

KEY FOR A LOCK CYLINDER OF A KEY/LOCK SYSTEM

- 5 The invention relates to a key for a lock cylinder of a key - lock system, including a key head and a key web, wherein the key web has a plurality of control cut-outs for receiving segments of associated tumblers of the lock cylinder according to the preamble of claim 1.
- 10 DE 1 093 253 B discloses a key for rotating cylinder locks wherein the key includes a longitudinal channel in which three longitudinally movable key web cut out plates are arranged longitudinally movable in a tongue channel. For an inserted key the key web cut outs move the locking pins arranged opposite to the key web cut out plates into a starting position, in particular a so called zero position.
- 15 In the locking system according to US 2013/0091910 A1 a key is used wherein core pins are arranged at the key which facilitate additional coding.
- US 2013 0298621 A1 discloses a key for a locking system wherein the key includes
- 20 movable elements which cooperate with the square pins of the locking cylinder. In a key for a rotating locking cylinder according to WO 2015 004 192A1 the key includes at least one move ably arranged control element which includes a control surface that cooperates with a locking device of the rotating lock cylinder.
- 25 US 7,958,760 B2 however illustrates a key lock system with protrusions and recesses formed in the key by milling in order to provide additional coding options. The technique of milling to obtain a multi-dimensional structure in the key profile is very complex and not copy protected.
- 30 Thus, it is an object of the invention to provide an improved key for a locking cylinder of a key lock system with a key grip and a key web which facilitates expanded coding

options and wherein an option is provided to predetermine or adjust a service life of the key. Thus, the key to be provided shall be producible in a simple and cost effective manner, wherein the coding options are expandable by simple measures starting with a basic system key.

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The object is achieved by a key for a lock cylinder of a key lock system according to the feature combination of claim 1 wherein the dependent claims include at least advantageous embodiments and improvements.

10 According to the invention at least one of the typical control recesses in the key web is provided with an additional recess, in particular a bore hole for receiving an insertable square pin. The square pin includes a square pin tip with a predetermined contour. Different square pins with different square pin tips can be inserted in to the respective recess so that many additional coding options can be provided easily
15 starting with a circular profile.

Since the square pin, at least however the square pin tip is made from a completely different material than the actual key there is an option according to the invention to select for example a material for the square pin which has less hardness and thus also
20 more wear. Thus an option is provided to automatically render the key unusable after a predetermined service life of the key.

Introducing the bore holes to receive the square pins can be performed with a simple technique. Expensive mill work in particular for providing two or three structures can
25 be prevented. Eventually the square pins are configurable hidden and miniaturized so that a user cannot easily determine their significance which further improves safety against illegal copying. The square pins can be securely fixed in the recesses through form locking, friction locking and bonding.

30 In an advantageous embodiment the respective square pin tip comes in contact with a flank of a respectively associated tumbler when the key is introduced into the key

cylinder. In particular the respective square pin tip contacts the flank of the respectively associated locking pin. Only then a release position is reached where the lock cylinder is rotated.

- 5 The square pin tip can be configured for example as a cone, frustum, pyramid, pyramid frustum or as a wedge shaped edge similar to an edge of a chisel.

The square pins include a square pin base which is partially or completely inserted into the recess in the key web.

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In one embodiment of the invention the square pin base can have a structure at an outer conference, in particular a profile or knurl or a circumferential threaded edge.

- 15 The structure or profile can advantageously extend on an outer circumference in a direction towards the longitudinal extension of the square pin or it can also be configured as a spiral cutting edge so that a secure support of the square pin is provided in the recess.

- 20 In an advantageous embodiment the square pin base is configured as a cylinder. By the same token it is possible to configure the square pin base convex, barrel shaped or with a bulge in order to secure the square pin through friction locking impression in the key.

- 25 Through the choice of the wear properties of the square pin material, in particular of the square pin tip the service life of the respective key can be predetermined as described supra.

The invention shall be subsequently described based on drawing figures, wherein:

- 30 FIG. 1a illustrates a side view with a partial sectional view of a lock cylinder with an inserted key and tumblers which cooperate with control recesses in the key web;

FIG. 1b illustrates a detail view according to FIG. 1a with an embodiment of a tumbler that cooperates with a square pin, wherein the square pin is arranged in a portion of a recess in a control recess of the key;

- 5 FIG. 1c illustrates a sectional view along the line A-A according to FIG. 1b with a visible square pin that is arranged within a recess in the key web of the key, wherein the square pin tip contacts the flank of an associated tumbler;

- 10 FIG. 2a illustrates a perspective view of an embodiment of a square pin with a teething that is formed in the portion of the square pin base in the longitudinal direction of the square pin;

FIG. 2b illustrates a side view of the square pin according to FIG. 2a;

- 15 FIG. 3a – c illustrates a side view, a top view and a perspective view of the square pin with a frustum shaped square pin tip and a cylindrical square pin base;

FIG. 4a – c illustrates a side view, a front view and a perspective view of a square pin with a cylindrical square pin base and a cone shaped square pin tip;

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FIG. 5a – c illustrates a side view, a front view and a perspective view of another embodiment of a square pin with a cylindrical square pin base and a square pin tip configured as a blunt wedge shaped cutting edge;

- 25 FIG. 6a – c illustrates an embodiment similar to the embodiment according to 5a – c, however with an acute angled wedge in the portion of the square pin tip;

- FIG. 7a – c illustrates a side view, a front view and a perspective view of another embodiment of a square pin with a cylindrical square pin base and a square pin tip
30 that is configured as a pyramid frustum;

FIG. 8a – c illustrates an embodiment of a square pin similar to the embodiments according to the FIGs. 7a – c, however with a cone tip in the portion of the square pin tip;

5 FIG. 9 illustrates a side view of a square pin with a convex square pin base and a cone tip;

FIG. 10 a, b illustrates a side view of another embodiment of a square pin with a convex or barrel shaped square pin base and circumferential protruding cutting edges, wherein a cutting edge is illustrate in detail 10b; and
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FIG. 11 illustrates a side view of a square pin with a conical square pin tip and a convex square pin base, wherein two exemplary slanted cutting edge protrusions configured as threaded cutting edges are arranged on the surface of the square pin base.
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As illustrated in FIGs. 1a – 1c the invention is based on a typical key 1 which cooperates with a lock cylinder 2 of a key-lock system. In the key web 3 of the key 1 a plurality of in particular milled control recesses is introduced for receiving sections of associated tumblers 4 of the lock cylinder 2.
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Within at least one of the control recesses (c.f. in particular FIG. 1b) a recess is configured to receive a square pin 5, wherein the square pin includes a square pin tip 6 with a predetermined contour.
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At least the square pin tip 6 is provided with different hardness and/or wear properties than the material of the key web 3 and/or the tumblers 4.

The respective square pin tip 6 comes in contact with a flank of the respective tumbler when the correct key is introduced into the lock cylinder as evident in particular from FIG. 1b and 1c.
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FIGs. 2a and 2b illustrate an embodiment of a square pin.

5 The square pin in FIG. 2a and FIG. 2b is configured frustum shaped. The square pin base 7 has a cylindrical basic shape, wherein a teething 8 oriented in a longitudinal direction of the square pin is arranged at a circumferential section of the square pin base 7 wherein the teething provides a secure and firm seat through form locking that is provided when the square pin is pressed into the associated recess in the key web.

10 The embodiment according to FIG. 3a – c illustrates a square pin 5 with a cylindrical square pin base 7 and a square pin tip 6 configured frustum shaped. FIGs. 4a – c illustrate an embodiment that is analogous to the embodiment according to FIG. 3a, with a cone tip in the portion of the square pin tip 6.

15 The representations according to FIGs. 5a – c and 6a – c illustrate the embodiment of a square pin with a square pin tip configured as a blunt wedge 5a – 5c and on the other hand side as an acute wedge (FIGs. 6a – 6c).

20 A pyramid frustum shape of a square pin tip can be derived from FIGs. 7 a – c, wherein a pointed pyramid of a square pin with a corresponding square pin tip is illustrated in FIGs. 8a – 8c.

In one embodiment of the invention the square pin base 7 can have a convex or barrel shape 71 as illustrated in FIG. 9.

25 In a supplemental manner the barrel shape 71 can be configured with circumferential cutting edge 72 according to FIGs. 10a and 10b.

30 The cutting edges 72 can be implemented essentially perpendicular to the drawn longitudinal axis 10a but also circumferentially extending with a slant angle as illustrated in FIG. 11.

PATENT CLAIMS

1. The invention relates to a key (1) for a lock cylinder (2) of a key/lock system, comprising a key head and a key web, wherein the key web includes a plurality of control recesses configured to receive segments of associated tumblers (4) of the lock cylinder (2) characterized in that a recess for receiving an inserted square pin (5) is configured in at least one of the control recesses, wherein the square pin (5) includes a square pin tip (6) with a predetermined contour and at least the square pin tip (6) has different hardness and/or wear properties with reference to a material of the key web (3) and/or of the tumblers (4).
2. The key according to claim 1, characterized in that the respective square pin tip (6) comes in contact with a flank of a respectively associated tumbler (4) when the key (1) is introduced into the lock cylinder.
3. The key according to one of the preceding claims, characterized in that the square pin tip (6) is configured as a cone, a frustum, a pyramid, a pyramid frustum or as a wedge shaped cutting edge.
4. The key according to one of the preceding claims, characterized in that a square pin includes a square pin base (7) which is partially or completely inserted into the key web, wherein the square pin base includes a structure, in particular a profile, a knurl or a circumferential thread cutting edge at least in sections of an outer circumference.
5. The key according to one of the preceding claims, characterized in that a service life of the key is controllable by selecting wear properties of the square pin material.
6. The key according to one of the preceding claims, characterized in that the respective square pin is arranged fixated and non-movable in the associated recess.

7. The key according to claim 4, characterized in that the square pin base (7) is configured cylindrical.

5 8. The key according to one of the preceding claims, characterized in that the square pin base (7) has a convex shape (71).

9. The key according to one of the preceding claims, characterized in that the recess for receiving the respective square pin (5) is configured by drilling.

10 10. The key according to claim 2, characterized in that the respective square pin tip (6) contacts a flank of the respectively associated tumbler (4) when the key (1) is introduced into the key lock cylinder.