A BLANK, SECURITY KEY, LOCK SYSTEM AND MANUFACTURING METHOD

The invention relates to a blank, to a security key and to a lock system with security keys and with assigned cylinders, as well as to a method for manufacturing the security key from a blank, according to the preamble of the independent claims.

With regard to lock technology, there exist the basic tasks of firstly preventing the unauthorised replication of keys with better and better means or rendering it more difficult, and on the other hand of increasing the number of possible permutations of a key and thus also the security of the lock systems.

A lock system with security turn keys is known from EP 1 185 755 as the closest state of the art, which at the key tip comprise a horizontal blocking groove with a coded blocking depth. A blocking tumbler pin pair, consisting of a standard coding pin (coding tumbler pin) and an extended standard blocking counter pin preventing the complete insertion of a key with a blocking groove which is not deep enough, is attached at the rearmost coding position in the assigned cylinder. This blocking groove coding results in high permutation capacities. Such a horizontal blocking groove however is still not too difficult to copy or replicate.

Embodiments of the present invention seek to provide a system with blanks, security keys and with assigned cylinders which significantly improves the characteristics of known systems, in particular of the known block-code system according to EP 1 185 755, with additional security functions, an improved replication protection for keys and blanks by way of a shaping which is difficult to define and copy and which moreover permits higher permutation capacities. Moreover, a reliable functioning over a long period of use and robustness with respect to wear are to be achieved, and a rational, inexpensive series production is to be possible. Above all, the new shaping should also not necessitate additional space on the key with several coding rows. A complete market range is to be covered by only one type of blank, and unauthorised key replications by way of key-cutting services are to be prevented.

According to ~~an~~ first aspect of the invention, a blank for manufacturing a security key with at least two coding rows / pin rows on the flat sides of the key for an assigned cylinder with tumbler pins and with counter pins of a lock system with an insertion block, acting ~~in a vertical direction to the key axis,~~ by means of an extended counter pin is described, the blank is characterised by~~wherein~~ two parallel lateral grooves and a central projecting part between the lateral grooves, and which are formed parallel to the key axis and symmetrically to the central plane of a coding row / pin row, wherein the lateral grooves and the central projecting part are extending from the key tip to a coding region of ~~the~~ first coding positions, and said lateral

grooves in an entry region at the key tip running at a high level and in the coding region of ~~the~~ first coding positions running in a sunk manner at a lower level, wherein the lateral grooves are suitably shaped, in order to correspond to an additional lateral shoulder~~s~~ extending in the longitudinal and transverse direction to the key axis (x) of an associated ~~circularly symmetric~~ cylindrical special tumbler pin and an extended counter pin at the rearmost coding position of the cylinder, so that an additional insertion block acting ~~in a vertical direction to the key axis~~by means of an extended counter pin in the entry region and an additional rotation block in the coding region can be carried out by the lateral grooves of the blank and the lateral shoulders of the associated special tumbler pin.

According to a second~~nother~~ aspect of the invention, a security key with at least two coding rows / pin rows on the flat sides of the key for an assigned cylinder with tumbler pins and with counter pins of a lock system with an insertion block, acting ~~in a vertical direction to the key axis~~by means of an extended counter pin is described, the security key is characterised by ~~wherein~~ two parallel lateral grooves ~~and~~, a central groove and a central projecting part between the lateral grooves, and these are formed parallel to the key axis and symmetrically to the central plane of a coding row / pin row, wherein the lateral grooves ~~and~~, the central groove and the central projecting part are extending from the key tip to a coding region of ~~the~~ first coding positions, wherein coding recesses are formed at the first coding positions in the region of the central groove in the coding region, and wherein the lateral grooves in an entry region at the key tip running at a high level and in the coding region of the first coding positions running in a sunk manner at a lower level, wherein the lateral grooves are suitably shaped, in order to correspond to an additional lateral shoulder~~s~~ extending in the longitudinal and transverse direction to the key axis of an associated ~~circularly symmetric~~cylindrical special tumbler pin and an extended counter pin at the rearmost coding position of the cylinder, so that an additional insertion block acting ~~in a vertical direction to the key axis~~ by means of an extended counter pin in the entry region and an additional rotation block in the coding region can be carried out by the lateral grooves of the key and the lateral shoulders of the associated special tumbler pin.

According to a~~nother~~ third aspect of the invention, a lock system with security keys with at least two coding rows / pin rows on the flat sides of the key and with assigned cylinders with tumbler pins and with counter pins and with an insertion block, acting ~~in a vertical direction to the key axis~~by means of an extended counter pin is descibed, the lock system is characterised by ~~wherein~~ keys with two parallel lateral grooves, ~~and~~ a central groove and a central projecting part which are formed parallel to the key axis and symmetrically to the central plane of a coding row / pin row, with coding recesses in the region of the central groove at first coding positions, wherein the lateral grooves, ~~and~~ the central groove ~~or a~~and the central projecting part are extending from the key tip to a coding region of the first coding positions, and said lateral

grooves in an entry region at the key tip running at a high level and in the coding region of the first coding positions running in a sunk manner at a lower level, and with assigned cylinders with a ~~circularly-symmetric~~cylindrical special tumbler pin at the rearmost coding position of the cylinder, said special tumbler pin comprising an additional lateral shoulder~~s~~, which extends in the longitudinal and transverse direction to the key axis, wherein these lateral shoulders of the special tumbler pin are shaped such that they correspond to the lateral grooves of the key, and wherein in the entry region, the length of the special tumbler pin and an extended counter pin up to the lateral shoulder corresponds to the distance from the cylinder housing up to the lateral groove, and at a first coding position, the length of the special tumbler pin up to the lateral shoulder corresponds to the distance from the shear line up to the lateral groove, with a tolerance region, so that an additional insertion block acting ~~in vertical direction to the key axis~~by means of an extended counter pin, in the entry region and an additional rotation block in the coding region can be carried out with the lateral grooves of the key and with the lateral shoulders of the assigned special tumbler pin.

This new blank block-code system emanates for example from the previous block-code system and additionally comprises new features, characteristics and functions, with which the mentioned objects can be achieved, as shown and explained further also by way of the figures.

PATENT CLAIMS

1. A blank (R) for manufacturing a security key with at least two coding rows / pin rows (Ai) on the flat sides of the key for an assigned cylinder (Z) with tumbler pins (ZH) and with counter pins (GZH) of a lock system with an insertion block, acting ~~in a vertical direction to the key axis (x),~~ by means of an extended counter pin, characterised by
- two parallel lateral grooves (RB-SN) and a central projecting part (RB-M) between the lateral grooves, and which are formed parallel to the key axis (x) and symmetrically to the central plane of a coding row / pin row (A),
- wherein the lateral grooves (RB-SN) and the central projecting part (RB-M) are extending from the key tip to a coding region (RB-P) of ~~the~~ first coding positions (P1, P2)
- and said lateral grooves (RB-SN) in an entry region (RB-E) at the key tip running at a high level (N1) and in the coding region (RB-P) of ~~the~~ first coding positions (P1, P2) running in a sunk manner at a lower level (N2),
- wherein the lateral grooves (RB-SN) are suitably shaped, in order to correspond to an additional lateral ~~shoulders~~ shoulder (RB-ZH-S) extending in the longitudinal and transverse direction to the key axis (x) of an associated ~~circularly symmetric~~cylindrical special tumbler pin (RB-ZH) and an extended counter pin (RB-GZH) at the rearmost coding position (P1, P2) of the cylinder,
- so that an additional insertion block, acting ~~in a vertical direction to the key axis (x)~~by means of an extended counter pin (RB-GZH), in the entry region (RB-E) and an additional rotation block in the coding region (RB-P) can be carried out by the lateral grooves (RB-SN) of the blank and the lateral shoulders (RB-ZH-S) of the associated special tumbler pin.

2. A blank according to claim 1, characterised in that the central projecting part RB-M is sunk to a lower level (RB-M(2)) in the coding region (RB-P).

3. A blank according to claim 1 or 2, characterised in that the complete width bg(2) of lateral grooves RB-SN and the central projecting part RB-M on both sides is larger than the width (bcv) of the coding recesses (Cod-V) of the coding row (A) by an amount (bb): bg (2) = bcv + 2 bb.

4. A blank according to one of the preceding claims, characterised in that the width (bm) of the central projecting part RB-M is at least 33% of the complete groove width (bg).

5 A blank according to one of the preceding claims, characterised in that the width (bn) of a lateral groove RB-SN is at least 20% of the complete groove width (bg).

6. A blank according to one of the preceding claims, characterised in that the inner walls (11) of the lateral grooves RB-SN are inclined at an angle Wm to the pin plane (A).

7. A blank according to claim 6, characterised in that the angle Wm is = 10° - 40°.

8. A blank according to one of the preceding claims, characterised in that with an inclined pin plane (A) with an inclination angle Wa > 0, on the inner side, an additional side groove RB-nn adjoins to the lateral groove RB-SN, said side groove forming a supporting surface orthogonal to the coding plane / pin plane (A).

9. A security key with at least two coding rows / pin rows (Ai) on the flat sides of the key for an assigned cylinder (Z) with tumbler pins (ZH) and with counter pins (GZH) of a lock system with an insertion block, acting ~~in a vertical direction to the key axis (x)~~by means of an extended counter pin, characterised by
- two parallel lateral grooves (RB-SN) ~~and~~, a central groove (RB-MN) and a central projecting part (RB-M) between the lateral grooves, and these are formed parallel to the key axis (x) and symmetrically to the central plane of a coding row / pin row (A),
- wherein the lateral grooves (RB-SN) ~~and~~, the central groove (RB-MN) and the central projecting part (RB-M) are extending from the key tip to a coding region (RB-P) of ~~the~~ first coding positions (P1, P2)
- wherein coding recesses are formed at the first coding positions (P1, P2) in the region of the central groove (RB-MN) in the coding region (RB-P),
- and wherein the lateral grooves (RB-SN) in an entry region (RB-E) at the key tip running at a high level (N1) and in the coding region (RB-P) of the first coding positions (P1, P2) running in a sunk manner at a lower level (N2),
- wherein the lateral grooves (RB-SN) are suitably shaped, in order to correspond to an additional lateral ~~shoulders~~shoulder (RB-ZH-S) extending in the longitudinal and transverse direction to the key axis (x) of an associated ~~circularly symmetric~~cylindrical special tumbler pin (RB-ZH) and an extended counter pin (RB-GZH) at the rearmost coding position (P1, P2) of the cylinder,
- so that an additional insertion block, acting ~~in a vertical direction to the key axis (x)~~by means of an extended counter pin (RB-GZH) in the entry region (RB-E) and an additional rotation block in the coding region (RB-P) can be carried out by the lateral grooves (RB-SN) of the key and the lateral shoulders (RB-ZH-S) of the associated special tumbler pin (RB-ZH).

10. A key according to claim 9, characterised in that the coding recesses of the first coding positions (P1, P2) are formed on a sunk central projecting part RB-M(2).

11. A key according to claim 9 or 10, characterised in that the complete width bg(2) of lateral grooves RB-SN and the central groove RB-MN on both sides is larger than the width (bcv) of coding recesses (Cod-V) of the coding row (A) by an amount (bb): bg (2) = bcv + 2 bb.

12. A key according to one of the claims 9 to 11, characterised in that with an inclined pin plane (A) with an inclination angle Wa > 0, on the inner side, an additional side groove RB-nn

adjoins to the lateral groove RB-SN, said side groove forming a supporting surface orthogonal to the pin plane (A).

13. A key according to one of the claims 9 to 12, characterised in that RB coding steps Ci* in the coding region are situated higher or more deeply than the standard coding steps (Ci) of the coding row (A) with a correspondingly different length of the assigned tumbler pin RB-ZH.

14. A key according to one of the claims 9 to 13, characterised in that the distance (dN) between the high level (N1) and the lower level (N2) is at least one coding step (dC).

15. A lock system with security keys (S) with at least two coding rows / pin rows (Ai) on the flat sides of the key and with assigned cylinders (Z) with tumbler pins (ZH) and with counter pins (GZH) and with an insertion block, acting ~~in a vertical direction to the key axis (x), by~~ means of an extended counter pin, characterised by

- keys (S) with two parallel lateral grooves (RB-SN), ~~and~~ a central groove (RB-MN) and a central projecting part which are formed parallel to the key axis (x) and symmetrically to the central plane of a coding row / pin row (A), with coding recesses in the region of the central groove (RB-MN) at first coding positions (P1, P2),
- wherein the lateral grooves (RB-SN), ~~and~~ the central groove (RB-MN) ~~or a~~and the central projecting part (RB-M) are extending from the key tip to a coding region (RB-P) of the first coding positions (P1, P2)
- and said lateral grooves (RB-SN) in an entry region (RB-E) at the key tip running at a high level (N1) and in the coding region (RB-P) of the first coding positions (P1, P2) running in a sunk manner at a lower level (N2),
- and with assigned cylinders (Z) with a ~~circularly symmetric~~cylindrical special tumbler pin (RB-ZH) at the rearmost coding position (P1, P2) of the cylinder, said special tumbler pin comprising an additional lateral ~~shoulders~~shoulder (RB-ZH-S), which extends in the longitudinal and transverse direction to the key axis (x),
- wherein these lateral shoulders (RB-ZH-S) of the special tumbler pin (RB-ZH) are shaped such that they correspond to the lateral grooves (RB-SN) of the key,
- and wherein in the entry region (RB-E), the length (ls) of the special tumbler pin (RB-ZH) and an extended counter pin (RB-GZH) up to the lateral shoulder (RB-ZH-S) corresponds to the distance (ds) from the cylinder housing (10) up to the lateral groove (RB-SN),
- and at a first coding position (P1, P2), the length (lz) of the special tumbler pin (RB-ZH) up to the lateral shoulder (RB-ZH-S) corresponds to the distance (dz) from the shear line (9) up to the lateral groove (RB-SN), with a tolerance region (to),
- so that an additional insertion block, acting ~~in vertical direction to the key axis (x)~~ by means of an extended counter pin (RB-GZH), in the entry region (RB-E) and an additional rotation block

in the coding region (RB-P) can be carried out with the lateral grooves (RB-SN) of the key and ~~with~~ the lateral shoulders (RB-ZH-S) of the assigned special tumbler pin (RB-ZH).

16. A method for manufacturing a key (S) according to one of the claims 9 to 14, from a blank (R) according to one of the claims 1 to 8, by way of a coding,
characterised in that on the blank (R), ~~a~~ the central groove RB-MN is manufactured in the entry region (RB-E) and coding recesses (Cod-V) are manufactured at the first coding positions (P1, P2) in the coding region (RB-P), by way of material removal at the central projecting part RB-M.

17. A method according to claim 16, characterised in that on the blank, firstly a sunk central projecting part RB-M(2) is manufactured in the coding region (RB-P) by way of a first milling cutter, and subsequently the lateral grooves RB-SN are manufactured in the entry region (RB-E) at a high level (N1) and in the coding region (RB-P) at a lower level (N2) by way of a second milling cutter.

18. A method according to claim 17, characterised in that on the blank, and with an inclined pin plane (A) with an inclination angle Wa > 0, firstly the sunk central projecting part RB-M(2) and an additional side groove RB-nn are created by way of ~~a~~ the first milling cutter.