into the mechanism, the door lock or corresponding, which is to be opened or closed by the cylinder lock.

Patent publications SE329104 and US6758074 describe these types of disc tumbler cylinder locks and their keys. In both of these publications, a groove or grooves are seen on the surface of the key shaft, which via the pegs of the tumbler discs guide the tumbler discs into the unlocked position, when the key is inserted into the cylinder lock, and correspondingly into the locked position, when the key is extracted from the cylinder lock.

The problems of known solutions have been reliability and ease of use. Wearing of the key and cylinder lock occurs unevenly on different surfaces. Uneven wearing, in turn, causes particularly in old keys and cylinder locks functional disturbances. Production can also be difficult, which increases production costs. Inaccuracies in the guide grooves (particularly in cases of side-by-side or intersecting guide grooves) can cause malfunctioning.

Brief description

~~The purpose~~Embodiments of the invention ~~is to~~ provide an alternative solution to a key and a disc tumbler cylinder lock, which reduces above said problems. ~~The purpose of the invention is achieved in the manner presented in the independent claims. The dependent claims present different embodiments of the invention.~~

According to an aspect of the present invention, there is provided a key, which is intended for use in such cylinder locks, in which the part of the key to be inserted into the lock is shaped to turn turnable tumbler discs by a longitudinal motion performed in the lock, which occurs by at least two guide grooves arranged in the key, which key has two guide grooves, characterized in that the part of the key to be inserted into the cylinder lock is in its basic shape cylindrical comprising a cylinder sector intended for each guide groove, and that the key further comprises a longitudinal, central cavity and also torque-transferring longitudinal guide surfaces on both sides of the cylinder sectors intended to the guide grooves, and the part to be inserted into the cylinder lock further

comprises a lateral cut, which extends to the central cavity and also comprises edge surfaces shaped as torque-transferring guide surfaces, which are intended with the key for cooperatively guiding the cylinder lock.

A key according to embodiments of the invention has two guide grooves for turning the tumbler discs. The part of the key that is to be inserted into the lock (the shaft part of the key) has a primarily cylindrical basic shape, which has a cylinder sector for each of the two guide grooves, which are primarily diametrically arranged in relation to each other to their own side of the key. This design makes the key strong, and the cylindrical basic shape fully utilizes the space available to the part of the key to be inserted into the lock, i.e. the keyhole and the key canal. At the same time, the surface of the areas available to the guide grooves of the key is maximized. Additionally, it becomes easier to shape the guide grooves optimally by arranging them to a surface, the shape of which corresponds to the shape of the central opening of the tumbler discs. Additionally, the cylindrical basic shape supports and guides the tumbler discs, and transfer of force to these from the key occurs

Claims

1. A key, which is intended for use in such cylinder locks, in which the part (3) of the key (1) to be inserted into the lock is shaped to turn turnable tumbler discs by a longitudinal motion performed in the lock, which occurs by at least two guide grooves arranged in the key, which key (1) has two guide grooves (15a,15b), **characterized** in that the part (3) of the key to be inserted into the cylinder lock is in its basic shape cylindrical comprising a cylinder sector (37a, 37b) intended for each guide groove (15a, 15b), and that the key (1) further comprises a longitudinal, central cavity (36) and also torque-transferring longitudinal guide surfaces (39) on both sides of the cylinder sectors (37a, 37b) intended to the guide grooves (15a, 15b), and the part to be inserted into the cylinder lock further comprises a lateral cut (10), which extends to the central cavity (36) and also comprises edge surfaces (12) shaped as torque-transferring guide surfaces, which are intended with the key (1) for cooperatively guiding the cylinder lock.

2. A key according to claim 1, **characterized** in that the torque-transferring guide surfaces (39) existing in at least two diametrically opposed parts of the key (1) are primarily radially directed.

3. A key according to any one of the preceding claims, **characterized** in that the central cavity (36) comprises a sector (11), which is at least 200 degrees.

4. A key according to any one of the preceding claims, **characterized** in that the part (3) to be inserted into the lock has two opposing cylinder sectors (37a, 37b), which are shaped to radially guide the tumbler discs of the lock, wherein both of the cylinder sectors extend at least over 84°, which sectors (37a, 37b) are arranged in relation to each other primarily diametrically, each on its own side of the key (1).

5. A key according to any one of the preceding claims, **characterized** in that the guide grooves (15a, 15b) comprise longitudinal parts (4l3a, 413b) and, between

these, parts (414) travelling at an angle, which follow a spiral curve, whose pitch is constant.

6. A key according to claim 5, **characterized** in that every such longitudinal point, which corresponds to a location site of a tumbler disc guided by the guide groove (15a, 15b) has a longitudinal part (413a) in respective guide groove (15a, 15b), which, at that endpoint (417), which is closer to the cavity end of the key, immediately changes to one of said parts (414) travelling at an angle.

7. A key according to claim 5 or 6, **characterized** in that the guide groove (15a, 15b) between two closely-located combination locations has an axially travelling part (413b) in that case that the circumferential position desired for the other combination location cannot be achieved by that spiral curve of constant pitch, which the parts (414) travelling at the angle of the guide groove follow.

8. A key according to any one of claims 1 - 7, **characterized** in that to the guide grooves (15a, 15b) is given a cross-sectional shape, which expands in the direction from the bottom (15) of the groove outwards, wherein the sides (16a) of the guide grooves are at a 20° - 45° angle in relation to each other.

9. A key according to any one of claims 1 - 8, **characterized** in that the key comprises two grooves, which lie on opposite sides of the key shaft in relation to the lateral cut (10).

10. A key according to claim 9, **characterized** in that key comprises a cut in relation to the cylindrical basic shape of the key between two grooves.

11. A key according to any one of claims 1 - 10, **characterized** in that the central cavity is symmetrical and the lateral cut is narrower than the central cavity.

~~12. A cylinder lock comprising an exterior lock housing (4), in the lock housing a turnable inner cylinder (5, 6), which encloses a set of turnable tumbler discs (17), which are arranged to lock and correspondingly to release a lock rod (20) moving~~

radially in the lock, which, in the locking position, is arranged to prevent turning of the inner cylinder (5, 6) in relation to the lock housing (4) and, in the releasing position, is arranged to release turning of the inner cylinder (5, 6) in relation to the lock housing (4), which tumbler discs (17) have a central opening (30), which is dimensioned to allow the axial inserting and extracting of the key (1) using the lock, which key (1) has two guide grooves (15a, 15b), which are arranged, using the axial movement of the key (1) via the radial projections (31) in the central opening (30) of the tumbler discs, to affect the tumbler discs (17) by a turning force to place the tumbler discs (17) into a position releasing or correspondingly locking the lock rod (20), **characterized** in that the lock comprises binding rods (19), which, as the key (1) is inserted into the lock in a position, which causes the tumbler discs (17) to turn the inner cylinder (5,6) into the releasing position, is arranged to bind and centralize the tumbler discs (17) in relation to the inner cylinder (5, 6), immediately when the inner cylinder (5, 6) is turned in relation to the lock housing (4) by the torque transferred from the key (1).

13. A lock according to claim 12, **characterized** in that it comprises spacer plates (13), the centre openings of which are shaped to correspond to the shapes of the profile of the key.

14. A lock according to claim 13, **characterized** in that the inner cylinder (5,6) or elements (16) incorporated into the inner cylinder have two gap-shaped guide surfaces (24), which circumferentially are approximately 90 degrees from the position of the lock rod (20) and both of which contain a binding rod (19), which is arranged, immediately in the initial stage of turning the inner cylinder (5, 6), by the influence of a groove (26) in the inner surface of the lock housing (4) surrounding the inner cylinder (5,6), to guide radially inwards into contact with the tumbler discs (17) in order to bind and centralize them in relation to the inner cylinder (5, 6).

15. A lock according to claim 12, 13 or 14, **characterized** in that the side (28) of the binding rods (19) directed radially inwards (28) is in shape radially inwardly narrowing and that the tumbler discs (17) have radially inwards directed

indentations (29), which in shape at least partially correspond to the shape of the radially inwards directed side (28) of the binding rods (19).

16. A lock according to any one of the preceding claims, **characterized** in that the cross section of the radial projections (31) of the tumbler discs have two substantially parallel side lines (35) directed vertically in relation to the plane of the tumbler discs, which, at both ends, change to a bevel (33), the bevel angle and extension of which are fitted for contact and axial force transfer on the obliquely travelling part of the guide groove (15a, 15b) of key.

17. A lock according to any one of claims 12 – 16, **characterized** in that the projections (31) of the tumbler discs are radially inwardly narrowing and fitted to the shape of the guide groove (15a, 15b) of the key.

18. A lock according to any one of claims 12 - 17, **characterized** in that the tumbler disc comprises two hollows (25) for the lock rod, which lie on opposite sides of the tumbler disc.

19. A cylinder lock and key combination, **characterized** in that the key (1) is according to any one of the preceding claims 1 – 11 and the cylinder lock is according to any one of the preceding claims 12 - 18.