enables an identical unlocking key to lock and unlock different security levels of plural cylinder locks.

Means for Solving the Problems

[0008]

The present disclosure relates to a locking device that includes: a cylinder lock including an outer cylinder and an inner cylinder that rotatably engages with the outer cylinder; and an unlocking key corresponding to a keyhole formed in the inner cylinder. A protrusion is formed at an end of the keyhole, and a positioning indentation is formed at the tip of the unlocking key, in which the indentation can engage with the protrusion.

SUMMARY

[0008A]

In one aspect, the present disclosure refers to a locking device, comprising, a cylinder lock including an outer cylinder and an inner cylinder that rotatably engages with the outer cylinder, and an unlocking key corresponding to a keyhole formed in the inner cylinder, wherein a pair of protrusions is formed at an end of the keyhole, at positions that are symmetrical to each other about a rotational axis of the inner cylinder, the pair of protrusions protrudes toward a center of the keyhole from an outer circumferential direction of the inner cylinder, and a pair of positioning indentations engageable with the pair of protrusions is formed

at a tip of the unlocking key.

[0008B]

In another aspect, the present disclosure refers to a cylinder lock comprising an outer cylinder and an inner cylinder. The inner cylinder rotatably engages with the outer cylinder, wherein a pair of protrusions is formed at an end of a keyhole formed in the inner cylinder, at positions that are symmetrical to each other about a rotational axis of the inner cylinder, and the pair of protrusions is engageable with a pair of positioning indentations formed at a tip of an unlocking key corresponding to the keyhole formed in the inner cylinder.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

Fig. 1 is a perspective view illustrating a configuration of a locking device according to a first embodiment;

Fig. 2 is an exploded perspective view illustrating a configuration of a cylinder lock according to the first embodiment;

Fig. 3 is a front view of the cylinder lock according to the first embodiment;

Fig. 4 is a rear view of the cylinder lock according to the first embodiment;

Fig. 5 is a top view of an unlocking key according to the first embodiment;

[0018]

(Driver Pin, Tumbler Pin)

The driver pins 61 and the tumbler pins 62 are slidably accommodated in the pin holes 22 and 32. The tumbler pins 62 are arranged on the side of the keyhole 21, and each have a rounded tip that contacts the unlocking key 5. One end of the driver pin 61 contacts the tumbler pin 62 inside the pin holes 22 and 32, and the other end of the tumbler pin 62 contacts an urging member (not illustrated). Although Fig. 2 illustrates only one set of the driver pin 61 and the tumbler pin 62 for simplicity, there are a plurality of sets of driver pins 61 and tumbler pins 62, which are accommodated in the plurality of sets of pin holes 22 and 32.

[0019]

The urging member (not illustrated) urges the driver pin 61 and the tumbler pin 62 towards the keyhole 21. When the unlocking key 5 is not inserted into the keyhole 21, the driver pins 61 are positioned between the inner cylinder 2 and the outer cylinder 3, thereby restricting the rotation of the inner cylinder 2. When the unlocking key 5 is inserted into the keyhole 21, the protrusions being the tips of the pins 21a engage with the indentations 52 formed at the tip of the unlocking key 5. In this state, the boundary between the driver pins 61 and the tumbler pins 62 coincides with the boundary between the inner cylinder 2 and the outer cylinder 3 as a result of setting the lengths of the driver pins 61 and

keyhole 21, as in the case of the pins 21a. In the present embodiment, the protrusions formed by the pins 21a protrude more into the keyhole 21 than the protrusions formed by the pins 23a.

[0034]

[Unlocking Key]

As illustrated in Figs. 12 to 14, indentations 54 and 55 having a predetermined shape are formed on the outer periphery of the tip of the unlocking key 5a, along the axial direction from the tip surface 51. The indentations 54 and 55 extend along the axial direction of the unlocking key 5a. Each of the indentations 54 and 55 is a pair of indentations formed symmetrically about the rotational axis S1 of the unlocking key 5a. The indentation 54 engages with the protrusion formed by the pin 21a, and the indentation 55 engages with the protrusion formed by the pin 23a. As illustrated in Fig. 12, the depth d1 of the indentation 54 is greater than the depth d2 of the indentation 55. The depth d1 corresponds to the amount of protrusion formed by the pin 21a into the keyhole 21, and the depth d2 corresponds to the amount of protrusion formed by the pin 23a into the keyhole 21. This ensures that only the protrusion formed by the pin 21a engages with the indentation 54, and only the protrusion formed by the pin 23a engages with the indentation 55. Therefore, even when there is a plurality of sets of such protrusions and indentations, the unlocking key 5a can be positioned in the rotational

CLAIMS

1. A locking device, comprising:

a cylinder lock including an outer cylinder and an inner cylinder that rotatably engages with the outer cylinder; and

an unlocking key corresponding to a keyhole formed in the inner cylinder, wherein

a pair of protrusions is formed at an end of the keyhole, at positions that are symmetrical to each other about a rotational axis of the inner cylinder,

the pair of protrusions protrudes toward a center of the keyhole from an outer circumferential direction of the inner cylinder, and

a pair of positioning indentations engageable with the pair of protrusions is formed at a tip of the unlocking key.

2. The locking device according to claim 1, wherein

the indentation is formed in plural, on an outer periphery of the tip of the unlocking key.

3. The locking device according to claim 1 or 2, wherein

The pair of indentations is formed at positions having 180° rotational symmetry with each other about a rotational axis of the unlocking key, the pair of indentations being formed in plural.

4. The locking device according to any one of claims 1 to 3, wherein the unlocking key includes an insertion part insertable into the keyhole, the insertion part having a circular columnar shape.

5. The locking device according to any one of claims 1 to 4, wherein a contact part that forms an area of contact between the protrusion and the indentation has an arc shape.

6. The locking device according to any one of claims 1 to 5, wherein

a projection geometry of the unlocking key in a direction of insertion into the keyhole is circular.

7. The locking device according to any one of claims 1 to 6, wherein

a guide is formed in an insertion hole of the keyhole, so as to restrict rotation of the unlocking key to a position where the protrusion engages with the indentation, and

a groove corresponding to the shape of the guide is formed on the unlocking key.

8. The locking device according to claim 7, wherein

the indentation and the groove extend along an axial direction of the unlocking key, and are arranged adjacent to each other.

9. The locking device according to any one of claims 1 to 8, wherein

an axial length of an insertion part of the unlocking key is longer than an axial length of the keyhole.

10. A cylinder lock comprising:

an outer cylinder; and

an inner cylinder that rotatably engages with the outer cylinder, wherein a pair of protrusions is formed at an end of a keyhole formed in the inner cylinder, at positions that are symmetrical to each other about a rotational axis of the inner cylinder, and

the pair of protrusions is engageable with a pair of positioning indentations formed at a tip of an unlocking key corresponding to the keyhole formed in the inner cylinder.

11. The unlocking key used for the locking device according to any one of claims 1 to 9.

12. A door comprising the cylinder lock of the locking device according to any one of claims 1 to 9.