

Profile System for Defining the Cross Section of Flat Keys and of Key Channels

TECHNICAL FIELD

The invention relates to a system of profiles defining the cross sections of flat keys having substantially plane and approximately parallel flat faces and corresponding key ways or key channels in lock cylinders, particularly for composing lock systems, with ribs and grooves on the flat sides of the bit and the key way, designated as elements of profile variations and of guiding profiles. The invention also relates to a flat key encompassing this system of profiles.

The protection of life, of privacy, and of property are of dominant relevance. Therefore, particular importance is attributed to locks and keys. In locked systems, access areas are defined and obtained by assigning each key of the system to one or more locks. This assignment, or exclusion, of key and lock in regard to the locking function is obtained by the cross section profile of the key and the cross section of the key way in lock systems based on lock cylinders and flat keys. Only if the contour of the cross section of the key way precisely matches the cross section of a flat key or encloses the same, will the key fit into the lock. As soon as there is an intersection between the cross section of the flat key and the cross section of the key way, the key does not have authorisation to lock with the specific lock cylinder.

Of course, this association of the key with the lock cylinder by means of the profile, i.e., the cross section of the key, particularly a flat key, and the key way of the lock cylinder, holds also for the individual cylinder and the individual key which is not an intrinsic part of a lock system.

The fact that a key cannot be directly copied meets safety requirements. A spare key can be obtained by the authorised person from the original manufacturer via safety certificates and identity checks. If blanks can be obtained on the market, a locksmith service can readily produce a spare key with a copy-milling machine by producing the toothing pattern on the front side of the key. If, in addition, a copy-milling machine is capable of sensing the contour of the cross section on the plane faces of an original key and if appropriate milling tools are available, a spare key can be produced even by cutting a metal plate. Thus, if so far by restricting free availability on the market, the production of spare keys with key contours subject to restrictions was not possible because of unavailable blanks, locksmith services nowadays have the technical capability of copying a key in regard to toothing patterns as well as contour. The profile of the key is sensed mechanically or optically from the side. The results of this lateral scanning is followed by the insertion and advance



of one or several milling cutters for creating U-shaped, V-shaped or rectangular grooves. By inclining the blank, grooves can be cut also at an angle to the centre line of the profile cross section, e.g., in the form of backed-off grooves.

STATE OF THE ART

From DE 31 36 314 A1 there is known a key which has ribs extending laterally far beyond imaginary lateral lines of an assumed central cross section, so that this key does not have plane and approximately parallel flat faces. These salient ribs have grooves cut into the direction of motion of the pins. When the salient ribs of the key are filed down, the key can be readily inserted into the key channel and may even effect locking. A key profile should be configured so that working on it by flat milling does not lead to success.

DISCLOSURE OF THE INVENTION

The invention intends to configure a profile system for defining the cross sections of flat keys with substantially plane and approximately parallel faces and of corresponding key channels in lock cylinders so that it is not possible to reproduce the profile in an operation making use of a modern key-profile milling machine as used by locksmith services. In the case of flat keys having substantially plane and approximately parallel sides, as well as of corresponding key channels, this is achieved in that at least one additional groove as a branch groove or a branch rib issues from at least one groove, particularly from a groove of the guiding profile, and that the directions of plunge-cutting of the groove and of the branch groove are at variance and differ, by, say, 60°. Lateral scanning of the profile grooves of an original key does not sense the branch groove or senses it only incompletely. The branch groove would have to be produced by reclamping the blank and repeated scanning of the original. Reclamping into an angular position of the center line of the profile groove deviating from the original direction of plunge-cutting of a profile groove necessarily causes lateral shifting so that a branch groove or an additional groove issuing laterally from a groove cannot be produced with proper dimensions, for proper functioning, and at low cost. In practice, this can be done only in the lock-manufacturing plant which has profile reaming machines and large milling centers where clamping alignment errors do not occur because separate error-inducing operations with repeated measurements of an initial position are not required.

Producing branch grooves, which issue from the interior of a groove cut into the flat side of a key, is as difficult as the appropriately matched production of a key channel profile in the lock cylinder. The branch groove or branch grooves advantageously issue from a lateral flank or from

the lateral flanks of a groove at a distance from the bottom of the groove. In this way, distinct branching of the grooves into two or more directions is obtained and this branching can hardly be reproduced. In view of the guarantee that this branching groove or branching grooves should always be present in lock systems for safety reasons (i.e., also in a subordinated key), the groove and branch groove or the rib and the branch rib are conveniently provided as guiding profile elements. In a lock system, the guiding profile is formed on each key so that the desired security is in all cases given. The guiding profile elements are advantageously provided as profile elements having at least one branch groove at a groove or a branch rib at a rib of the guiding profile, with the profile elements configured as oppositely directed, overlapping profile elements issuing from both flat faces of the key. If an attempt were made to produce a so-to-speak superordinated profile by grinding out the branching groove, the resulting enlargement of the groove would cause weakening of the entire cross section and, in most instances, collapse of the cross section. Thus, there exist restrictions in regard to producing a spare key with the conventional means and unauthorised copying of the key is precluded. It must be noted that the production of a key not corresponding to the original is considered as production of a burglary tool and is punishable by law and that the lock system is degraded by such a key in a manner detrimental to competition. In regard to manufacture or for safety reasons, the plunge-cut width of the branch groove or branch grooves has about one third of the length of the flank or of the bottom of the groove from which the branch groove issues. A flat key with substantially plane and approximately parallel flat faces and with grooves cut into the same is characterised in that from at least one groove, particularly from oppositely directed, overlapping grooves, in the center region of the bit cross section there issues a further groove as a branch groove, and that the directions of plung-cutting the groove and the branch groove are at variance and differ by, for example, 60°. This flat key can be a key of a lock system or an individual key. It is particularly convenient to have the branch groove or the branch grooves issue from the lateral flanks of the groove in the flat key at a distance from the bottom of the groove. Such a key is particularly difficult to produce and, by virtue of the branch groove, weakens the strength of the key to a lesser extent than a groove possibly situated at a lower position in the bottom of the main groove.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the object of the invention are shown in the drawings. Figures 1 to 4 show cross sections of keys, Figure 5 shows the cross section of a key channel.

OPTIMAL EMBODIMENT OF THE INVENTION

A key 1 of a lock system has in the cross section of the bit an overlapped guiding profile with grooves 2, 3 each protruding beyond the center line of the profile and situated approximately in the middle of its length. Such an embodiment fulfills the task of a guiding profile, namely to position the key in the key hole or key channel and covers the top portion of core pins, i.e., it serves for secure sensing in the lock cylinder. A branch groove 4 in the form of a triangular groove issues from a lateral flank of groove 2. The direction of plunge-cutting (arrow 5) for producing the groove 2 differs from the direction of plunge-cutting (arrow 6) the branch groove 4. Thus, two operations and reclamping of the blank are required for the changed direction of working.

Figure 2 shows a key 7 and, in addition, a rectangular branch groove 8 in the groove 3. Figure 5 shows the corresponding key channel 9: the same has ribs 2' and 3' and branch ribs 4' and 8'. Since the branch groove 8 is missing, a key according to Figure 1 could not be inserted into the key channel 9.

If a locksmith service had an original key 7 according to Figure 2 for producing a duplicate key, only the grooves 2 and 3 could be cut in the one direction of plunge-cutting. If an attempt were made to form grooves 2 and 3 by deeper plunge-cutting such that the branch grooves 4 and 8 were included, the key 7 would break. The contours of deeper plunge-cutting are shown by dashed lines in Figure 2.

Figure 3 shows a key 10, which on a guiding profile according to Figure 1 with grooves 2 and 3 and branch groove 4, has, in addition, grooves 11, 12, and 13, 13' as well as 14, 14' as a profile variation. Groove 11 is an example of a system with a variation.

Figure 4 illustrates a key 15 which has grooves 2, 3, and branch groove 4 as the guiding profile. In groove 16, which like all the other non-referenced grooves is part of the profile variation, there is provided a branch groove 17 as part of the profile variation, with groove 17 issuing opposite groove 16 from a lateral flank under a different direction of plunge-cutting of the milling tool. This branch groove 17 has a bottom which is inclined relative to the plane of the lateral flank of groove 15. This poses even greater obstacles to reproducing a key. Thus, not only the profile elements of the guiding profile but also those of the profile variation with branch grooves on the lateral flanks or at the bottom of the groove (e.g., in the case of rectangular grooves or trapezoidal grooves) can be formed.

What has been said about the key, the grooves and the one or more branch grooves holds with the proper interpretation for the corresponding ribs and branch ribs in the key channel. The invention relates to individual keys as well as to system keys, with the latter having the branch groove in a profile section which must be necessarily present in all keys of the system so that the safety effect is ensured with all keys in combination with the one or more matching lock cylinders.

Claims

1. A profile system with cross section configurations of flat keys having substantially plane and approximately parallel flat faces and with matching key channels in lock cylinders, particularly for arranging lock systems, wherein grooves cut into the plane faces of the flat key are provided as elements of profile variations and as guiding profile elements, characterised in that from at least one groove (2, 3, 16), particularly from a groove of the guiding profile, there issues at least one additional groove as a branch groove (4, 8, 17) and that the directions of plunge-cutting the groove (2, 3, 16) and branch groove (4, 8, 17) are nonidentical and are at variance by, for example, 60°.
2. The profile system according to Claim 1, characterised in that the branch groove (4, 8, 17) or the branch grooves issue from a lateral flank or lateral flanks of the groove (4, 8, 17) at a distance from the bottom (2', 3') of the groove.
3. The profile system according to Claims 1 or 2, characterised in that the groove (2, 3) and the branch groove (4, 8) are provided as guiding profile elements.
4. The profile system according to Claim 3, characterised in that the guiding profile elements are provided as overlapping profile elements which issue in opposite directions from the two flat faces of the key or, respectively, from the side walls of the key channels and have at least one branch groove (4, 8) at a groove (2, 3) of the flat key (1, 7, 10) or at a branch rib (4', 8') in the key channel (9).
5. The profile system according to Claim 4, characterised in that the guiding profile grooves (2, 3) are provided with at least one branch groove (4, 8) and the guiding profile ribs (2', 3') are provided with at least one branch rib (4', 8') in the center region of the the bit cross section (1, 7, 10) or, respectively, in the center region of the cross section of the key channel (9).
6. The profile system according to any one of Claims 1 to 5, characterised in that the width of the plung-cut incision for the branch groove (4, 8, 17) or branch grooves amounts to about one third of the length of the flank or, respectively, of the bottom of the groove (2, 3, 16) from which the branch groove issues.
7. Flat keys having substantially plane and approximately parallel flat faces and grooves cut into the same, characterised in that from at least one groove (2, 3, 16), and particularly from overlapping oppositely directed grooves (2, 3), preferably in the center part of the cross section of the key bit, there issues a further groove as a branch groove (4, 8, 17) and that the directions of

plung-cutting of the groove (2, 3, 16) and of the branch groove (4, 8, 17) are different and at variance by, for example, 60°.

8. The flat keys according to Claim 7, characterised in that the branch groove or the branch grooves issue from a side flank or, respectively, the side flanks of the groove (4, 8, 17) in the flat key at a distance from the bottom of the groove.