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Description

[0001] This invention relates to a combination of a disc tumbler lock and a key therefor, the combination being in accordance with the preamble of ensuing claim 1. A lock and key combination similar to the preamble of claim 1 is disclosed in DE-B-1159306. The invention also relates to the key of the combination and a key blank from which such a key is formed.

[0002] Disc tumbler locks are often used as security locks in doors. While the market is expanding, there is a requirement for there to be a large number of possible different key alternatives for operating such locks. In principle this can be achieved, for example, by increasing the number of tumbler discs in the lock, by increasing the stepping alternatives for combination surface millings or by increasing the number of combination values. However, both the size of the key and the lock must be kept reasonable. Furthermore, decreasing the stepping of milling for its part can cause malfunctions and error openings.

[0003] It is also desirable to make the picking of such locks as difficult as possible. Traditionally the locking channel of the tumbler discs used in these locks has locking branches and a straight connecting branch which extends in the direction of transfer movements of the lock bolt. In such cases it is sufficient to pick the lock for the tumbler discs to be arranged so that the connecting branches in their locking channels are located at the position of the locking pin. The lock bolt can then be pressed to its opening position while the locking pin moves directly through the branch of the locking channel in question. In order to prevent picking, it is known to provide the locking branches of the locking channel with different recesses in which the locking pin can be received whilst the correct positions of the tumbler discs are found. Thus probing of the position of the tumbler discs becomes more difficult.

[0004] An aim of the invention is to provide a new combination of a disc tumbler lock and a key therefor which allows the use of a great number of new key alternatives and which makes it easier to prevent or deter picking of the lock.

[0005] According to one aspect of the present invention there is provided a combination of a disc tumbler lock and a key therefor, the combination being as claimed in the ensuing claim 1.

[0006] The key-bit means includes guide means which affect the lock bolt so that, in the final stage of the selecting movement of the tumbler disc, it guides the locking pin into the third branch of the locking channel. The third branch of the locking channel has at least one guiding means for guiding the locking pin at the same time as the transfer movement of the lock bolt and the selecting movement of the tumbler discs are achieved. The movement of the locking pin into the branch which interconnects the locking branches of the locking channel and, in this branch at least, at an early stage of the

movement of the locking pin requires simultaneous movement of the tumbler disc. Thus in this case the traditional way of picking a lock, by alternately arranging individual tumbler discs of the lock, does not work. With the present invention, it is also possible to make the keys of corresponding old lock systems functionally incompatible, since these keys operate firstly by selecting the movement of the tumbler discs and only thereafter by the transfer movement of the lock bolt and its locking pin. Thus totally new key combination alternatives can be utilized.

[0007] In practise the third branch of the locking channel advantageously has a guide surface which is angled or bevelled with regard to the transfer movement of the lock bolt and is arranged to co-operate with the locking pin. In addition the third branch of the locking channel is provided with a protrusion which limits or partially obstructs the width of the channel and which is arranged on the opposite side of the channel to the angled or bevelled guide surface and which, together with this guide surface, affects the locking pin and guides it in the direction of the selecting movement of the tumbler disc. Although it would be possible to transfer the locking pin to the third branch of the locking channels of all the tumbler discs, the protrusion prevents the transfer of the locking pin forward in the branch in question unless also all tumbler discs are simultaneously moved correctly.

[0008] Different key combinations can advantageously be accomplished by varying the shape and/or the size of the guiding means of the third branch of the locking channel of the tumbler disc. In this case the corresponding shapes of the combination surfaces of the key can be changed correspondingly so that combination surfaces of a certain shape accomplish the functional compatibility of the locking pin only with a locking channel provided with guiding means having a certain shape and/or size.

[0009] The locking channel may, in a known way, be provided with a fourth branch, which extends transversally with respect to the transfer movement of the lock bolt, and a fifth branch, which connects the second and fourth branches. In this case the fifth branch is also conveniently provided with guiding means for guiding the locking pin. As a consequence, in order to open the lock, two successive selecting movements, caused by turning the key, are required, which increases the number of alternative combinations and improves the possibilities of preventing picking of the lock.

[0010] In practise a locking pin compatible with the above-mentioned restriction members and guide surfaces can with advantage be obtained if the cross-section of the locking pin taken in the direction of the selecting movement of the tumbler disc is triangular.

[0011] Suitably the key has an elongate shank and the key-bit means extend in an axial plane containing the elongate axis of the shank and are formed with said combination surfaces, the guide means extending outwardly, perpendicular to the axial plane, further than the

key-bit means and are arranged to move the lock bolt and thus the locking pin before finishing the selecting movement of the tumbler discs of the lock. The combination surfaces accomplishing the selecting movement of the tumbler discs are arranged on the key blade on both sides of the guide member in the axial direction of the shank of the key. If there are equal numbers of combination surfaces on both sides of the guide means, the key can advantageously be operated from both sides of the lock.

[0012] The key-bit means may also include a guide surface independent of the guide means to provide the transfer movements of the lock bolt after the selecting movement of the locking combination. The guide surface and the guide means are suitably arranged in the same cross-sectional plane with regard to the shank of the key.

[0013] The number of locking combinations available can essentially be increased by having at least two different combination surface types which can be used. These combination surface alternatives can be arranged to be functionally incompatible with the tumbler disc of the other alternative(s) since the compatibility with the tumbler disc requires only that certain changes required by each combination surface type are made to the locking channel of the tumbler disc. The combination surfaces of the key can then be selected to contain either one of the combination surface types or any combination thereof.

[0014] The combination surface types can advantageously include a plane surface milling and a milling surface comprising two bevelled or angled surfaces which taper or converge towards the tip part of the blade. In practise the blade of the key most preferably has at least one such combination surface that contains a tip formed by opposite bezels in perpendicular cross-sectional level of the shank of the key. Mixed use of different combination types complicates essentially remembering the combination values of the key and thus unauthorised manufacturing of the key.

[0015] The number of combination alternatives is further increased as the key has two blade parts provided with combination surfaces and positioned symmetrically on both sides of the shank of the key blank. The combination surfaces of the blade parts can mutually be at least partly different either as regards the value of millings or the type of the combination surface.

[0016] According to another aspect of the present invention there is provided a key blank as claimed in the ensuing claim 13. The guide means is arranged to move the lock bolt of the lock, and thus also the locking pin, before finishing the selecting movement of the tumbler discs of the lock.

[0017] According to a further aspect of the present invention there is provided a key as claimed in the ensuing claim 17.

[0018] Embodiments of the invention will now be described, by way of example only, with particular refer-

ence to the accompanying drawings, in which:

Figs. 1 - 6 show a lock of a lock and key combination according to the invention, the lock being shown in different operational positions viewed from one side and with an opened cover of the lock casing;

Fig. 7a shows an enlarged view of a tumbler disc of the lock with its locking channels;

Fig. 7b shows schematically the movement of a locking pin in the locking channel of the tumbler disc of Fig. 7a in different operational positions of the lock;

Fig. 8 shows different combination milling alternatives for the key of the lock; and

Fig. 9 is a sectional view taken on line IX-IX of Fig. 8.

[0019] In the drawings reference numeral 1 designates a lock casing of a lock for installation on a door or the like and includes a front plate 2 and a lock bolt 3 movable back and forth on operation of a key 8 of the lock between a protruding locked position and a retracted released position. The lock casing 1 preferably has a keyhole 1b at each of its two sides. The key 8 (see Fig. 8) includes a shank 8a having two key-bits in the form of blade parts 8b1 and 8b2.

[0020] The lock casing 1 houses a set of tumbler discs 5 which are separated from each other by spacer plates 7 and which each have a multi-branched locking channel for a locking pin 4 of the lock bolt 3. In order to control the movements of the locking pin 4, and thus of the lock bolt 3, the lock has a guide groove 1a. As is more apparent from Fig. 7a, the locking channel is provided, in the embodiment shown, with locking branches 5a, 5b and 5d which are interconnected by branches 5c and 5e. When the locking pin 4 moves through the branches 5c or 5e, the lock bolt 3 moves simultaneously from one position to another. The branch 5c has an inclined guide surface 5f and a guide protrusion 5g. Correspondingly the branch 5e has an inclined guide surface 5i and a guide protrusion 5h. These guide surfaces and guide protrusions guide the relative movement of the locking pin 4 along the locking channel as shown in Fig. 7b. In practice, because of the guide groove 1a, the movement of the lock bolt 3 and the locking pin 4 is linear, so the transfer of the lock bolt 3 requires correspondingly movements of the tumbler disc 5. The locking channel can also be provided with recesses 5j which, together with a recess 4a of the locking pin 4, make it more difficult to probe the position of the tumbler discs and thus to pick the lock.

[0021] As is more apparent from Figs. 8 and 9, there are combination surfaces 8c (8c1, 8c2 etc.) on the key 8 for each tumbler disc 5 and correspondingly the tumbler discs 5 have counter surfaces 5k for the combina-

tion surfaces of the key. When the key 8 is turned in the lock to select the locking combination, the tumbler discs 5 move upwards (as viewed in Figs. 1 to 6) guided by pins 9a and 9b of the lock casing against the force of springs 6. The combination surfaces are formed by milling the key-bits of the key. In the embodiment shown, the key 8 has two key-bits or blade parts 8b1 and 8b2. These together with the three locking branches 5a, 5b and 5d of the locking channel provide two protruding positions of different length for the lock bolt 3, which can be obtained with two consecutive selecting movements of the tumbler discs 5 caused by turning the key 8.

[0022] Referring to Figs. 1, 8 and 9, the blade parts 8b1 and 8b2 of the key are additionally equipped with guide members 8d (8d11 etc.), which act on the guide surfaces 3a1, 3a2, 3b1 and 3b2 of the lock bolt 3 to transfer the lock bolt 3 at the final stage of each selecting movement of the tumbler discs 5 so that the locking pin 4 is guided to the branch 5c of the locking channel or correspondingly to the branch 5e. Furthermore, the blade parts of the key have guide surfaces 8e1 and 8e2 to provide the actual transfer movements of the lock bolt 3 after the selecting movement of the locking combination. For this there are guide surfaces 3a3 and 3b3 in the lock bolt 3.

[0023] The operation of the lock is as follows. In the starting situation of Fig. 1, the lock bolt 3 is in its outer protruding position, whereby the locking pin 4 is in the locking branch 5a of the locking channel of the tumbler discs 5. When the key 8 is turned in the lock, the combination surface series 8c1 hits the stop surface 5k of the tumbler discs, whereupon the tumbler discs 5 move upwards (as viewed in Figs. 1-6) against the force of the springs 6. At the same time the relative position of the locking pin 4 in the locking branch 5a changes. After this, in the final stage of the selecting movement of the tumbler discs 5, the guide protrusion 8d12 in the key hits the guide surface 3a1 of the lock bolt and starts to move the lock bolt 3 to the right (as viewed in Fig. 2) concurrently as the tumbler discs 5 are moved as a result of being displaced by the combination surfaces of the key. As a result of the combination of these movements, the locking pin 4 is first guided to the branch 5c of the locking channel and from there further onward until the selecting movement of the tumbler discs is finished, assuming that the analogous combination surfaces of the key are correct. Then, in the situation of Fig. 3, the guide surface 8e1 of the key affects the stop surface 3a3 of the lock bolt and moves the lock bolt forward at the same time as the locking pin 4 moves in the branch 5c below the guide protrusion 5g. The transfer of the locking pin 4 through the branch 5c, however, succeeds only with the help of the correct combination of the above-mentioned movements. For example, if the selecting movement of the tumbler discs had already been finished, the guide protrusion 5g would prevent the moving of the locking pin 4 in the branch 5c of the locking channel. Correspondingly, the guide surface 5f prevents the transfer of

the locking pin 4 in the branch 5c of the locking channel in case the corresponding combination surface of the tumbler disc 5 is incorrect either regarding its combination value or its combination surface type.

[0024] In the situation of Fig. 4, the locking pin 4 has already moved to the position of the locking branch 5b of the locking channel. In this case the tumbler discs 5 are moved downwards (as viewed in Fig. 4) pressed by the spring 6 at the same time as their guide surfaces 5k and combination surfaces 8c1 still remain in contact with each other. In this stage the guide member 8d11 on the other side of the blade 8b1 of the key acts on the guide surface 3a2 of the lock bolt and the guide surface 8e1 of the key correspondingly acts on the guide surface 3a1 of the lock bolt so that they together guide the locking pin 4 past the picking recess 5j located in the locking branch 5b of the locking channel. As a result of this, on turning the key 8 further, the locking pin 4 is able to move to the end of the locking branch 5b as is apparent from Fig. 5.

[0025] The transfer of the lock bolt 3 and the locking pin 4 from the position of Fig. 5 to the position of Fig. 6, where the lock bolt is totally retracted and the key is removed from the lock, occurs in a totally analogous way as described above by turning the key 8 further in the same direction. Correspondingly, when the lock bolt 3 is transferred back to the protruding position the above described measures occur in the reverse order.

[0026] As particularly can be noticed from Figs. 7a and 7b, the guide surfaces 5f and 5i of the locking channel and the guide protrusions 5g and 5h differ somewhat from each other. Correspondingly the combination values of the combination surfaces 8c121 and 8c232 of the opposite blade parts of the key of the Figs. 1-5, but in addition particularly the shapes of the surfaces differ from each other (cf. Fig. 9). In this way two different shapes of combination surfaces can be utilized as combination surfaces of the key for each combination value, the compatibility of which with the locking channel of the tumbler disc is determined expressly by the shape and location of the above mentioned guide surfaces and guide protrusions and, when necessary, in addition by the exact location of the transversal branch 5c or 5e so that a particular shape of the combination surface is compatible with only a certain type of guide surface shape and the guide protrusion. This is based on the fact that the disclosed combination surface types differing from each other provide movements at the final stage of the selecting movement which differ slightly from each other. Different combination surface alternatives are presented schematically in Figs. 8 and 9.

[0027] Since in the embodiment disclosed two different selections of tumbler discs are accomplished by means of two blades 8b1 and 8b2 of the key, one for each protruding length of the lock bolt, hereby an enormous number of different locking combinations can be obtained for utilization. For example assuming that the lock is a symmetrical lock, whereby the key can be in-

serted in the lock from either side, and that there are two key blade parts in the key located opposite to each other and having combination surfaces for eight tumbler discs, whereby four different combination values can be provided for each combination surface, which for their part can be provided with two different shapes of the combination surface, one gets theoretically 16777216 different locking combinations. Of these it is possible to apply in practice at least 1005480 combinations. In the case of an asymmetric lock, one ends up correspondingly with substantially larger amounts.

[0028] The invention is not limited to the shown embodiments, but several modifications are feasible within the scope of the invention as defined by the attached claims.

Claims

1. A combination of a disc tumbler lock and a key (8) therefor provided with key-bit means (8b, 8c), the lock including a lock case (1) and, mounted within the lock case, a lock bolt (3) movable between locking and releasing positions and provided with locking pin means (4), and tumbler discs (5) movable by the key on turning of the latter within the lock, each tumbler disc being provided with a locking channel co-operable with said locking pin means (4) to control the movement of the lock bolt (3) between its locking and releasing positions, each locking channel having at least first and second branch portions (5a and 5b) extending transversely to the directions of movement of the lock bolt between its locking and releasing positions and a third branch portion (5c) connecting said first and second branch portions (5a and 5b), whereby said key-bit means (8b, 8c) has, associated with each tumbler disc (5), a separate combination surface (8c) which, when the key is turned in the lock, moves the tumbler disc (5) in the direction of said first and second branch portions (5a and 5b) to select the locking combination, **characterised in that** said key-bit means (8b, 8c) further has guide means (8d) which coacts with the lock bolt (3) so that, during a final stage of the selecting movement of the tumbler disc (5), it guides the locking pin (4) into the said third branch portion (5c) of the locking channel, and **in that** the said third branch portion (5c) of the locking channel has a protrusion (5g) limiting the width of the locking channel so that it prevents the locking pin (4) from moving along said third channel portion (5c) if the combination surface of the key is incorrect.
2. A combination according to claim 1, **characterised in that** said third branch portion (5c) of the locking channel has a guide surface (5f) angled with regard to the direction of movement of the lock bolt between the locking and releasing positions of the latter and arranged to co-operate with the locking pin means (4).
3. A combination according to claim 2, **characterised in that** said angled guide surface (5f) is arranged on the opposite side of the locking channel to said protrusion (5g), said protrusion (5g) and said guide surface (5f) cooperating with the locking pin (4) to control the relative movement of the latter along the locking channel.
4. A combination according to any one of the preceding claims, **characterised in that** the shape and/or size of said guide surface (5f) and/or said protrusion (5g) of the different locking channels are not all the same, and that the shapes of the corresponding combination surfaces (8c) of the key are arranged so that a combination surface (8c) with a certain shape accomplishes the functional compatibility of the locking pin (4) only with a locking channel (5c) provided with a guide surface and protrusion having the correct shape and/or size.
5. A combination according to claim 3 or 4, **characterised in that** each locking channel has a fourth branch portion (5d) extending transversely to the directions of movement of the lock bolt between its locking and releasing positions and a fifth branch portion (5e) connecting said second and fourth branch portions (5b and 5d), and **in that** said fifth branch portion also has an angled surface (5h) and an oppositely positioned projection (5i) for controlling relative movement of the locking pin means (4) along the locking channel.
6. A combination according to any one of the preceding claims, **characterised in that** the cross-section of the locking pin means (4) taken in the direction of the selecting movement of the tumbler discs (5) is triangular.
7. A combination according to any one of the preceding claims, **characterised in that** said key has an elongate shank (8a) and said key-bit means (8b) extend in an axial plane containing the elongate axis of the shank and formed with said combination surfaces (8c), **in that** the said guide means (8d) extend outwardly, perpendicular to said axial plane, further than said key-bit means (8b), and **in that** the combination surfaces (8c) are formed on either side of the guide means (8d) in the direction of said elongate axis.
8. A combination according to claim 7, **characterised in that** the key-bit means (8b) includes a guide surface (8e) separate from said guide means (8d) for providing the transfer movements of the lock bolt (3) after the selecting movement of the locking com-

bination, and **in that** said guide surface (8e) and said guide means (8d) are arranged in the same plane perpendicular to the elongate axis of the shank (8a).

9. A combination according to claim 7 or 8, **characterised in that** the combination surfaces (8c) for moving the individual tumbler discs (5) can alternatively be selected from at least two different combination surface types, the shapes of which differ from each other and which are arranged to be functionally incompatible with a tumbler disc (5) according to the other alternative, and **in that** the combination surfaces (8c) of the key are selected to contain either one of said combination surface types or any combinations thereof.
10. A combination according to claim 9, **characterised in that** the said combination surface types include a plane surface milling (8c111 etc.) and a milled surface (8c112 etc.) comprising two adjacent bezels tapering to the tip part of the key-bit means.
11. A combination according to claim 9 or 10, **characterised in that** the key-bit means (8b) has at least one combination surface (8c) that contains a tip (8c112 etc.) formed by opposite bezels in perpendicular cross-sectional plane of the shank (8a) of the key.
12. A combination according to any one of claims 10 to 14, **characterised in that** it contains two key-bit means (8b1, 8b2) provided with combination surfaces and located symmetrically on both sides of the shank (8a) of the key blank, and **in that** the combination surfaces (8c1, 8c2) of the blade parts (8b1, 8b2) are mutually at least partly different either as regards the value of millings or the type of the combination surface.
13. A key blank which can be milled to form the key of a combination according to any one of the preceding claims, the key blank comprising an elongate shank (8a), two blade parts (8b1, 8b2) on opposite sides of the shank and extending in an axial plane containing the elongate axis of the shank and intended to be milled to form the combination surfaces (8c) of the key which, in use of the key in the lock, turn the tumbler discs (5) of the lock, **characterised in that** said blade parts (8b1, 8b2) are located symmetrically on opposite sides of the shank and **in that** the key blank further comprises guide means (8d11, 8d12, 8d21, 8d22) intended, in use of a key formed from the key blank, to coact with the lock bolt (3) of a lock, the guide means extending outwardly, in directions perpendicular to said axial plane, from surfaces of each of the two blade parts (8b1, 8b2) positioned on opposite sides of said axial

plane, the guide means on opposite sides of said axial plane being symmetrical with each other.

14. A key blank according to claim 13, **characterised in that** each of said guide means (8d11, 8d12, 8d21, 8d22) has an axial extent less than the axial extent of the blade part (8b1, 8b2) from which it extends.
15. A key blank according to claim 13 or 14, **characterised in that** each of said guide means (8d11, 8d12, 8d21, 8d22) is positioned, in the axial direction, in a central part of the blade part (8b1, 8b2) from which it extends.
16. A key blank according to claim 13, 14 or 15, **characterised in that** each of said guide means (8d11, 8d12, 8d21, 8d22) is positioned radially inwardly of the radially outer extremity of the blade part (8b1, 8b2) from which it extends.
17. A key for operating a disc tumbler lock including a lock case (1) and, mounted within the lock case, a lock bolt (3) movable between locking and releasing positions and provided with locking pin means (4), and tumbler discs (5) intended to be operated by the key on turning of the latter within the lock, each tumbler disc being provided with a locking channel co-operable with said locking pin means (4) to control the movement of the lock bolt (3) between its locking and releasing positions, each locking channel having at least first and second branch portions (5a and 5b) extending transversely to the directions of movement of the lock bolt between its locking and releasing positions and a third branch portion (5c) connecting said first and second branch portions (5a and 5b) and having a protrusion (5g) limiting the width of the locking channel, the key comprising an elongate shank (8a), two blade parts (8b1, 8b2) on opposite sides of the shank (8a) and extending in an axial plane containing the elongate axis of the shank, each blade part having, associated with each tumbler disc (5), a separate combination surface (8c) which, when the key is turned in the lock, is intended to move the tumbler discs (5) in the direction of said first and second branch portions (5a and 5b) to select the locking combination, **characterised in that** said blade parts (8b1, 8b2) are located symmetrically on opposite sides of the shank (8a) and **in that** each of said blade parts has guide means (8d11, 8d12, 8d21, 8d22) extending outwardly on opposite sides of, and in directions perpendicular to, said axial plane, said guide means on opposite sides of said axial plane being symmetrical with each other and being intended in use to coact with the lock bolt (3) so that, during a final stage of the selecting movement of the tumbler discs (5), they guide the locking pin (4) into the said third

branch portion (5c) of the locking channel.

18. A key according to claim 17, **characterised in that** each of said guide means (8d11,8d12,8d21,8d22) has an axial extent less than the axial extent of the blade part (8b1,8b2) from which it extends. 5
19. A key according to claim 17 or 18, **characterised in that** each of said guide means (8d11,8d12,8d21,8d22) is positioned, in the axial direction, in a central part of the blade part (8b1,8b2) from which it extends. 10
20. A key according to claim 17, 18 or 19, **characterised in that** each of said guide means (8d11,8d12,8d21,8d22) is positioned radially inwardly of the radially outer extremity of the blade part (8b1,8b2) from which it extends. 15

Patentansprüche

1. Kombination aus einem Zuhaltungsscheibenschloss und einem Schlüssel (8) dafür, der mit Schlüsselbartmitteln (8b, 8c) versehen ist, wobei das Schloss einen Schlosskasten (1) und, im Schlosskasten angebracht, einen Schlossriegel (3), der zwischen einer Verriegelungs- und einer Freigabeposition beweglich und mit Verriegelungstiftmitteln (4) versehen ist, und Zuhaltungsscheiben (5) enthält, die durch den Schlüssel bei Drehen desselben im Schloss beweglich sind, wobei jede Zuhaltungsscheibe mit einem Verriegelungskanal versehen ist, der zwischen dem Verriegelungstiftmittel (4) zur Steuerung der Bewegung des Schlossriegels (3) zwischen seiner Verriegelungs- und seiner Freigabeposition zusammenwirken kann, wobei jeder Verriegelungskanal mindestens einen ersten und einen zweiten Abzweigenteil (5a und 5b), die sich quer zur Bewegungsrichtung des Schlossriegels zwischen seiner Verriegelungs- und seiner Freigabeposition erstrecken, sowie einen dritten Abzweigenteil (5c), der den ersten und den zweiten Abzweigenteil (5a und 5b) verbindet, aufweist, wobei das Schlüsselbartmittel (8b, 8c) eine, jeder Zuhaltungsscheibe (5) zugeordnete getrennte Kombinationsfläche (8c) aufweist, die, wenn der Schlüssel im Schloss gedreht wird, die Zuhaltungsscheibe (5) in Richtung des ersten und des zweiten Abzweigenteils (5a und 5b) bewegt, um die Verriegelungskombination auszuwählen, **dadurch gekennzeichnet, dass** das Schlüsselbartmittel (8b, 8c) weiterhin ein Führungsmittel (8d) aufweist, das mit dem Schlossriegel (3) zusammenwirkt, so dass es während einer Endstufe der Wahlbewegung der Zuhaltungsscheibe (5) den Verriegelungstift (4) in den dritten Abzweigenteil (5c) des Verriegelungskanals führt und der dritte Abzwei-

gungsteil (5c) des Verriegelungskanals einen Vorsprung (5g) aufweist, der die Breite des Verriegelungskanals begrenzt, so dass er verhindert, dass sich der Verriegelungstift (4) entlang dem dritten Kupplungsteil (5c) bewegt, wenn die Kombinationsfläche des Schlüssels unkorrekt ist.

2. Kombination nach Anspruch 1, **dadurch gekennzeichnet, dass** der dritte Abzweigenteil (5c) des Verriegelungskanals eine bezüglich der Bewegungsrichtung des Schlossriegels zwischen der Verriegelungs- und Freigabeposition des Letzteren abgewinkelte Führungsfläche aufweist, die zum Zusammenwirken mit Verriegelungstiftmitteln (4) angeordnet ist.
3. Kombination nach Anspruch 2, **dadurch gekennzeichnet, dass** die abgewinkelte Führungsfläche (5f) auf der gegenüberliegenden Seite des Verriegelungskanals bezüglich des Vorsprungs (5g) angeordnet ist, wobei der Vorsprung (5g) und die Führungsfläche (5f) mit dem Verriegelungstift (4) zur Steuerung der Relativbewegung des Letzteren entlang dem Verriegelungskanal zusammenwirken.
4. Kombination nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Form und/oder Größe der Führungsfläche (5f) und/oder des Vorsprungs (5g) der verschiedenen Verriegelungskanäle nicht überall die gleiche ist und dass die Formen der entsprechenden Kombinationsflächen (8c) des Schlüssels so angeordnet sind, dass eine Kombinationsfläche (8c) mit einer gewissen Form die Funktionskompatibilität des Verriegelungstifts (4) nur mit einem Verriegelungskanal (5c) erreicht, der mit einer Führungsfläche und einem Vorsprung mit der richtigen Form und/oder Größe versehen ist.
5. Kombination nach Anspruch 3 oder 4, **dadurch gekennzeichnet, dass** jeder Verriegelungskanal einen vierten Abzweigenteil (5d), der sich quer zu den Bewegungsrichtungen des Schlossriegels zwischen seiner Verriegelungs- und seiner Freigabeposition erstreckt, und einen fünften Abzweigenteil (5e), der den zweiten und den vierten Abzweigenteil (5b und 5d) verbindet, aufweist und dass der fünfte Abzweigenteil des Weiteren eine abgewinkelte Fläche (5h) und einen gegenüber angeordneten Vorsprung (5i) zur Steuerung der Relativbewegung des Verriegelungstiftmittels (4) entlang dem Verriegelungskanal aufweist.
6. Kombination nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Querschnitt des Verriegelungstiftmittels (4) in Richtung der gewählten Bewegung der Zuhaltungsscheiben (5) dreieckig ist.

7. Kombination nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Schlüssel einen länglichen Schaft (8a) aufweist und sich die Schlüsselbartmittel (8b) in einer axialen Ebene erstrecken, die die Längsachse des Schafts enthält, und mit den Kombinationsflächen (8c) ausgebildet sind, dass sich das Führungsmittel (8d) senkrecht zur axialen Ebene weiter als die Schlüsselbartmittel (8b) nach außen erstreckt und dass die Kombinationsflächen (8c) auf beiden Seiten des Führungsmittels (8d) in Richtung der Längsachse ausgebildet sind.
8. Kombination nach Anspruch 7, **dadurch gekennzeichnet, dass** das Schlüsselbartmittel (8b) eine Führungsfläche (8e) enthält, die von dem Führungsmittel (8d) getrennt ist, um die Transferbewegungen des Schlossriegels (3) nach der gezielten Bewegung der Verriegelungskombination bereitzustellen, und dass die Führungsfläche (8e) und das Führungsmittel (8d) in der gleichen Ebene senkrecht zur Längsachse des Schafts (8a) angeordnet sind.
9. Kombination nach Anspruch 7 oder 8, **dadurch gekennzeichnet, dass** die Kombinationsflächen (8c) zur Bewegung der einzelnen Zuhaltungsscheiben (5) als Alternative dazu unter mindestens zwei verschiedenen Kombinationsflächenarten ausgewählt sein können, deren Formen sich voneinander unterscheiden und die so angeordnet sind, dass sie mit einer Zuhaltungsscheibe (5) gemäß der anderen Alternative funktionsmäßig inkompatibel sind, und dass die Kombinationsflächen (8c) des Schlüssels so ausgewählt sind, dass sie eine der Kombinationsflächenarten oder beliebige Kombinationen davon enthalten.
10. Kombination nach Anspruch 9, **dadurch gekennzeichnet, dass** die Kombinationsflächenarten eine Planoberflächenfräsung (8c111 usw.) und eine gefräste Oberfläche (8c112 usw.), die zwei benachbarte, konisch zum Spitzenteil des Schlüsselbartmittels zulaufende Abschrägungsflächen umfassen, enthalten.
11. Kombination nach Anspruch 9 oder 10, **dadurch gekennzeichnet, dass** das Schlüsselbartmittel (8b) mindestens eine Kombinationsfläche (8c) aufweist, die eine Spitze (8c112 usw.) enthält, die durch zwei gegenüberliegende Abschrägungsflächen in senkrechter Querschnittsebene des Schafts (8a) des Schlüssels gebildet wird.
12. Kombination nach einem der Ansprüche 10 bis 14, **dadurch gekennzeichnet, dass** sie zwei Schlüsselbartmittel (8b1, 8b2) enthält, die mit Kombinationsflächen versehen und symmetrisch auf beiden Seiten des Schafts (8a) des Schlüsselrohlings angeordnet sind, und dass die Kombinationsflächen (8c1, 8c2) der Blattteile (8b1, 8b2) zumindest teilweise bezüglich einander verschieden sind, entweder was das Fräsausmaß oder was die Art der Kombinationsfläche anbetrifft.
13. Schlüsselrohling, der zur Bildung des Schlüssels einer Kombination nach einem der vorhergehenden Ansprüche gefräst werden kann, wobei der Schlüsselrohling einen länglichen Schaft (8a), zwei Blattteile (8b1, 8b2) auf gegenüberliegenden Seiten des Schafts, die sich in einer die Längsachse des Schafts enthaltenden axialen Ebene befinden und zur Bildung der Kombinationsflächen (8c) des Schlüssels gefräst werden sollen, die im Gebrauch des Schlüssels im Schloss die Zuhaltungsscheiben (5) des Schlosses drehen, **dadurch gekennzeichnet, dass** sich die Blattteile (8b1, 8b2) symmetrisch auf gegenüberliegenden Seiten des Schafts befinden und dass der Schlüsselrohling weiterhin Führungsmittel (8d11, 8d12, 8d21, 8d22) umfasst, die im Gebrauch eines aus dem Schlüsselrohling gebildeten Schlüssels mit dem Schlossriegel (3) eines Schlosses zusammenwirken sollen, wobei sich die Führungsmittel von Flächen jedes der beiden Blattteile (8b1, 8b2), die auf gegenüberliegenden Seiten der axialen Ebene positioniert sind, nach außen erstrecken, wobei die Führungsmittel auf gegenüberliegenden Seiten der axialen Ebene symmetrisch zueinander sind.
14. Schlüsselrohling nach Anspruch 13, **dadurch gekennzeichnet, dass** jedes der Führungsmittel (8d11, 8d12, 8d21, 8d22) eine geringere axiale Erstreckung aufweist als die axiale Erstreckung des Blattteils (8b1, 8b2), von dem es sich erstreckt.
15. Schlüsselrohling nach Anspruch 13 oder 14, **dadurch gekennzeichnet, dass** jedes der Führungsmittel (8d11, 8d12, 8d21, 8d22) in Axialrichtung in einem mittleren Teil des Blattteils (8b1, 8b2), von dem es sich erstreckt, angeordnet ist.
16. Schlüsselrohling nach Anspruch 13, 14 oder 15, **dadurch gekennzeichnet, dass** jedes der Führungsmittel (8d11, 8d12, 8d21, 8d22) radial einwärts des radial äußeren Endes des Blattteils (8b1, 8b2), von dem es sich erstreckt, angeordnet ist.
17. Schlüssel zur Betätigung eines Zuhaltungsscheibenschlosses mit einem Schlüsselkasten (1) und, im Schlosskasten angebracht, einem Schlossriegel (3), der zwischen einer Verriegelungs- und einer Freigabeposition beweglich und mit Verriegelungsmitteln (4) versehen ist, und Zuhaltungsscheiben (5), die durch den Schlüssel bei Drehung desselben im Schloss betätigt werden sollen, wobei je-

de Zuhaltungsscheibe mit einem Verriegelungskanal versehen ist, der mit dem Verriegelungsstiftmittel (4) zur Steuerung der Bewegung des Schlossriegels (3) zwischen seiner Verriegelungs- und seiner Freigabeposition zusammenwirken kann, wobei jeder Verriegelungskanal mindestens einen ersten und einen zweiten Abzweigenteil (5a und 5b), die sich quer zur Bewegungsrichtung des Schlossriegels zwischen seiner Verriegelungs- und seiner Freigabeposition erstrecken, sowie einen dritten Abzweigenteil (5c), der den ersten und den zweiten Abzweigenteil (5a und 5b) verbindet und einen Vorsprung (5g) aufweist, der die Breite des Verriegelungskanals begrenzt, aufweist, wobei der Schlüssel einen länglichen Schaft (8a), zwei Blattteile (8b1, 8b2) auf gegenüberliegenden Seiten des Rohlings (8a), die sich in einer die Längsachse des Schafts enthaltenden axialen Ebene erstrecken, umfasst, wobei jeder Blattteil eine jeder Zuhaltungsscheibe (5) zugeordnete getrennte Kombinationsfläche (8c) aufweist, die, wenn der Schlüssel im Schloss gedreht wird, die Zuhaltungsscheiben (5) in Richtung des ersten und des zweiten Abzweigenteils (5a und 5b) bewegen soll, um die Verriegelungskombination auszuwählen, **dadurch gekennzeichnet, dass** die Blattteile (8b1, 8b2) symmetrisch auf gegenüberliegenden Seiten des Schafts (8a) angeordnet sind und dass jeder der Blattteile ein Führungsmittel (8d11, 8d12, 8d21, 8d22) aufweist, das sich auf gegenüberliegenden Seiten der axialen Ebene und in senkrecht dazu verlaufenden Richtungen erstreckt, wobei die Führungsmittel auf gegenüberliegenden Seiten der axialen Ebene symmetrisch zueinander sind und im Gebrauch mit dem Schlossriegel (3) zusammenwirken sollen, so dass sie während einer Endstufe der Wahlbewegung der Zuhaltungsscheiben (5) den Verriegelungsstift (4) in den dritten Abzweigenteil (5c) des Verriegelungskanals führen.

18. Schlüssel nach Anspruch 17, **dadurch gekennzeichnet, dass** jedes der Führungsmittel (8d11, 8d12, 8d21, 8d22) eine geringere axiale Erstreckung aufweist als der Blattteil (8b1, 8b2), von dem es sich erstreckt.

19. Schlüssel nach Anspruch 17 oder 18, **dadurch gekennzeichnet, dass** jedes der Führungsmittel (8d11, 8d12, 8d21, 8d22) in der axialen Richtung in einem mittleren Teil des Blattteils (8b1, 8b2), von dem es sich erstreckt, angeordnet ist.

20. Schlüssel nach Anspruch 17, 18 oder 19, **dadurch gekennzeichnet, dass** jedes der Führungsmittel (8d11, 8d12, 8d21, 8d22) radial einwärts des radial äußeren Endes des Blattteils (8b1, 8b2), von dem es sich erstreckt, angeordnet ist.

Revendications

1. Combinaison d'une serrure à gorges à disques et d'une clé (8) pour celle-ci, comprenant un moyen de panneton (8b, 8c), la serrure comprenant une case de serrure (1) et, monté à l'intérieur de la case de serrure, un pêne dormant (3) mobile entre des positions de verrouillage et de déblocage et comprenant un moyen de goujon de blocage (4), et des disques de gorge (5) pouvant être déplacés par la clé en faisant tourner celle-ci à l'intérieur de la serrure, chacun des disques de gorge comportant un canal de verrouillage pouvant être actionné de concert avec ledit moyen de goujon de blocage (4) pour commander le déplacement du pêne dormant (3) entre ses positions de verrouillage et de déblocage, chaque canal de verrouillage présentant au moins une première et une deuxième parties de ramification (5a et 5b) s'étendant transversalement aux directions de déplacement du pêne dormant entre ses positions de verrouillage et de déblocage, et une troisième partie de ramification (5c) reliant lesdites première et deuxième parties de ramification (5a et 5b), dans laquelle ledit moyen de panneton (8b, 8c) présente, associée à chacun des disques de gorge (5), une surface de combinaison séparée (8c) qui, lorsque la clé est tournée dans la serrure, déplace le disque de gorge (5) dans la direction desdites première et deuxième parties de ramification (5a et 5b) dans le but de sélectionner la combinaison de verrouillage, **caractérisée en ce que** ledit moyen de panneton (8b, 8c) comprend en outre un moyen de guidage (8d) qui co-agit avec le pêne dormant (3) de telle sorte que, au cours d'une étape finale de sélection du déplacement du disque de gorge (5), il guide le goujon de blocage (4) dans ladite troisième partie de ramification (5c) du canal de verrouillage, et **en ce que** ladite troisième partie de ramification (5c) du canal de verrouillage présente une saillie (5g) limitant la largeur du canal de verrouillage de manière à empêcher le goujon de blocage (4) de se déplacer le long de ladite troisième partie de canal (5c) si la surface de combinaison de la clé est incorrecte.

2. Combinaison selon la revendication 1, **caractérisée en ce que** ladite troisième partie de ramification (5c) du canal de verrouillage présente une surface de guidage (5f) inclinée par rapport à la direction du déplacement du pêne dormant entre les positions de verrouillage et de déblocage de ce dernier, et agencée de façon à coopérer avec le moyen de goujon de blocage (4).

3. Combinaison selon la revendication 2, **caractérisée en ce que** ladite surface inclinée (5f) est agencée sur le côté opposé du canal de verrouillage par rapport à ladite saillie (5g), ladite saillie (5g) et ladite

surface de guidage (5f) coopérant avec le goujon de blocage (4) pour commander le déplacement de ce dernier le long du canal de verrouillage.

4. Combinaison selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la forme et/ou la taille de ladite surface de guidage (5f) et/ou de ladite saillie (5g) des différents canaux de verrouillage ne sont pas toutes les mêmes, et **en ce que** les formes des surfaces de combinaison correspondantes (8c) de la clé sont arrangées de telle sorte qu'une surface de combinaison (8c) présentant une certaine forme accomplisse la compatibilité fonctionnelle du goujon de blocage (4) avec un seul canal de verrouillage (5c) pourvu d'une surface de guidage et d'une saillie présentant la taille et/ou la forme correcte(s). 5
5. Combinaison selon la revendication 3 ou 4, **caractérisée en ce que** chaque canal de verrouillage comprend une quatrième partie de ramification (5d) s'étendant transversalement aux directions de déplacement du pêne dormant entre ses positions de verrouillage et de déblocage, et une cinquième partie de ramification (5e) reliant lesdites deuxième et quatrième parties de ramification (5b et 5d), et **en ce que** ladite cinquième partie de ramification présente également une surface inclinée (5h) et une saillie positionnée en opposition (5i) pour commander le déplacement relatif du moyen de goujon de verrouillage (4) le long du canal de verrouillage. 10 15 20 25 30
6. Combinaison selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la section transversale du moyen de goujon de verrouillage (4) prise dans la direction du déplacement de sélection des disques de gorge (5) est triangulaire. 35
7. Combinaison selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ladite clé présente une tige allongée (8a), et ledit moyen de panneton (8b) s'étend dans un plan axial contenant l'axe allongé de la tige et formé avec lesdites surfaces de combinaison (8c), **en ce que** ledit moyen de guidage (8d) s'étend vers l'extérieur, perpendiculairement audit plan axial, plus loin que ledit moyen de panneton (8b), et **en ce que** les surfaces de combinaison (8c) sont formées de part et d'autre du moyen de guidage (8d) dans la direction dudit axe allongé. 40 45 50
8. Combinaison selon la revendication 7, **caractérisée en ce que** le moyen de panneton (8b) comprend une surface de guidage (8e) séparée dudit moyen de guidage (8d) pour réaliser les déplacements de transfert du pêne dormant (3) après le déplacement de sélection de la combinaison de ver-

rouillage, et **en ce que** ladite surface de guidage (8e) et ledit moyen de guidage (8d) sont arrangés dans le même plan perpendiculaire à l'axe allongé de la tige (8a).

9. Combinaison selon la revendication 7 ou 8, **caractérisée en ce que** les surfaces de combinaison (8c) pour déplacer les disques de gorge individuels (5) peuvent être sélectionnées alternativement à partir d'au moins deux types de surface de combinaison différents, dont les formes diffèrent les uns par rapport aux autres et qui sont agencés de manière à être fonctionnellement incompatibles avec un disque de gorge (5) selon l'autre alternative, et **en ce que** les surfaces de combinaison (8c) de la clé sont sélectionnées de façon à contenir soit un desdits types de surface de combinaison, soit n'importe quelle combinaison de celles-ci. 5
10. Combinaison selon la revendication 9, **caractérisée en ce que** lesdits types de surface de combinaison comprennent un fraisage de surface plane (8c111, etc.) et une surface fraisée (8c112, etc.) comprenant deux chanfreins voisins s'amincissant en direction de la partie de pointe du moyen de panneton. 10 15 20 25 30
11. Combinaison selon la revendication 9 ou 10, **caractérisée en ce que** le moyen de panneton (8b) présente au moins une combinaison de surface (8c) contenant une pointe (8c112, etc.) formée par des chanfreins opposés dans un plan en coupe transversale perpendiculaire de la tige (8a) de la clé. 35
12. Combinaison selon l'une quelconque des revendications 10 à 14, **caractérisée en ce qu'elle** contient deux moyens de panneton (8b1, 8b2) présentant des surfaces de combinaison et situés d'une façon symétrique sur les deux côtés de la tige (8a) de l'ébauche de clé, et **en ce que** les surfaces de combinaison (8c1, 8c2) des parties de lame (8b1, 8b2) sont mutuellement au moins partiellement différentes sur le plan soit de la valeur de fraisage, soit du type de la surface de combinaison. 40 45 50
13. Ebauche de clé pouvant être fraisée pour former la clé d'une combinaison selon l'une quelconque des revendications précédentes, l'ébauche de clé comprenant une tige allongée (8a), deux parties de lame (8b1, 8b2) sur des côtés opposés de la tige et s'étendant dans un plan axial contenant l'axe allongé de la tige et destinées à être fraisées pour former les combinaisons de surface (8c) de la clé qui, lors de l'utilisation de la clé dans la serrure, font tourner les disques de gorge (5) de la serrure, **caractérisée en ce que** lesdites parties de lame (8b1, 8b2) sont situées d'une façon symétrique sur des côtés opposés de la tige, et **en ce que** l'ébauche de clé com-

prend en outre des moyens de guidage (8d11, 8d12, 8d21, 8d22) destinés, lors de l'utilisation d'une clé formée à partir de l'ébauche de clé, à co-agir avec le pêne dormant (3) d'une serrure, les moyens de guidage s'étendant vers l'extérieur dans des directions perpendiculaires audit plan axial à partir de surfaces de chacune des deux parties de lame (8b1, 8b2) positionnées sur des côtés opposés dudit plan axial, les moyens de guidage sur des côtés opposés dudit plan axial étant symétriques l'une par rapport à l'autre.

14. Ebauche de clé selon la revendication 13, **caractérisée en ce que** chacun desdits moyens de guidage (8d11, 8d12, 8d21, 8d22) présente une étendue axiale plus petite que l'étendue axiale de la partie de lame (8b1, 8b2) à partir de laquelle il s'étend.

15. Ebauche de clé selon la revendication 13 ou 14, **caractérisée en ce que** chacun desdits moyens de guidage (8d11, 8d12, 8d21, 8d22) est positionné, dans la direction axiale, dans une partie centrale de la partie de lame (8b1, 8b2) à partir de laquelle il s'étend.

16. Ebauche de clé selon la revendication 13, 14 ou 15, **caractérisée en ce que** chacun desdits moyens de guidage (8d11, 8d12, 8d21, 8d22) est positionné radialement vers l'intérieur de l'extrémité radialement extérieure de la partie de lame (8b1, 8b2) à partir de laquelle il s'étend.

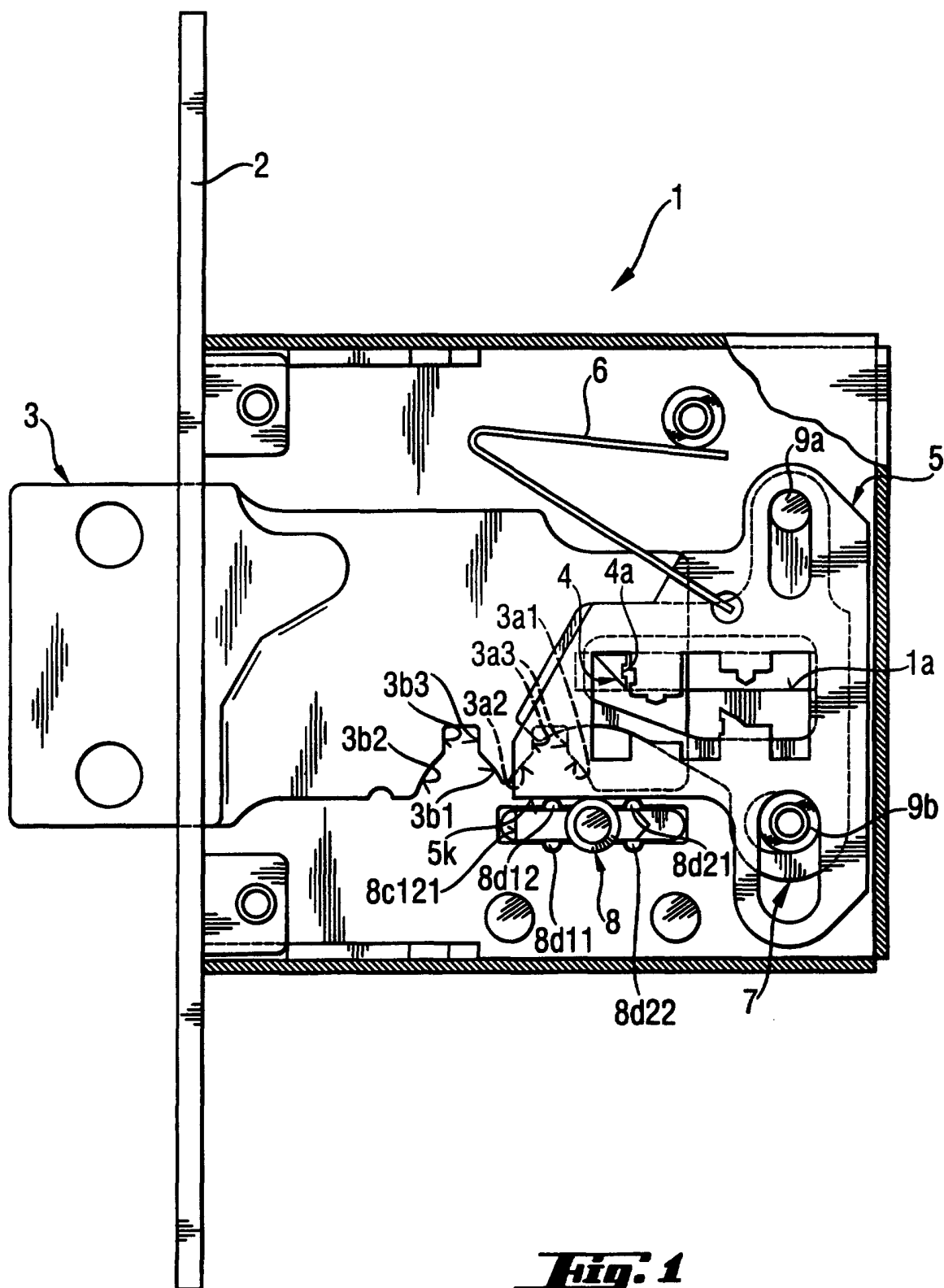
17. Clé pour actionner une serrure à gorges à disques comprenant une case de serrure (1) et, monté à l'intérieur de la case de serrure, un pêne dormant (3) mobile entre des positions de verrouillage et de déblocage et comprenant un moyen de goujon de blocage (4), et des disques de gorge (5) pouvant être déplacés par la clé en faisant tourner celle-ci à l'intérieur de la serrure, chacun des disques de gorge comportant un canal de verrouillage pouvant être actionné de concert avec ledit moyen de goujon de blocage (4) pour commander le déplacement du pêne dormant (3) entre ses positions de verrouillage et de déblocage, chaque canal de verrouillage présentant au moins une première et une deuxième parties de ramification (5a et 5b) s'étendant transversalement aux directions de déplacement du pêne dormant entre ses positions de verrouillage et de déblocage, et une troisième partie de ramification (5c) reliant lesdites première et deuxième parties de ramification (5a et 5b) et présentant une saillie (5g) limitant la largeur du canal de verrouillage, la clé comprenant une tige allongée (8a), deux parties de lame (8b1, 8b2) sur des côtés opposés de la tige (8a) et s'étendant dans un plan axial contenant l'axe allongé de la tige, chaque partie de lame présentant, associée à chacun des disques de

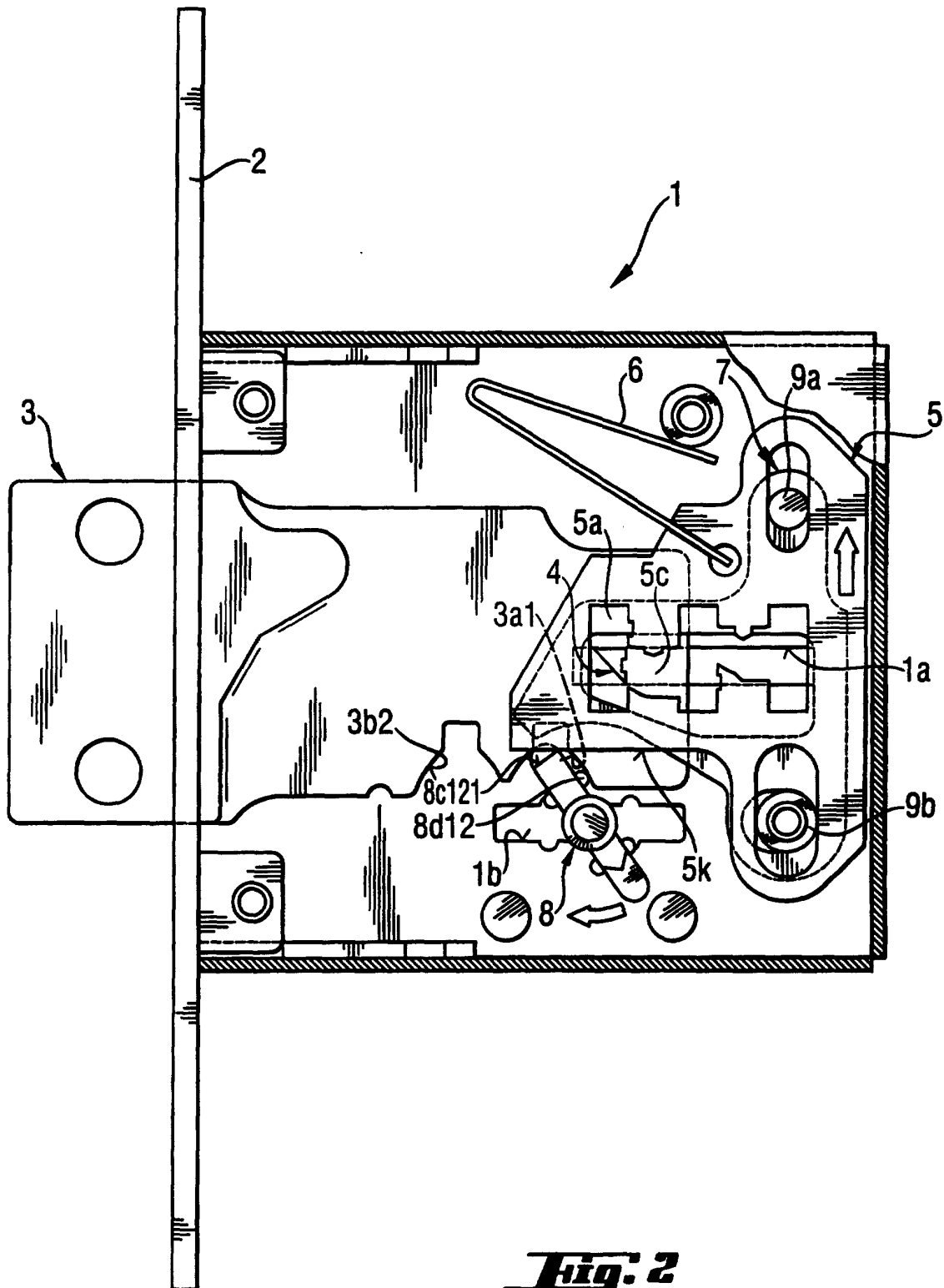
gorge (5), une surface de combinaison séparée (8c) qui, lorsque la clé est tournée dans la serrure, déplace le disque de gorge (5) dans la direction desdites première et deuxième parties de ramification (5a et 5b) dans le but de sélectionner la combinaison de verrouillage, **caractérisée en ce que** lesdites parties de lame (8b1, 8b2) sont situées d'une façon symétrique sur des côtés opposés de la tige (8a), et **en ce que** chacune desdites parties de lame comprend des moyens de guidage (8d11, 8d12, 8d21, 8d22) s'étendant vers l'extérieur sur des côtés opposés dudit plan axial et dans des directions perpendiculaires à celui-ci, lesdits moyens de guidage sur des côtés opposés dudit plan axial étant symétriques les uns par rapport aux autres, et étant destinés lors de l'utilisation à co-agir avec le pêne dormant (3) de telle sorte que, au cours d'une étape finale du déplacement de sélection des disques de gorge (5), ils guident le goujon de blocage (4) dans ladite troisième partie de ramification (5c) du canal de verrouillage.

18. Clé selon la revendication 17, **caractérisée en ce que** chacun desdits moyens de guidage (8d11, 8d12, 8d21, 8d22) présente une étendue axiale plus petite que l'étendue axiale de la partie de lame (8b1, 8b2) à partir de laquelle il s'étend.

19. Clé selon la revendication 17 ou 18, **caractérisée en ce que** chacun desdits moyens de guidage (8d11, 8d12, 8d21, 8d22) est positionné, dans la direction axiale, dans une partie centrale de la partie de lame (8b1, 8b2) à partir de laquelle il s'étend.

20. Clé selon la revendication 17, 18 ou 19, **caractérisée en ce que** chacun desdits moyens de guidage (8d11, 8d12, 8d21, 8d22) est positionné radialement vers l'intérieur de l'extrémité radialement extérieure de la partie de lame (8b1, 8b2) à partir de laquelle il s'étend.





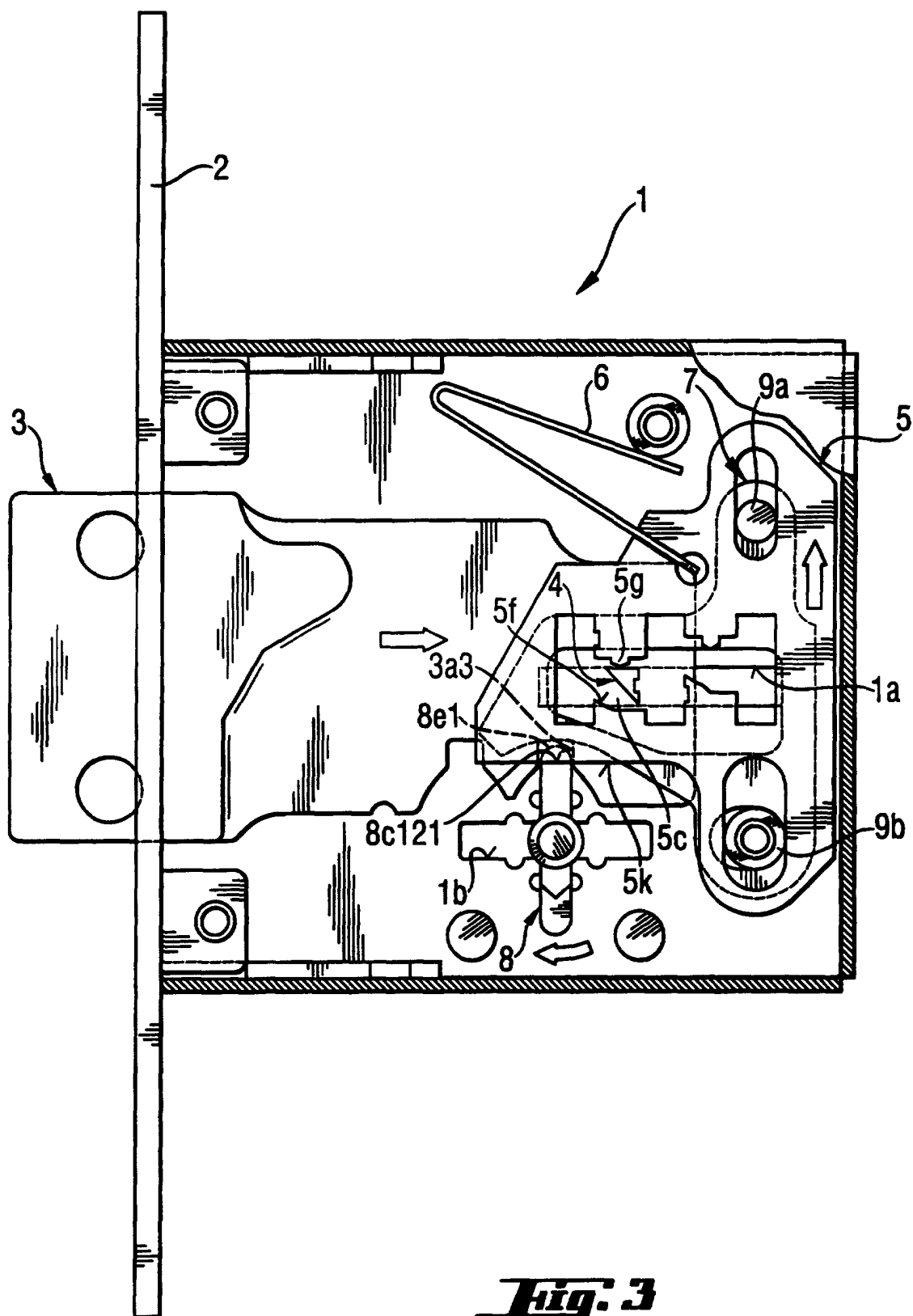


Fig. 3

