

HANDLE DRIVE DEVICE

Field of the Invention

[1] The present invention relates to the field of door locks, and specifically to a handle drive device.

Background of the Invention

[2] Nowadays, a door lock constitutes of an essential part of people's daily lives. Generally, a door lock is qualified to have a certain anti-theft function, and at the same time, it is easy for people to turn on or off. Therefore, a drive device of a door lock is very important. There are many types of conventional drive devices of a door lock, and more common is such type of a drive device, wherein a lock cylinder is located inside the lock body, and the door lock is turned on by one tooth or a plurality of teeth of the lock cylinder engaging with the lock body. The position for opening the door lock by inserting a mechanical key locates at the outer surface of a lock housing, but there are two disadvantages: i) the lock cylinder takes up a lot of space in the lock body, and thus space utilization is low; and ii) anti-theft function is poor, because it is difficult to hide the position for opening the door lock.

Summary of the Invention

[3] One object of the present invention is to provide a handle drive device which has high utilization of space and good anti-theft function.

[4] To achieve the above object, according to one aspect of the present invention, there is provided a handle drive device including a handle, a lock cylinder embedded in the handle, and a drive axle. The lock cylinder is fixed with a latch bolt by a snap spring, and the latch bolt is actively engaged with the drive axle at one end thereof. The handle, the lock cylinder and the drive axle are coaxially disposed, and the end of the drive axle which is actively engaged with the latch bolt is provided with a smooth slope. When the lock cylinder is turned on, the latch bolt rotates along the slope. The drive axle is pushed to displace forward due to the function of the slope.

[5] Preferably, the handle drive device further comprises a clutch. When the drive axle displaces forward due to the rotation of the latch bolt until it engages with a connecting pole of the clutch so that the lock cylinder, the drive axle and the connecting pole are engaged with each other, if the handle is pulled down, then the door lock is opened.

[6] Preferably, the internal structure of the lock cylinder is provided with a blade structure having more than 10 blades. The advantage of this structure includes higher safety, and wherein the safety grade of the door lock is B or higher.

[7] Preferably, the handle includes a shank, and the shank comprises a shank casing, a handle sliding cover and front and rear slide rail plates. The front slide rail plate includes a first through-hole and a second through-hole, and the first through-hole aligns with a keyhole of the lock cylinder so that a screw is able to pass through the second through-hole and fix the front slide rail plate within the shank casing. There is provided with a first slide rail on the edges of the two ends of the front slide rail plate. The rear slide rail plate includes a third through-hole and a fourth through-hole, and the third through-hole is provided in a U-shaped groove of the rear slide rail plate, and a screw is able to pass through the fourth through-holes and fix the rear slide rail plate within the shank casing. There are provided with a second slide rail on the edges of the two ends of the rear slide rail plate, and the handle sliding cover is slidably connected to the first slide rail and the second slide rail by means of a chute at two ends thereof.

[8] Preferably, a stopping chute is arranged inside of the handle sliding cover, and the stopping chute is provided in a middle position of the handle sliding cover.

[9] Preferably, a blind hole is arranged inside of the handle sliding cover, and the blind hole is arranged on one side of the stopping chute.

[10] Preferably, there are ribs interleaving transversely and vertically which are arranged inside of the handle sliding cover, and the advantage thereof is to increase the strength and rigidity of the handle sliding cover and avoid deformation of the plastics.

[11] Preferably, a first projection hole is provided within the shank casing, and a

screw passes through the first projection hole and is inserted within a stopping chute of the handle sliding cover, so that the handle sliding cover can slide to a certain extent but does not fall off from the shank.

[12] Preferably, a second projection hole is also provided within the shank casing, and a screw passes through the second projection hole and fixes the handle sliding cover onto the shank. The advantage of this structure includes that, the keyhole is hidden so as to avoid the destruction of the lock cylinder deliberately.

[13] Preferably, the material of the front slide rail plate includes ABS material.

[14] Preferably, the material of the rear slide rail plate includes ABS material.

[15] The lock cylinder is embedded in the handle in the handle drive device, which significantly saves space for the overall structure. In addition, the assembly of the hidden the lock cylinder also plays a very good role for anti-theft function. Multiple-segment design for the slide rail plates greatly reduces the complexity of the manufacture process, and saves manufacture costs. In normal states, the handle sliding cover is slidably connected to the handle shank, and door lock drives the clutch by supplying power thereto so that the connecting pole on the clutch engages with the drive axle, at this time when the handle is rotated, the coaxial engaged lock cylinders, drive axle and the connecting pole rotate by the driving of the handle, so that the door lock is open. When there is an abnormal situation for the door lock so that the door can not be opened in a smart manner, handle sliding cover on the handle is pushed away slidably, exposing the keyhole originally hidden in the handle, then the door lock is opened by the key, at this time, the latch bolt of the lock cylinder moves in accompany with the movement of the key and rotates along the slope of the drive axle, due to the function of the slope, then the latch bolt push the drive axle to move forward, and the drive axle pushes the connecting pole within the clutch, prompting the connecting pole engaging with a driven square shaft, and turning the handle will open the door lock. The arrangement of a stopping chute within the handle sliding cover ensures that the handle sliding cover can only slide within a certain extent and can not fall off from the handle, which greatly reduces the possibility of loss of the handle sliding cover and ensures the integrity of the handle drive device.

[16] The beneficial technical effects of the present application lies in: the space for installing is significantly saved in the handle drive device according to the invention; and the anti-theft function is greatly improved. The handle drive device according to the invention is applicable to a door lock, and is specifically applicable to an electronic door lock, which greatly improves the convenience and comfort of a door lock.

Brief Description of Drawings

[17] Figure 1 is a schematic view of a preferred structure of a handle drive device according to one embodiment of the invention.

[18] Figure 2 is a schematic view for the assembly structure of the components of the handle drive device according to one embodiment of the invention.

[19] Figure 3 is a schematic view of the structure of the lock cylinder of the handle drive device according to one embodiment of the invention.

[20] Figure 4 is a schematic view of the structure of the drive axle of the handle drive device according to one embodiment of the invention.

[21] Figure 5 is a schematic view of the structure of the shank casing of the handle drive device according to one embodiment of the invention.

[22] Figure 6 is a schematic view of the structure of the handle sliding cover of the handle drive device according to one embodiment of the invention.

[23] Figure 7 is schematic view of the structure of the front slide rail plate of the handle drive device according to one embodiment of the invention.

[24] Figure 8 is schematic view of the structure of the rear slide rail plate of the handle drive device according to one embodiment of the invention.

[25] A list of the reference numbers:

[26] 1 a handle; 2 a lock cylinder; 3 a drive axle; 4 a shank casing; 5 a handle sliding cover; 6 a front slide rail plate; 7 a rear slide rail plate; 21 a latch bolt; 22 a keyhole; 31 a slope; 41 a first projection hole; 42 a second projection hole; 51 a chute; 52 a stopping chute; 53 a blind hole; 61 a first through-hole; 62 a second through-hole; 63 a first slide rail; 71 a third through-hole; 72 a fourth through-hole; 73 a U-shaped

groove; 74 a second slide rail.

Detailed Description of Preferred Embodiments

[27] The embodiments of the present invention will be described below in conjunction with the accompanying drawings and specific examples, for better understanding of the present invention.

[28] Example

[29] The handle drive device according to one embodiment of the invention includes a handle 1, a lock cylinder 2 embedded in the handle, and a drive axle 3. The lock cylinder 2 shown in Figure 3 is fixed with a latch bolt 21 by a snap spring, and the latch bolt 21 is actively engaged with the drive axle 3 at one end thereof. The handle 1, the lock cylinder 2 and the drive axle 3 are coaxially disposed, and as shown in Figure 4, the end of the drive axle 3 which is actively engaged with the latch bolt 21 is provided with a smooth slope 31. When the lock cylinder 2 is turned on, the latch bolt 21 rotates along the slope 31. The drive axle 3 is pushed to displace forward due to the function of the slope.

[30] The handle drive device further comprises a clutch. When the drive axle 3 displaces forward due to the rotation of the latch bolt 21 until it engages with a connecting pole of the clutch so that the lock cylinder 2, the drive axle 3 and the connecting pole are engaged with each other, if the handle is pulled down, then the door lock is opened.

[31] The internal structure of the lock cylinder 2 is provided with a blade structure having more than 10 blades. The advantage of this structure includes higher safety, and wherein the safety grade of the door lock is B or higher.

[32] As shown in Figures 1-2, the handle 1 includes a shank. Said shank comprises a shank casing 4, a handle sliding cover 5 and front and rear slide rail plates 6, 7. As shown in Figure 7, the front slide rail plate 6 includes a first through-hole 61 and a second through-hole 62. The first through-hole 61 aligns with a keyhole 22 of the lock cylinder 2 so that a screw may pass through the second through-hole 62 and fix the front slide rail plate 6 within the shank casing 4. There is

provided with a first slide rail 63 on the edges of the two ends of the front slide rail plate 6. The rear slide rail plate 7 as shown in FIG. 8 includes a third through-hole 71 and a fourth through-hole 72. The third through-hole 71 is provided in a U-shaped groove 73 of the rear slide rail plate 7, and a screw may pass through the fourth through-holes 72 and fix the rear slide rail plate 7 within the shank casing 4. There is provided with a second slide rail 74 on the edges of the two ends of the rear slide rail plate 7. The handle sliding cover 5 is slidably connected to the first slide rail 63 and the second slide rail 74 by means of a chute 51 at two ends thereof. A stopping chute 52 is arranged inside of the handle sliding cover 5 as shown in Figure 6. The stopping chute 52 is provided in a middle position of the handle sliding cover 5. A blind hole 53 is arranged inside of the handle sliding cover 5, and the blind hole 53 is arranged on one side of the stopping chute 52. There are ribs interleaving transversely and vertically which are arranged inside of the handle sliding cover 5, and the advantage thereof is to increase the strength and rigidity of the handle sliding cover and avoid deformation of the plastics.

[33] As shown in Figure 5, a first projection hole 41 is provided within the shank casing 4, and a screw passes through the first projection hole 41 and is inserted within a stopping chute 52 of the handle sliding cover 5, so that the handle sliding cover 5 can slide to a certain extent but does not fall off from the shank. A second projection hole 42 is also provided within the shank casing 4, and a screw passes through the second projection hole 42 and fixes the handle sliding cover 5 onto the shank. The advantage of this structure includes that, the keyhole is hidden so as to avoid the destruction of the lock cylinder deliberately.

[34] The material of the front slide rail plate 6 includes ABS material.

[35] The material of the rear slide rail plate 7 includes ABS material.

[36] The lock cylinder 2 is embedded in the handle 1 in the handle drive device, which significantly saves space for the overall structure. In addition, the assembly of the hidden the lock cylinder 2 also plays a very good role for anti-theft function. Multiple-segment design for the slide rail plates greatly reduces the complexity of the manufacture process, and saves manufacture costs. In normal states,

the handle sliding cover 5 is slidably connected to the handle shank, and door lock drives the clutch by supplying power thereto so that the connecting pole engages with the drive axle, at this time when the handle is rotated, the coaxial engaged lock cylinders, drive axle and the connecting pole rotate by the driving of the handle, so that the door lock is open. When there is an abnormal situation for the door lock so that the door can not be opened in a smart manner, handle sliding cover on the handle is pushed away slidably, exposing the keyhole originally hidden in the handle, then the door lock is opened by the key, at this time, the latch bolt of the lock cylinder moves in accompany with the movement of the key and rotates along the slope of the drive axle, due to the function of the slope, then the latch bolt push the drive axle to move forward, and the drive axle pushes the connecting pole within the clutch, prompting the connecting pole engaging with a driven square shaft, and turning the handle will open the door lock. The arrangement of a stopping chute within the handle sliding cover ensures that the handle sliding cover can only slide within a certain extent and can not fall off from the handle, which greatly reduces the possibility of loss of the handle sliding cover and ensures the integrity of the handle drive device.

[37] What are described above are only preferred embodiments of the present invention and not intended to limit the present invention. Those skilled in the art appreciate that the present invention may have diverse modifications and variations. Any modifications, equivalent substitutions and improvements made within the spirit and principle of the present invention all fall within the protection scope of the present invention.

WHAT IS CLAIMED IS:

1. A handle drive device including a handle, a lock cylinder embedded in the handle and a drive axle, characterized in that,

the lock cylinder is fixed with a latch bolt by a snap spring, and the latch bolt is actively engaged with the drive axle at one end thereof, and the handle, the lock cylinder and the drive axle are coaxially disposed, and the end of the drive axle which is actively engaged with the latch bolt is provided with a smooth slope;

the handle includes a shank, and the shank comprises a shank casing, a handle sliding cover and front and rear slide rail plates, and the front slide rail plate includes a first through-hole and a second through-hole, and the first through-hole aligns with a keyhole of the lock cylinder so that a screw is able to pass through the second through-hole and fix the front slide rail plate within the shank casing, and there is provided with a first slide rail on the edges of the two ends of the front slide rail plate, and the rear slide rail plate includes a third through-hole and a fourth through-hole, and the third through-hole is provided in a U-shaped groove of the rear slide rail plate, and a screw is able to pass through the fourth through-holes and fix the rear slide rail plate within the shank casing, and there are provided with a second slide rail on the edges of the two ends of the rear slide rail plate, and the handle sliding cover is slidably connected to the first slide rail and the second slide rail by means of a chute at two ends thereof.

2. The handle drive device according to claim 1, characterized in that,

an internal structure of the lock cylinder is provided with a blade structure having more than 10 blades.

3. The handle drive device according to claim 1, characterized in that,

a stopping chute is arranged inside of the handle sliding cover, and the stopping chute is provided in a middle position of the handle sliding cover.

4. The handle drive device according to claim 3, characterized in that, a blind hole is arranged inside of the handle sliding cover, and the blind hole is arranged on one side of the stopping chute.

5. The handle drive device according to claim 1, characterized in that, there are ribs interleaving transversely and vertically which are arranged inside of the handle sliding cover.

6. The handle drive device according to claim 1, characterized in that, a first and second projection holes are provided within the shank casing.

7. The handle drive device according to claim 1, characterized in that, the material of the front slide rail plate includes ABS material.

8. The handle drive device according to claim 1, characterized in that, the material of the rear slide rail plate includes ABS material.