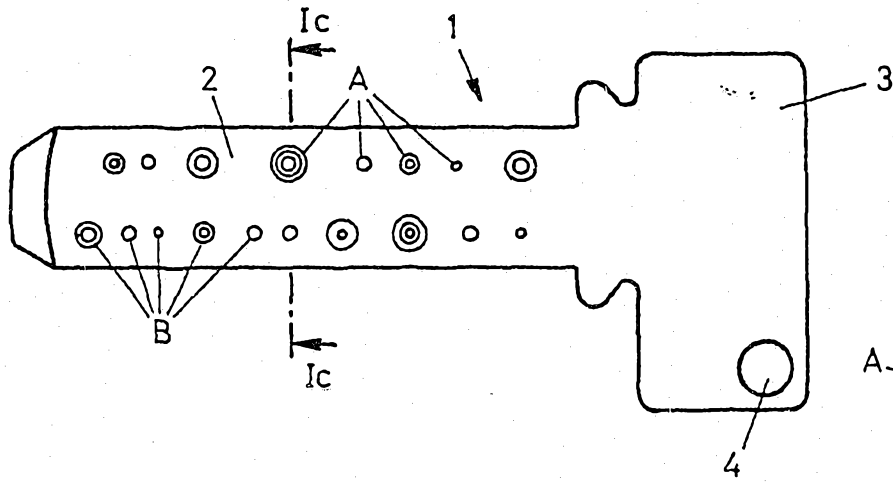


Fig. 1c

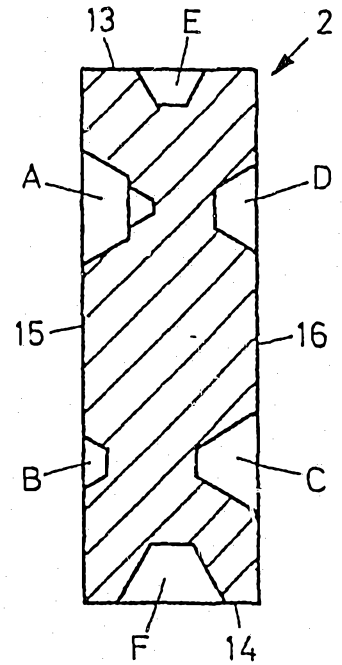


Fig. 1b

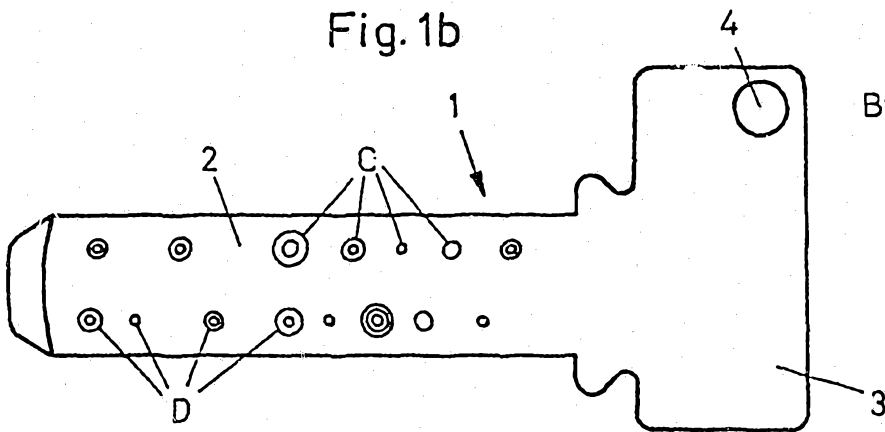


Fig. 2

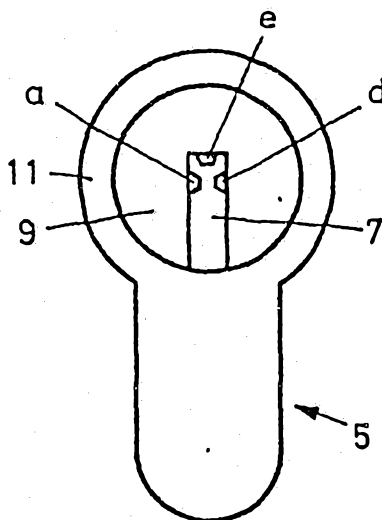


Fig. 3

