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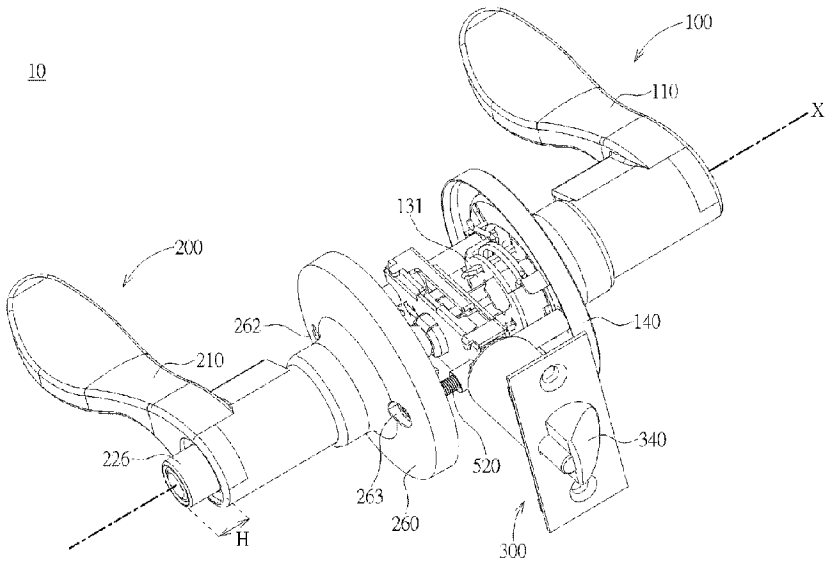

(57) Abrégé/Abstract:
A transmission mechanism applied to a lock and for controlling the lock to switch between an unlocked state and a locked state. The lock includes a first handle set including a first cover plate which includes a first fitting portion. The transmission mechanism includes a transmission element and a moving component. The transmission element is connected to the first handle set in a manner that the transmission element is incapable of moving along a rotating axis and has an abutting portion. The moving component is disposed on the transmission element in a manner that the moving component is capable of moving along the rotating axis and includes a first engaging groove, a second engaging groove and a second fitting portion. When the transmission element is operated to rotate, the abutting portion is capable of switching between the first engaging groove and the second engaging groove.

Abstract of Disclosure

A transmission mechanism applied to a lock and for controlling the lock to switch between an unlocked state and a locked state. The lock includes a first handle set including a first cover plate which includes a first fitting portion. The transmission mechanism includes a transmission element and a moving component. The transmission element is connected to the first handle set in a manner that the transmission element is incapable of moving along a rotating axis and has an abutting portion. The moving component is disposed on the transmission element in a manner that the moving component is capable of moving along the rotating axis and includes a first engaging groove, a second engaging groove and a second fitting portion. When the transmission element is operated to rotate, the abutting portion is capable of switching between the first engaging groove and the second engaging groove.

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Title

TRANSMISSION MECHANISM AND LOCK

Background of the Invention

1. Field of the Invention

The present disclosure relates to a transmission mechanism and a lock, and more particularly, to a transmission mechanism incapable of moving along the rotating axis when being operated to rotate and a lock having the same.

2. Description of the Prior Art

Please refer to FIG. 1, which is an exploded diagram showing a lock 1 of prior art. The lock 1 defines a rotating axis X and is for being installed on a door (not shown). The lock 1 includes a first handle set 2, a second handle set 3 and a transmission mechanism (not labelled). The transmission mechanism includes a transmission element 4, a moving component 5, a transmission cam 6 and a tubular connecting element 7. The first handle set 2 includes a first cover plate 21 fixedly disposed on the door. The first cover plate 21 includes two first fitting portions 22 (only one is shown) which are disposed symmetrically. The transmission element 4 includes two abutting portions 41. The moving component 5 includes two first bottom grooves 51 which are disposed symmetrically, two second bottom grooves 52 which are disposed symmetrically, two second fitting portions 53 which are disposed symmetrically, and two first engaging parts 54 which are disposed symmetrically. A bottom of the first bottom groove 51 and a bottom of the second bottom groove 52 are located on a same plane, i.e., there is no distance between the bottom of the first bottom groove 51 and the bottom of the second bottom groove 52 along the rotating axis X. Please also refer to FIG. 2 and FIG. 3. FIG. 2 is a schematic diagram showing the transmission mechanism of the lock 1 of FIG. 1

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in an unlocked state. FIG. 3 is a schematic diagram showing the transmission mechanism of the lock 1 of FIG. 1 in a locked state. In FIG. 2 and FIG. 3, the tubular connecting element 7 of the transmission mechanism is omitted for clearly showing the direction of the transmission element 4. The transmission cam 6 includes two sliding slopes 61 (only one is shown) which are disposed symmetrically and two second engaging parts 62 (only one is shown) which are disposed symmetrically. The second engaging parts 62 are notches concaved from a peripheral wall of the transmission cam 6, and shapes of the second engaging parts 62 are corresponding to shapes of the first engaging parts 54. When the lock 1 is in the unlocked state, the second fitting portions 53 of the moving component 5 are separated from the first fitting portions 22 of the first cover plate 21 (not shown). Meanwhile, as shown in FIG. 2, each of the abutting portions 41 of the transmission element 4 is located at a first end 61a of one of the sliding slopes 61, and each of the first engaging parts 54 is engaged with one of the second engaging parts 62. When the lock 1 is in the locked state, the second fitting portions 53 of the moving component 5 are fitted into the first fitting portions 22 of the first cover plate 21 (not shown). Meanwhile, as shown in FIG. 3, each of the abutting portions 41 of the transmission element 4 is located at a second end 61b of one of the sliding slopes 61, and each of the first engaging parts 54 is separated from one of the second engaging parts 62. When the lock 1 is desired to be switched from the unlocked state to the locked state, the transmission element 4 can be operated to rotate along a first direction D1 (shown in FIG. 2), such that each of the abutting portions 41 of the transmission element 4 slides along one of the sliding slopes 61 from the first end 61a to the second end 61b. In contrary, when the lock 1 is desired to be switched from the locked state to the unlocked state, the transmission element 4 can be operated to rotate

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along a second direction D2 (shown in FIG. 3), such that each of the abutting portions 41 of the transmission element 4 slides along one of the sliding slopes 61 from the second end 61b to the first end 61a. In other words, when the lock 1 is switched between the unlocked state and the locked state, the abutting portions 41 of the transmission element 4 slide along the sliding slopes 61, such that the transmission element 4 rotates about the rotating axis X and moves along the rotating axis X (also called axial movement). When operated, a user needs to spend more effort to allow the transmission element 4 to move along the rotating axis X. It is less smooth in use.

The lock 1 can further include a latch mechanism (not shown). When assembling the lock 1, the latch mechanism is installed on the door first, and then the first handle set 2 and the transmission mechanism are assembled to form an outer side assembly. The outer side assembly is disposed on a side of the door, the tubular connecting element 7, the transmission element 4, two screw posts 8 are inserted through holes of the latch mechanism corresponding thereto, and are aligned and connected with the second handle set 3. However, when the outer side assembly of the lock 1 is in the locked state (shown in FIG. 3), the transmission cam 6 and the tubular connecting element 7 are capable of rotating 90 degrees unidirectionally. When assembling the lock 1, if the transmission cam 6 and the tubular connecting element 7 are accidentally rotated 90 degrees prior to be inserted through the latch mechanism (not shown), the positions of the first engaging parts 54 are not corresponding to the positions of the second engaging parts 62. Accordingly, the lock 1 is incapable of functioning normally.

Summary of the Invention

According to an embodiment of the present disclosure, a

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transmission mechanism applied to a lock and for controlling the lock to switch between an unlocked state and a locked state is disclosed. The lock defines a rotating axis and is for being installed on a door. The door includes a first side and a second side opposite to the first side. The lock includes a first handle set and a second handle set. The first handle set is disposed on the first side of the door. The second handle set is disposed on the second side of the door. The first handle set includes a first cover plate fixedly disposed on the first side of the door. The first cover plate includes a first fitting portion. The transmission mechanism includes a transmission element and a moving component. The transmission element is connected to the first handle set in a manner that the transmission element is incapable of moving along the rotating axis. The transmission element has an abutting portion. The moving component is disposed on the transmission element in a manner that the moving component is capable of moving along the rotating axis. The moving component includes a first engaging groove, a second engaging groove and a second fitting portion. The first engaging groove is formed on a side of the moving component. The second engaging groove is formed on the side of the moving component. The second fitting portion is configured for corresponding to the first fitting portion. When the transmission element is operated to rotate, the abutting portion is capable of switching between the first engaging groove and the second engaging groove. When the abutting portion is located in the first engaging groove, the second fitting portion is configured to be separated from the first fitting portion, such that the lock is in the unlocked state. When the abutting portion is located in the second engaging groove, the second fitting portion is configured to be fitted into the first fitting portion, such that the lock is in the locked state.

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According to another embodiment of the present disclosure, a lock defining a rotating axis and for being installed on a door is disclosed. The door includes a first side and a second side opposite to the first side. The lock includes a first handle set, a second handle set and the aforementioned transmission mechanism. The first handle set is disposed on the first side of the door. The first handle set includes a first cover plate and a lock element. The first cover plate is fixedly disposed on the first side of the door. The second handle set is disposed on the second side of the door. The transmission element is connected to the lock element in a manner that the transmission element and the lock element are capable of moving synchronously. When the lock element is operated to switch between a first state and a second state, the lock element drives the transmission element to rotate, such that the abutting portion is capable of switching between the first engaging groove and the second engaging groove.

According to yet another embodiment of the present disclosure, a lock defining a rotating axis and for being installed on a door is disclosed. The lock includes a first handle set, a second handle set, a cylindrical element, a movable element, a transmission element and a latch mechanism. The first handle set is disposed on a side of the door. The first handle set includes a first handle and a first tubular element. The first tubular element is connected to the first handle in a manner that the first tubular element and the first handle are capable of moving synchronously. The second handle set is disposed on another side of the door. The second handle set includes a second handle and a second tubular element. The second tubular element is connected to the second handle in a manner that the second tubular element and the second handle are capable of moving synchronously. The second tubular element is independent from the first tubular element. The

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cylindrical element is disposed in the second handle. The cylindrical element includes a guiding track. The guiding track has an unlocked end and a locked end opposite to the unlocked end. The movable element is disposed in the cylindrical element in a manner that the movable element is capable of moving along the guiding track. The transmission element has a first end and a second end opposite to the first end. The first end is connected to the first handle set. The second end is connected to the movable element. The latch mechanism is disposed between the first handle set and the second handle set. The latch mechanism includes a latch tongue driven by the first tubular element or the second tubular element. When the cylindrical element is operated to move along the rotating axis and towards the first handle set, the movable element is driven to move from the unlocked end to the locked end to drive the transmission element to rotate, such that the lock is switched from an unlocked state to a locked state. When the second handle is operated to rotate along a first direction, the cylindrical element is driven to rotate, and the movable element is driven to move from the locked end to the unlocked end to drive the transmission element to rotate, such that the lock is switched from the locked state to the unlocked state.

These and other objectives of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.

Brief Description of the Drawings

FIG. 1 is an exploded diagram showing a lock of prior art.

FIG. 2 is a schematic diagram showing a transmission mechanism of the lock of FIG. 1 in an unlocked state.

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FIG. 3 is a schematic diagram showing the transmission mechanism of the lock of FIG. 1 in a locked state.
FIG. 4 is a three-dimensional diagram showing a lock according to a first embodiment of the present disclosure.
FIG. 5 is an exploded diagram showing the lock of FIG. 4.
FIG. 6 is another exploded diagram showing the lock of FIG. 4.
FIG. 7 is a plane view showing the lock of FIG. 4.
FIG. 8 is a cross-sectional view of the lock taken along line A-A in FIG. 7.
FIG. 9 is a cross-sectional view of the lock taken along line B-B in FIG. 7.
FIG. 10 is a three-dimensional diagram showing a first driving element of FIG. 5.
FIG. 11 is a three-dimensional diagram showing a moving component of FIG.5.
FIG. 12 is a plane view showing the moving component of FIG. 11.
FIG. 13 is a cross-sectional view of the moving component taken along line C-C in FIG. 12.
FIG. 14 is a schematic diagram showing a first cover plate and a transmission mechanism of FIG.5 in an unlocked state.
FIG. 15 is a schematic diagram showing the first cover plate and the transmission mechanism of FIG.5 in a locked state.
FIG. 16 is a three-dimensional diagram showing a lock element of FIG. 5.
FIG. 17 is a plane view showing the lock element of FIG. 16.
FIG. 18 is a three-dimensional diagram showing a lock according to a second embodiment of the present disclosure.
FIG. 19 is an exploded diagram showing the lock of FIG. 18.
FIG. 20 is another exploded diagram showing the lock of FIG. 18.
FIG. 21 is a three-dimensional diagram showing a moving component of FIG.19.

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FIG. 22 is a schematic diagram showing a first cover plate and a transmission mechanism of FIG.19 in an unlocked state.
FIG. 23 is a schematic diagram showing a transmission element, the moving component and a transmission cam of FIG.22 in an unlocked state.
FIG. 24 is a schematic diagram showing the first cover plate and the transmission mechanism of FIG.19 in a locked state.
FIG. 25 is a schematic diagram showing the transmission element, the moving component and the transmission cam of FIG.24 in a locked state.

Detailed Description

In the following detailed description of the embodiments, reference is made to the accompanying drawings which form a part thereof, and in which is shown by way of illustration specific embodiments in which the disclosure may be practiced. In this regard, directional terminology, such as top, bottom, left, right, front or back, is used with reference to the orientation of the Figure(s) being described. The components of the present disclosure can be positioned in a number of different orientations. As such, the directional terminology is used for purposes of illustration and is in no way limiting. In addition, identical or similar numeral references are used for identical components or similar components in the following embodiments. Accordingly, the drawings and descriptions will be regarded as illustrative in nature and not as restrictive.

In the present disclosure, "independent" is used to describe two elements are independent from each other in operation. For example, when one element is operated to rotate, the other element does not rotate with the element.

<The First Embodiment>

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Please refer to FIG. 4 to FIG. 9. A transmission mechanism (not labelled) applied to a lock 10 and for controlling the lock 10 to switch between an unlocked state and a locked state is disclosed. The lock 10 defines a rotating axis X and is for being installed on a door (not shown). The door includes a first side and a second side opposite to the first side. The lock 10 includes a first handle set 100 and a second handle set 200. The first handle set 100 is disposed on the first side of the door, and the second handle set 200 is disposed on the second side of the door. The first handle set 100 includes a first cover plate 140 fixedly disposed on the first side of the door.

Please refer to FIG. 14 to FIG. 15. The first cover plate 140 includes two first fitting portions 144 which are disposed symmetrically. The number of the first fitting portions 144 is exemplary. The transmission mechanism includes a transmission element 400 and a moving component 160. The transmission element 400 is connected to the first handle set 100 in a manner that the transmission element 400 is incapable of moving along the rotating axis X. The transmission element 400 has two abutting portions 420 which are disposed symmetrically. The number of the abutting portions 420 is exemplary. The moving component 160 is disposed on the transmission element 400 in a manner that the moving component 160 is capable of moving along the rotating axis X.

Please refer to FIG. 11 to FIG. 13. The moving component 160 includes two first engaging grooves 166, two second engaging grooves 167 and two second fitting portions 162. The numbers of the first engaging grooves 166, the second engaging grooves 167 and the second fitting portions 162 are exemplary. The two first engaging grooves 166 are disposed symmetrically. The two second engaging grooves 167 are disposed symmetrically.

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The two second fitting portions 162 are disposed symmetrically. The first engaging grooves 166 and the second engaging grooves 167 are formed on a second side 165 of the moving component 160. The second fitting portions 162 are configured for corresponding to the first fitting portions 144. When the transmission element 400 is operated to rotate, the abutting portions 420 are capable of switching between the first engaging grooves 166 and the second engaging grooves 167. As shown in FIG. 14, when the abutting portions 420 are located in the first engaging grooves 166, the second fitting portions 162 are configured to be separated from the first fitting portions 144, such that the lock 10 is in the unlocked state. As shown in FIG. 15, when the abutting portions 420 are located in the second engaging grooves 167, the second fitting portions 162 are configured to be fitted into the first fitting portions 144, such that the lock 10 is in the locked state.

With the aforementioned structure, the transmission mechanism controls the lock 10 to switch between the unlocked state and the locked state by the movement of the moving component 160 along the rotating axis X, such that the second fitting portions 162 are capable of being separated from the first fitting portions 144 or being fitted into the first fitting portions 144. The transmission element 400 only rotates about the rotating axis X and is incapable of moving along the rotating axis X (hereinafter, also called axial movement). Accordingly, the operation resistance can be reduced, and the operation smoothness can be enhanced.

Specifically, as shown in FIG. 11 to FIG. 12, the moving component 160 has a first side 164 and the second side 165 opposite to the first side 164. The moving component 160 can further include a through hole 163, two guiding surfaces 168 and two stop surfaces 169. The through hole 163 communicates the first side 164 and the second side 165. The two first

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engaging grooves 166 are disposed symmetrically at two sides of the through hole 163. The two second engaging grooves 167 are disposed symmetrically at the two sides of the through hole 163. The numbers of the guiding surfaces 168 and the stop surfaces 169 are exemplary. The guiding surfaces 168 are formed on the second side 165. Each of the guiding surfaces 168 is disposed on a side of the first engaging groove 166 and located between the first engaging groove 166 and the second engaging groove 167. The two stop surfaces 169 are formed on the second side 165. Each of the stop surfaces 169 is opposite to the guiding surface 166 and is disposed on another side of the first engaging groove 166. The guiding surface 168 is for guiding the abutting portion 420 to move from the first engaging groove 166 to the second engaging groove 167 or from the second engaging groove 167 to the first engaging groove 166 through the guiding surface 168. The stop surface 169 is for stopping the abutting portion 420 to move from the first engaging groove 166 to the second engaging groove 167 or from the second engaging groove 167 to the first engaging groove 166 through the stop surface 169. The two sides of the first engaging groove 166 are respectively disposed with the guiding surface 168 and the stop surface 169, which is for limiting a rotation direction of the transmission element 400. As such, in FIG. 11, the abutting portion 420 can only move from the first engaging groove 166 to the second engaging groove 167 along a counterclockwise direction, or can only move from the second engaging groove 167 to the first engaging groove 166 along a clockwise direction. As shown in FIG. 12, an included angle A1 is between the first engaging groove 166 and the second engaging groove 167. The included angle A1 can be greater than 0 degree and less than or equal to 90 degrees. In the embodiment, the included angle A1 is equal to 90 degrees. Moreover, the moving component 160 can be made of metal. The moving component 160 can be produced

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by sheet metal process, which is favorable for reducing production cost.

Please refer to FIG. 13. The first engaging groove 166 of the moving component 160 has a first bottom 166a. The second engaging groove 167 of the moving component 160 has a second bottom 167a. A distance d1 is between the first bottom 166a and the second bottom 167a along the rotating axis X. As such, when the transmission element 400 is operated to rotate, the transmission element 400 is incapable of axial movement, and the moving component 160 is pushed by the transmission element 400 to move along the rotating axis X. The displacement of the moving component 160 is substantially equal to d1.

Please refer to FIG. 14. The first fitting portions 144 are concaved from a surface of the first cover plate 140. The moving component 160 can further include a main body 161. The second fitting portions 162 are extended outwardly from the main body 161 along a direction perpendicular to the rotating axis X.

Please refer to FIGs. 5, 6, 14 and 15. The transmission mechanism can further include a first elastic element 150 abutting against the first side 164 of the moving component 160. When the transmission element 400 is operated to rotate, and the abutting portions 420 are moved from the first engaging grooves 166 to the second engaging grooves 167 (i.e., from the state of FIG. 14 to the state of FIG. 15), the abutting portions 420 push the moving component 160 to move along the rotating axis X and towards the first elastic element 150, such that the second fitting portions 162 are fitted into the first fitting portions 144, the first elastic element 150 accumulates an elastic force, and the lock 10 is in the locked state. When the transmission element 400 is operated to rotate

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and the abutting portions 420 are moved from the second engaging grooves 167 to the first engaging grooves 166 (i.e., from the state of FIG. 15 to the state of FIG. 14), the first elastic element 150 releases the elastic force to push the moving component 160 to move along the rotating axis X and away from the first elastic element 150, such that the second fitting portions 162 are separated from the first fitting portions 144, and the lock 10 is in the unlocked state.

Please refer to FIGs. 5, 6, 14 and 15. The transmission mechanism can further include a cylindrical element 220 and a movable element 240. The cylindrical element 220 is disposed in the second handle set 200. The cylindrical element 220 includes a receiving space 221 (shown in FIG. 6), a cylindrical wall 222, two guiding tracks 223 (only one is shown) which are symmetrically disposed, and a button 226. The cylindrical wall 222 surrounds the receiving space 221. The number of the guiding tracks 223 is exemplary. Each of the guiding tracks 223 is disposed on the cylindrical wall 22 and oblique relative to the rotating axis X. Each of the guiding tracks 223 has an unlocked end 224 and a locked end 225 opposite to the unlocked end 224. The phrase "each of the guiding tracks 223 is disposed on the cylindrical wall 222 and oblique relative to the rotating axis X" refers that each of the guiding tracks 223 is not parallel to the rotating axis X nor perpendicular to the rotating axis X, i.e., an included angle (not shown) is between each of the guiding tracks 223 and the rotating axis X. The included angle is greater than 0 degree and is less than 90 degrees, or the included angle is greater than 90 degrees and is less than 180 degrees. More specifically, a distance d2 is between a bottom 224a of the unlocked end 224 and a bottom 225a of the locked end 225 along the rotating axis X. When the unlocked end 224 and the locked end 225 are projected to a plane (not shown) perpendicular to the rotating

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axis X, a projecting position of the unlocked end 224 is different from a projecting position of the locked end 225. The button 226 is exposed to outside through the penetrating hole 211 (shown in FIG. 5) of the second handle 210, and the button 226 has a protruding height H (shown in FIG. 4) relative to an outer side of the second handle 210. The movable element 240 is disposed in the cylindrical element 220 in a manner that the movable element 240 is capable of moving along the guiding tracks 223. The movable element 240 is connected to the transmission element 400 in a manner that the movable element 240 and the transmission element 400 are capable of moving synchronously. As shown in FIG. 5, the movable element 240 includes a main body 243, a limiting hole 241 and two guiding parts 242 corresponding to the two guiding tracks 223. The number of the guiding parts 242 is exemplary. In the embodiment, each of the guiding parts 242 is a lug structure which is extended outwardly along a direction perpendicular to the rotating axis X. Each of the guiding tracks 223 is a groove structure formed on the cylindrical wall 222. The limiting hole 241 is formed in the main body 243 and is inserted with the second end 430 of the transmission element 400. Herein, cross sections of the limiting hole 241 and the transmission element 400 are rectangular, such that the limiting hole 241 and the transmission element 400 are capable of rotating together. The guiding parts 242 are extended outwardly from the main body 243 along the direction perpendicular to the rotating axis X. The guiding parts 242 are movably disposed in the guiding tracks 223. Specifically, the guiding part 242 is capable of moving from the unlocked end 224 to the locked end 225 through the guiding track 223, or from the locked end 225 to the unlocked end 224 through the guiding track 223. The transmission element 400 can further include a second elastic element 230 disposed in the cylindrical element 220 and abutting against a side of the movable element 240.The

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second elastic element 230 is disposed in the receiving space 221 of the cylindrical element 220.

As shown in FIG. 14 and FIG. 15, when the cylindrical element 220 is operated to move along the rotating axis X and towards the first handle set 100, the movable element 240 is guided by the guiding tracks 223 to move from the unlocked ends 224 to the locked ends 225 (from the state of FIG. 14 to the state of FIG. 15) to drive the transmission element 400 to rotate, such that the lock 10 is switched from the unlocked state to the locked state. As this time, the button 226 is driven to move with the cylindrical element 220 and towards the first handle set 100. As such, the protruding height H (shown in FIG. 4) is reduced, and the second elastic element 230 is pushed against by the movable element 240 and accumulates an elastic force.

As shown in FIG. 14 and FIG. 15, when the movable element 240 is located at the locked ends 225 (as shown in FIG. 15), and the cylindrical element 220 is operated to rotate along a first direction D1, the second elastic element 230 releases the elastic force to push the movable element 240, the movable element 240 is guided by the guiding tracks 223 to move from the locked ends 225 to unlocked ends 224 to drive the transmission element 400 to rotate, such that the lock 10 is switched from the locked state to the unlocked state. When the movable element 240 is located at the locked ends 225 (as shown in FIG. 15), and the cylindrical element 220 is operated to rotate along a second direction D2 opposite to the first direction D1, the locked ends 225 of the guiding tracks 223 push the guiding parts 242 of the movable element 240, which enables the movable element 240 to be driven by the cylindrical element 220 to rotate along the second direction D2 to drive the transmission element 400 to rotate along the second

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direction D2, such that the lock 10 is switched from the locked state to the unlocked state. In other words, when the lock 10 is in the locked state, no matter the cylindrical element 220 is operated to rotate along the first direction D1 or the second direction D2, the transmission element 400 can be driven to rotate, which enables the lock 10 to be switched from the locked state to the unlocked state.

More specifically, as shown in FIG. 4 to FIG.9, the lock 10 can further include a first fixing element 510, a second fixing element 520 and a latch mechanism 300. The first fixing element 510 and the second fixing element 520 are configured to combine the first handle set 100 and the second handle set 200, so as to fix the first handle set 100, the second handle set 200 and the latch mechanism 300 on the door. The latch mechanism 300 is disposed between the first handle set 100 and the second handle set 200. The latch mechanism 300 includes a first transfer shaft 310, a second transfer shaft 320, a first hole 331, a second hole 332 and a latch tongue 340. The first transfer shaft 310 defines a first transfer hole 311 for being inserted with a first tubular element 190. The second transfer shaft 320 defines a second transfer hole 321 for being inserted with a second tubular element 290. The first transfer shaft 310 is independent from the second transfer shaft 320. When the first transfer shaft 310 is operated to rotate, the latch tongue 340 can be driven to retract or stretch out. When the second transfer shaft 320 is operated to rotate, the latch tongue 340 can be driven to retract or stretch out.

The first handle set 100 can further include a first handle 110, a lock element 120, a first axial tube 130, a first restoring element 170, a first driving element 180 and the first tubular element 190.

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Please also refer to FIG. 16. The lock element 120 is disposed in the first handle 110 in a manner that the lock element 120 and the first handle 110 are capable of rotating together. The lock element 120 includes an outer cylinder 123 and a lock cylinder 124. The lock cylinder 124 can be operated to rotate relative to the outer cylinder 123, such that the lock element 120 is capable of switching between the locked state and the unlocked state. An inner end of the lock cylinder 124 is disposed with an accommodating groove 121. The accommodating groove 121 includes a first abutting surface 125 and a second abutting surface 126. An outer end of the lock cylinder 124 is disposed with a keyhole 122 (shown in FIG. 6). The keyhole 122 is exposed to outside through a penetrating hole 111 of the first handle 110.

The first handle 110 is disposed at an end of the first axial tube 130. Herein, the first handle 110 surrounds the end of the first axial tube 130. The first handle 110 is connected to the first axial tube 130 in a manner that the first handle 110 and the first axial tube 130 are capable of moving synchronously. For example, the first handle 110 can be connected to the first axial tube 130 through engagement, such that the first handle 110 is capable of rotating with the first axial tube 130. An inner end of the first handle 110 is inserted between the first axial tube 130 and the first cover plate 140 (shown in FIG.8), such that the first handle 110 is connected to the first cover plate 140 in a manner that the first handle 110 is capable of rotating relative to the first cover plate 140.

The first axial tube 130 is inserted in a center hole (not labelled) of the first cover plate 140 in a manner that the first axial tube 130 is capable of rotating relative to the first cover plate 140. Two ends of the first axial tube 130

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protrude from two sides of the first cover plate 140, respectively. The first axial tube 130 includes a spacer 132 (shown in FIG. 8). The spacer 132 divides the inner space of the first axial tube 130 into a first accommodating space 133 and a second accommodating space 134. The first accommodating space 133 is for accommodating the lock element 120. The second accommodating space 134 is for accommodating the first elastic element 150 and the moving component 160. As shown in FIGs. 8 and 9, the first elastic element 150 and the moving component 160 are disposed in the first cover plate 140 through the first axial tube 130. An inner end of the first axial tube 130 can further include two limiting grooves 135 (shown in FIG. 5, wherein only one of the limiting grooves 135 is labelled) and four hooks 131. An extending direction of the limiting groove 135 is substantially parallel to the rotating axis X. The four hooks 131 are disposed at a terminal of the inner end of the first axial tube 130 and are configured to engage with four hook slots 185 of the first driving element 180, such that the first axial tube 130 is connected to the first driving element 180 in a manner that the first axial tube 130 and the first driving element 180 are capable of moving synchronously.

The first cover plate 140 can further include a first fixing part 142, a second fixing part 143, a first limiting post 145 and a second limiting post 146. The first fixing part 142, the second fixing part 143, the first limiting post 145 and the second limiting post 146 are extended from a surface (not labelled) of the first cover plate 140 along the rotating axis X. The first fixing part 142 and the second fixing part 143 are configured to corporate with the first fixing element 510 and the second fixing element 520 to combine the first handle set 100 and the second handle set 200, such that the first handle set 100, the second handle set 200 and the latch mechanism 300 can be fixed on the door. In the embodiment,

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the first fixing element 510 and the second fixing element 520 are screws, and the first fixing part 142 and the second fixing part 143 are screw posts. However, the present disclosure is not limited thereto. The first fixing part 142, the second fixing part 143, the first fixing element 510 and the second fixing element 520 which can corporate with each other to achieve the aforementioned effect are all within the scope of the present disclosure.

The first restoring element 170 is configured to provide a restoring force for the first driving element 180 to return to its initial position after being rotated. The first restoring element 170 includes a first leg 171 and a second leg 172. The first restoring element 170 surrounds the inner end of the first axial tube 130. Please refer to FIG. 10. The first driving element 180 includes an inner space 187, a center hole 184, four hook slots 185, four first engaging parts 186 and a limiting slot 181. The limiting slot 181 includes a first end 182 and a second end 183. The inner space 187 is for accommodating the first restoring element 170. The limiting slot 181 is configured to allow the first leg 171 and the second leg 172 of the first restoring element 170 to limitedly move therein. The four hook slots 185 are configured for being engaged with the four hooks 131 of the first axial tube 130. As such, the first elastic element 150, the moving component 160 and the first restoring element 170 are fixed between the spacer 132 and the first driving element 180. The first tubular element 190 is a tubular structure and includes two second engaging parts 191 disposed symmetrically (only one is shown in FIG. 5). An end of the first tubular element 190 is inserted in the center hole 184 of the first driving element 180, and two of the second engaging parts 191 are engaged with two of the first engaging parts 186, respectively. As such, the first tubular element 190 is engaged with the first driving element

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180 and incapable of being separated from the center hole 184 of the first driving element 180. In the embodiment, each of the second engaging parts 191 is a raised structure, and each of the first engaging parts 186 is a recessed structure corresponding to the raised structure. However, the present disclosure is not limited thereto. For example, in other embodiment, each of the second engaging parts 191 can be a recessed structure, and each of the first engaging parts 186 can be a raised structure corresponding to the recessed structure. Cross sections of the first tubular element 190 and the center hole 184 are square, such that the first tubular element 190 is connected to the first driving element 180 in a manner that the first tubular element 190 and the first driving element 180 are capable of moving synchronously. Another end of the first tubular element 190 is inserted in a first transfer hole 311 of the first transfer shaft 310. Cross sections of the first tubular element 190 and the first transfer hole 311 are square, such that the first tubular element 190 is connected to the first transfer shaft 310 in a manner that the first tubular element 190 and the first transfer shaft 310 are capable of moving synchronously. Furthermore, the main body 161 of the moving component 160 is disposed in the second accommodating space 134 of the first axial tube 130. The two second fitting portions 162 of the moving component 160 protrude from the two limiting grooves 135 (shown in FIG. 5) of the first axial tube 130, respectively. As such, the moving component 160 is incapable of rotating relative to the first axial tube 130, and is connected to the first axial tube 130 in a manner that the moving component 160 and the first axial tube 130 are capable of moving synchronously. With the aforementioned arrangement, the first handle 110, the lock element 120, the first axial tube 130, the moving component 160, the first driving element 180, the first tubular element 190 and the first transfer shaft 310

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are connected and capable of moving synchronously with each other, i.e., capable of rotating with each other.

The second handle set 200 can further include the second handle 210, a second axial tube 250, a second cover plate 260, a second restoring element 270, a second driving element 280 and the second tubular element 290. The second handle 210 is disposed at an end of the second axial tube 250. Herein, the second handle 210 surrounds an outer end of the second axial tube 250. The second handle 210 is connected to the second axial tube 250 in a manner that the second handle 210 and the second axial tube 250 are capable of moving synchronously. For example, the second handle 210 can be connected to the second axial tube 250 through engagement, such that the second handle 210 is capable of rotating with the second axial tube 250. An inner end of the second handle 210 is inserted between the second axial tube 250 and the second cover plate 260 (shown in FIG.8), such that the second handle 210 is connected to the second cover plate 260 in a manner that the second handle 210 is capable of rotating relative to the second cover plate 260. The second handle 210 includes the penetrating hole 211. The cylindrical element 220 is disposed in the second handle 210.

The second axial tube 250 is inserted in a center hole (not labelled) of the second cover plate 260 in a manner that the second axial tube 250 is capable of rotating relative to the second cover plate 260. Two ends of the second axial tube 250 protrude from two sides of the second cover plate 260, respectively. The second axial tube 250 includes a spacer 252 (shown in FIG. 8). The spacer 252 divides the inner space of the second axial tube 250 into a first accommodating space 253 and a second accommodating space 254. The first accommodating space 253 is for accommodating the cylindrical element 220, the second elastic element 230 and the movable

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element 240. The second accommodating space 254 is for accommodating a third elastic element 255. The third elastic element 255 is for providing an elastic force to the second tubular element 290, such that the second tubular element 290 is capable of abutting against the second transfer shaft 320, which can enhance the transmission efficiency between the second tubular element 290 and the second transfer shaft 320. Another end of the second axial tube 250 can further include four hooks 251. The four hooks 251 are disposed at a terminal of the inner end of the second axial tube 250 and are configured to engage with four hook slots 285 of the second driving element 280, such that the second axial tube 250 is connected to the second driving element 280 in a manner that the second axial tube 250 and the second driving element 280 are capable of moving synchronously.

The second cover plate 260 includes a first penetrating hole 262 and a second penetrating hole 263. The first penetrating hole 262 is provided for the first fixing element 510 to insert therethrough. The second penetrating hole 263 is provided for the second fixing element 520 to insert therethrough. The inner side of the second cover plate 260 includes a first limiting post 264 and a second limiting post 265. The first limiting post 264 and the second limiting post 265 protrude from a surface (not labelled) of the second cover plate 260 and are extended along the rotating axis X.

The second restoring element 270 is configured to provide a restoring force for the second driving element 280 to return to its initial position after being rotated. The second restoring element 270 includes a first leg 271 and a second leg 272. The second restoring element 270 surrounds the inner end of the second axial tube 250. The structure of the second driving element 280 is the same as that of the first driving

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element 180. For details of the elements of the second driving element 280, references can be made to the elements having the same name of the first driving element 180. The second driving element 280 includes an inner space (not labelled), a center hole 284, four hook slots 285, four first engaging parts (not shown) and a limiting slot 281. The limiting slot 281 includes a first end 282 and a second end 283. The inner space is for accommodating the second restoring element 270. The limiting slot 281 is configured to allow the first leg 271 and the second leg 272 of the second restoring element 270 to move limitedly therein. The four hook slots 285 are configured for being engaged with the four hooks 251 of the second axial tube 250. As such, the third elastic element 255 and the second restoring element 270 are fixed between the spacer 252 and the second driving element 280. The second tubular element 290 is a tubular structure and includes two second engaging parts 291 disposed symmetrically. An end of the second tubular element 290 is inserted in the center hole 284 of the second driving element 280, and the two second engaging parts 291 are engaged with two of the first engaging parts of the second driving element 280, respectively. As such, the second tubular element 290 is engaged with the second driving element 280 and incapable of being separated from the center hole 284 of the second driving element 280. Cross sections of the second tubular element 290 and the center hole 284 are square, such that the second tubular element 290 is connected to the second driving element 280 in a manner that the second tubular element 290 and the second driving element 280 are capable of moving synchronously. Another end of the second tubular element 290 is inserted in the second transfer hole 321 of the second transfer shaft 320. Cross sections of the second tubular element 290 and the second transfer hole 321 are square, such that the second tubular element 290 is connected to the second transfer shaft 320 in a manner that

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the second tubular element 290 and the second transfer shaft 320 are capable of moving synchronously. With the aforementioned arrangement, the second handle 210, the second axial tube 250, the second driving element 280, the second tubular element 290 and the second transfer shaft 320 are connected and capable of moving synchronously with each other, i.e., capable of rotating with each other. Furthermore, the cylindrical element 220 of the transmission mechanism is disposed in the second handle 210 in a manner that the cylindrical element 220 and the second handle 210 are capable of rotating together.

In the embodiment, cross sections of the center hole 184, the first tubular element 190 and the first transfer hole 311 are square, such that the first driving element 180, the first tubular element 190 and the first transfer shaft 310 are connected and capable of moving synchronously with each other. Cross sections of the center hole 284, the second tubular element 290 and the second transfer hole 321 are square, such that the second driving element 280, the second tubular element 290 and the second transfer shaft 320 are connected and capable of moving synchronously with each other. However, the present disclosure is not limited thereto. In other embodiment, the cross sections of the center hole 184, the first tubular element 190, the first transfer hole 311, the center hole 284, the second tubular element 290 and the second transfer hole 321 can be formed in other non-circular shapes, such as semicircular shapes, triangular shapes or pentagonal shapes, which can also achieve the same functionality.

The first tubular element 190 and the second tubular element 290 are for independently driving the latch tongue 340 of the latch mechanism 300 to retract or stretch out. As shown in FIG. 8 and FIG. 9, the first tubular element 190 and

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the second tubular element 290 are independent from each other. That is, when the first tubular element 190 is rotated, the second tubular element 290 does not rotate therewith, and vice versa. The first transfer shaft 310 and the second transfer shaft 320 are independent from each other. That is, when the first transfer shaft 310 is rotated, the second transfer shaft 320 does not rotate therewith, and vice versa. How to drive the latch tongue 340 with the first transfer shaft 310 and the second transfer shaft 320 is conventional and is omitted herein.

The transmission element 400 has the first end 410 and a second end 430 opposite to the first end 410, and includes the abutting portions 420 for abutting against the moving component 160. The two abutting portions 420 are disposed between the first end 410 and the second end 430, and each of the abutting portions 420 is a lug structure. The lug structure is extended outwardly along a direction perpendicular to the rotating axis X. The transmission element 400 is inserted in the through hole 163 of the moving component 160. The first end 410 of the transmission element 400 is connected to the first handle set 100. The second end 430 of the transmission element 400 is connected to the movable element 240 of the second handle set 200. Specifically, the first end 410 of the transmission element 400 is disposed in the accommodating groove 121 of the lock cylinder 124. Please refer to FIG. 17, in which a cross section of the first end 410 of the transmission element 400 is shown in dashed line for illustrating the connection relationship between the transmission element 400 and the lock element 120. As shown in FIG. 17, the first end 410 of the transmission element 400 is disposed in the accommodating groove 121, and two sides 411, 412 of the first end 410 abut against the first abutting surface 125 and the second abutting surface 126, respectively.

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As such, the transmission element 400 is connected to the lock cylinder 124 in a manner that the transmission element 400 and the lock cylinder 124 are capable of moving synchronously. When the lock cylinder 124 is operated to rotate (such as unlocking the lock 10 with a key to drive the lock cylinder 124 to rotate), the transmission element 400 can be driven to rotate together. In other words, When the lock element 120 is operated to switch between a first state and a second state (such as the locked state and the unlocked state), the lock element 120 drives the transmission element 400 to rotate, such that the abutting portions 420 are capable of switching between the first engaging grooves 166 and the second engaging grooves 167. Please refer to FIGs. 8 and 9. The two abutting portions 420 of the transmission element 400 abut against the second side 165 of the moving component 160. The limiting hole 241 is inserted with the second end 430 of the transmission element 400. The second end 430 of the transmission element 400 is connected to the limiting hole 241 in a manner that the second end 430 of the transmission element 400 and the limiting hole 241 are capable of moving synchronously.

In the embodiment, as shown in FIG. 8 and FIG. 9, the first end 410 and the abutting portions 420 are abutted by a bottom of a accommodating groove 121 of the lock element 120 and the first tubular element 190, such that the transmission element 400 is incapable of axial movement.

With the aforementioned arrangement, when the lock 10 is in the unlocked state as shown in FIG. 14, the abutting portions 420 are located in the first engaging grooves 166, and the second fitting portions 162 are separated from the first fitting portions 144. Because the second fitting portions 162 are not fitted into the first fitting portions 144, the moving

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component 160 is capable of rotating relative to the first cover plate 140. Because the moving component 160 is connected to the first handle 110 in a manner that the moving component 160 and the first handle 110 are capable of moving synchronously, the first handle 110 is also capable of rotating relative to the first cover plate 140. When the first handle 110 is pressed downwardly, i.e., the first handle 110 is rotated along the first direction D1, the first driving element 180 and the first tubular element 190 are driven to rotate along the first direction D1, which drives the first transfer shaft 310 to rotate along the first direction D1 to drive the latch tongue 340 to retract to open the door. When the first handle 110 is released, the first restoring element 170 provides the elastic force for the first driving element 180 to rotate along the second direction D2 to return to its initial position, which drives the first handle 110 and the first tubular element 190 to rotate along the second direction D2, such that the first transfer shaft 310 is driven to rotate along the second direction D2 to drive the latch tongue 340 to stretch out to its initial position. Please refer to FIG. 5, in the embodiment, the first restoring element 170 is cooperated with the first limiting post 145 and the second limiting post 146 of the first cover plate 140, and the limiting slot 181 of the first driving element 180 to bring the first driving element 180 to return its initial position. Specifically, when the first handle 110 is pressed downwardly, i.e., the first handle 110 is rotated along the first direction D1, the first driving element 180 is driven to rotate along the first direction D1, a first leg 171 of the first restoring element 170 is blocked by the first limiting post 145 and is incapable of rotating. A second leg 172 of the first restoring element 170 is pushed by an end 183 of the limiting slot 181 and is rotated counterclockwise with the first driving element 180. As such, the first restoring element 170 accumulates an

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elastic force. When the first handle 110 is released, the first restoring element 170 releases the elastic force which allows the second leg 172 of the first restoring element 170 to push the end 183 of the limiting slot 181, such that the first driving element 180 is driven to rotate along the second direction D2 to return to its initial position before being rotated. When the second handle 210 is pressed downwardly, the latch tongue 340 can be driven to retract to open the door; when the second handle 210 is released, the latch tongue 340 can be driven to stretch out to its initial position. The principle that drives the latch tongue 340 through the second handle 210 is similar to that of the first handle 110 and is not repeated herein.

When the lock 10 is in the locked state, as shown in FIG. 15, the abutting portions 420 are located in the second engaging grooves 167, and the second fitting portions 162 are fitted into the first fitting portions 144. Because the second fitting portions 162 are fitted into the first fitting portions 144, the moving component 160 is incapable of rotating relative to the first cover plate 140. Because the moving component 160 is connected to the first handle 110 in a manner that the moving component 160 and the first handle 110 are capable of moving synchronously. The first handle 110 is incapable of rotating relative to the first cover plate 140, either. As such, the first handle 110 is incapable of driving the latch tongue 340 to retract to open the door.

When the lock 10 is in the unlocked state, the lock 10 can be switched to the locked state by the following methods. In the first method, a key (not shown) is inserted into the keyhole 122 (shown in FIG. 6) of the lock element 120 and rotated, which allows the lock cylinder 124 to rotate relative to the outer cylinder 123 along the first direction D1, and the

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transmission element 400 is driven to rotate along the first direction D1, such that the lock 10 is in the locked state shown in FIG. 15. In the second method, as shown in FIG. 14, the button 226 is pressed, which allows the cylindrical element 220 to be operated to move along the rotating axis X and towards the first handle set 100, the guiding parts 242 of the movable element 240 are guided by the guiding tracks 223 to move from the unlocked ends 224 to the locked ends 225 to drive the transmission element 400 to rotate along the first direction D1, such that the lock 10 is in the locked state.

When the lock 10 is in the locked state, the lock 10 can be switched to the unlocked state by the following methods. In the first method, the key (not shown) is inserted into the keyhole 122 (shown in FIG. 6) of the lock element 120 and rotated, which drives the lock cylinder 124 to rotate relative to the outer cylinder 123 along the second direction D2, and the transmission element 400 is driven to rotate along the second direction D2. Please also refer to FIG. 12, because the second side 165 of the moving component 160 is disposed with the two guiding surfaces 168 and the two stop surfaces 169, the transmission element 400 only can rotate along the second direction D2 by the guidance of the guiding surfaces 168, such that the abutting portions 420 are moved from the second engaging grooves 167 to the first engaging grooves 166. Furthermore, because the transmission element 400 is incapable of axial movement, and the distance d1 is between the first bottom 166a of the first engaging groove 166 and the second bottom 167a of the second engaging groove 167 along the rotating axis X, the first elastic element 150 releases the elastic force to push the moving component 160 to move along the rotating axis X and away from the first elastic element 150 when the abutting portions 420 are moved from the second engaging grooves 167 to the first engaging grooves 166,

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which allows the second fitting portions 162 to separate from the first fitting portions 144. In other words, when the transmission element 400 is driven to rotate, and the abutting portions 420 are moved from the second grooves 167 to the first grooves 166, the moving component 160 is pushed by the first elastic element 150 to move along the rotating axis X and away from the first elastic member 150, which allows the second fitting portions 162 to separate from the first fitting portions 144. Furthermore, when the transmission element 400 rotates along the second direction D2, the movable element 240 is driven to rotate with the transmission element 400, and the second elastic element 230 releases the elastic force. The guiding parts 242 move from the locked ends 225 to the unlocked ends 224 by the push of the second elastic element 230 and the guidance of the guiding tracks 223. At the same time, the cylindrical element 220 moves along the rotating axis X and towards outside of the second handle set 200. As such, the protruding height H is returned to its original height, and the lock 10 is in the unlocked state, as shown in FIG. 14. In the second method, the second handle 210 is pressed downwardly (i.e., the second handle 210 is rotated along the first direction D1) to drive the cylindrical element 220 to rotate along the first direction D1, too. The second elastic element 230 releases the elastic force. The guiding parts 242 of the movable element 240 move from the locked ends 225 to the unlocked ends 224 by the push of the second elastic element 230 and the guidance of the guiding tracks 223. At the same time, the cylindrical element 220 moves towards outside of the second handle set 200. As such, the protruding height H is returned to its original height. When the guiding parts 242 move from the locked ends 225 to the unlocked ends 224, the moving component 240 is allowed to rotate, the transmission element 400 is driven to rotate along the second direction D2. The abutting portions 420 are moved from the

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second engaging grooves 167 to the first engaging grooves 166, the first elastic element 150 releases the elastic force to push the moving component 160 to move along the rotating axis X and away from the first elastic element 150, so as to allow the second fitting portions 162 to separate from the first fitting portions 144, such that the lock 10 is in the unlocked state. In other words, when the second handle 210 is operated to rotate along a first direction D1, the cylindrical element 220 is driven to rotate, and the movable element 240 is driven to move from the locked ends 225 to the unlocked ends 224 to drive the transmission element 400 to rotate, such that the lock 10 is switched from the locked state to the unlocked state. Furthermore, when the second handle 210 is pushed downwardly, the second tubular element 290 can be driven to rotate together, which drives the second transfer shaft 320 to rotate, so as to drive the latch tongue 340 to retract. Therefore, when the second handle 210 is pressed downwardly, the lock 10 can be unlocked and the latch tongue 340 can be driven to retract, such that the door can be opened. In the third method, the second handle 210 is pulled upwardly, i.e., the second handle 210 is rotated along the second direction D2 to drive the cylindrical element 220 to rotate along the second direction D2. The locked ends 225 of the guiding tracks 223 push the guiding parts 242 of the movable element 240 to drive the movable element 240 and the cylindrical element 220 to rotate along the second direction D2, and the transmission element 400 is driven to rotate along the second direction D2, such that the abutting portions 420 are moved from the second engaging grooves 167 to the first engaging grooves 166, so as to allow the second fitting portions 162 to separate from the first fitting portions 144. Afterwards, the second handle 210 can be pressed downwardly to return to its initial position. That is, when the second handle 210 is rotated along the first direction D1, the cylindrical element 220 can be driven to

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rotate along the first direction D1. At this time, the movable element 240 is guided by the guiding tracks 223 to move from the locked ends 225 to the unlocked ends 224, as shown in FIG. 14. In other words, when the second handle 210 is operated to rotate along the second direction D2, the cylindrical element 220 is driven to rotate, and the movable element 240 is driven to rotate with the cylindrical element 220 along the second direction D2 to drive the transmission element 400 to rotate, such that the lock 10 is switched from the locked state to the unlocked state. Furthermore, when the second handle 210 is pulled upwardly, the second tubular element 290 can be driven to rotate together, which drives the second transfer shaft 320 to rotate, so as to drive the latch tongue 340 to retract. Therefore, when the second handle 210 is pulled upwardly, the lock 10 can be unlocked and the latch tongue 340 can be driven to retract, such that the door can be opened. To sum up, the lock 10 in the first embodiment can be unlocked by using the key, pressing the second handle 210 downwardly or pulling the second handle 210 upwardly.

In the embodiment, when the lock 10 is switched between the locked state and the unlocked state, the transmission element 400 is incapable of axial movement, which is favorable for reducing the operation resistance and enhancing the operation smoothness. Furthermore, with the improvement of the structure of the transmission mechanism of the lock 10, such as the omission of the transmission cam, the assembly error similar to that of the conventional lock 1 can be avoided.

<The Second Embodiment>

Please refer to FIG. 18 to FIG. 20, another transmission mechanism (not labelled) applied to a lock 10′ and for controlling the lock 10′ to switch between an unlocked state and a locked state is disclosed. The lock 10′ defines a rotating

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axis X and is for being installed on a door (not shown). The door includes a first side and a second side opposite to the first side. The lock 10′ includes a first handle set 100′ and a second handle set 200′. The first handle set 100′ is disposed on the first side of the door, and the second handle set 200′ is disposed on the second side of the door. The first handle set 100′ includes a first cover plate 140′ fixedly disposed on the first side of the door.

Please refer to FIG. 22 to FIG. 24. The first cover plate 140′ includes two first fitting portions 144′ which are disposed symmetrically. The number of the first fitting portions 144′ is exemplary. The transmission mechanism includes a transmission element 400′ and a moving component 160′. The transmission element 400′ is connected to the first handle set 100′ in a manner that the transmission element 400′ is incapable of moving along the rotating axis X. The transmission element 400′ has two abutting portions 420′ which are disposed symmetrically. The number of the abutting portions 420′ is exemplary. The moving component 160′ is disposed on the transmission element 400′ in a manner that the moving component 160′ is capable of moving along the rotating axis X.

Please refer to FIG. 21. The moving component 160′ includes two first engaging grooves 166′, two second engaging grooves 167′ and two second fitting portions 162′. The numbers of the first engaging grooves 166′, the second engaging grooves 167′ and the second fitting portions 162′ are exemplary. The two first engaging grooves 166′ are disposed symmetrically. The two second engaging grooves 167′ are disposed symmetrically. The two second fitting portions 162′ are disposed symmetrically. The second fitting portions 162′ are configured for corresponding to the first fitting portions

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144′. When the transmission element 400′ is operated to rotate, the abutting portions 420′ are capable of switching between the first engaging grooves 166′ and the second engaging grooves 167′. As shown in FIG. 22, when the abutting portions 420′ are located in the first engaging grooves 166′, the second fitting portions 162′ are configured to be separated from the first fitting portions 144′, such that the lock 10′ is in the unlocked state. As shown in FIG. 24, when the abutting portions 420′ are located in the second engaging grooves 167′, the second fitting portions 162′ are configured to be fitted into the first fitting portions 144′, such that the lock 10′ is in the locked state.

With the aforementioned structure, the transmission mechanism according to the present disclosure controls the lock 10′ to switch between the unlocked state and the locked state by the movement of the moving component 160′ along the rotating axis X, such that the second fitting portions 162′ are capable of being separated from the first fitting portions 144′ or being fitted into the first fitting portions 144′. The transmission element 400′ only rotates about the rotating axis X and is incapable of moving along the rotating axis X (hereinafter, also called axial movement). Accordingly, the operation resistance can be reduced, and the operation smoothness can be enhanced.

As shown in FIG. 21, the moving component 160′ has two sides 164′, 165′ opposite to each other. The first engaging grooves 166′ and the second engaging grooves 167′ are formed on the side 165′ of the moving component 160′. The first engaging groove 166′ has a first bottom 166a′, the second engaging groove 167′ has a second bottom 167a′. A distance (not labelled) is between the first bottom 166a′ and the second bottom 167a′ along the rotating axis X. The moving component 160′ can

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further include two guiding surfaces 168′ and two stop surfaces 169′. Other details of the moving component 160′ can refer to that of the moving component 160 of the first embodiment and are not repeated herein.

As shown in FIG. 19 and FIG. 20. The transmission mechanism can further include a first elastic element 150′, a transmission cam 600′, a tubular connecting element 700′, a cylindrical element 220′, a movable element 240′ and a second elastic element 230′. Please also refer to FIG. 22 and FIG. 24. The cylindrical element 220′ includes two guiding tracks 223′. Each of the guiding tracks 223′ has an unlocked end 224′ and a locked end 225′. The cylindrical element 220′ can further include a button 226′. The button 226′ is exposed to outside through a penetrating hole 211′ (shown in FIG. 19) of the second handle 210′. The movable element 240′ includes a main body 243′, a limiting hole 241′ and two guiding parts 242′. Other details of the movable element 240′ can refer to that of the movable element 240 of the first embodiment. Differences between the second embodiment and the first embodiment are recited below.

As shown in FIG. 21, the moving component 160′ can further include four first engaging parts 161a′. The number of the first engaging parts 161a′ is exemplary. Each of the first engaging parts 161a′ is a notch formed on a peripheral wall of the moving component 160′. Specifically, each of the first engaging parts 161a′ is a notch concaved from the peripheral wall of the main body 161′.

As shown in FIG. 19 and FIG. 23, the transmission cam 600′ includes a main body 610′, four second engaging parts 620′, a center hole 630′, a first step portion 640′ and a second step portion 650′. The number of the second engaging parts

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620′ is exemplary. The second engaging parts 620′ are corresponding to the first engaging parts 161a′ of the moving component 160′. Each of the second engaging parts 620′ is a protrusion and is extended outwardly from a peripheral wall of the transmission cam 600′ along the rotating axis X. More specifically, each of the second engaging parts 620′ is a protrusion extended from a peripheral wall of the main body 610′ along the rotating axis X and towards the first handle 110′. The second step portion 650′ is extended from the main body 610′ along the rotating axis X and towards the second handle 210′. The first step portion 640′ is extended from the second step portion 650′ along the rotating axis X and towards the second handle 210′. The second step portion 650′ is configured to be surrounded by the center hole 184′ of the first driving element 180′, and the step surface 660′ is configured to abut against a surface of the first driving element 180′ facing towards the first handle 110′. As shown in FIG. 19, cross sections of the second step portion 650′ and the center hole 184′ of the first driving element 180′ are circular. As such, the first driving element 180′ is capable of rotating relative to the transmission cam 600′.

As shown in FIG. 19, the tubular connecting element 700′ has a first end 710′ and a second end 720′ opposite to the first end 710′. The first end 710′ of the tubular connecting element 700′ is connected to the transmission cam 600′ in a manner that the first end 710′ of the tubular connecting element 700′ and the transmission cam 600′ are capable of moving synchronously. The second end 720′ of the tubular connecting element 700′ is connected to the second handle 210′ of the second handle set 200' in a manner that the second end 720′ of the tubular connecting element 700′ and the second handle 210′ are capable of moving synchronously. Specifically, the first end 710′ of the tubular connecting element 700′ is

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inserted in the center hole 630′ of the transmission cam 600′. Cross sections of the tubular connecting element 700′ and the center hole 630′ are square, such that the tubular connecting element700′ is incapable of rotating relative to the transmission cam 600′ and is connected to the transmission cam 600′ in a manner that the tubular connecting element 700′ and the transmission cam 600′ are capable of moving synchronously. The second end 720′ of the tubular connecting element 700′ is inserted in the center hole 284′ of the second driving element 280′. Cross sections of the tubular connecting element 700′ and the center hole 284′ are square, such that the tubular connecting element 700′ is incapable of rotating relative to the second driving element 280′ and is connected to the second driving element 280′ in a manner that the tubular connecting element 700′ and the second driving element 280′ are capable of moving synchronously. The second driving element 280′ is connected to the second handle 210′ in a manner that the second driving element 280′ and the second handle 210′ are capable of moving synchronously (reference can be made to the related illustration of the first embodiment). Accordingly, the tubular connecting element 700′ is connected to the second handle 210′ in a manner that the tubular connecting element 700′ and the second handle 210′ are capable of moving synchronously.

The latch mechanism 300′ is disposed between the first handle set 100′ and the second handle set 200′. The latch mechanism 300′ includes a latch tongue 340′ and a transfer shaft 350′. The transfer shaft 350′ penetrates the latch mechanism 300′ and protrudes from two sides of the latch mechanism 300′ along the rotating axis X. The tubular connecting element 700′ is configured to drive the latch tongue 340′ of the latch mechanism 300′ to retract or stretch out. Specifically, the tubular connecting element 700′ is

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inserted in the transfer hole 351′ of the transfer shaft 350′. Cross sections of the tubular connecting element 700′ and the transfer hole 351′ are square, such that the tubular connecting element 700′ is connected to the transfer shaft 350 in a manner that the tubular connecting element 700′ and the transfer shaft 350 are capable of moving synchronously. When the tubular connecting element 700′ is operated to rotate, the transfer shaft 350′ is driven to rotate so as to drive the latch tongue 340′ to retract or stretch out. How to drive the latch tongue 340′ with the transfer shaft 350′ is conventional and is omitted herein.

In the embodiment, cross sections of the center hole 284′, the tubular connecting element 700′ and the transfer hole 351′ are square, such that the second driving element 280′, the tubular connecting element700′, and the transfer shaft 350′ are connected and are capable of moving synchronously with each other. However, the present disclosure is not limited thereto. In other embodiment, the cross sections of the center hole 284′, the tubular connecting element 700′, and the transfer hole 351′ can be formed in other non-circular shapes, such as semicircular shapes, triangular shapes or pentagonal shapes, which can also achieve the same functionality.

In the embodiment, the first end 410′ and the abutting portions 420′ of the transmission element 400′ are abutted by a bottom of a accommodating groove 121′ of the lock element 120′ and the first end 710′ of the tubular connecting element 700′, such that the transmission element 400′ is incapable of axial movement.

Moreover, in the embodiment, the first handle 110′, the lock element 120′, the first axial tube 130′, the moving component 160′, the first driving element 180′ are connected

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and capable of moving synchronously with each other, i.e., capable of rotating with each other. The first axial tube 130′ has four hooks 131′ engaged with four hook slots 185′ of the first driving element 180′, such that the first axial tube 130′ is connected to the first driving element 180′ in a manner that the first axial tube 130′ and the first driving element 180′ are capable of moving synchronously. The two second fitting portions 162′ of the moving component 160′ protrude from the two limiting groove 135′ (shown in FIG. 19) of the first axial tube 130′, respectively. As such, the moving component 160′ is incapable of rotating relative to the first axial tube 130′ and is connected to the first axial tube 130′ in a manner that the moving component 160′ and the first axial tube 130′ are capable of moving synchronously. The transmission element 400′ is connected to the lock element 120′ in a manner that the transmission element 400′ and the lock element 120′ are capable of moving synchronously. When the lock cylinder 124′ is operated to rotate relative to the outer cylinder 123′, the transmission element 400′ can be driven to rotate therewith. The second handle set 200′ includes a second handle 210′, a second axial tube 250′, a second cover plate 260′, a second restoring element 270′ and a second driving element 280′. The second handle 210′, the cylindrical element 220′, the second axial tube 250′, the second driving element 280′, the tubular connecting element 700′ and the transfer shaft 350′ are connected and capable of moving synchronously with each other. The second axial tube 250′ has four hooks 251′ engaged with four hook slots 285′ of the second driving element 280′, such that the second axial tube 250′ is connected to the second driving element 280′ in a manner that the second axial tube 250′ and the second driving element 280′ are capable of moving synchronously, i.e., capable of rotating together. Other details can refer to the related illustration of the first embodiment.

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Please refer to FIG. 21 to FIG. 23. FIG. 22 is a schematic diagram showing the first cover plate 140′ and a transmission mechanism of FIG.19 in the unlocked state. The tubular connecting element 700′ is omitted for showing the direction of the transmission element 400′. When the lock 10′ is in the unlocked state, the abutting portions 420′ are in the first engaging grooves 166′, the second fitting portions 162′ are separated from the first fitting portions 144′, and the first engaging parts 161a′ of the moving component 160′ are engaged with the second engaging parts 620′ of the transmission cam 600′. Because the second fitting portions 162′ are not fitted into the first fitting portions 144′, the moving component 160′ is capable of rotating relative to the first cover plate 140′. Because the moving component 160′ is connected to the first handle 110′ in a manner that the moving component 160′ and the first handle 110′ are capable of moving synchronously, the first handle 110′ is also capable of rotating relative to the first cover plate 140′. Moreover, because the first engaging parts 161a′ of the moving component 160′ are engaged with the second engaging parts 620′ of the transmission cam 600′, the first handle 110′ is connected to the transmission cam 600′ in a manner that the first handle 110′ and the transmission cam 600′ are capable of moving synchronously. When the first handle 110′ is pressed downwardly, i.e., the first handle 110′ is rotated along the first direction D1, the first driving element 180′, the moving component 160′, the transmission cam 600′ and the tubular connecting element 700′ are driven to rotate along the first direction D1, which drives the transfer shaft 350′ to rotate along the first direction D1 to drive the latch tongue 340′ to retract to open the door. When the first handle 110′ is released, the first restoring element 170′ provides the elastic force for the first driving element 180′ to rotate along the second

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direction D2 to return to its initial position, which drives the first handle 110′, the moving component 160′, the transmission cam 600′ and the tubular connecting element 700′ to rotate along the second direction D2, such that the transfer shaft 350′ is driven to rotate along the second direction D2 to drive the latch tongue 340′ to stretch out to its initial position. As shown in FIG. 19, the first restoring element 170′ is through a first leg 171′ and a second leg 172′ cooperated with the first limiting post 145′ and the second limiting post 146′ of the first cover plate 140′, and an end 183′ of the limiting slot 181′ of the first driving element 180′ to bring the first driving element 180′ to return its initial position. Details can refer to the related illustration of the first embodiment and are not repeated herein. When the second handle 210′ is pressed downwardly, the latch tongue 340′ can be driven to retract to open the door; when the second handle 210′ is released, the latch tongue 340′ can be driven to stretch out to its initial position. The principle that drives the latch tongue 340′ through the second handle 210′ is similar to that of the first handle 110 and the second handle 210 of the first embodiment, and is not repeated herein.

Please refer to FIGs. 21, 24 and 25. FIG. 24 is a schematic diagram showing the first cover plate 140′ and the transmission mechanism of FIG.19 in the locked state. The tubular connecting element 700′ is omitted for showing the direction of the transmission element 400′. When the lock 10′ is in the locked state, the abutting portions 420′ are in the second engaging grooves 167′, the second fitting portions 162′ are engaged with the first fitting portions 144′, and the first engaging parts 161a′ of the moving component 160′ are separated from the second engaging parts 620′ of the transmission cam 600′. Because the second fitting portions

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162′ are fitted into the first fitting portions 144′, the moving component 160′ is incapable of rotating relative to the first cover plate 140′. Because the moving component 160′ is connected to the first handle 110′ in a manner that the moving component 160′ and the first handle 110′ are capable of moving synchronously, the first handle 110′ is incapable of rotating relative to the first cover plate 140′, either. Accordingly, the first handle 110′ is incapable of driving the latch tongue 340′ to retract to open the door. Moreover, when the lock 10′ in the locked state, the first engaging parts 161a′ of the moving component 160′ are separated from the second engaging parts 620′ of the transmission cam 600′, the first handle 110′ is independent from the transmission cam 600′ and the tubular connecting element700′. As such, the second handle 210′ is capable of rotating relative to the second cover plate 260′, even though the first handle 110′ is incapable of rotating relative to the first cover plate 140′. Accordingly, the transmission cam 600′ and the tubular connecting element700′ are capable of being driven to rotate by the second handle 210′.

When the lock 10′ is in the unlocked state, the lock 10′ can be switched to the locked state by the following methods. In the first method, a key (not shown) is inserted into the keyhole 122′ (shown in FIG. 20) of the lock element 120′ and rotated, which allows the lock cylinder 124′ to rotate relative to the outer cylinder 123′ along the first direction D1, and the transmission element 400′ is driven to rotate along the first direction D1, such that the lock 10′ is in the locked state, as shown in FIG. 24. In the second method, as shown in FIG. 22, the button 226′ is pressed, which allows the cylindrical element 220′ to be operated to move along the rotating axis X and towards the first handle set 100′, the guiding parts 242′ of the movable element 240′ are guided by

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the guiding tracks 223′ to move from the unlocked ends 224′ to the locked ends 225′ to drive the transmission element 400′ to rotate along the first direction D1, such that the lock 10′ is in the locked state.

When the lock 10′ is in the locked state, the lock 10′ can be switched to the unlocked state by the following methods. In the first method, the key (not shown) is inserted into the keyhole 122′ (shown in FIG. 20) of the lock element 120′ and rotated, which drives the lock cylinder 124′ to rotate relative to the outer cylinder 123′ along the second direction D2, and the transmission element 400′ is driven to rotate along the second direction D2, such that the lock 10′ is in the unlocked state, as shown in FIG. 22. In the second method, the second handle 210′ is pressed downwardly (i.e., the second handle 210′ is rotated along the first direction D1) to drive the cylindrical element 220′ to rotate along the first direction D1. The second elastic element 230′ releases the elastic force. The guiding parts 242′ of the movable element 240′ move from the locked ends 225′ to the unlocked ends 224′ by the push of the second elastic element 230′ and the guidance of the guiding tracks 223′. The transmission element 400′ is driven to rotate along the second direction D2, such that the lock 10′ is in the unlocked state. In the third method, the second handle 210′ is pulled upwardly, i.e., the second handle 210′ is rotated along the second direction D2 to drive the cylindrical element 220′ to rotate along the second direction D2. The locked ends 225′ of the guiding tracks 223′ push the guiding parts 242′ of the movable element 240′ to drive the movable element 240′ and the cylindrical element 220′ to rotate along the second direction D2, and the transmission element 400′ is driven to rotate along the second direction D2, such that the abutting portions 420′ are moved from the second engaging grooves 167′ to the first engaging grooves

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166′, so as to allow the second fitting portions 162′ to separate from the first fitting portions 144′, and the first engaging parts 161a′ of the moving component 160′ are engaged with the second engaging parts 620′ of the transmission cam 600′. Afterwards, the second handle 210′ can be pressed downwardly to return to its initial position. That is, when the second handle 210′ is rotated along the first direction D1, the cylindrical element 220′ can be driven to rotate along the first direction D1. At this time, the movable element 240′ is guided by the guiding tracks 223′ to move from the locked ends 225′ to the unlocked ends 224′, as shown in FIG. 22. In other words, the lock 10′ can be unlocked by using the key, pressing the second handle 210′ downwardly or pulling the second handle 210′ upwardly.

As shown in FIGs. 19, 20, 23 and 25, a cross section of the tubular connecting element 700′ is a regular polygon, the moving component 160′ includes a plurality of first engaging parts 161a′, and the transmission cam 600′ includes a plurality of second engaging parts 620′. A number of the first engaging parts 161a′ and a number of the second engaging parts 620′ are corresponding a number of the sides of the regular polygon, and the first engaging parts 161a′ and the second engaging parts 620′ are arranged equiangularly. Specifically, the cross section of the tubular connecting element 700′ is a square, the number of the first engaging parts 161a′ is four, and the number of the second engaging parts 620′ is four. The four first engaging parts 161a′ are arranged equiangularly. That is, an included angle formed by the connections between the two adjacent first engaging parts 161a′ and the rotating axis X is 90 degrees. The four second engaging parts 620′ are arranged equiangularly. That is, an included angle formed by the connections between the two adjacent second engaging parts 620′ and the rotating axis X is 90 degrees. When assembling

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the lock 10′, the latch mechanism 300′ is installed on the door first, then the first handle set 100′ and the first elastic element 150′, the moving component 160′, the transmission cam 600′, the tubular connecting element 700′ and the transmission element 400′ of the transmission mechanism are assembled to form an outer side assembly. The outer side assembly is disposed on the first side of the door, the tubular connecting element 700′ and the transmission element 400′ are inserted through the transfer hole 351′, and the screw posts 142′ and 143′ are inserted through holes of the latch mechanism 300′ corresponding thereto, and are aligned and connected with the second handle set 200′. If the outer side assembly is in the locked state shown in FIG. 25 before assembling with the latch mechanism 300′, the transmission cam 600′ and the tubular connecting element 700′ are capable of the idling rotating 360 degrees relative to the moving component 160′ because the second engaging parts 620′ are separated from the first engaging parts 161a′. Moreover, the number of the first engaging parts 161a′ and the number of the second engaging parts 620′ are corresponding to the number of the sides of cross section of the tubular connecting element 700′. When the tubular connecting element 700′ is inserted through the transfer hole 351′ in arbitrary direction, one of the second engaging parts 620′ is corresponding to one of the first engaging parts 161a′. That is, the assembly error can be avoided. In other embodiment, the cross section of the tubular connecting element 700′ can be a regular polygon other than the square. For example, the cross section of the tubular connecting element700′ can be a triangle, and the number of the first engaging parts 161a′ and the second engaging parts 620′ can be correspondingly adjusted to three and are arranged equiangularly, the same functionality can be achieved, too.

For other elements of the lock 10′, references can be made

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to the elements having the same name of the lock 10. For other details of the lock 10', references can be made to the related illustration of the lock 10, and are not repeated herein.

In the embodiment, when the lock 10' according to the present embodiment is switched between the locked state and the unlocked state, the transmission element 400' is incapable of axial movement, which is favorable for reducing the operation resistance and enhancing the operation smoothness. Furthermore, with the improvement of the structure of the transmission mechanism of the lock 10', such as the omission the sliding slope on the transmission cam 600', the regular polygon of the cross section of the tubular connecting element 700', the correspondence between the numbers of the first engaging parts 161a' and the second engaging parts 620' and the sides of the regular polygon, and the equiangular arrangement of the first engaging parts 161a' and the second engaging parts 620', the assembly error similar to that of the conventional lock 1 can be avoided.

Compared to the prior art, when the lock of the present disclosure is switched between the locked state and the unlocked state, the transmission element is incapable of axial movement, which is favorable for reducing the operation resistance and enhancing the operation smoothness. Furthermore, with the improvement of the structure of the transmission mechanism, the assembly error can be avoided.

Those skilled in the art will readily observe that numerous modifications and alterations of the device and method may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.

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Claims

What is claimed is:

1. A transmission mechanism applied to a lock and for controlling the lock to switch between an unlocked state and a locked state, the lock defining a rotating axis and for being installed on a door, the door comprising a first side and a second side opposite to the first side, the lock comprising a first handle set and a second handle set, the first handle set being disposed on the first side of the door, the second handle set being disposed on the second side of the door, the first handle set comprising a first cover plate fixedly disposed on the first side of the door, the first cover plate comprising a first fitting portion, the transmission mechanism comprising:

a transmission element connected to the first handle set in a manner that the transmission element is incapable of moving along the rotating axis, the transmission element having an abutting portion; and

a moving component disposed on the transmission element in a manner that the moving component is capable of moving along the rotating axis, the moving component comprising:

a first engaging groove formed on a side of the moving component;

a second engaging groove formed on the side of the moving component; and

a second fitting portion configured for corresponding to the first fitting portion;

wherein when the transmission element is operated to rotate, the abutting portion is capable of switching between the first engaging groove and the second engaging groove;

wherein when the abutting portion is located in the first

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engaging groove, the second fitting portion is configured to be separated from the first fitting portion, such that the lock is in the unlocked state;

wherein when the abutting portion is located in the second engaging groove, the second fitting portion is configured to be fitted into the first fitting portion, such that the lock is in the locked state.

2. The transmission mechanism of claim 1, wherein the moving component further comprises:

a guiding surface disposed on a side of the first engaging groove and located between the first engaging groove and the second engaging groove.

3. The transmission mechanism of claim 2, wherein the moving component further comprises:

a stop surface opposite to the guiding surface and disposed on another side of the first engaging groove.

4. The transmission mechanism of claim 1, wherein the first engaging groove of the moving component has a first bottom, the second engaging groove of the moving component has a second bottom, and a distance is between the first bottom and the second bottom along the rotating axis.

5. The transmission mechanism of claim 1, wherein the first fitting portion is concaved from a surface of the first cover plate, the moving component further comprises a main body, and the second fitting portion is extended outwardly from the main body along a direction perpendicular to the rotating axis.

6. The transmission mechanism of claim 1, further comprising:

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a first elastic element abutting against another side of the moving component;

wherein when the transmission element is operated to rotate and the abutting portion is moved from the first engaging groove to the second engaging groove, the abutting portion pushes the moving component to move along the rotating axis and towards the first elastic element, such that the second fitting portion is fitted into the first fitting portion, and the first elastic element accumulates an elastic force;

wherein when the transmission element is operated to rotate and the abutting portion is moved from the second engaging groove to the first engaging groove, the first elastic element releases the elastic force to push the moving component to move along the rotating axis and away from the first elastic element, such that the second fitting portion is separated from the first fitting portion.

7. The transmission mechanism of claim 1, wherein an included angle is between the first engaging groove and the second engaging groove, and the included angle is 90 degrees.

8. The transmission mechanism of claim 1, further comprising:

a cylindrical element disposed in the second handle set, the cylindrical element comprising a guiding track, the guiding track having an unlocked end and a locked end opposite to the unlocked end; and

a movable element disposed in the cylindrical element in a manner that the movable element is capable of moving along the guiding track, the movable element being connected to the transmission element in a manner that the movable element and the transmission element are

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capable of moving synchronously;

wherein when the cylindrical element is operated to move along the rotating axis and towards the first handle set, the movable element is guided by the guiding track to move from the unlocked end to the locked end to drive the transmission element to rotate, such that the lock is switched from the unlocked state to the locked state.

9. The transmission mechanism of claim 8, wherein the movable element comprises:

a main body;

a limiting hole formed in the main body and being inserted with the transmission element; and

a guiding part extended outwardly from the main body along a direction perpendicular to the rotating axis and movably disposed in the guiding track.

10. The transmission mechanism of claim 8, wherein when the movable element is located at the locked end, and the cylindrical element is operated to rotate along a first direction, the movable element is guided by the guiding track to move from the locked end to unlocked end to drive the transmission element to rotate, such that the lock is switched from the locked state to the unlocked state.

11. The transmission mechanism of claim 10, wherein when the movable element is located at the locked end, and the cylindrical element is operated to rotate along a second direction opposite to the first direction, the movable element is driven by the cylindrical element to rotate along the second direction to drive the transmission element to rotate, such that the lock is switched from the locked state to the unlocked state.

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12. The transmission mechanism of claim 8, further comprising:

a second elastic element disposed in the cylindrical element and abutting against a side of the movable element;

wherein when the cylindrical element is operated to move along the rotating axis and towards the first handle set, and the movable element is guided by the guiding track to move from the unlocked end to the locked end, the second elastic element is pushed against by the movable element and accumulates an elastic force;

wherein when the cylindrical element is operated to rotate along a first direction, the second elastic element releases the elastic force to push the movable element, such that the movable element is driven to move from the locked end to the unlocked end.

13. The transmission mechanism of claim 1, wherein the moving component further comprises a first engaging part, the transmission mechanism further comprises:

a transmission cam comprising a second engaging part corresponding to the first engaging part;

a tubular connecting element having a first end and a second end opposite to the first end, the first end of the tubular connecting element being connected to the transmission cam in a manner that the first end of the tubular connecting element and the transmission cam are capable of moving synchronously, the second end of the tubular connecting element being connected to a second handle of the second handle set in a manner that the second end of the tubular connecting element and the second handle are capable of moving synchronously;

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wherein when the abutting portion is located in the first engaging groove, the first engaging part is engaged with the second engaging part, such that a first handle of the first handle set is capable of driving the transmission cam to rotate;

wherein when the abutting portion is located in the second engaging groove, the first engaging part is separated from the second engaging part, such that the first handle of the first handle set is incapable of driving the transmission cam to rotate.

14. The transmission mechanism of claim 13, wherein the first engaging part is a notch formed on a peripheral wall of the moving component, the second engaging part is a protrusion extended outwardly from a peripheral wall of the transmission cam along the rotating axis.

15. The transmission mechanism of claim 13, wherein a cross section of the tubular connecting element is a regular polygon, the moving component comprises a plurality of first engaging parts, the transmission cam comprises a plurality of second engaging parts, a number of the first engaging parts and a number of the second engaging parts are corresponding a number of sides of the regular polygon, and the first engaging parts and the second engaging parts are arranged equiangularly.

16. The transmission mechanism of claim 13, wherein the lock further comprises a latch mechanism disposed between the first handle set and the second handle set, and the tubular connecting element is configured for driving a latch tongue of the latch mechanism to retract or stretch out.

17. The transmission mechanism of claim 1, wherein the lock

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further comprises:

a first tubular element connected to a first handle of the first handle set in a manner that the first tubular element and the first handle are capable of moving synchronously; and

a second tubular element connected to a second handle of the second handle set in a manner that the second tubular element and the second handle are capable of moving synchronously, the second tubular element being independent from the first tubular element.

18. The transmission mechanism of claim 17, wherein the lock further comprises a latch mechanism disposed between the first handle set and the second handle set, the first tubular element and the second tubular element are configured for independently driving a latch tongue of the latch mechanism to retract or stretch out.

19. The transmission mechanism of claim 18, wherein the latch mechanism further comprises a first transfer shaft and a second transfer shaft, the first tubular element is connected to the first transfer shaft in a manner that the first tubular element and the first transfer shaft are capable of moving synchronously, the second tubular element is connected to the second transfer shaft in a manner that the second tubular element and the second transfer shaft are capable of moving synchronously, and the first transfer shaft and the second transfer shaft are independent from each other.

20. A lock defining a rotating axis and for being installed on a door, the door comprising a first side and a second side opposite to the first side, the lock comprising:

a first handle set disposed on the first side of the door,

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the first handle set comprising:

a first cover plate fixedly disposed on the first side of the door; and

a lock element;

a second handle set disposed on the second side of the door; and

the transmission mechanism of claim 1;

wherein the transmission element is connected to the lock element in a manner that the transmission element and the lock element are capable of moving synchronously, when the lock element is operated to switch between a first state and a second state, the lock element drives the transmission element to rotate, such that the abutting portion is capable of switching between the first engaging groove and the second engaging groove.

21. The lock of claim 20, wherein the first handle set further comprises:

a first handle connected to the first cover plate in a manner that the first handle is capable of rotating relative to the first cover plate, when the abutting portion is located in the first engaging groove, the first handle is capable of rotating relative to the first cover plate, when the abutting portion is located in the second engaging groove, the first handle is incapable of rotating relative to the first cover plate.

22. The lock of claim 20, wherein the second handle set further comprises:

a second handle connected to the transmission element, when the lock is in the locked state, and the second handle is operated to rotate to drive the transmission

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element to rotate, the lock is capable of switching from the locked state to the unlocked state.

23. A lock defining a rotating axis and for being installed on a door, the lock comprising:

a first handle set disposed on a side of the door, the first handle set comprising:

a first handle; and

a first tubular element connected to the first handle in a manner that the first tubular element and the first handle are capable of moving synchronously;

a second handle set disposed on another side of the door, the second handle set comprising:

a second handle; and

a second tubular element connected to the second handle in a manner that the second tubular element and the second handle are capable of moving synchronously, the second tubular element being independent from the first tubular element;

a cylindrical element disposed in the second handle, the cylindrical element comprising a guiding track, the guiding track having an unlocked end and a locked end opposite to the unlocked end;

a movable element disposed in the cylindrical element in a manner that the movable element is capable of moving along the guiding track;

a transmission element having a first end and a second end opposite to the first end, the first end being connected to the first handle set, the second end being connected to the movable element; and

a latch mechanism disposed between the first handle set and the second handle set, the latch mechanism comprising a latch tongue driven by the first tubular element or the second tubular element;

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wherein when the cylindrical element is operated to move along the rotating axis and towards the first handle set, the movable element is driven to move from the unlocked end to the locked end to drive the transmission element to rotate, such that the lock is switched from an unlocked state to a locked state;

wherein when the second handle is operated to rotate along a first direction, the cylindrical element is driven to rotate, and the movable element is driven to move from the locked end to the unlocked end to drive the transmission element to rotate, such that the lock is switched from the locked state to the unlocked state.

24. The lock of claim 23, wherein when the second handle is operated to rotate along a second direction, the cylindrical element is driven to rotate, and the movable element is driven to rotate with the cylindrical element along the second direction to drive the transmission element to rotate, such that the lock is switched from the locked state to the unlocked state.

25. The lock of claim 23, wherein the first handle set further comprises:

a lock element disposed in the first handle, an end of the lock element being disposed with an accommodating groove, the accommodating groove comprising a first abutting surface and a second abutting surface;

wherein the first end of the transmission element is disposed in the accommodating groove, and two sides of the first end respectively abut against the first abutting surface and the second abutting surface.

26. The lock of claim 23, wherein the movable element

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comprises:

a limiting hole inserted with the second end of the transmission element; and

a guiding part movably disposed in the guiding track.

27. The lock of claim 23, wherein the second handle comprises a penetrating hole, the cylindrical element further comprises a button, the button is exposed to outside through the penetrating hole of the second handle.

28. The lock of claim 23, further comprising:

a moving component, comprising:

a first engaging groove formed on a side of the moving component and comprising a first bottom; and

a second engaging groove formed on the side of the moving component and comprising a second bottom, wherein an included angle is between the first engaging groove and the second engaging groove, and a distance is between the first bottom and the second bottom along the rotating axis;

wherein the transmission element comprises an abutting portion for abutting against the moving component;

when the lock is in the unlocked state, the abutting portion is located in the first engaging groove, when the lock is in the locked state, the abutting portion is located in the second engaging groove.

29. The lock of claim 28, wherein:

the first handle set further comprises a first cover plate, the first cover plate is fixedly disposed on the side of the door, the first cover plate comprises a first fitting portion;

the moving component further comprises a second fitting portion corresponding to the first fitting portion;

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when the lock is in the unlocked state, the second fitting portion is separated from the first fitting portion, when the lock is in the locked state, the second fitting portion is fitted into the first fitting portion.

30. The lock of claim 29, wherein the first fitting portion is concaved from a surface of the first cover plate, the moving component further comprises a main body, and the second fitting portion is extended outwardly from the main body along a direction perpendicular to the rotating axis.

31. The lock of claim 29, wherein the first handle is connected to the first cover plate in a manner that the first handle is capable of rotating relative to the first cover plate, when the abutting portion is located in the first engaging groove, the first handle is capable of rotating relative to the first cover plate, when the abutting portion is in the second engaging groove, the first handle is incapable of rotating relative to the first cover plate.

32. The lock of claim 29, further comprising:
a first elastic element disposed in the first cover plate and abutting against another side of the moving component.

33. The lock of claim 32, wherein:
when the transmission element is driven to rotate and the abutting portion is moved from the first engaging groove to the second engaging groove, the abutting portion pushes the moving component to move along the rotating axis and towards the first elastic element, such that the second fitting portion is fitted into the first fitting portion;

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when the transmission element is driven to rotate and the abutting portion is moved from the second engaging groove to the first engaging groove, the moving component is pushed by the first elastic element to move along the rotating axis and away from the first elastic element, such that the second fitting portion is separated from the first fitting portion.

34. The lock of claim 28, wherein the included angle is 90 degrees.

35. The lock of claim 28, wherein the moving component further comprises:

a guiding surface disposed on a side of the first engaging groove and located between the first engaging groove and the second engaging groove.

36. The lock of claim 35, wherein the moving component further comprises:

a stop surface opposite to the guiding surface and disposed on another side of the first engaging groove.

37. The lock of claim 23, further comprising:

a second elastic element disposed in the cylindrical element and abutting against the movable element.

38. The lock of claim 23, wherein the latch mechanism further comprises a first transfer shaft and a second transfer shaft, the first tubular element is connected to the first transfer shaft in a manner that the first tubular element and the first transfer shaft are capable of moving synchronously, the second tubular element is connected to the second transfer shaft in a manner that the second tubular element and the second transfer shaft are capable

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of moving synchronously, and the first transfer shaft is independent from the second transfer shaft.

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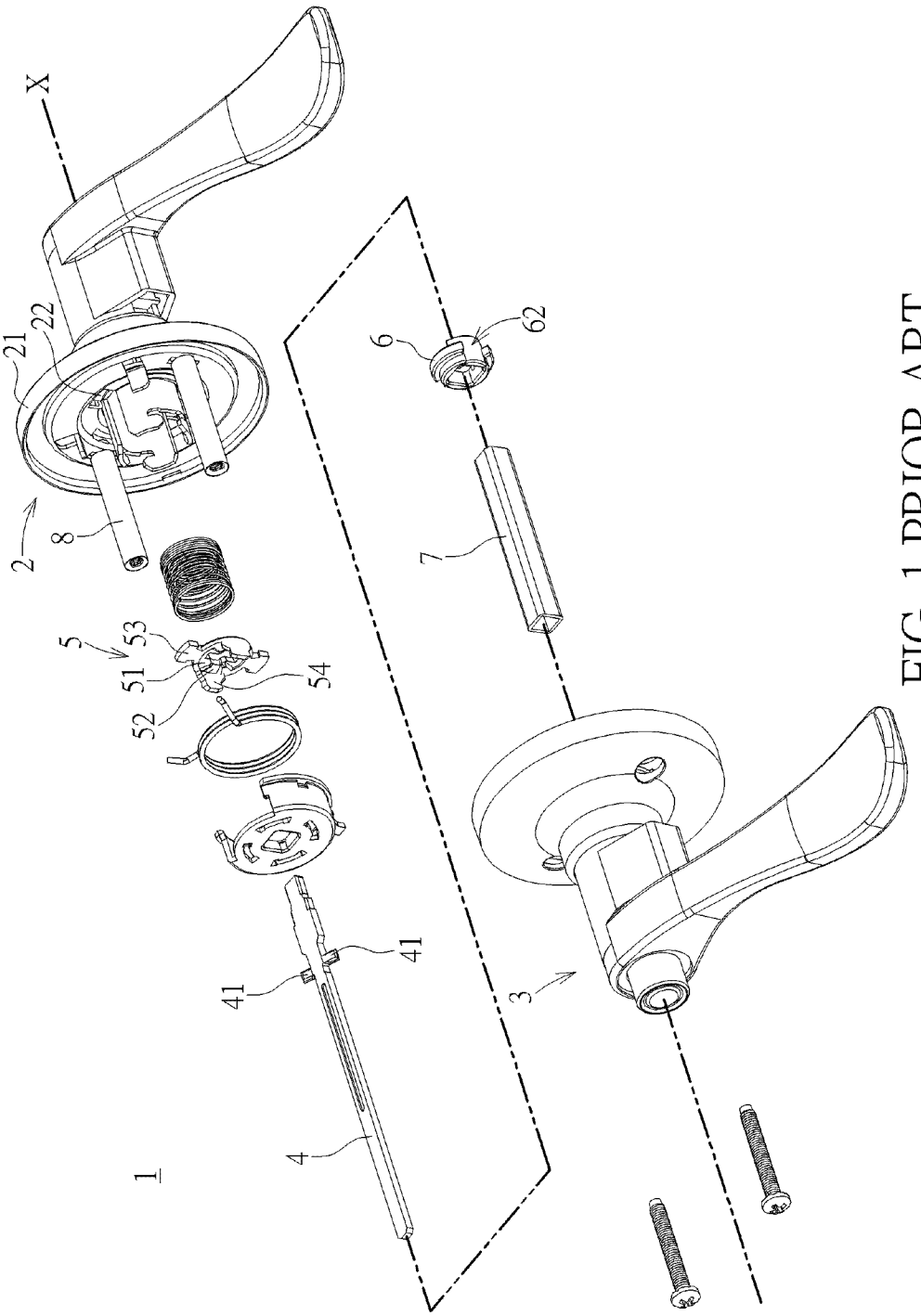

FIG. 1 PRIOR ART

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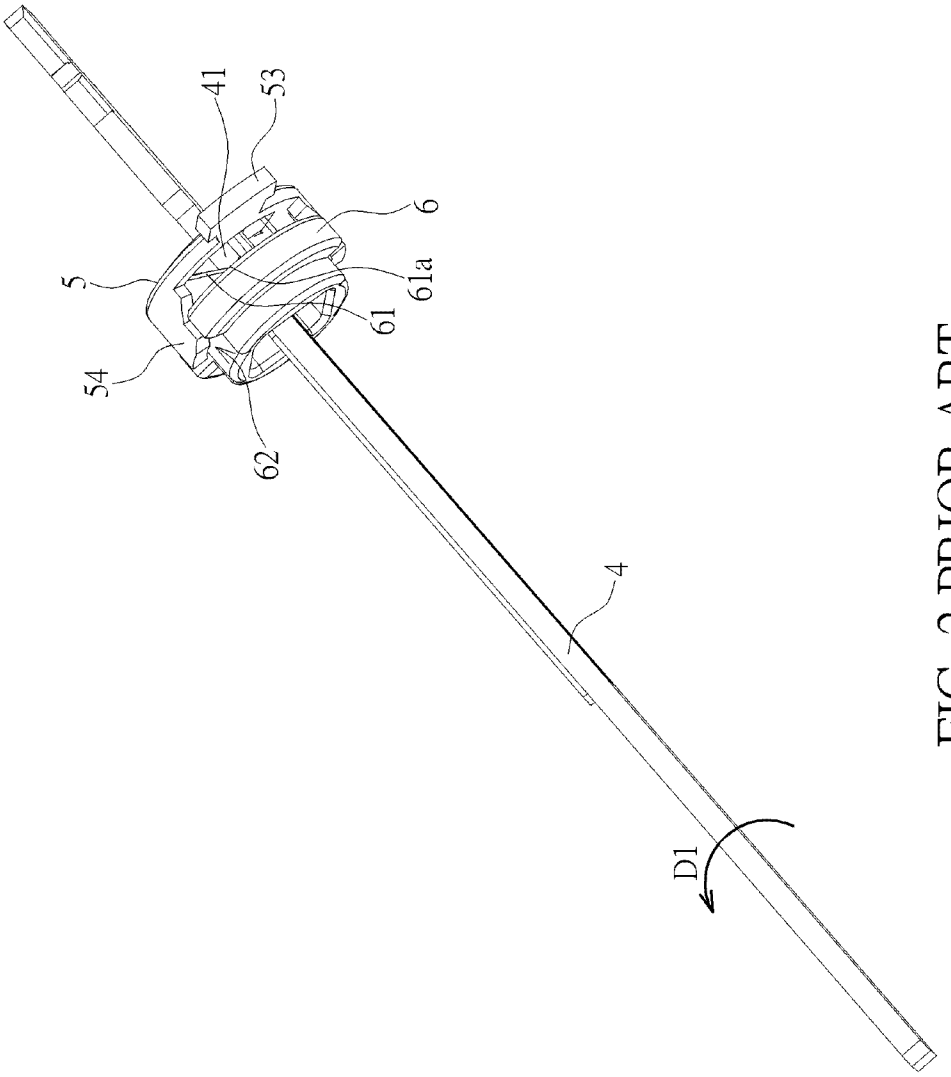

FIG. 2 PRIOR ART

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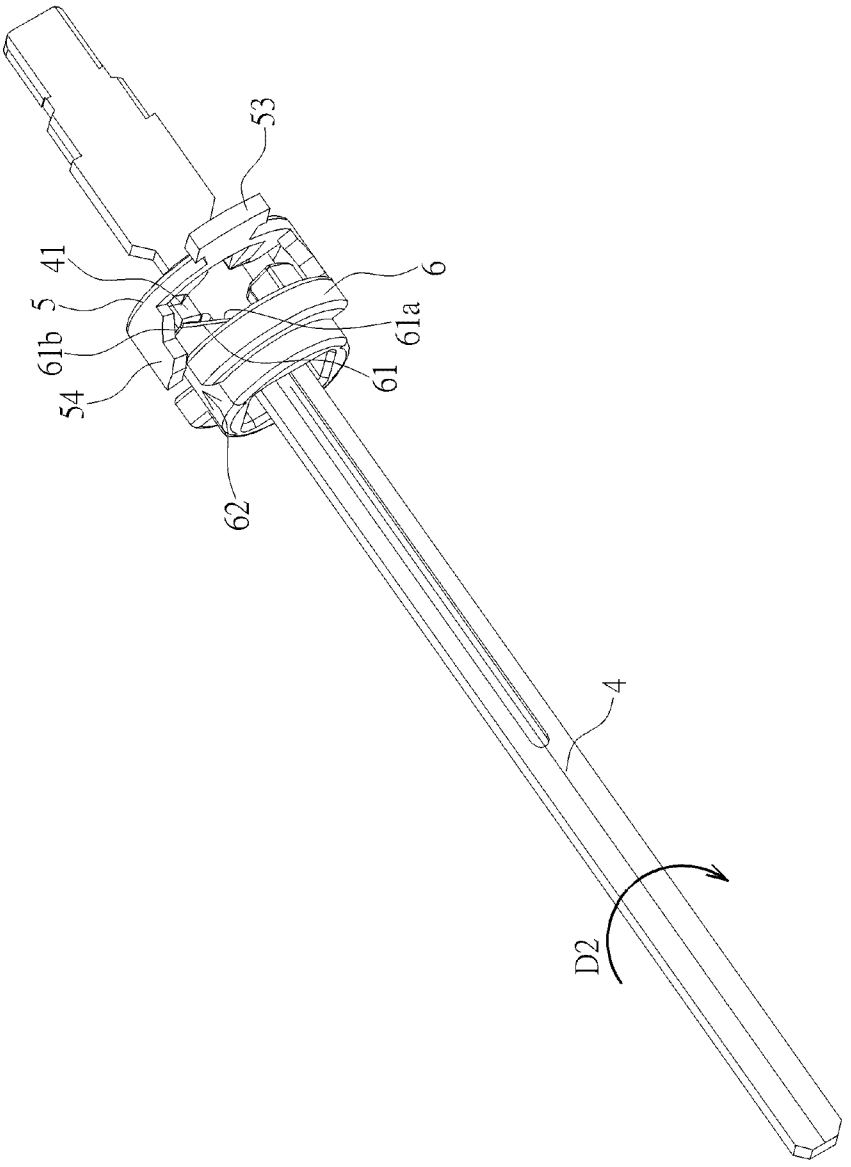

FIG. 3 PRIOR ART

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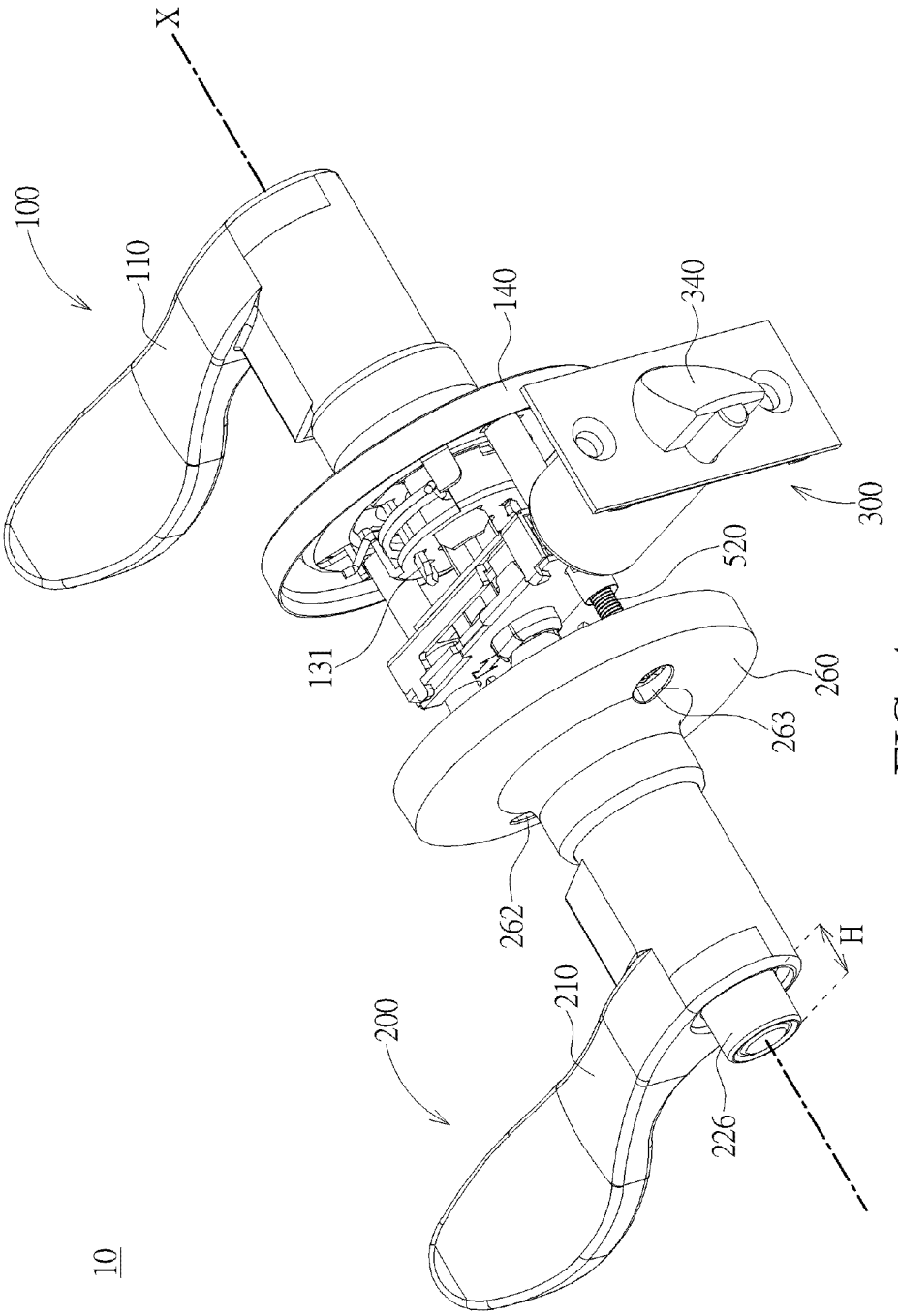

FIG. 4

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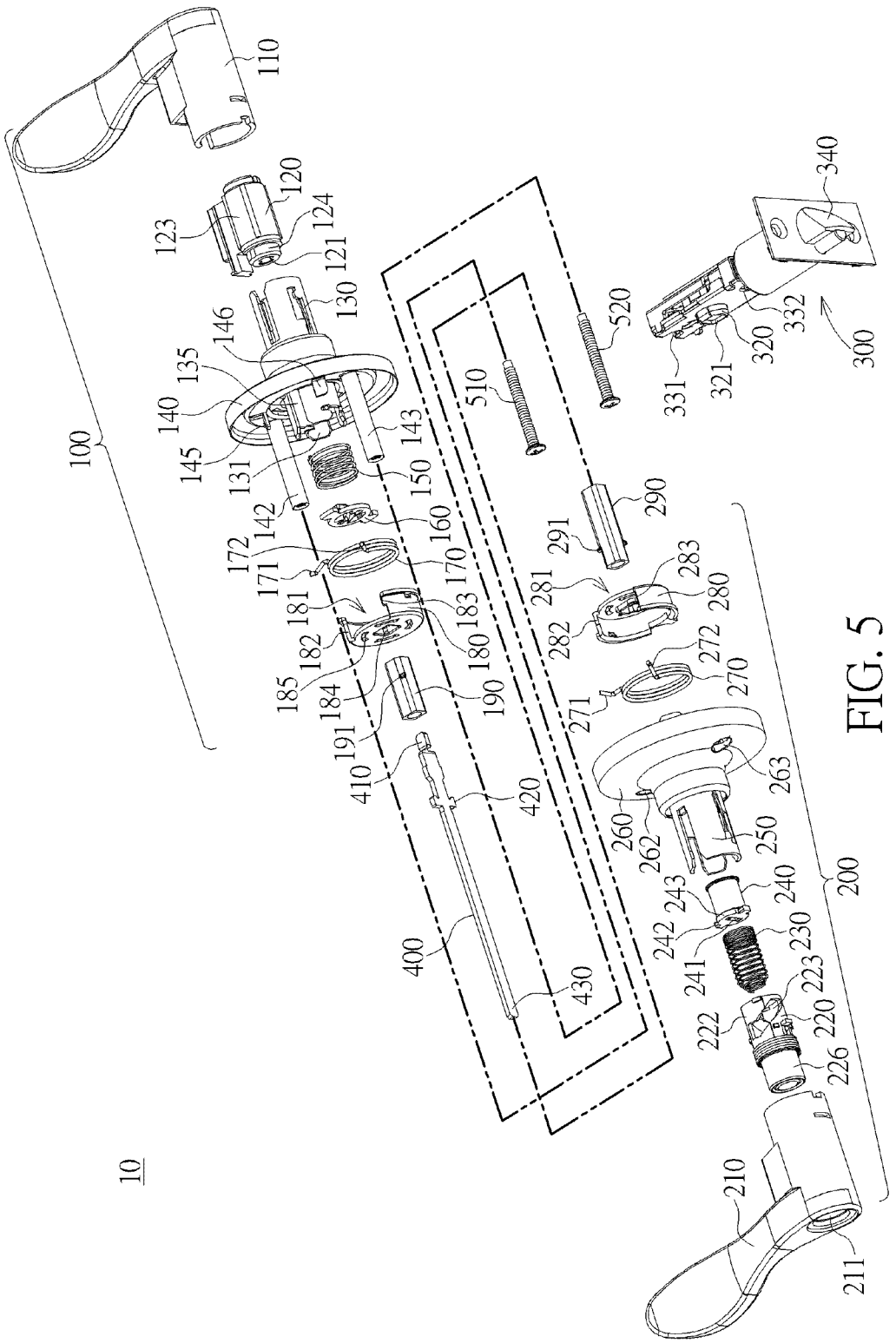


FIG. 5

Date Reçue/Date Received 2021-08-18

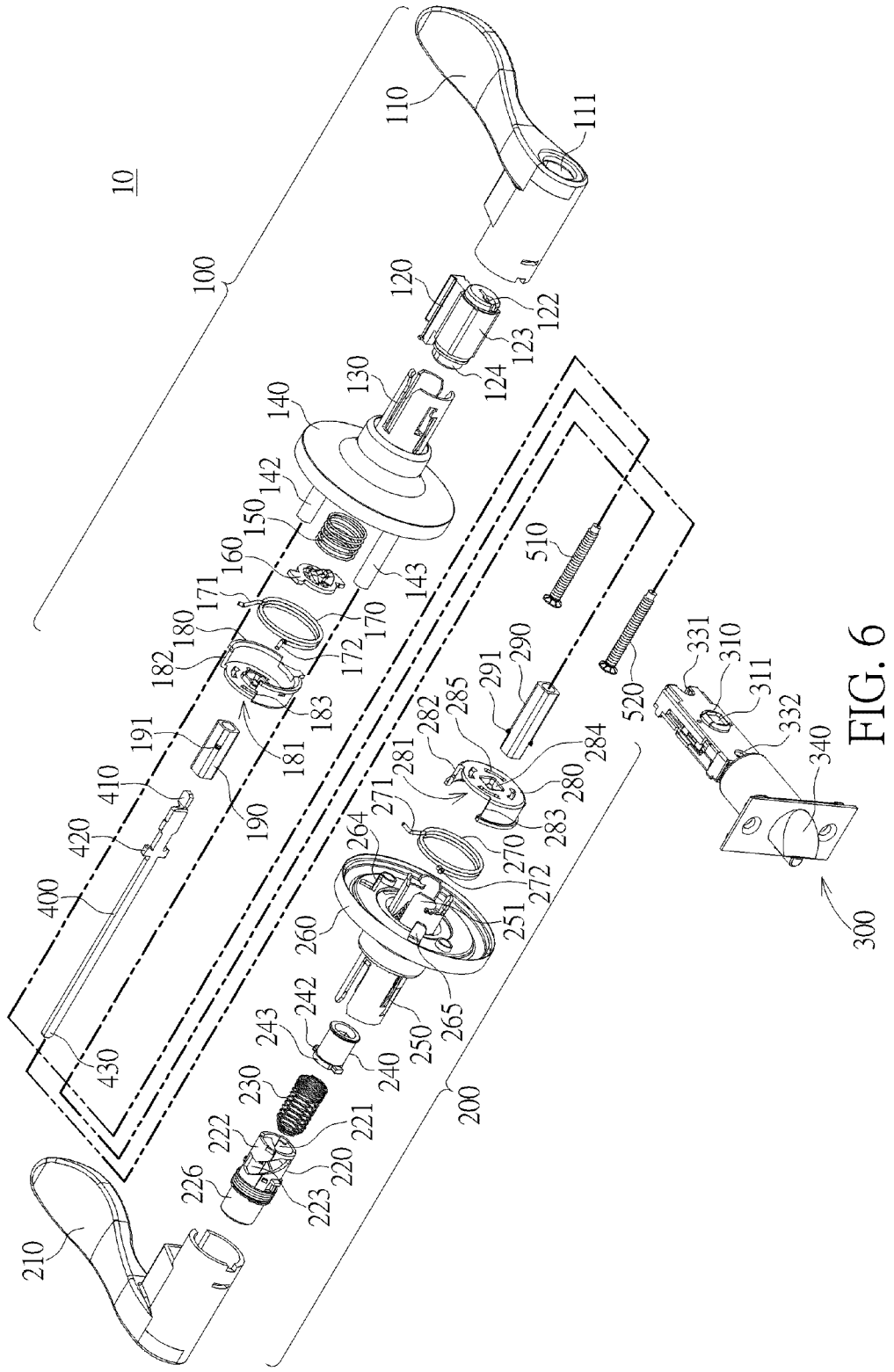


FIG. 6

Date Reçue/Date Received 2021-08-18

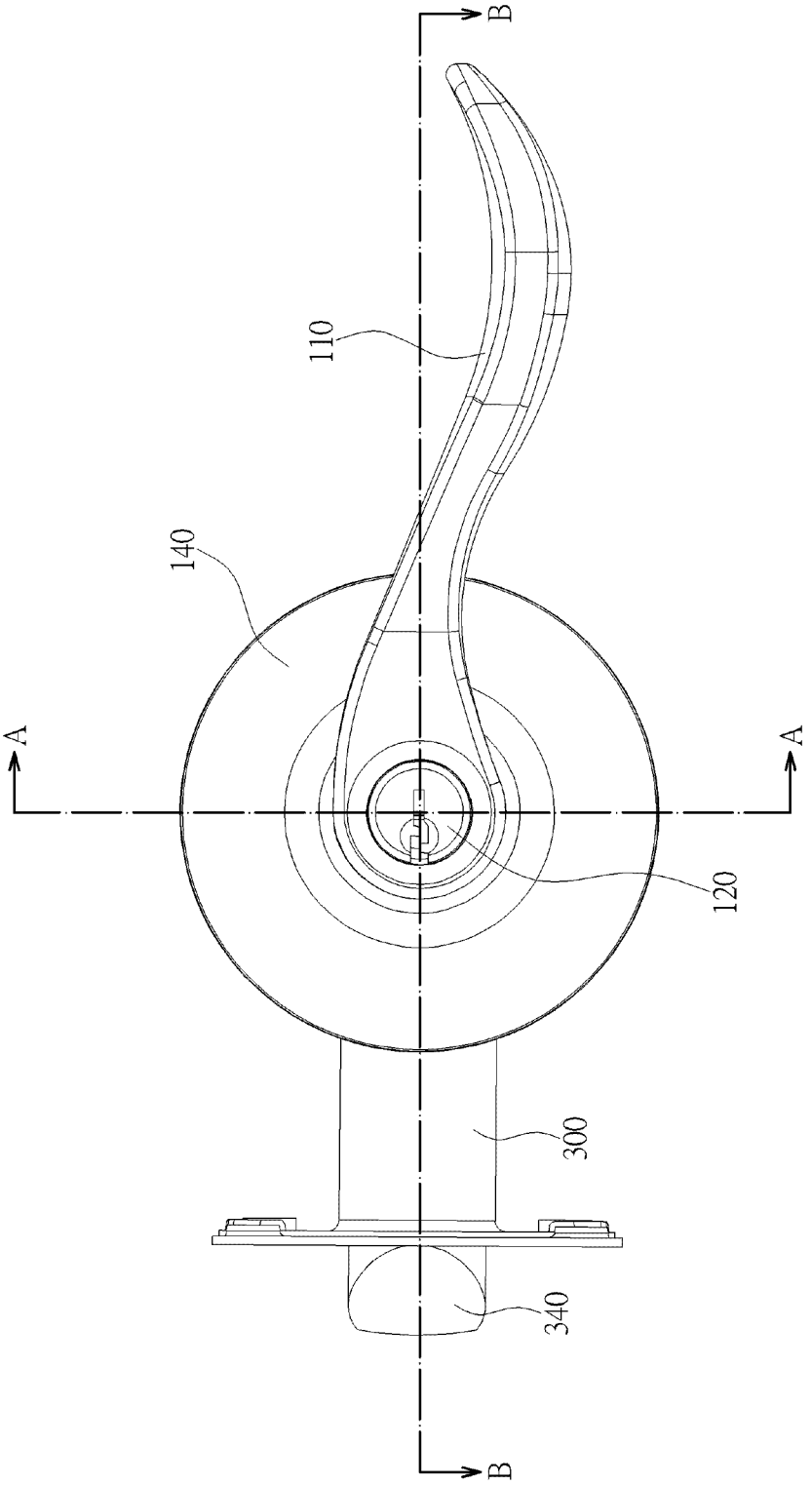


FIG. 7

Date Reçue/Date Received 2021-08-18

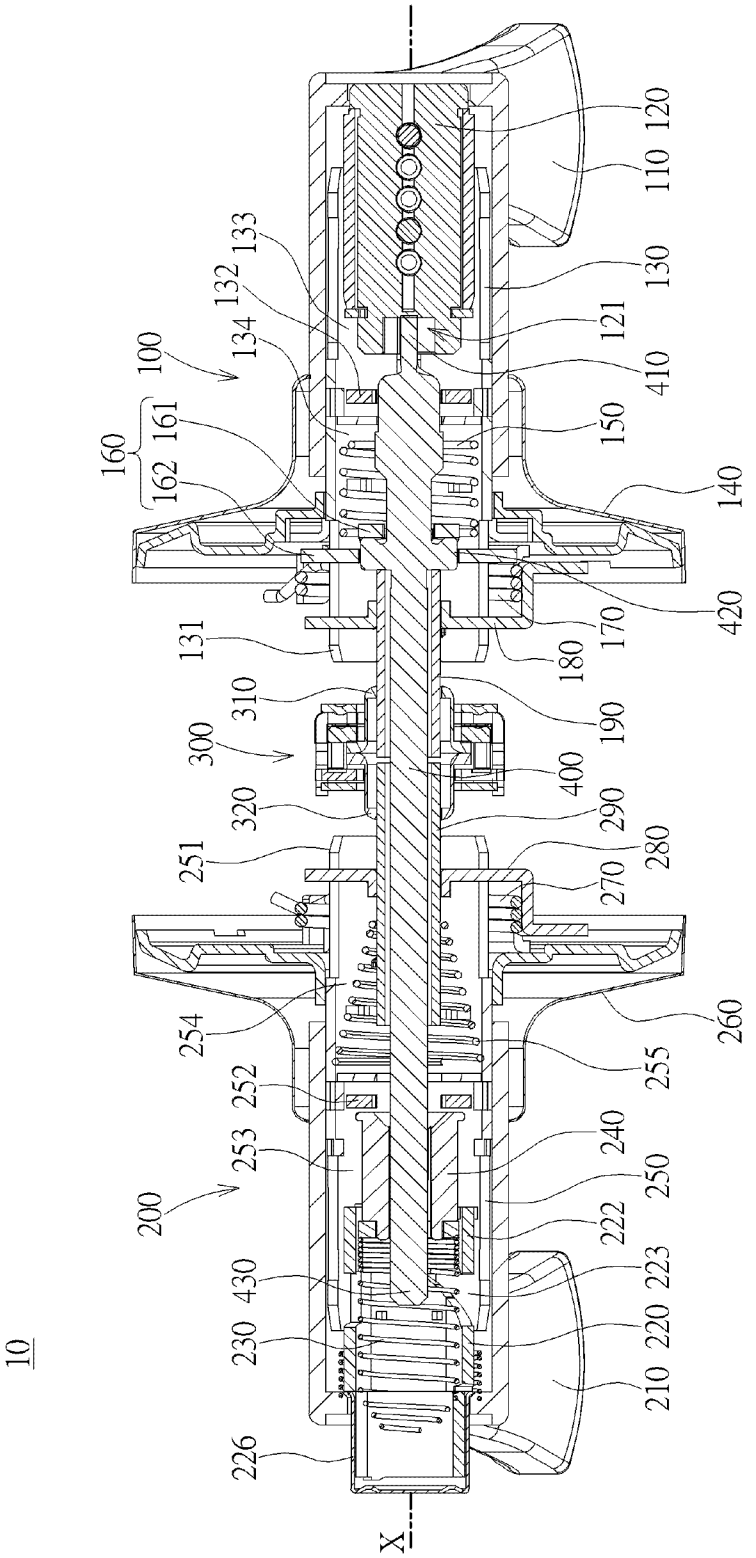


FIG. 8

Date Reçue/Date Received 2021-08-18

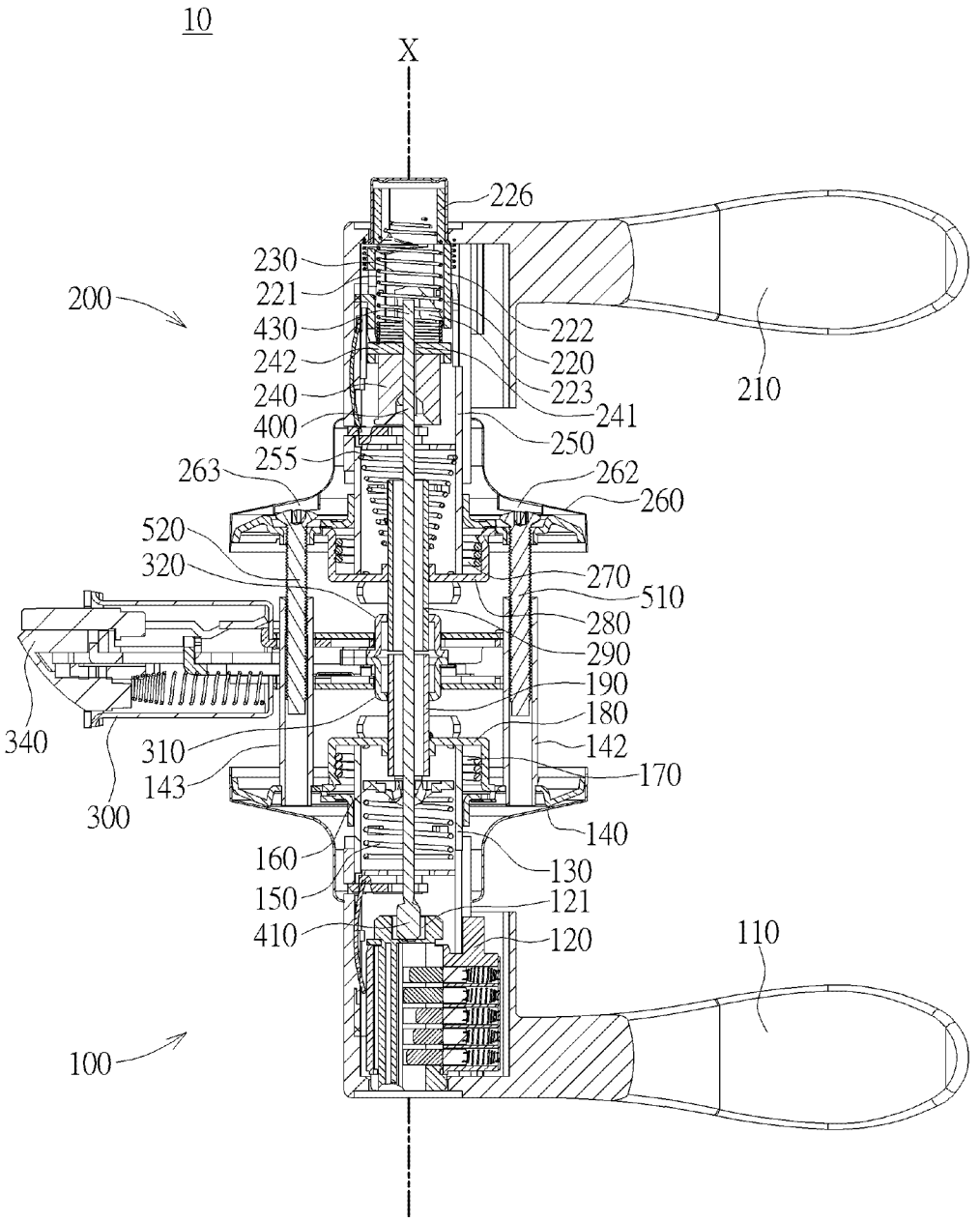


FIG. 9

Date Reçue/Date Received 2021-08-18

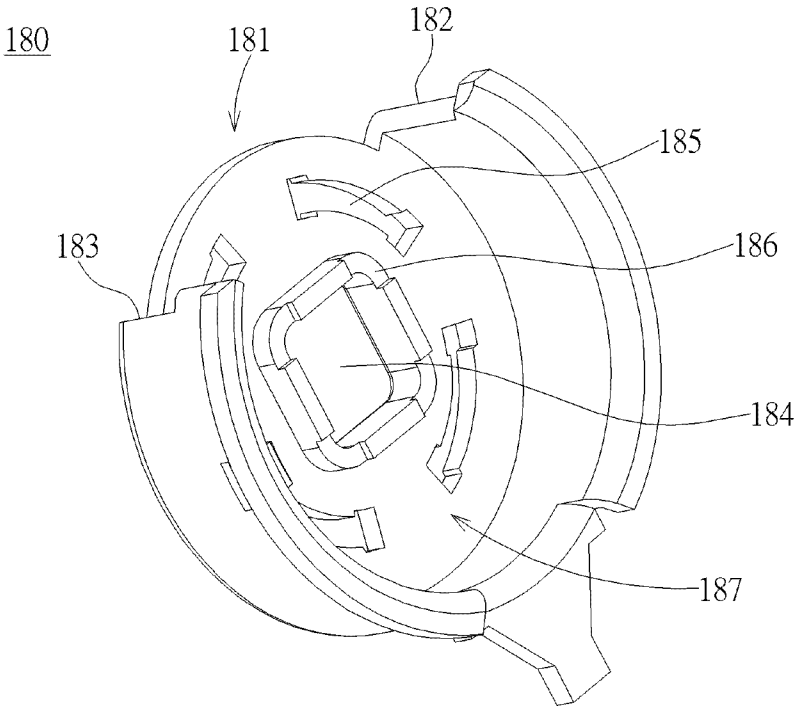


FIG. 10

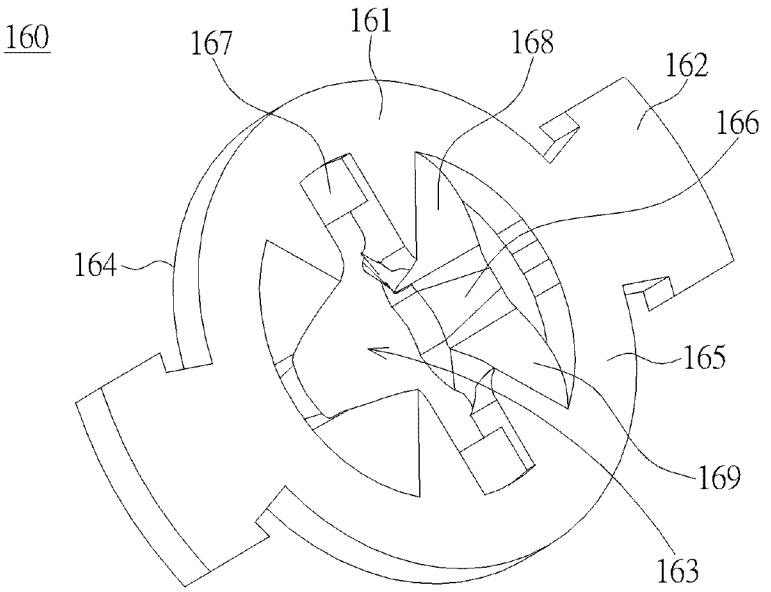


FIG. 11

Date Reçue/Date Received 2021-08-18

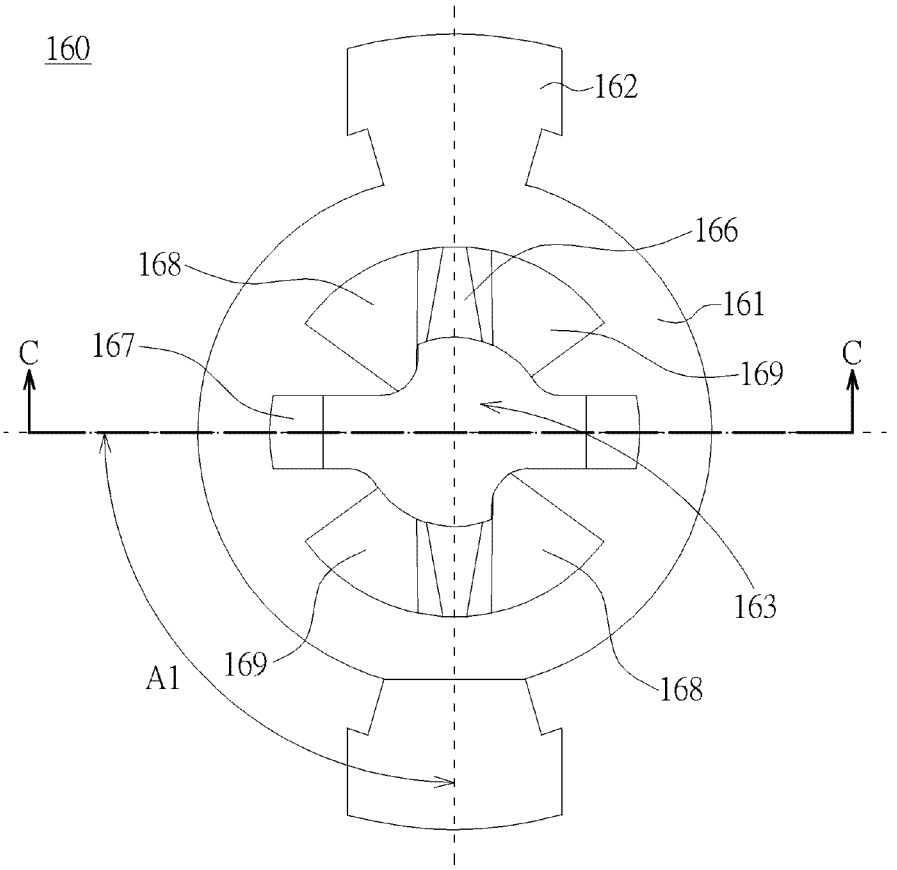


FIG. 12

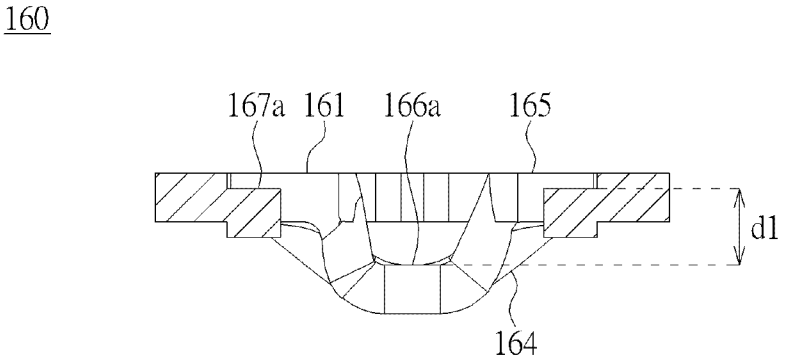


FIG. 13

Date Reçue/Date Received 2021-08-18

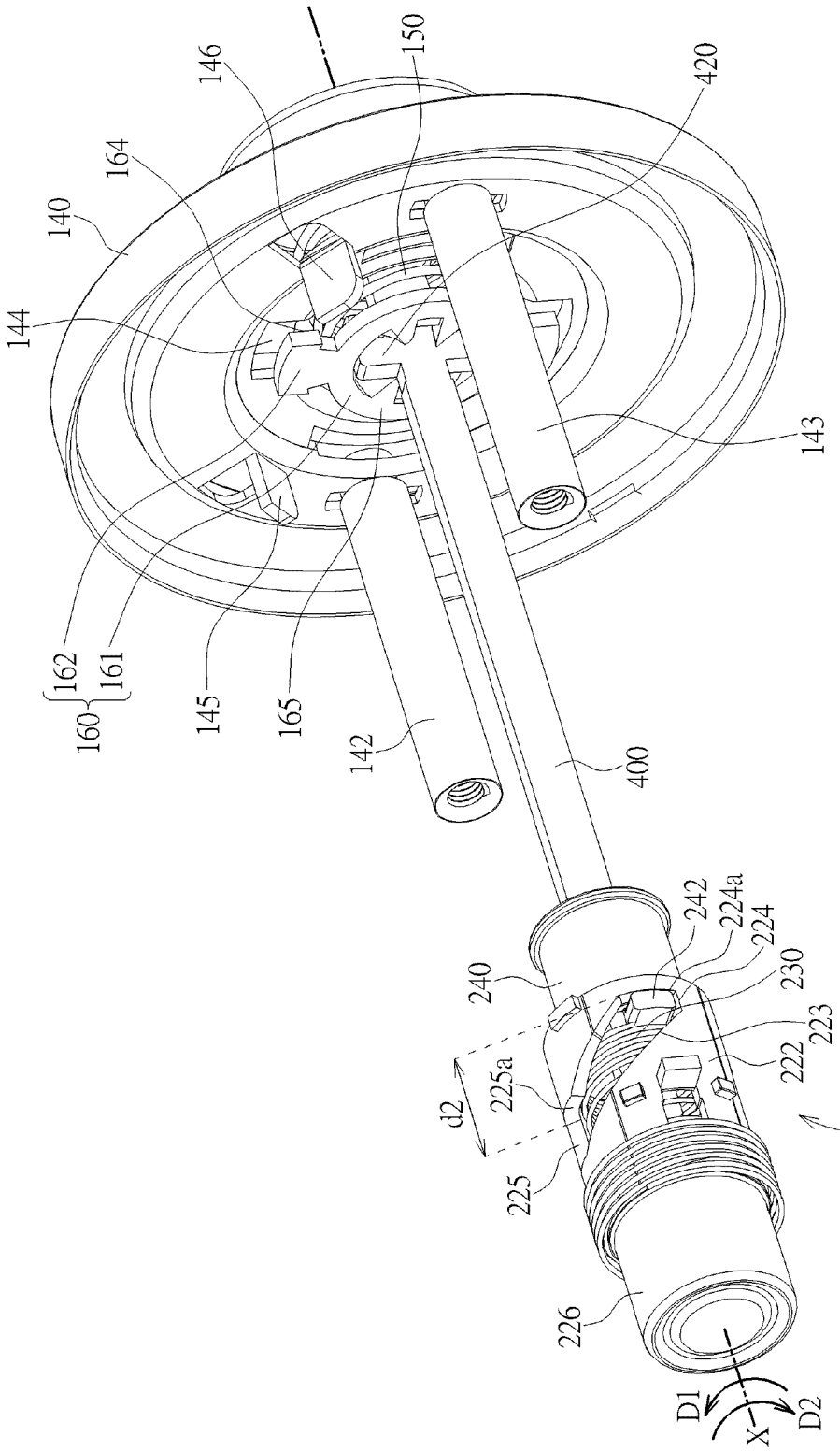


FIG. 14

Date Reçue/Date Received 2021-08-18

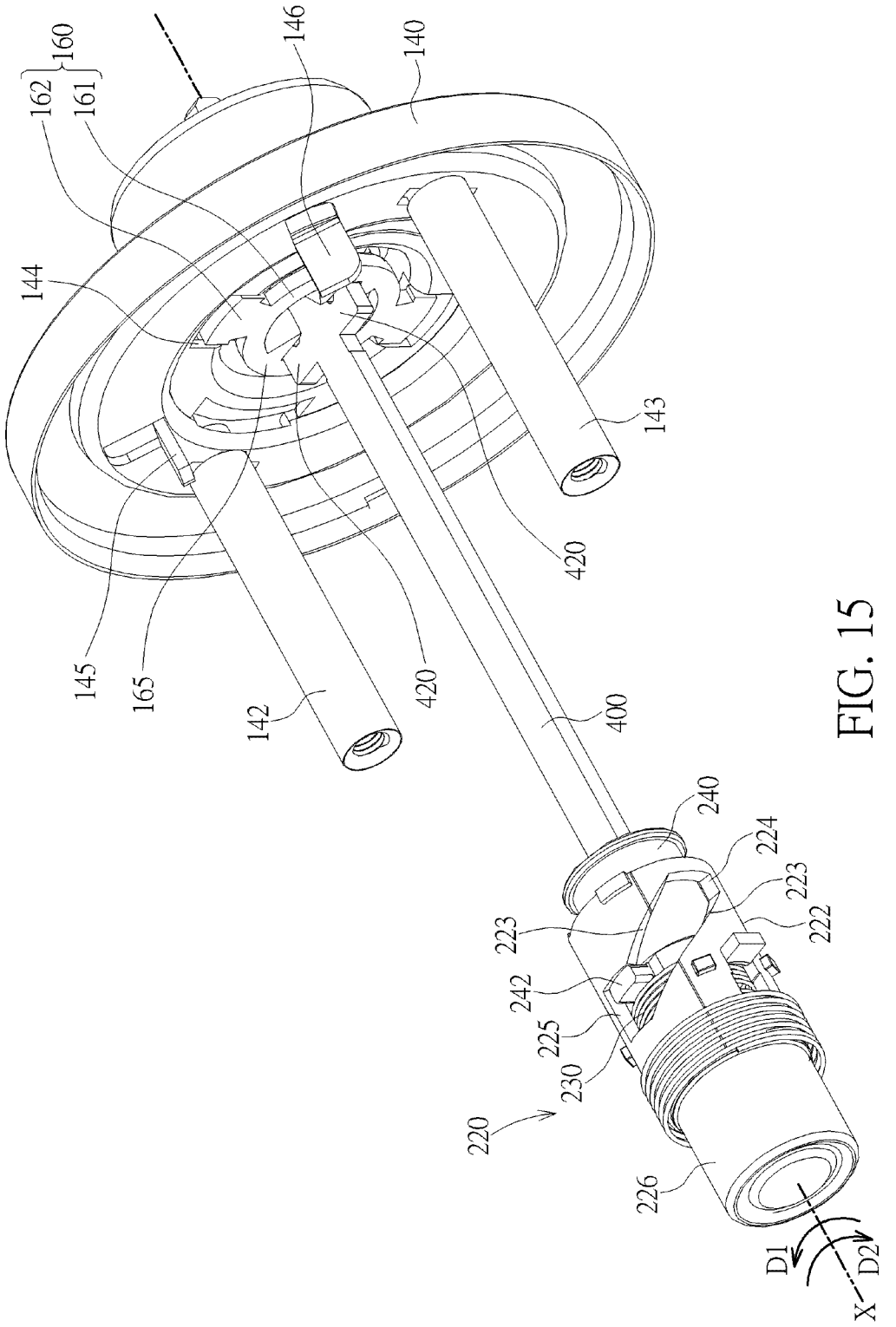


FIG. 15

Date Reçue/Date Received 2021-08-18

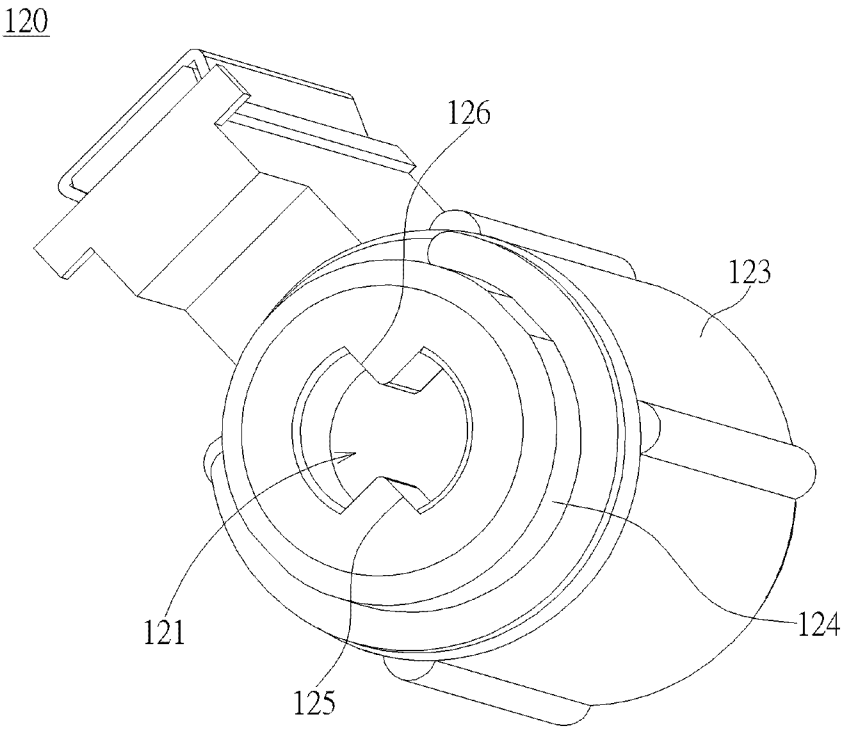


FIG. 16

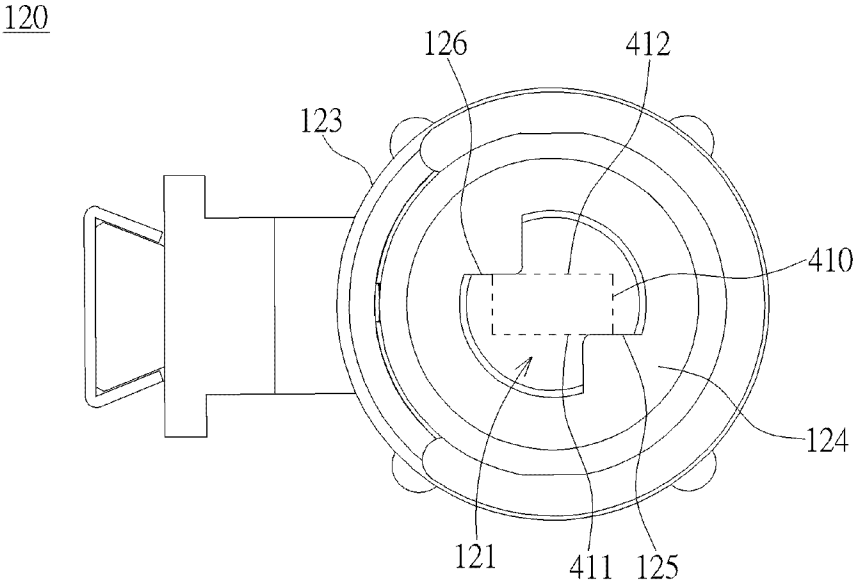


FIG. 17

Date Reçue/Date Received 2021-08-18

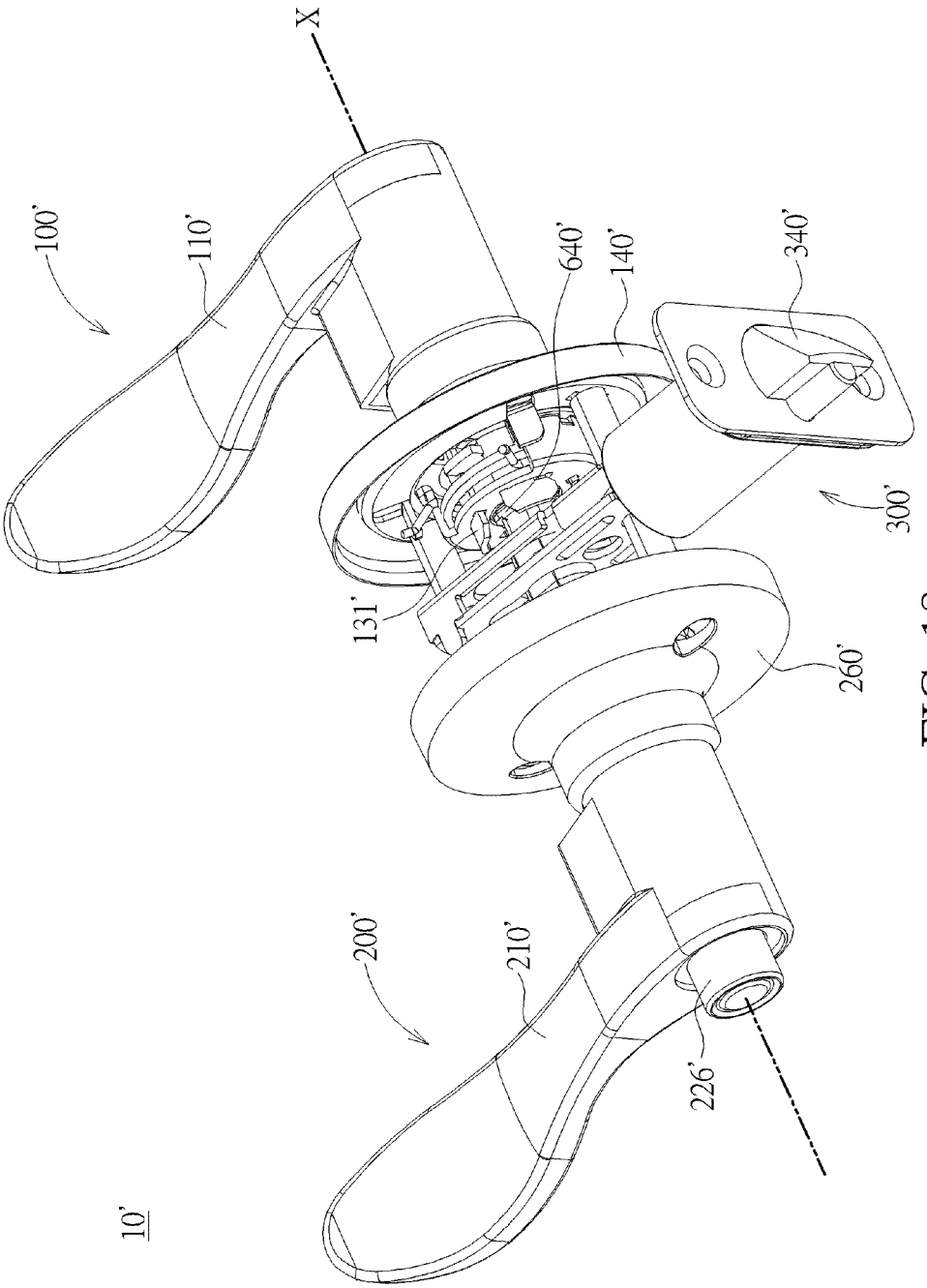


FIG. 18

Date Reçue/Date Received 2021-08-18

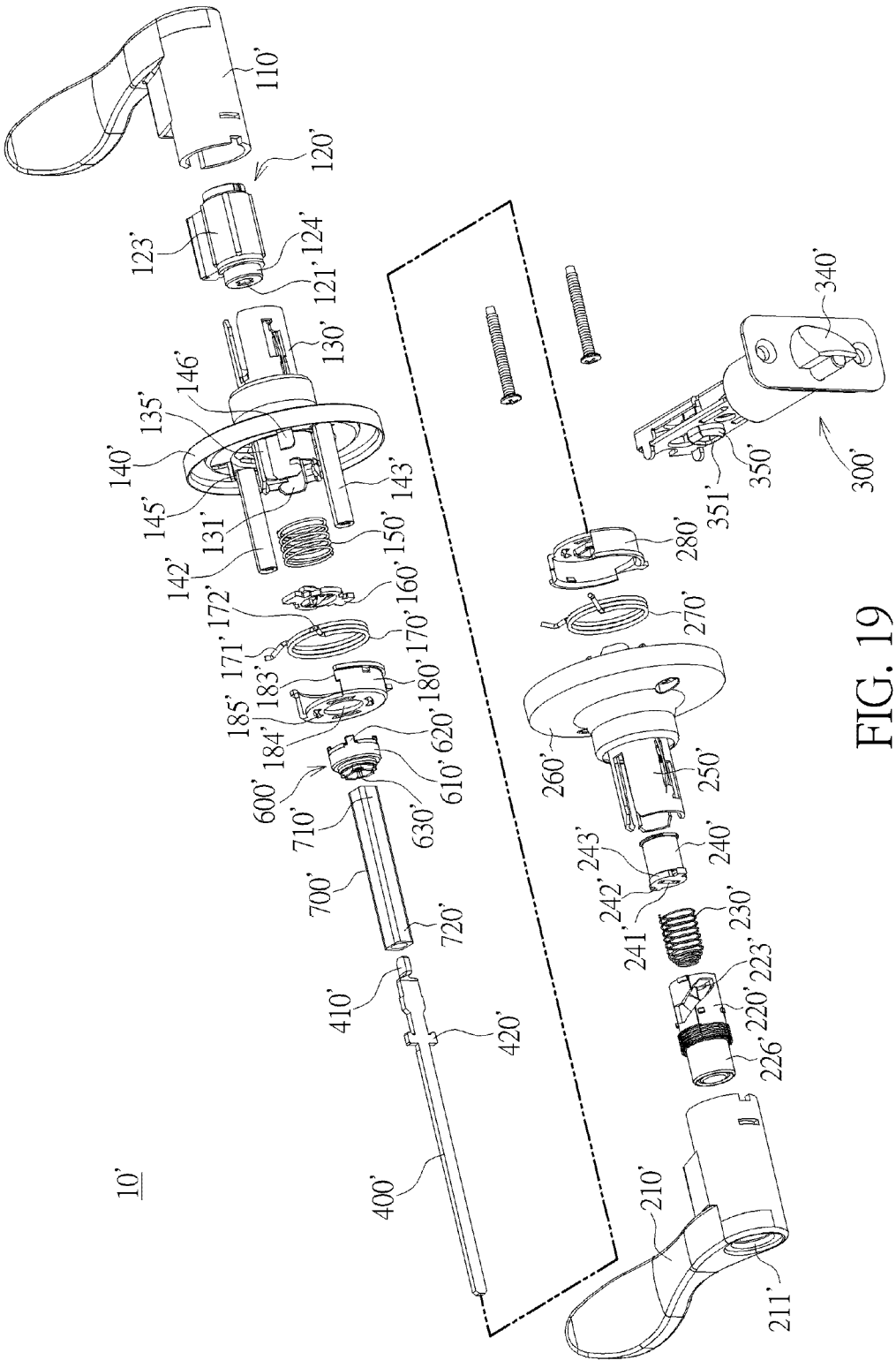


FIG. 19

Date Reçue/Date Received 2021-08-18

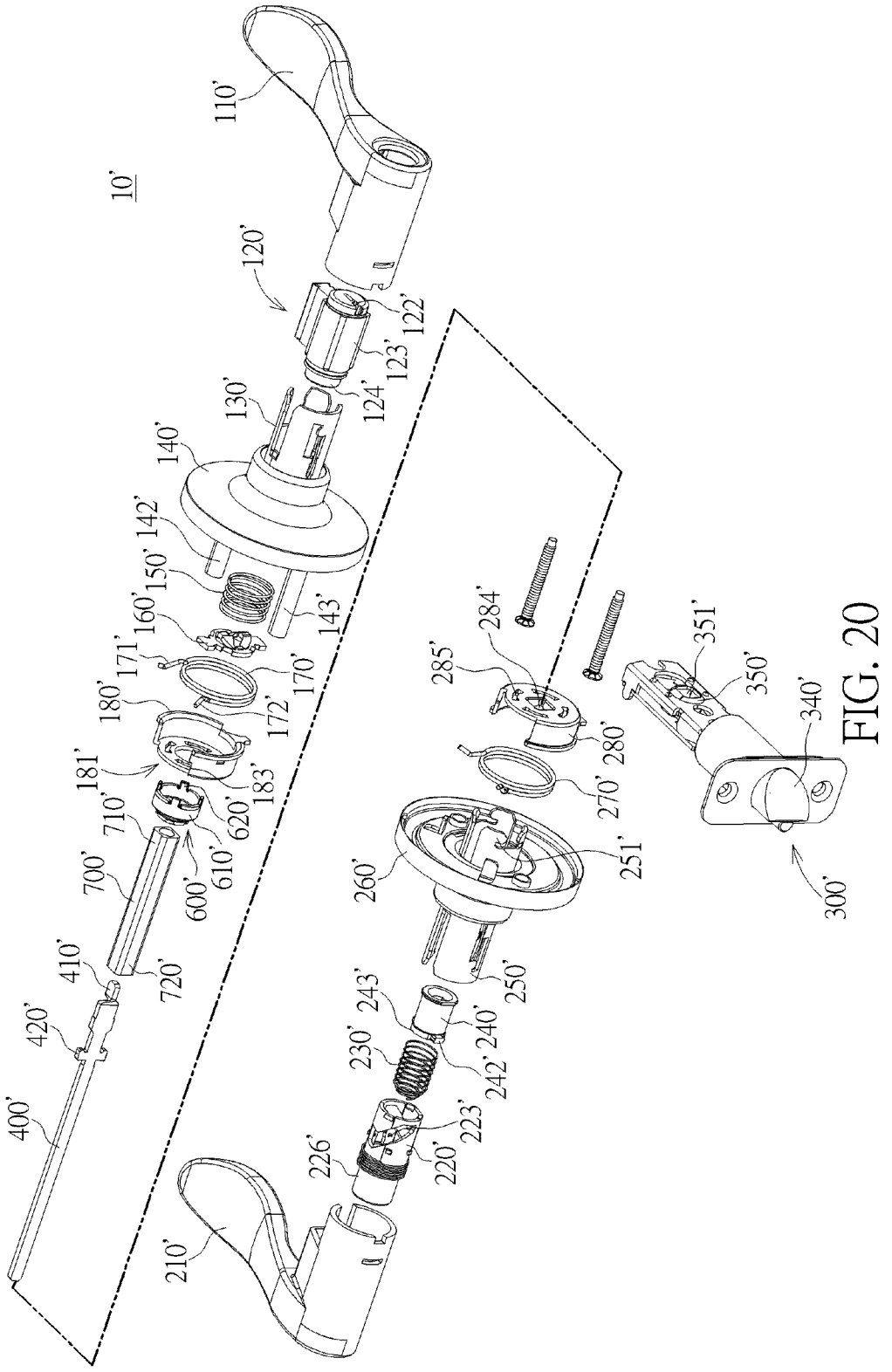


FIG. 20

Date Reçue/Date Received 2021-08-18

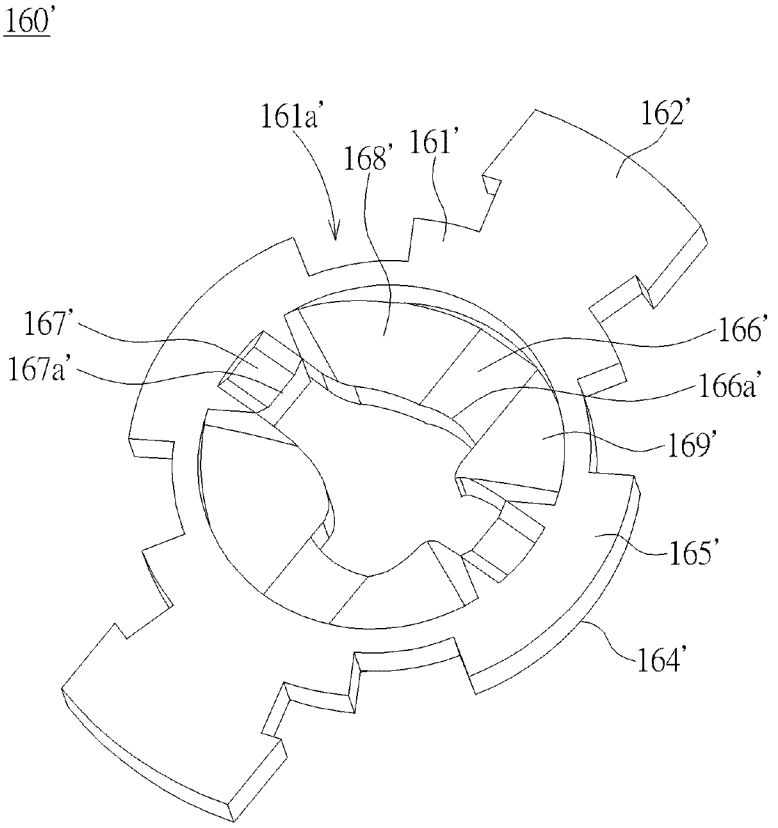


FIG. 21

Date Reçue/Date Received 2021-08-18

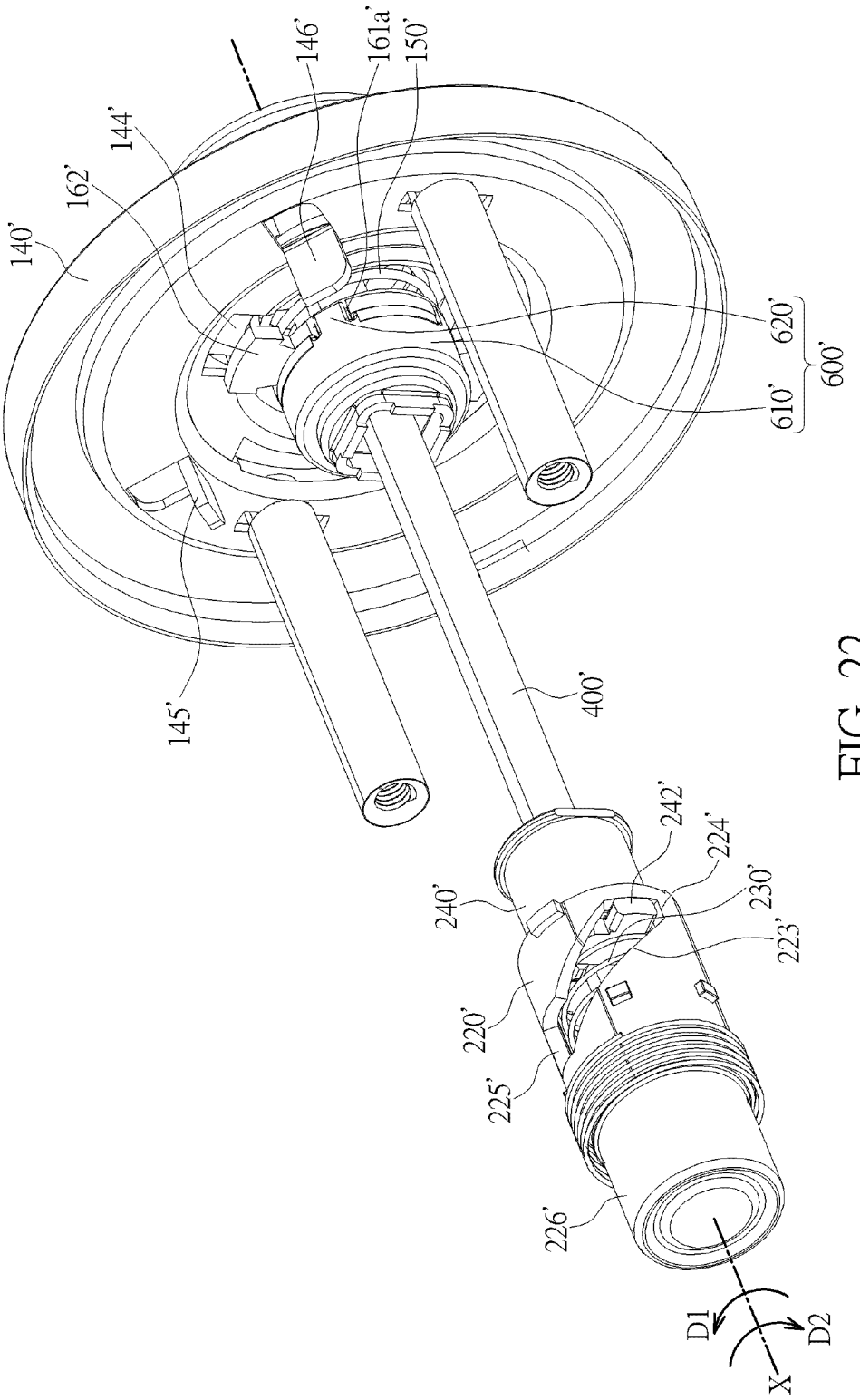


FIG. 22

Date Reçue/Date Received 2021-08-18

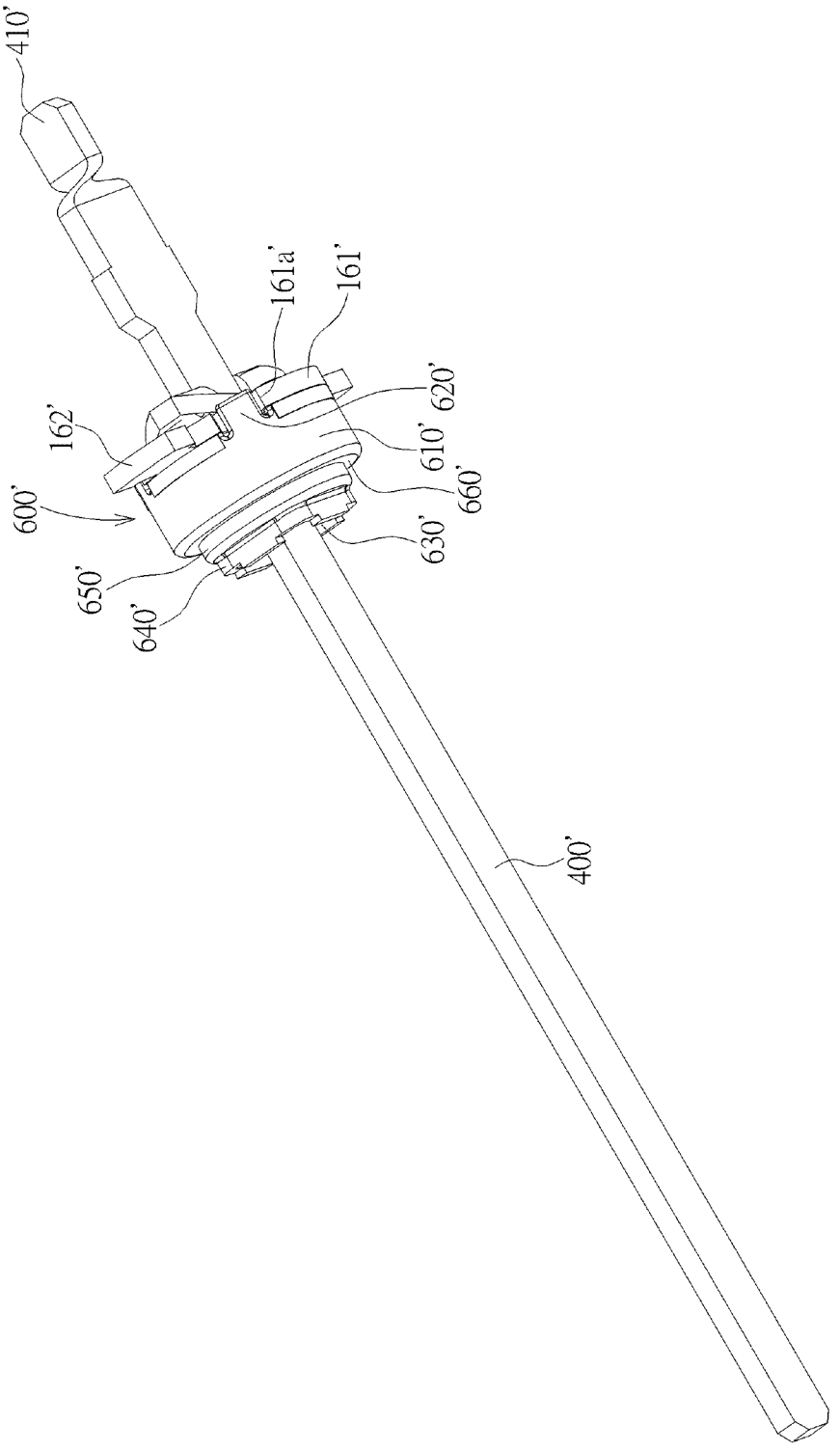


FIG. 23

Date Reçue/Date Received 2021-08-18

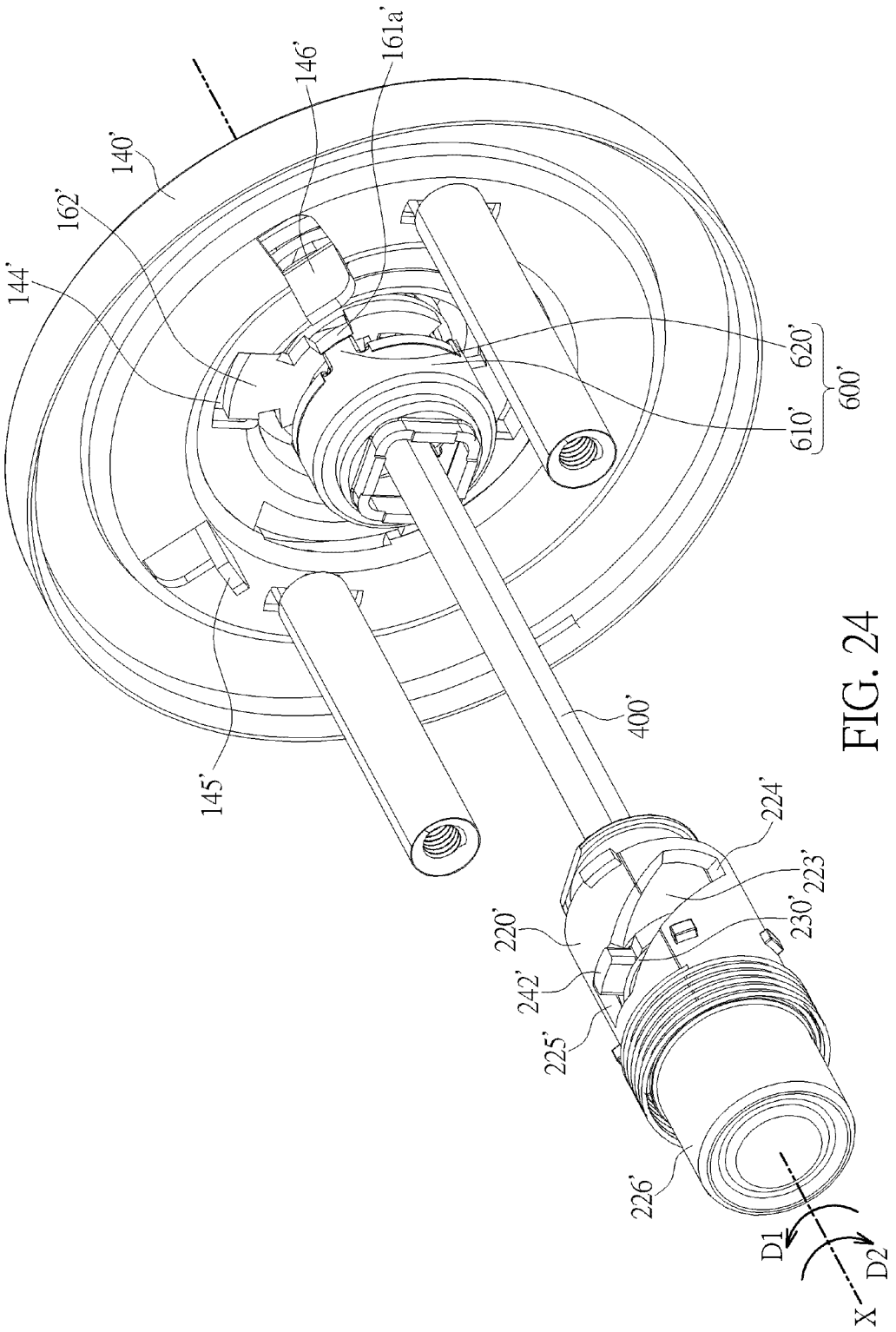


FIG. 24

Date Reçue/Date Received 2021-08-18

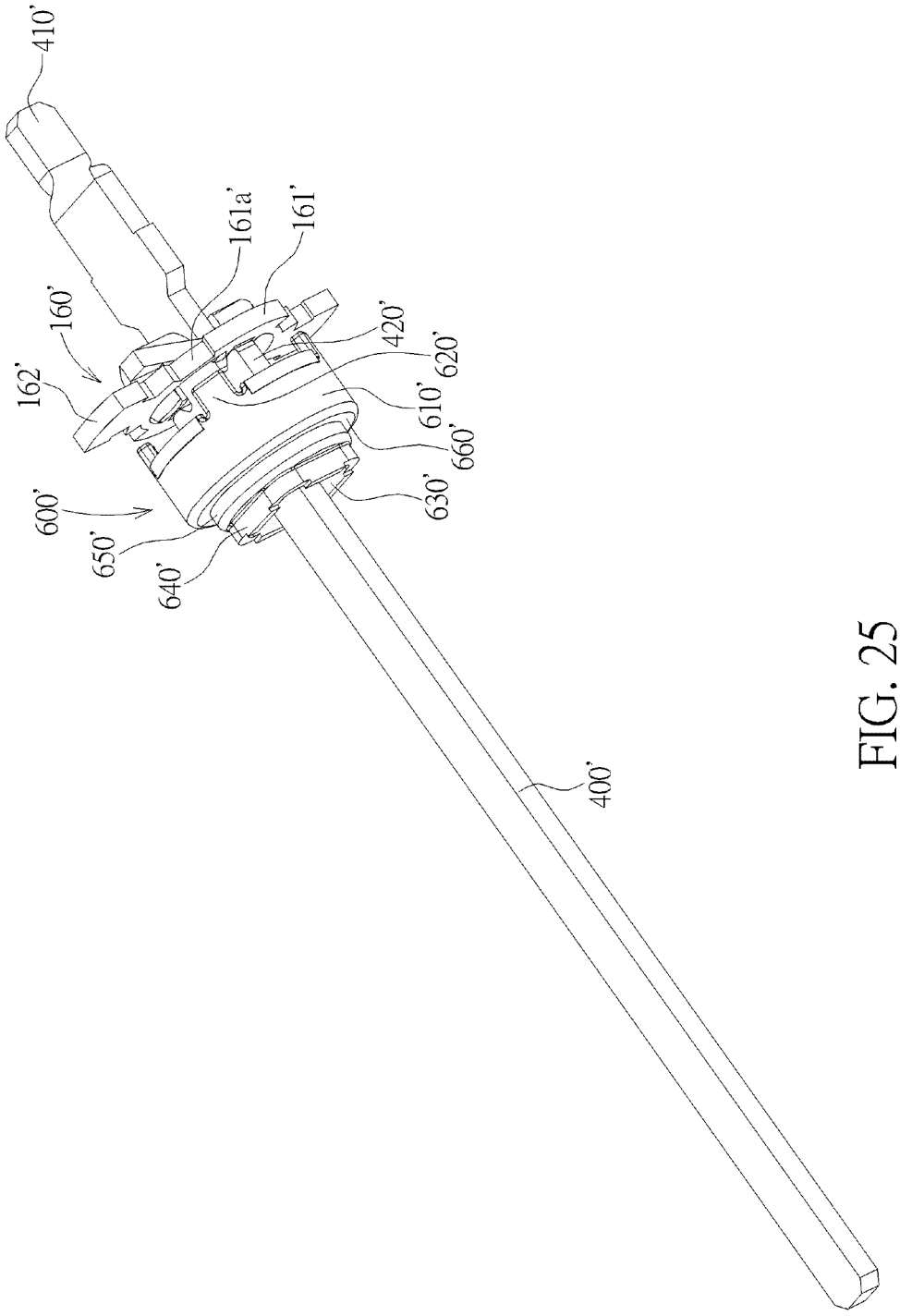
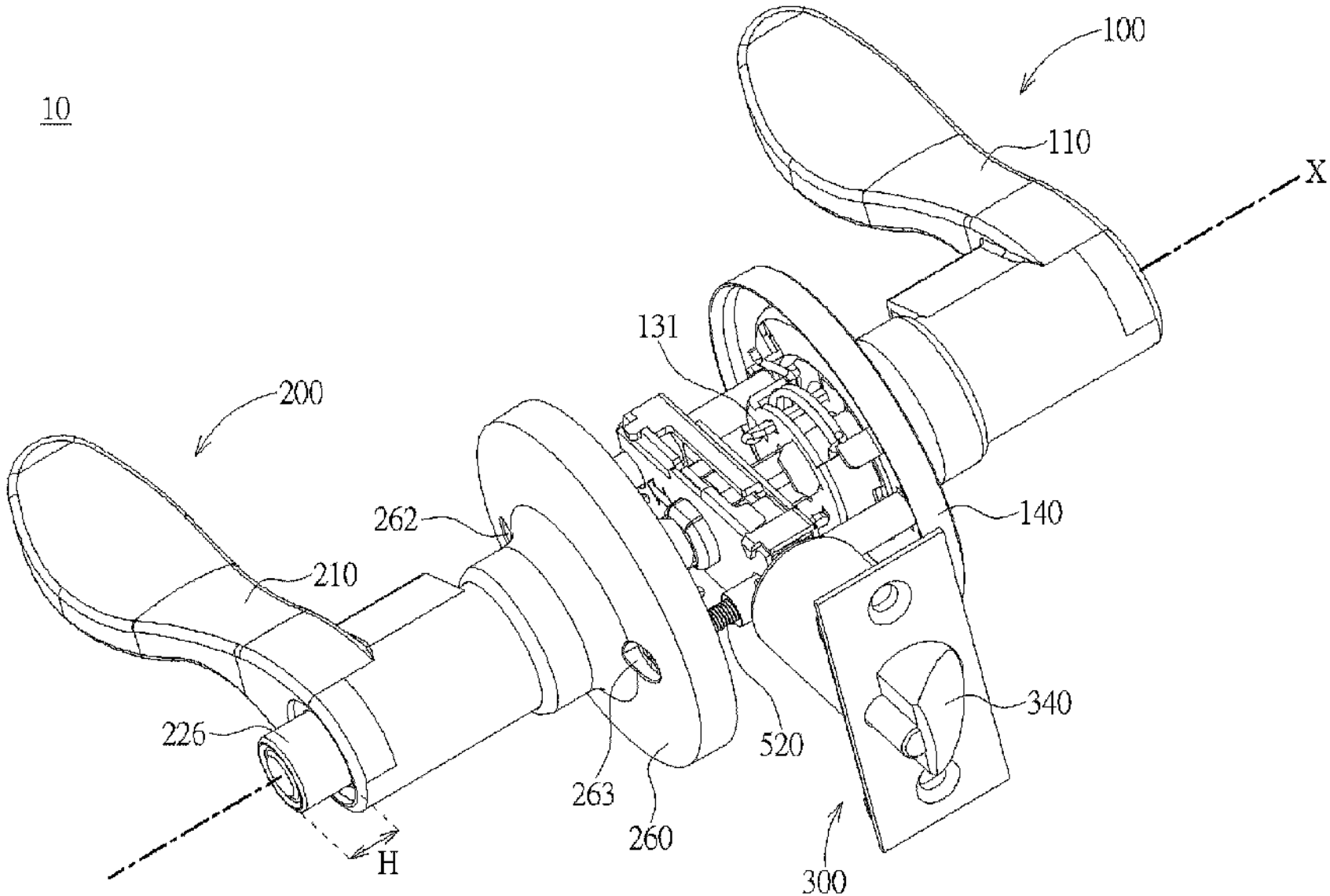


FIG. 25

Date Reçue/Date Received 2021-08-18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