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Key and built-in double cylinder for a safety lock

The invention relates to a key and built-in double cylinder for a safety lock, with two cylinder halves which are connected to one another, with a cylinder plug and with tumblers which are designed as plug pins and housing pins and which can be put in order for the rotational release of the cylinder plug by the key insertable into the keyway.

Such a key and built-in double cylinder is known from CH-A-626,679 of the applicant. The two cylinder halves are connected and reinforced by means of a web made of chrome-nickel steel. The cylinder housings of the two cylinder halves consist of lined-up discs fixedly connected to one another. This built-in double cylinder already affords a high degree of safety against being forced open.

The inventor's set object is to increase safety against forcing open.

In a generic key and built-in double cylinder, the object is achieved in that the key has, on its shank, a lengthening element, by means of which the tumblers in an opposite cylinder half can be put in order for rotational release. In the built-in double cylinder according to the invention, the locking function is guaranteed even when one cylinder half has no tumblers. In this cylinder half without tumblers, the rotor or a rotor half can be made, for example, from hardened steel. When the double cylinder is being built in, this cylinder half is as a rule arranged on the outside. The cylinder half having the tumblers is in that case therefore located on the inside of the door. The rotor arranged on the outside of the door and consisting of hardened steel protects the tumblers arranged on the inside and, in an attempt to break in, would have to be removed, for example cut out by milling over its entire length, which



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would be extremely complicated. Since the key extends essentially over the entire length of the double cylinder, no coupling is required, thus simplifying manufacture. Since the outer sleeve can be produced
5 without tumblers and, moreover, as mentioned, no coupling is required, the cylinder can be matched exactly to each door thickness on the attack side. This makes it possible to avoid causing the cylinder to project on the outside or the need to attach a rose.

10 According to a development of the invention, the rotor is continuous and is provided with a thickened middle part. The thickened middle part effectively prevents the rotor from being broken off and pulled out.

15 According to a development of the invention, the rotor has an insert which is drilled with a specific drilling pattern. The number of locking possibilities can be doubled in a simple way by rotating the insert.

If, according to a development of the invention, the lengthening element on the key is attached movably
20 and can be folded round, then the key can be brought to a conventional key length and then is not bulky on a bunch of keys. The key is preferably composed of a standard element and of the lengthening element. The key length can then be matched to any cylinder length by a
25 corresponding length of the lengthening element.

It is essential that the key may be designed in such a way that it locks only from the outside or from the outside and the inside. As a result, locking competence in a security area can be made more purposeful than
30 hitherto. A corresponding system can also have, in addition to the key according to the invention, conventional keys, by means of which locking can take place on the inside.

Further advantageous features emerge from the
35 remaining dependent patent claims, the following description and the drawing.

An exemplary embodiment of the invention is explained in more detail below by means of the drawing. In this:



Figure 1 shows a key according to the invention and a built-in double cylinder according to the invention, the individual parts being disassembled for graphical reasons,

5 Figure 2 shows a built-in double cylinder according to the invention in an alternative version, likewise with disassembled individual parts,

Figure 3 shows a further alternative version of a built-in double cylinder according to the invention,

10 Figure 4 shows a partial sectional key according to the invention,

Figure 5 shows a further view of the key according to Figure 4, and

15 Figure 6 shows diagrammatically the control bores of a key according to the invention.

Figure 1 shows one cylinder half 10 with a housing 10a which has a cylindrical recess 10b for receiving a rotor 21. The rotor 21 consists of hard material, especially hardened steel, and is fitted with
20 hard-metal pins 22. A key guide 24 extends over the entire length of the rotor 21. The rotor 21 is inserted into the orifice 10b from the rear side of the cylinder half 10 and bears with a flange 23 on the housing 10a at the rear. Inserted into a longitudinal groove 18 of the
25 recess 10b are slides 17 which, under the effect of spring elements 19, retain the rotor 21 in the withdrawal position when the key is withdrawn. The cylinder half 10 preferably has no tumblers and the rotor 21 correspondingly no radial bores. In an attempt to break in, the
30 rotor 21 made from resistant material could be cut out by milling only with very great effort. Since the flange 23 bears on the housing 10a on the inside, it is moreover impossible to pull the rotor 21 out of the housing 10a from the attack side.



The cylinder half 10 is connected to a second cylinder half 11 by means of a web 15. In this case, the web 15 engages with its two ends in each case into a recess 20 of a cylinder 12. The web 15 is fixedly connected to the cylinder halves 10 and 11 by means of crosspins 13 which are inserted into bores 14. A threaded bore 16 for a fore-end screw, which fixes the double cylinder in the door lock, is provided in the middle thickened part of the web 15.

The second cylinder half 11 likewise has a cylinder housing 11a, in which a rotor 27 is mounted. The latter is fixed on its rear side by means of a ring 26. The cylinder half 11 can be designed in a way known per se, that is to say can have conventional tumblers which can be put in order with the release of the rotor 27 by means of a conventional key 3. After the key 3 has been inserted into the key guide 27a, therefore, the rotor 27 and, together with this, the driver 25 can be rotated. In contrast, if the key 3 is inserted into the key guide 24 of the cylinder half 10, only the rotor 21 can be rotated and, in this case, does not take up the driver 25. With the key 3, therefore, the driver 25 cannot be rotated and accordingly a bolt of the lock cannot be actuated. As a rule, the double lock cylinder is inserted into a door in such a way that the cylinder half 10 is arranged on the outside and the cylinder half 11 on the inside. With the key 3, the double lock cylinder can then be actuated only from the inside.

However, an actuation of the rotary lock cylinder from the outside is possible by means of the keys 1 and 2 shown in Figure 1. These each possess a lengthening element 5 or 7 which is provided with bores 8 known per se and which is attached to the front end of a standard element 4 or 6. When the key 1 is inserted into the lock cylinder from the outside, the lengthening element 5 lies in the key guide 27a of the rotor 27 and puts the tumblers of the cylinder half 11 in order by means of the control faces of the bores 8. The rotors 21 and 27 and, together with these, the driver 25 can then be rotated.



However, the rotary lock cylinder cannot be actuated from the inside by means of the key 1, since the standard element 4, which then lies in the rotor 27, has no corresponding bores 8.

5 However, an actuation of the rotary lock cylinder from the outside and from the inside is possible by means of the key 2 which has corresponding bores 8 on the lengthening element 7 and on the standard element 2, as shown in Figure 1. A lock system can therefore have the
10 keys 1, 2 and 3 shown in Figure 1. As explained, the locking possibilities of these three keys are different. It is consequently possible to design the locking competence in a security area purposefully. Of course, a locking system has, as a rule, a plurality of double lock
15 cylinders and a large number of keys.

 In the double lock cylinder shown in Figure 2, a rotor 30, which is produced from a continuous cylindrical piece of hardened steel, is provided. The rotor 30 possesses approximately centrally a thickening 31, onto
20 which a driver 53 is pushed. The driver 53 engages with an extension 53a into a groove 54 of the rotor 30 and is thus connected to the latter fixedly in terms of rotation. Ends 55 and 56 of the rotor have in each case a recess 36 or 37 for an insert 33 or 32 and are mounted
25 in corresponding recesses 58 and 57 of the cylinder housing 11a or 10a. A key guide 44 extends over the entire length of the rotor 30.

 The inserts 33 and 32 are drilled according to a specific drilling pattern and receive plug pins 35. The
30 cylinder housings 11a and 10a have housing pins, not shown here, which are conventional per se and which cooperate with the plug pins 35 in a known way. The insert 32 is preferably shorter than the insert 33 and the recess 37 is correspondingly shorter than the recess
35 36. The end 55 of the rotor 30 is therefore substantially sturdier than the end 56 and offers great resistance to an attack, for example with a milling cutter. In the lock cylinder according to Figure 2, an essential advantage, in addition to the high degree of safety, is that the



locking possibilities can be doubled by rotating the inserts 32 and 33. An appreciable increase in the number of lockings is consequently possible in a very simple way without an additional manufacturing outlay.

5 The housings 10a and 11a can be lengthened by means of lengthening elements 28 and 29. An associated key 1 or 2 can be matched in a simple way to the corresponding length of the double cylinder by producing the lengthening element 5 or 7 with a corresponding length.
10 There is no need for a matching of the standard element 4 or 6.

 In the design according to Figure 3, a rotor 38, which has a recess 41 for an insert 42 at the end 40 on the inside only, is provided. The rotor 38 likewise
15 possesses a keyway 44 extending over its entire length. The other end 39 of the rotor 38 does not have any bores for tumblers and, with the exception of the keyway 44, is solid. Here too, a driver 43 is pushed onto the rotor 38 fixedly in terms of rotation. As in the rotor 30, in this
20 rotor too a thickened middle part 31 is provided and effectively prevents the rotor from being pulled out of the cylinder housing. The locking cylinder shown in Figure 3 is otherwise designed as described above.

 Figures 4 to 6 show a key 2 with the standard
25 element 6 and with the lengthening element 7. As Figure 5 shows, the key can be shortened, that is to say brought to the conventional length of such a key, by pivoting the lengthening element 7 about a joint 46. Reference symbol 7a shows the lengthening element in the working position and reference symbol 7b shows it in the folded-in
30 position. Folding round is possible in the directions of the double arrows 52 and 60.

 The joint has a connecting plate 47 which is pivotably connected to the standard element 6 and to the
35 lengthening element 7 by means of crosspins 48. Pins 49 are mounted displaceably to a limited extent in stepped bores 51 of the standard element 45 and of the lengthening element 7 and bear on a plane side face 47a of the plate 47 under the effect of a compression spring 50 in



each case. The lengthening element 7 is fixed in the position 7a by the pins 49, but can be pivoted out of this position by means of a comparatively slight transverse force. In the position 7b, the pins 49 bear on side faces 47b (Figure 6) and also fix the lengthening element 7 in this folded-in position. The key 2 can thus be brought to a conventional key length in a simple way. The same applies to the key 1 shown in Figure 1. Designs, in which the lengthening element 7 cannot be pivoted, are also conceivable. Finally, designs, in which the shank of the key 2 can be retracted telescopically, are possible.

Figure 6 shows a possible arrangement of bores on the shank of the key 2.



Patent claims

1. Key and built-in double cylinder for a safety lock, with two cylinder halves (10, 11), with a cylinder plug (21, 27, 30, 38) and with tumblers (35) which are
5 designed as plug pins and housing pins and which can be put in order for the rotational release of the cylinder plug by the key (1, 2, 3) insertable into the keyway (24, 27a, 44), characterized in that the key (1, 2) has, on its shank, a lengthening element (5, 7), by means of
10 which the tumblers in an opposite cylinder half (10, 11) can be put in order for rotational release.
2. Key and built-in double cylinder according to Claim 1, characterized in that the cylinder plug has two rotors (21, 27), at least one rotor (21) being made from
15 a hard material, for example hardened steel.
3. Key and built-in double cylinder according to Claim 2, characterized in that the rotor (21) is fitted with hard-metal pins (22).
4. Key and built-in double cylinder according to
20 Claim 2 or 3, characterized in that the rotor (1) is made solid with the exception of a key guide (24).
5. Key and built-in double cylinder according to one of Claims 2 to 4, characterized in that the rotor (21) has a flange (23) which bears on a cylinder housing (10a)
25 on the inside.
6. Key and built-in double cylinder according to Claim 1, characterized in that the cylinder plug has a continuous rotor (30, 38) extending essentially over the entire length of the cylinder.
- 30 7. Key and built-in double cylinder according to Claim 6, characterized in that the rotor (30, 38) is thickened approximately centrally.
8. Key and built-in double cylinder according to Claim 6 or 7, characterized in that the rotor (30, 38)
35 has at least one recess (36, 37, 41), into which an insert (32, 33, 42) is inserted, and this insert is made of a material, for example of brass, which is substantially softer than the remaining region of the rotor.
9. Key and built-in double cylinder according to one





of Claims 1 to 8, characterized in that at least one cylinder half (10) has a sprung slide (17), by means of which a rotor (21) is centred when the key is withdrawn.

10. Key and built-in double cylinder according to one of Claims 1 to 9, characterized in that the two cylinder halves (10, 11) are connected to one another by means of a web (15).

11. Key and built-in double cylinder according to Claim 1, characterized in that the lengthening element (5, 7) is attached movably to the remaining part of the key.

12. Key and built-in double cylinder according to Claim 11, characterized in that the lengthening element (5, 7) is attached movably by means of a joint (46), and this joint has a plate (47) which is fixed rotatably to the lengthening element (7) and to a standard element (6) by means of pins (48).

13. Locking system having a plurality of built-in double cylinders and keys according to Claim 1, characterized in that at least one key (1, 2) is designed with a lengthening element (5, 7) and at least one key (3) is designed without such a lengthening element.

