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(54) **AUTOMOBILE DOOR LOCK AND AUTOMOBILE DOOR**

(57) Disclosed are an automobile door lock and an automobile door, which relate to the technical field of automobile manufacturing. The automobile door lock includes a central structure assembly (100) including a transmission structure (110) and an safety structure (120), wherein the transmission structure (110) includes a bottom board (111), an outward-opening linkage board (112), an inward-opening linkage board (113) and an opening linkage board (114) that are rotatably provided on the bottom board (111) along a normal direction of the bottom board (111) in sequence, the outward-opening linkage board (112) is configured to be linked with the opening linkage board (114) to rotate, the inward-opening linkage board (113) is configured to be linked with the outward-opening linkage board (112) to rotate, the outward-opening linkage board (112) and the

inward-opening linkage board (113) are respectively connected to an outward-opening handle assembly (300) and an inward-opening handle assembly (200); a lock body assembly (400) is connected to the opening linkage board (114); the safety structure (120) includes an safety swing arm mechanism (121) provided on the opening linkage board (114), an safety actuator (122) and an safety linkage board (123) that are provided on the bottom board (111), and the safety actuator (122) drives the safety linkage board (123) to rotate so as to enable the safety swing arm mechanism (121) to switch between a first position and a second position. The automobile door lock provided in the present disclosure has a simpler overall structure, a compact structure and a small volume, and does not occupy installation space.

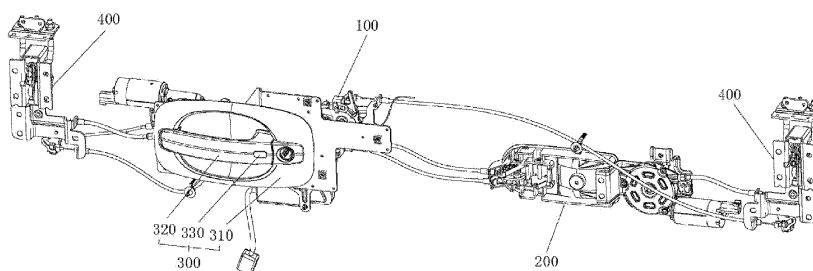


Fig. 1

Description

[0001] The present disclosure belongs to the technical field of automobile manufacturing, and particularly to an automobile door lock and an automobile door.

[0002] Automobile door locks are key structures of vehicles, and the automobile door locks mainly play a role in protecting safety to guarantee the safety of life and property.

[0003] With the rapid development of the field of automobiles, there are more and more types of automobile door locks, and more and more functions to be realized by the automobile door locks. At present, in order to realize multiple functions, the automobile door locks on the market are complicated in structure and large in volume, and occupy a big installation space.

[0004] To overcome the defects in the prior art, the present application provides an automobile door lock and an automobile door for solving the problems of complicated structure and large volume, and occupying a large installation space of an automobile door in the prior art.

[0005] Based thereon, it is an object of the present invention to at least partially solve the problems described with reference to the prior art.

[0006] This object solved by the features of the independent claim. Further advantageous embodiments of the invention are indicated in the dependent claims. It should be noted that the features listed individually in the dependent claims can be combined with each other in any technologically useful way and define further embodiments of the invention. In addition, the features indicated in the claims are further specified and explained in the description, wherein further preferred embodiments of the invention are illustrated.

[0007] In a first aspect, the present application provides an automobile door lock applied to an automobile door of a vehicle, particularly an automobile door lock of an automobile door of a recreational vehicle. The recreational vehicle, often abbreviated as RV or named camper, caravan, mobile home, is a motor vehicle or trailer which includes living quarters designed for accommodation.

[0008] The automobile door lock includes an outward-opening handle assembly, an inward-opening handle assembly, a central structure assembly, and at least one lock body assembly.

[0009] The central structure assembly is provided inside the automobile door and includes a transmission structure and a safety structure.

[0010] The term "safety" shall express that the structure is safely (reliably) in the actually desired state, such as closed and opened. Thus, the state is fail-safe and situations that the door is closed or opened undesirably due to negligence of the user or for other reasons (children or thieves) can efficiently be prevented.

[0011] The transmission structure includes a bottom board, an outward-opening linkage board, an inward-opening linkage board and an opening linkage board that

are rotatably provided on the bottom board, wherein the outward-opening linkage board, the inward-opening linkage board and the opening linkage board are provided along a normal direction of the bottom board in sequence, the outward-opening linkage board is configured to be linked with the opening linkage board to rotate, and the inward-opening linkage board is configured to be linked with the outward-opening linkage board to rotate.

[0012] The outward-opening linkage board is connected to the outward-opening handle assembly, the inward-opening linkage board is connected to the inward-opening handle assembly, and each lock body assembly is connected to the opening linkage board.

[0013] The safety structure includes a safety swing arm mechanism, a safety actuator, and a safety linkage board, wherein the safety swing arm mechanism is provided on the opening linkage board, the safety swing arm mechanism includes a first position and a second position, the safety actuator and the safety linkage board are both provided on the bottom board, and the safety actuator drives the safety linkage board to rotate so as to drive the safety swing arm mechanism to switch between the first position and the second position.

[0014] In an initial state, the safety swing arm mechanism is located at the first position, and the opening linkage board and the outward-opening linkage board are in linkage cooperation; and when the safety linkage board drives the safety swing arm mechanism to switch to the second position, the linkage cooperation of the opening linkage board and the outward-opening linkage board is released, and the inward-opening linkage board abuts against the safety linkage board.

[0015] In a second aspect, the present application further provides an automobile door applied to a recreation vehicle and including the automobile door lock provided in the first aspect.

[0016] Compared with the prior art, the present application has the following beneficial effects:

the present application provides an automobile door lock and an automobile door, the automobile door lock includes an outward-opening handle assembly, an inward-opening handle assembly, a central structure assembly, and at least one lock body assembly, wherein the central structure assembly is provided inside the automobile door and includes a transmission structure and a safety structure; the transmission structure includes a bottom board, an outward-opening linkage board, inward-opening linkage board and an opening linkage board that are rotatably provided on the bottom board, the outward-opening linkage board, the inward-opening linkage board and the opening linkage board are provided along a normal direction of the bottom board in sequence, the outward-opening linkage board is configured to be linked with the opening linkage board to rotate, the inward-opening linkage board is configured to be linked with the outward-opening linkage board to rotate, the outward-opening linkage board is connected to the outward-opening handle assembly, the inward-opening linkage board

is connected to the inward-opening handle assembly, and each lock body assembly is connected to the opening linkage board; the safety structure includes a safety swing arm mechanism, a safety actuator, and a safety linkage board, the safety swing arm mechanism is provided on the opening linkage board, the safety swing arm mechanism includes a first position and a second position, the safety actuator and the safety linkage board are both provided on the bottom board, and the safety actuator drives the safety linkage board to rotate so as to drive the safety swing arm mechanism to switch between the first position and the second position; in an initial state, the safety swing arm mechanism is located at the first position, and the opening linkage board and the outward-opening linkage board are in linkage cooperation; and when the safety linkage board drives the safety swing arm mechanism to switch to the second position, the linkage cooperation of the opening linkage board and the outward-opening linkage board is released, and the inward-opening linkage board abuts against the safety linkage board. According to the automobile door lock provided in the present application, integration of the outward-opening handle assembly, the inward-opening handle assembly and a safety function is realized by the central structure assembly, and thus the automobile door lock has a simpler overall structure, a compact structure and a small volume, and does not occupy an installation space.

[0017] According to another aspect of the disclosure, the use of a lock described here to safely lock and unlock a door of recreational vehicle (camper, caravan, mobile home) is proposed. The lock in particular comprises a central structure assembly, a transmission structure, an outward-opening linkage board, an inward-opening linkage board and an opening linkage board as well as a safety structure as disclosed here.

[0018] To describe the technical solutions of the embodiments of the present disclosure more clearly, the drawings required to be used in the embodiments will be briefly described below. It should be understood that the following drawings merely illustrate some embodiments of the present disclosure and should not be regarded as a limitation to the scope, and those of ordinary skill in the art can further obtain other related drawings based on these drawings without creative efforts.

Fig. 1 is a schematic stereostructure diagram of an automobile door lock according to an embodiment of the present disclosure;

Fig. 2 is a schematic stereostructure diagram of the automobile door lock in Fig. 1 in an another angle of view;

Fig. 3 is a schematic partial enlarged diagram of A in Fig. 2;

Fig. 4 is a schematic exploded diagram of a central

structure assembly of the automobile door lock in Fig. 1;

Fig. 5 is a schematic partial enlarged diagram of C in Fig. 4;

Fig. 6 is a schematic structural diagram of an inward-opening handle assembly of the automobile door lock in Fig. 1;

Fig. 7 is a schematic exploded diagram of an outward-opening handle assembly of the automobile door lock in Fig. 1;

Fig. 8 is a schematic partial enlarged diagram of B in Fig. 2;

Fig. 9 is a schematic partial exploded diagram of a lock body assembly of the automobile door lock in Fig. 1;

Fig. 10 is a schematic partial enlarged diagram of D in Fig. 9;

Fig. 11 is a schematic diagram of unlocking states of a child lock and a safety lock in the central structure assembly of the automobile door lock in Fig. 1; and

Fig. 12 is a schematic diagram of locking states of the child lock and the safety lock of the central structure assembly of the automobile door lock in Fig. 1.

Description of main element symbols:

[0019] 100: central structural assembly; 110: transmission structure; 111: bottom board; 1110: central control rotating shaft; 1111: pin shaft; 1112: first limiting pin; 1113: groove; 1114: limiting bayonet; 112: outward-opening linkage board; 1120: L-shaped linkage slot; 1120a: first slot section; 1120b: second slot section; 1121: retaining bayonet; 113: inward-opening linkage board; 1130: rotating body part; 1131: toggling arm; 1132: safety toggling pin; 1133: driving arm; 1134: second long kidney-shaped hole; 114: opening linkage board; 1140: first long kidney-shaped hole; 1141: limiting hole; 114a: third stay wire component; 115: child lock structure; 1150: switch board; 1150a: third long kidney-shaped hole; 1150b: toggling rod; 1150c: second limiting pin; 1150d: hump; 1151: driving shaft; 1151a: first sliding shaft part; 1151b: driving part; 1151c: second sliding shaft part; 120: safety structure; 121: safety swing arm mechanism; 1210: swing arm rotating shaft; 1211: swing arm body; 1212: linkage shaft; 122: safety actuator; 123: safety linkage board; 1230: U-shaped notch; 130: emergency switch stay wire; 200: inward-opening handle assembly; 210: inward-opening handle base; 220: inward-opening hand shank; 221: first stay wire component; 230: safety button; 231: second stay wire component; 300:

outward-opening handle assembly; 310: outward-opening handle base; 320: outward-opening hand shank; 321: pull rod; 330: PEPS button; 340: lock cylinder; 350: transmission pin; 360: outward-opening switching mechanism; 400: lock body assembly; 410: mounting shell body; 411: cover board; 412: end board; 420: lock body transmission mechanism; 421: lock body base; 4210: clearance; 422: rotating tongue piece; 4220: lock notch; 4221: front gear tooth; 4222: rear gear tooth; 423: stop hook; 4230: retaining tooth; 424: rotating tongue rotating shaft; 425: micro switch; 426: positioning shaft; 430: switching swing arm mechanism; 431: mounting base; 432: switching swing arm member; 433: lock body opening connection rod; 440: self-priming motor mechanism; 441: self-priming base; 442: self-priming motor; 443: self-priming transmission mechanism; 444: fourth stay wire component; 445: self-priming swing arm; 450: anti-mislock connection rod; and 500: U-shaped lock latch.

[0020] Embodiments of the present disclosure will be described in detail below, and the embodiments are illustrated in the drawings, wherein the same or similar reference numerals indicate the same or similar elements or elements with the same or similar functions. The embodiments described below with reference to the drawings are exemplary, are merely used to explain the present disclosure.

[0021] In the descriptions of the present disclosure, it should be understood that orientations or position relationships indicated by the terms "center", "longitudinal", "transverse", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inside", "outside", "clockwise", "anticlockwise", "axial", "radial", "circumferential", etc. are based on orientations or position relationships shown in the drawings, these terms are only for the convenience of describing the present disclosure and simplifying the description, and do not indicate or imply that the device or element referred to must have a specific orientation or be constructed and operated in a specific orientation. Therefore, they should not be regarded as a limitation of the present disclosure.

[0022] In addition, the terms "first" and "second" are merely for the purpose of description, but should not be understood as indicating or implying relative importance or implicitly indicating the number of indicated technical features. Therefore, a feature defined as "first" or "second" may explicitly or implicitly include one or more of these features. In the description of the present disclosure, "multiple" means two or more, unless otherwise specifically defined.

[0023] In the present disclosure, unless otherwise specifically defined and limited, the terms "install", "join", "connect", "fix", etc. should be understood in a broad sense. For example, it may be a fixed connection, a detachable connection, or integrated; it may be a mechanical connection or an electrical connection; it may be directly connected or indirectly connected through an intermediate medium, and it may be the internal commu-

nication of two components or the interaction relationship between two components. Those of ordinary skill in the art can understand the specific meaning of the above terms in the present disclosure according to specific circumstances.

[0024] In the present disclosure, unless otherwise specifically defined and limited, that the first feature is "on" or "under" the second feature may be that the first feature is in direct contact with the second feature, or the first feature is in indirect contact with the second feature through an intermediate medium. Moreover, that the first feature is "above" the second feature may be that the first feature is right above or obliquely above the second feature, or it merely means that the level of the first feature is higher than that of the second feature. That the first feature is "below" the second feature may be that the first feature is right below or obliquely below the second feature, or it merely means that the level of the first feature is lower than that of the second feature.

[0025] Referring to Fig. 1 and Fig. 2, the present embodiment provides an automobile door lock applied to an automobile door of a vehicle, wherein the vehicle includes a car or recreation vehicle, and the automobile door lock is configured to lock the automobile door and plays a role in protecting safety so as to guarantee the safety of life and property.

[0026] The automobile door lock provided in the present embodiment includes an outward-opening handle assembly 300, an inward-opening handle assembly 200, a central structure assembly 100, and at least one lock body assembly 400, wherein the outward-opening handle assembly 300, the inward-opening handle assembly 200 and the lock body assembly 400 are all connected to the central structure assembly 100; the outward-opening handle assembly 300 controls the lock body assembly 400 via the central structure assembly 100 to perform an unlocking action; the inward-opening handle assembly 200 controls the lock body assembly 400 via the central structure assembly 100 to perform an unlocking action, and the outward-opening handle assembly 300 and the inward-opening handle assembly 200 do not interfere with each other.

[0027] Referring to Fig. 3, Fig. 4 and Fig. 5, the above central structure assembly 100 is provided inside the automobile door and includes a transmission structure 110 and a safety structure 120.

[0028] The transmission structure 110 includes a bottom board 111, an outward-opening linkage board 112, an inward-opening linkage board 113 and an opening linkage board 114 that are rotatably provided on the bottom board 111. The outward-opening linkage board 112, the inward-opening linkage board 113 and the opening linkage board 114 are provided along a normal direction of the bottom board 111 in sequence, that is, the inward-opening linkage board 113 is located between the outward-opening linkage board 112 and the opening linkage board 114, and the outward-opening linkage board 112 is closer to the bottom board 111 than the opening linkage

board 114. The outward-opening linkage board 112 is configured to be linked with the opening linkage board 114 to rotate, and the inward-opening linkage board 113 is configured to be linked with the outward-opening linkage board 112 to rotate.

[0029] In the present embodiment, the outward-opening linkage board 112 is connected to the outward-opening handle assembly 300, that is, the outward-opening handle assembly 300 controls the outward-opening linkage board 112 to rotate; the inward-opening linkage board 113 is connected to the inward-opening handle assembly 200, that is, the inward-opening handle assembly 200 controls the inward-opening linkage board 113 to rotate; and each lock body assembly 400 is connected to the opening linkage board 114, that is, the opening linkage board 114 can control the lock body assembly 400 to perform an unlocking action.

[0030] Further preferably, the bottom board 111 is provided with a central control rotating shaft 1110, wherein the outward-opening linkage board 112, the inward-opening linkage board 113 and the opening linkage board 114 are all provided on the central control rotating shaft 1110, that is, the outward-opening linkage board 112, the inward-opening linkage board 113 and the opening linkage board 114 can all rotate around an axis of the central control rotating shaft 1110.

[0031] The safety structure 120 includes a safety swing arm mechanism 121, a safety actuator 122, and a safety linkage board 123, wherein the safety swing arm mechanism 121 is provided on the opening linkage board 114, the safety swing arm 122 and the safety linkage board 123 are both provided on the bottom board 111, and the safety actuator 122 drives the safety linkage board 123 to rotate so as to drive the safety swing arm mechanism 121 to switch between the first position and the second position.

[0032] In the present embodiment, it is defined that when the safety swing arm mechanism 121 is located at the first position, a safety is unlocked, and when the safety swing arm mechanism 121 is located at the second position, the safety arrangement is locked.

[0033] In an initial state, the safety swing arm mechanism 121 is located at the first position, that is, the safety arrangement is unlocked, the opening linkage board 114 and the outward-opening linkage board 112 are in linkage cooperation, that is, when the outward-opening linkage board 112 rotates, the opening linkage board 114 is driven to rotate together, and then the opening linkage board 114 drives the lock body assembly 400 to perform an unlocking action.

[0034] When the safety linkage board 123 drives the safety swing arm mechanism 121 to switch to the second position, that is, the safety arrangement is locked, the linkage cooperation of the opening linkage board 114 and the outward-opening linkage board 112 is released, and the inward-opening linkage board 113 abuts against the safety linkage board 123, that is, when the outward-opening linkage board 112 rotates, the opening linkage

board 114 is not driven to rotate together, so that the opening linkage board 114 does not drive the lock body assembly 400 to perform an unlocking action. However, in this state, when the inward-opening linkage board 113 rotates, the safety linkage board 123 can be pushed to rotate so as to release the restriction of the safety linkage board 123 on the safety swing arm mechanism 121, so that the safety swing arm mechanism 121 automatically switches back to the first position from the second position to unlock the safety arrangement. That is, when the safety arrangement is locked, driving the inward-opening linkage board 113 to rotate for the first time cannot drive the opening linkage board 114 to rotate together, and only when the inward-opening linkage board 113 is driven to rotate again, the inward-opening linkage board 113 will be linked with the opening linkage board 114 to rotate together so as to drive the lock body assembly 400 to perform an unlocking action.

[0035] In the present embodiment, when the safety arrangement is locked, the inward-opening linkage board 113 and the outward-opening linkage board 112 are in ratchet cooperation because the linkage cooperation of the opening linkage board 114 and the outward-opening linkage board 112 is released. At this moment, when the outward-opening linkage board 112 rotates, the inward-opening board 113 remains stationary; and when the inward-opening linkage board 113 rotates, the outward-opening linkage board 112 is driven to rotate synchronously so as to unlock the safety arrangement at the same time. When the safety arrangement is unlocked, the linkage cooperation of the opening linkage board 114 and the outward-opening linkage board 112 is restored, the inward-opening linkage board 113 is driven to rotate again, and the inward-opening linkage board 113 drives the outward-opening linkage board 112 to rotate synchronously, so that the opening linkage board 114 is driven to rotate to drive the lock body assembly 400 to perform an unlocking action.

[0036] The safety swing arm mechanism 121 includes a swing arm body 1211 and a linkage shaft 1212, wherein the swing arm body 1211 is rotatably provided on the opening linkage board 114 via a swing arm rotating shaft 1210, the linkage shaft 1212 is provided at one end, away from the swing arm rotating shaft 1210, of the swing arm body 1211, and the linkage shaft 1212 extends toward the bottom board 111.

[0037] Further preferably, the opening linkage board 114 is provided with a first long kidney-shaped hole 1140 for allowing the linkage shaft 1212 to pass through, wherein the first long kidney-shaped 1140 is in an arc shape that is adaptive to a trajectory of the linkage shaft 1212 moving with the swing arm body 1211. Moreover, the first long kidney-shaped hole 1140 includes a first end part and a second end part that are distributed along a length direction, wherein the first end part is close to a rotation center of the opening linkage board 114, and the second end part is far away from the rotation center of the opening linkage board 114.

[0038] The outward-opening linkage board 112 is provided with an L-shaped linkage slot 1120 for accommodating the linkage shaft 1212, wherein the L-shaped linkage slot 1120 has a first slot section 1120a and a second slot section 1120b that are communicated, that is, the first slot section 1120a and the second slot section 1120b are connected to form an L shape, further, the first slot section 1120a extends toward a rotation center of the outward-opening linkage board 112, and the second slot section 1120b extends along a circumferential direction of the outward-opening linkage board 112.

[0039] The operating principles of the safety swing arm mechanism 121, the outward-opening linkage board 112, and the opening linkage board 114 are as follows:

in the initial state, the safety swing arm mechanism 121 is located at the first position, in this case, the safety arrangement is unlocked; and the linkage shaft 1212 is located at the first end part and the first slot section 1120a, so that the linkage cooperation of the outward-opening linkage board 112 and the opening linkage board 114 is realized. It can be understood that because the linkage shaft 1212 is located at the first end part of the first long kidney-shaped hole 1140 and the first slot section 1120a of the L-shaped linkage slot 1120, when the outward-opening linkage board 112 rotates, the linkage shaft 1212 abuts against the outward-opening linkage board 112 and the opening linkage board 114 at the same time, and when the outward-opening linkage board 112 rotates, the opening linkage 114 is driven to rotate together.

[0040] When the safety swing arm mechanism 121 switches to the second position, in this case, the safety arrangement is locked; and the linkage shaft 1212 is located at the second end part of the first long kidney-shaped hole 1140 and the second slot section 1120b of the L-shaped linkage slot 1120, so that the linkage cooperation of the outward-opening linkage board 112 and the opening linkage board 114 is released. It can be understood that because the linkage shaft 1212 is located at the second end part and the second slot section 1120b, when the outward-opening linkage board 112 rotates, the outward-opening linkage board 112 does not contact the linkage shaft 1212, and when the outward-opening linkage board 112 rotates, the opening linkage board 114 is not driven to rotate.

[0041] The safety swing arm mechanism 121 further includes a safety reset spring, wherein the safety reset spring is sheathed on the swing arm rotating shaft 1210, the safety reset spring and the swing arm body 1211 as well as the opening linkage board 114 are in abutting cooperation, the safety reset spring is configured to keep the safety swing arm mechanism 121 at the first position, that is, to keep the linkage shaft 1212 at the first end part and in the first slot section 1120a. Therefore, it can be understood that by the safety reset spring, the safety swing arm mechanism 121 always has a tendency to move from the second position to the first position. Optionally, the safety reset spring is a torsional spring.

[0042] Rotation directions of the safety linkage board

123 includes a first rotation direction and a second rotation direction, wherein the first rotation direction is opposite to the second rotation direction, as shown in Fig. 4, the first rotation direction of the safety linkage board 123 is anticlockwise, and the second rotation direction is clockwise.

[0043] Further preferably, the safety linkage board 123 is provided with a U-shaped notch 1230 adaptive to the linkage shaft 1212, wherein the U-shaped notch 1230 has a side wall surface.

[0044] When the safety linkage board 123 is located between the outward-opening linkage board 112 and the inward-opening linkage board 113, an opening of the U-shaped notch 1230 faces the linkage shaft 1212 in the safety swing arm mechanism 121.

[0045] When the safety is locked, the side wall surface of the U-shaped notch 1230 abuts against the linkage shaft 1212 in the safety swing arm mechanism 121, at this moment, when the safety linkage board 123 is driven to rotate in the first rotation direction, the side wall surface of the U-shaped notch 1230 does not abut against the linkage shaft 1212, the safety swing arm mechanism 121 moves toward the first position under the action of the safety reset spring, the linkage shaft 1212 moves toward the first end part of the first long kidney-shaped hole 1140, and at the same time, the linkage shaft 1212 enters the first slot section 1120a of the L-shaped linkage slot 1120 so as to unlock the safety arrangement.

[0046] When the safety arrangement is unlocked and the safety linkage board 123 is driven to rotate in the second rotation direction again, the side wall surface of the U-shaped notch 1230 pushes against the linkage shaft 1212 of the safety swing arm mechanism 121 to move toward the second position so as to overcome an elastic force of the safety reset spring, at this moment, the side wall surface of the U-shaped notch 1230 abuts against the linkage shaft 1212 so as to push the linkage shaft 1212 to move toward the second end part of the first long kidney-shaped hole 1140, and at the same time, the linkage shaft 1212 enters the second slot section 1120b of the L-shaped linkage slot 1120 so as to lock the safety arrangement.

[0047] It can be seen from the above that through the switching of the safety linkage board 123 between the first rotation direction and the second rotation direction, the switching of the safety swing arm mechanism 121 between the first position and the second position is realized, that is, the switching of the safety arrangement between unlocking and locking is realized.

[0048] In the present embodiment, when the safety arrangement is locked, because the inward-opening linkage board 113 abuts against the safety linkage board 123, the inward-opening linkage board 113 can push against the safety linkage board 123 by driving the inward-opening linkage board 113 to rotate so as to unlock the safety arrangement. When the inward-opening linkage board 113 is driven to rotate again, the inward-opening linkage board 113 drives the opening linkage aboard

114 via the outward-opening linkage board 112 to rotate together so as to drive the lock body assembly 400 to perform an unlocking action.

[0049] Specifically, the inward-opening linkage board 113 further includes a rotating body part 1130 and a toggling arm 1131 connected to the rotating body part 1130, wherein the rotating body part 1130 and the bottom board 111 are in rotations cooperation, that is, the rotating body part 1130 is mounted on the central control rotating shaft 1110. The toggling arm 1131 extends away from the rotating body part 1130, the toggling arm 1131 is in an arc shape, an end part of the toggling arm 1131 is provided with a safety toggling pin 1132, wherein the safety toggling pin 1132 and a side edge of the safety linkage board 123 are in abutting cooperation, and the safety toggling pin 1132 is configured to drive the safety linkage board 123 to rotate in the first rotation direction.

[0050] Further preferably, the central structure assembly 100 further includes a child lock structure 115, wherein the inward-opening linkage board 113 and the outward-opening linkage board 112 are in ratchet cooperation via the child lock structure 115. The child lock structure 115 includes a switch board 1150 and a driving shaft 1151, wherein the switch board 1150 is rotatably provided on the bottom board 111, the driving shaft 1151 is connected to the switch board 1150 and the inward-opening linkage board 113, the switch board 1150 can drive the driving shaft 1151 to selectively abut against the outward-opening linkage board 112 so as to realize the ratchet cooperation of the inward-opening linkage board 113 and the outward-opening linkage board 112 when the safety arrangement is locked.

[0051] The rotating body part 1130 of the inward-opening linkage board 113 is further provided with a driving arm 1133, wherein the driving arm 1133 extends away from the toggling arm 1131, and the driving arm 1133 is provided with a second long kidney-shaped hole 1134.

[0052] The switch board 1150 is in a long strip shape, the switch board 1150 and the bottom board 111 are in rotation cooperation via a pin shaft 1111, and one end, away from the pin shaft 1111, of the switch board 1150 is provided with a third long kidney-shaped hole 1150a, wherein the third long kidney-shaped hole 1150a is in an arc shape.

[0053] The driving shaft 1151 is of a stepped structure, and the driving shaft 1151 includes a first sliding shaft part 1151a, a driving part 1151b and a second sliding shaft part 1151c in sequence along an axial direction.

[0054] When the driving shaft 1151 is mounted, the first sliding shaft part 1151a is located in the second long kidney-shaped hole 1134, the second sliding shaft part 1151c is located in the third long kidney-shaped hole 1150a, and the driving part 1151b is located between the inward-opening linkage board 113 and a base. A diameter of the driving part 1151b is greater than those of the first sliding shaft part 1151a and the second sliding shaft part 1151c so as to prevent the driving shaft 1151 from falling off during use.

[0055] Further preferably, one side, close to the third long kidney-shaped hole 1150a, of the switch board 1150 is provided with a toggling rod 1150b, and the switch board 1150 is driven to rotate by pushing the toggling rod 1150b.

[0056] One side, close to the driving shaft 1151, of the outward-opening linkage board 112 is further provided with a retaining bayonet 1121, when the switch board 1150 drives the driving shaft 1151 to abut against the outward-opening linkage board 112, the first sliding shaft part 1151a and the second sliding shaft part 1151c slide along the corresponding second long kidney-shaped hole 1134 and third long kidney-shaped hole 1150a, the driving part 1151b can be accommodated into the retaining bayonet 1121, which is defined as unlocking of the child lock, if at this moment, the safety arrangement is locked, the outward-opening linkage board 112 can rotate in a preset direction, and the inward-opening linkage board 113 remains stationary; and when the inward-opening linkage board 113 is also driven to rotate in the same preset direction, the inward-opening linkage board 113 drives the outward-opening linkage board 112 via the driving part 1151b to rotate synchronously. If at this moment, the safety arrangement is unlocked, when the outward-opening linkage board 112 rotates in a preset direction, the inward-opening linkage board 113 is driven via the linkage shaft 1212 to rotate together; and when the inward-opening linkage board 113 is also driven to rotate in the same preset direction, the inward-opening linkage board 113 drives the outward-opening linkage board 112 via the driving part 1151b to rotate synchronously.

[0057] It can be understood that the switch board 1150 drives the driving shaft 1151 not to abut against the outward-opening linkage board 112, which is defined as locking of the child lock, if at this moment, the safety arrangement is locked, the outward-opening linkage board 112 can rotate in a preset direction, and the inward-opening linkage board 113 remains stationary; and when the inward-opening linkage board 113 is also driven to rotate in the same preset direction, because the driving part 1151b does not abut against the retaining bayonet 1121, the inward-opening linkage board 113 does not drive the outward-opening linkage board 112 to rotate. If at this moment, the safety arrangement is unlocked, when the outward-opening linkage board 112 rotates in a preset direction, the inward-opening linkage board 113 is driven via the linkage shaft 1212 to rotate together; and when the inward-opening linkage board 113 is also driven to rotate in the same preset direction, the inward-opening linkage board 113 does not drive the outward-opening linkage board 112 to rotate.

[0058] Referring to Fig. 11 and Fig. 12, it can be seen from the above that the automobile door lock has the following four states: in a first state, as shown in Fig. 11, the child lock is unlocked and the safety arrangement is unlocked at the same time, an unlocking action can be performed by pulling an inward-opening hand shank 220

or an outward-opening hand shank 320; in a second state, the child lock is unlocked and the safety arrangement is locked at the same time, the safety arrangement is unlocked by pulling the inward-opening hand shank 220 for the first time, an unlocking action can be performed by pulling the inward-opening hand shank 220 for the second time, and the unlocking action cannot be performed by directly pulling the outward-opening hand shank 320; in a third state, the child lock is locked and the safety arrangement is unlocked at the same time, an unlocking action cannot be performed by pulling the inward-opening hand shank 220, and the unlocking action can be performed by pulling the outward-opening hand shank 320; and in a fourth state, as shown in Fig. 12, the child lock is locked and the safety arrangement is locked at the same time, an unlocking action cannot be performed by pulling the inward-opening hand shank 220 or the outward-opening hand shank 320, but the safety arrangement can be unlocked by pulling the inward-opening hand shank 220.

[0059] In some embodiments, the switch board 1150 is further provided with a second limiting pin 1150c, wherein the second limiting pin 1150c is close to the pin shaft 1111 connected between the switch board 1150 and the bottom board 111, and the bottom board 111 is provided with a U-shaped limiting bayonet 1114, and the second limiting pin 1150c and with the limiting bayonet 1114 are in touching cooperation so as to limit the switch board 1150 in the rotation direction.

[0060] Referring to Fig. 5, in some other embodiments, one end, away from the third long kidney-shaped hole 1150a, of the switch board 1150 is provided with a spherical hump 1150d, the base is provided with two grooves 1113 adaptive to the hump 1150d, positions of the two grooves 1113 respectively correspond to two position states of the driving part 1151b located at the retaining bayonet 1121 and disengaged from the retaining bayonet 1121, and when the switch board 1150 is pushed to rotate, the hump 1150d switches between the two grooves 1113.

[0061] It can be understood that, on one hand, by the cooperation of the hump 1150d and the grooves 1113, the switch board 1150 after switching can be positioned, thereby avoiding a switching failure caused by mis-touching the switch board 1150; and on the other hand, the hump 1150d makes a ticking sound when switching between the two grooves 1113, so that whether the switch board 1150 is pushed in place can be judged conveniently.

[0062] Further preferably, in order to enable the outward-opening linkage board 112, the inward-opening linkage board 113, and the opening linkage board 114 to return back to the original positions in time after rotating, torsional springs are provided between the outward-opening linkage board 112, the inward-opening linkage board 113, the opening linkage board 114 and the bottom board 111.

[0063] Referring to Fig. 3, Fig. 4 and Fig. 5, in order to

limit a rotation stroke of the opening linkage board 114, the bottom board 111 is provided with a first limiting pin 1112, wherein the first limiting pin 1112 penetrates through the opening linkage board 114, and the opening linkage board 114 is provided with a limiting hole 1141 for allowing the first limiting pin 1112 to pass through, the limiting hole 1141 is in an arc shape, a length of the limiting hole 1141 can limit the maximum rotation stroke of the opening linkage board 114, thereby preventing the opening linkage board 114 from rotating to a dead point and ensuring the normal use of the automobile door lock.

[0064] Referring to Fig. 3 and Fig. 4, in some embodiments, the opening linkage board 114 is further provided with an emergency switch stay wire 130, wherein in any case, the automobile door can be opened by pulling the emergency switch stay wire 130.

[0065] Referring to Fig. 2 and Fig. 6, the inward-opening handle assembly 200 includes an inward-opening handle base 210, an inward-opening hand shank 220 and a safety button 230 that are rotatably provided on the inward-opening handle base 210, wherein the inward-opening hand shank 220 is connected to the inward-opening linkage board 113 via a first stay wire component 221, and the safety button 230 is connected to the safety linkage board 123 via a second stay wire component 231.

[0066] Referring to Fig. 1, Fig. 2 and Fig. 7, the outward-opening handle assembly 300 includes an outward-opening handle base 310, an outward-opening hand shank 320, and an outward-opening switching mechanism 360, wherein one end of the outward-opening hand shank 320 is provided on the outward-opening handle base 310, and the other end of the outward-opening hand shank 320 is connected to the outward-opening linkage board 112 via the outward-opening switching mechanism 360 and a pull rod 321, the outward-opening hand shank 320 is further provided with a PEPS button 330, and the PEPS button 330 is electrically connected to a controller in the vehicle. A PEPS button is a "Passive Entry Passive Start" button and initiates or enables a phone-as-a-key method for radio-controlled authentication of vehicle access applications.

[0067] In some embodiments, the outward-opening handle base 310 is provided with a lock cylinder 340, wherein the lock cylinder 340 is provided with a key hole, and the lock cylinder 340 is connected to the safety linkage board 123 via a transmission pin 350, that is, an automobile key is inserted into the key hole of the lock cylinder 340, the safety linkage board 123 is driven to rotate through the rotation of the transmission pin 350 by twisting the automobile key so as to lock and unlock the safety arrangement.

[0068] In the present embodiment, the automobile door lock further includes a remote key assembly, wherein the remote key assembly is in a communication connection with the controller in the vehicle, the controller is electrically connected to the safety actuator 122, the remote key assembly is configured to control the action of

the safety actuator 122, that is, the remote key assembly controls the safety actuator 122 to drive the safety linkage board 123 to rotate so as to unlock and lock the safety arrangement.

[0069] Referring to Fig. 2, Fig. 8, Fig. 9 and Fig. 10, further, in the present embodiment, two lock body assemblies 400 are provided, the two lock body assemblies 400 are vertically distributed, that is, a two-point lock structure is realized, so that the locking effect is better and safer.

[0070] The two lock body assemblies 400 both include a mounting shell body 410, a lock body transmission mechanism 420, and a switching swing arm mechanism 430, wherein the mounting shell body 410 has an accommodation cavity for accommodating the lock body transmission mechanism 420.

[0071] The mounting shell body 410 includes two cover boards 411 that are arranged on left and right and an end board 412 located between the two cover boards 411, that is, the two cover boards 411 are arranged opposite to each other, the end board 412 is arranged between the two cover boards 411, and the two cover boards 411 and the end board 412 form the accommodation cavity in an enclosing manner.

[0072] The lock body transmission mechanism 420 includes a lock body base 421, a rotating tongue piece 422, and a stop hook 423, wherein the lock body base 421 is connected to one cover board 411 in the mounting shell body 410, the rotating tongue piece 422 and the stop hook 423 are both rotatably provided on the lock body base 421, and the stop hook 423 and the rotating tongue piece 422 are in spline cooperation.

[0073] Further preferably, the lock body base 421 is provided with a rotating tongue rotating shaft 424, wherein the rotating tongue piece 422 is mounted on the rotating tongue rotating shaft 424, a lower end surface of the lock body base 421 is provided with a clearance 4210 for accommodating the rotating tongue piece 422, one end, facing the clearance 4210, of the rotating tongue piece 422 is provided with a U-shaped lock notch 4220, and an opening of the lock notch 4220 is obliquely arranged and faces a bottom of the lock body base 421. The lock notch 4220 is adaptive to a U-shaped lock latch 500 provided on a door frame, in the process of closing the automobile door, the U-shaped lock latch 500 enters the lock notch 4220 by impaction, so that the rotating tongue piece 422 rotates to close the automobile door, and in the process of opening the automobile door, the rotating tongue piece 422 rotates in an opposite direction to return back to the original position.

[0074] The switching swing arm mechanism 430 includes a mounting base 431 and a switching swing arm piece 432, wherein the mounting base 431 is connected to the mounting shell body 410, and certainly, the mounting base 431 may also be mounted independently of the mounting shell body 410. The switching swing arm piece 432 is rotatably provided on the mounting base 431, the switching swing arm piece 432 includes at least one input

end and at least one opposite output end, wherein the input end is connected to the opening linkage board 114, and the output end is connected to the stop hook 423.

[0075] The switching swing arm piece 432 is in an L shape, and the input end and the output end are respectively located at two ends of the L-shaped switching swing arm piece 432.

[0076] In some embodiments, the input end of the switching swing arm piece 432 is connected to the opening linkage board 114 via a third stay wire component 114a, and the output end of the switching swing arm piece 432 is connected to the stop hook 423 via a lock body opening connection rod 433. That is, when the opening linkage board 114 rotates, the switching swing arm piece 432 is driven via the third stay wire component 114a to rotate, the switching swing arm piece 432 drives the stop hook 423 to rotate via the lock body opening connection rod 433, and the stop hook 423 drives the rotating tongue piece 422 to rotate so as to release the cooperation of the rotating tongue piece 422 and the U-shaped lock latch 500.

[0077] Further preferably, in the upper lock body assembly 400, the input end of the switching swing arm piece 432 is connected to the safety linkage board 123 via an anti-mislock connection rod 450. In the process of closing the automobile door, when the rotating tongue piece 422 rotates, the stop hook 423 is pushed to rotate, the stop hook 423 further pushes the switching swing arm piece 432 via the lock body opening connection rod 433 to rotate, if at this moment, the safety arrangement is locked, the switching swing arm piece 432 pushes the safety linkage board 123 via the anti-mislock connection rod 450 to rotate so as to unlock the safety arrangement, thereby avoiding the mislock of the automobile door.

[0078] The lock body assembly 400 further includes a self-priming motor mechanism 440, and the rotating tongue piece 422 includes a first gear and a second gear, the self-priming motor mechanism 440 is electrically connected to the controller in the vehicle, and the self-priming motor mechanism 440 is configured to drive the rotating tongue piece 422 to switch from the first gear to the second gear.

[0079] As shown in Fig. 10, one end, cooperating with the stop hook 423, of the rotating tongue piece 422 is provided with a front gear tooth 4221 and a rear gear tooth 4222, the stop hook 423 is correspondingly provided with a retaining tooth 4230, torsional springs are provided between the rotating tongue piece 422 and the lock body base 421, and between the stop hook 423 and the lock body base 421. Under the actions of the torsional springs, when the rotating tongue piece 422 is located at the first gear, the retaining tooth 4230 abuts against the front gear tooth 4221 so as to restrict contrarotation of the rotating tongue piece 422; and when the rotating tongue piece 422 is located at the second gear, the retaining tooth 4230 abuts against the rear gear tooth 4222 so as to restrict contrarotation of the rotating tongue piece 422.

[0080] Further preferably, the self-priming motor mechanism 440 includes a self-priming base 441, a self-priming motor 442, a self-priming transmission mechanism 443, and a self-priming swing arm 445, wherein the self-priming motor 442 and the self-priming transmission mechanism 443 are both provided on the self-priming base 441, an input end of the self-priming transmission mechanism 443 is connected to the self-priming motor 442, an output end of the transmission mechanism is connected to the self-priming swing arm 445 via a fourth stay wire component 444, the self-priming swing arm 445 is connected to the rotating tongue piece 422, the self-priming motor 442 drives the self-priming swing arm 445 via the self-priming transmission mechanism 443 to rotate so as to drive the rotating tongue piece 422 to rotate, so that the retaining tooth 4230 switches from abutting against the front gear tooth 4221 to abutting against the rear gear tooth 4222, thereby realizing the switching of the rotating tongue piece 422 from the first gear to the second gear.

[0081] The lock body assembly 400 further includes two micro switches 425, wherein the two micro switches 425 are respectively provided on one side of the mounting shell body 410, the rotating tongue piece 422 is provided with a positioning shaft 426, the positioning shaft 426 penetrates through the two sides of the mounting shell 410 and cooperates with the micro switches 425 in a touching manner. When the rotating tongue piece 422 switches from the first gear to the second gear, the positioning shaft 426 triggers the micro switches 425, and at this moment, the self-priming motor 442 stops working.

[0082] With reference to the drawings, various functions of the automobile door lock provided in the present embodiment are realized as follows:

(I) safety locking:

1.1) the safety arrangement is locked by the safety actuator 122: the remote key assembly or the PEPS button 330 on the outward-opening hand shank 320 is pushed, and the safety actuator 122 is started up, so that the safety arrangement linkage board 123 is driven to rotate in the second rotation direction, the side wall surface of the U-shaped notch 1230 pushes against the linkage shaft 1212 of the safety swing arm mechanism 121 to move toward the second position so as to overcome the elastic force of the safety reset spring, at this moment, the side wall surface of the U-shaped notch 1230 abuts against the linkage shaft 1212 so as to push the linkage shaft 1212 to move toward the second end part of the first long kidney-shaped hole 1140, and at the same time, the linkage shaft 1212 enters the second slot section 1120b of the L-shaped linkage slot 1120 so as to lock the safety arrangement.

1.2) the safety arrangement is locked by the safety button 230: the safety button 230 located at the inward-opening handle base 210 is pushed to drive the safety linkage board 123 via the second stay wire component 231 to rotate in the second rotation direction so as to lock the safety arrangement.

1.3) the safety arrangement is locked by the automobile key: the automobile key is inserted into the key hole of the lock cylinder 340 and twisted to drive the safety linkage board 123 via the transmission pin 350 to rotate in the second rotation direction so as to lock the safety arrangement.

(II) safety unlocking:

2.1) the safety arrangement is unlocked by the safety actuator 122: the remote key assembly or the PEPS button 330 on the outward-opening hand shank 320 is pushed, and the safety actuator 122 is shut down, so that the safety linkage board 123 is driven to rotate back to the first rotation direction, the side wall surface of the U-shaped notch 1230 does not abut against the linkage shaft 1212, the safety swing arm mechanism 121 moves toward the first position under the action of the safety reset spring, the linkage shaft 1212 moves toward the first end part of the first long kidney-shaped hole 1140, and at the same time, the linkage shaft 1212 enters the first slot section 1120a of the L-shaped linkage slot 1120 so as to unlock the safety arrangement.

2.2) the safety arrangement is unlocked by the safety button 230: the safety button 230 is pushed reversely to drive the safety linkage board 123 via the second stay wire component 231 to rotate back to the first rotation direction, and under the action of the reset spring, the safety swing arm mechanism 121 returns to the first position so as to unlock the safety arrangement.

2.3) the safety arrangement is unlocked by the automobile key: the automobile key is inserted into the key hole of the lock cylinder 340 and twisted reversely to drive the safety linkage board 123 via the transmission pin 350 to rotate back to the first rotation position so as to unlock the safety arrangement.

(III) controlling the lock body assembly 400 to perform an unlocking action by pulling the outward-opening hand shank 320:

3.1) in a safety locking state, pulling the outward-opening hand shank 320 cannot control the lock

body assembly 400 to perform an unlocking action: specifically, the 320 is pulled to drive the outward-opening linkage board 112 to rotate in an unlocking direction through the linkage relationship between the outward-opening switching mechanism 360 and the pull rod 321. At this moment, because the linkage shaft 1212 is located at the second slot section 1120b of the L-shaped linkage slot 1120, the outward-opening linkage board 112 does not contact the linkage shaft 1212, so that rotating the outward-opening linkage board 112 cannot drive the opening linkage board 114 to rotate, and thus the lock body assembly 400 cannot be controlled to perform the unlocking action.

3.2) in a safety unlocking state, pulling the outward-opening hand shank 320 drives the outward-opening linkage board 112 to rotate in the unlocking direction through the linkage relationship between the outward-opening switching mechanism 360 and the pull rod 321. At this moment, because the linkage shaft 1212 is located at the first slot section 1120a of the L-shaped linkage slot 1120, when the outward-opening linkage board 112 rotates, the linkage shaft 1212 will abut against the outward-opening linkage board 112 and the opening linkage board 114 at the same time, and when the outward-opening linkage board 112 rotate, the opening linkage board 114 is driven to rotate together. When the opening linkage board 114 rotates, the switching swing arm piece 432 is driven via the third stay wire component 114a to rotate, the switching swing arm piece 432 drives the stop hook 423 via the lock body opening connection rod 433 to rotate, the stop hook 423 drives the rotating tongue piece 422 to rotate so as to release the cooperation between the rotating tongue piece 422 and the U-shaped lock latch 500, thereby completing the unlocking action.

(IV) controlling the lock body assembly 400 to perform an unlocking action by pulling the inward-opening hand shank 220:

4.1) in a safety unlocking and child lock unlocking state, the automobile door is opened by the inward-opening hand shank 220: the inward-opening hand shank 220 is pulled to drive the inward-opening linkage board 113 via the first stay wire component 221 to rotate in the unlocking direction. At this moment, the inward-opening linkage board 113 drives the outward-opening linkage board 112 via the driving shaft 1151 in the child lock structure 115 to rotate together. Because the safety arrangement is unlocked, the outward-opening linkage board 112 can

drive the opening linkage board 114 to rotate together. When the opening linkage board 114 rotates, the switching swing arm piece 432 is driven via the third stay wire component 114a to rotate, the switching swing arm piece 432 drives the stop hook 423 via the lock body opening connection rod 433 to rotate, and the stop hook 423 drives the rotating tongue piece 422 to rotate so as to release the cooperation between the rotating tongue piece 422 and the U-shaped lock latch 500, thereby completing the unlocking action.

4.2) in a safety locking and child lock unlocking state, the automobile door is opened by inward-opening hand shank 220: when the inward-opening hand shank 220 is pulled for the first time, the inward-opening linkage board 113 is driven via the first stay wire component 221 to rotate in the unlocking direction. At this moment, the inward-opening linkage board 113 drives the outward-opening linkage board 112 via the driving shaft 1151 in the child lock structure 115 to rotate together. Because the safety arrangement is locked, the outward-opening linkage board 112 cannot drive the opening linkage board 114 to rotate. At the same time, when the inward-opening linkage board 113 rotates, the safety linkage board 123 can be pushed via the safety toggling pin 1132 on the toggling arm 1131 to rotate so as to release the restriction of the safety linkage board 123 on the safety swing arm mechanism 121, so that the safety swing arm mechanism 121 automatically switches from the second position to the first position to unlock the safety arrangement.

When the inward-opening hand shank 220 is pulled for the second time, the action of opening the automobile door by the inward-opening hand shank 220 is the same as that in the above safety arrangement unlocking and child lock unlocking state.

4.3) in a child lock locking state, the automobile door cannot be opened by the inward-opening hand shank 220: when the inward-opening hand shank 220 is pulled, the inward-opening linkage board 113 is driven via the first stay wire component 221 to rotate in the unlocking direction. At this moment, the inward-opening linkage board 113 cannot drive the outward-opening linkage board 112 via the driving shaft 1151 in the child lock structure 115 to rotate together, so that the lock body assembly 400 cannot be controlled to perform the unlocking action.

(V) emergency unlocking: in any case, the opening linkage board 114 can be directly driven to rotate by

pulling the emergency switch stay wire 130 so as to control the lock body assembly 400 to perform the unlocking action. After the unlocking action is completed, the opening linkage board, the inward-opening linkage board and the outward-opening linkage board return back to the original positions under the action of the torsional springs.

[0083] The present embodiment further provides an automobile door together, wherein the automobile door can be applied to a recreation vehicle and includes the automobile door lock provided in the present embodiment.

[0084] According to the automobile door lock, integration of the outward-opening handle assembly 300, the inward-opening handle assembly 200, a safety function, a child lock function and an emergency switching function is realized by the central structure assembly 100, and thus the automobile door lock has a simpler overall structure, a compact structure and a small volume, and does not occupy an installation space.

[0085] In the present description, descriptions with reference to the terms of "an embodiment", "some embodiments", "example", "specific example", "some examples", etc. mean specific features, structures, materials or characteristics described in conjunction with the embodiment or example are included in at least one embodiment or example of the present disclosure. In the present description, the exemplary representations of the above terms do not necessarily refer to the same embodiment or example. Moreover, the described specific features, structures, materials or characteristics can be combined in any one or more embodiments or examples in a suitable manner. In addition, those skilled in the art can combine different embodiments or examples and features of different embodiments or examples described in the present description without contradicting each other.

Claims

1. Automobile door lock for an automobile door of a vehicle, wherein the automobile door lock comprises an outward-opening handle assembly (300), an inward-opening handle assembly (200), a central structure assembly (100), and at least one lock body assembly (400);

the central structure assembly (100) is provided inside the automobile door and comprises a transmission structure (110) and a safety structure (120);

the transmission structure (110) comprises a bottom board (111), an outward-opening linkage board (112), an inward-opening linkage board (113) and an opening linkage board (114) that are rotatably provided on the bottom board (111), wherein the outward-opening linkage

board (112), the inward-opening linkage board (113) and the opening linkage board (114) are provided along a normal direction of the bottom board (111) in sequence, the outward-opening linkage board (112) is configured to be linked with the opening linkage board (114) to rotate, and the inward-opening linkage board (113) is configured to be linked with the outward-opening linkage board (112) to rotate;

the outward-opening linkage board (112) is connected to the outward-opening handle assembly (300), the inward-opening linkage board (113) is connected to the inward-opening handle assembly (200), and each lock body assembly (400) is connected to the opening linkage board (114);

the safety structure (120) comprises a safety swing arm mechanism (121), a safety actuator (122), and a safety linkage board (123), wherein the safety swing arm mechanism (121) is provided on the opening linkage board (114), the safety swing arm mechanism (121) comprises a first position and a second position, the safety actuator (122) and the safety linkage board (123) are both provided on the bottom board (111), and the safety actuator (122) drives the safety linkage board (123) to rotate so as to drive the safety swing arm mechanism (121) to switch between the first position and the second position;

in an initial state, the safety swing arm mechanism (121) is located at the first position, the opening linkage board (114) and the outward-opening linkage board (112) are in linkage cooperation; and when the safety linkage board (123) drives the safety swing arm mechanism (121) to switch to the second position, the linkage cooperation between the opening linkage board (114) and the outward-opening linkage board (112) is released, and the inward-opening linkage board (113) abuts against the safety linkage board (123).

2. Automobile door lock according to claim 1, wherein the automobile door lock further comprises a remote key assembly, wherein the remote key assembly is in a communication connection with a controller in the vehicle, the controller is electrically connected to the safety actuator (122), and the remote key assembly is configured to control the action of the safety actuator (122).

3. Automobile door lock according to claim 1 or 2, wherein the bottom board (111) is provided with a central control rotating shaft (1110), and the outward-opening linkage board (112), the inward-opening linkage board (113), and the opening linkage board (114) are all provided on the central control

rotating shaft (1110).

4. Automobile door lock according to any preceding claim, wherein the safety swing arm mechanism (121) comprises a swing arm body (1211) and a linkage shaft (1212), wherein the swing arm body (1211) is rotatably provided on the opening linkage board (114) via a swing arm rotating shaft (1210), the linkage shaft (1212) is provided at one end, away from the swing arm rotating shaft (1210), of the swing arm body (1211), and the linkage shaft (1212) extends toward the bottom board (111);

the opening linkage board (114) is provided with a first long kidney-shaped hole (1140) for allowing the linkage shaft (1212) to pass through, the first long kidney-shaped hole (1140) comprises an first end part and a second end part that are distributed along a length direction, the first end part is close to a rotation center of the opening linkage board (114), the outward-opening linkage board (112) is provided with an L-shaped linkage slot (1120) for accommodating the linkage shaft (1212), and the L-shaped linkage slot (1120) has a first slot section (1120a) and a second slot section (1120b) that are communicated; in the initial state, the safety swing arm mechanism (121) is located at the first position, the linkage shaft (1212) is located at the first end part and the first slot section (1120a) so as to realize the linkage cooperation between the outward-opening linkage board (112) and the opening linkage board (114); and when the safety swing arm mechanism (121) switches to the second position, the linkage shaft (1212) is located at the second end part and the second slot section (1120b) so as to release the linkage cooperation between the outward-opening linkage board (112) and the opening linkage board (114).

5. Automobile door lock according to claim 4, wherein the safety swing arm mechanism (121) further comprises an safety reset spring, wherein the safety reset spring is sheathed on the swing arm rotating shaft (1210) and configured to keep the linkage shaft (1212) at the first end part and in the first slot section (1120a).
6. Automobile door lock according to any preceding claim, wherein rotation directions of the safety linkage board (123) comprise a first rotation direction and a second rotation direction, wherein the first rotation direction is opposite to the second rotation direction;

the safety linkage board (123) is provided with a U-shaped notch (1230), and the U-shaped

notch (1230) has a side wall surface;

when the safety linkage board (123) rotates in the second rotation direction, the side wall surface pushes against the safety swing arm mechanism (121) to move toward the second position; and when the safety linkage board (123) rotates in the first rotation direction, the side wall surface does not push against the safety swing arm mechanism (121).

7. Automobile door lock according to claim 6, wherein the inward-opening linkage board (113) further comprises a rotating body part (1130) and a toggling arm (1131) connected to the rotating body part (1130), wherein the rotating body part (1130) and the bottom board (111) are in rotation cooperation, the toggling arm (1131) extends away from the rotating body part (1130), an end part of the toggling arm (1131) is provided with a safety toggling pin (1132), the safety toggling pin (1132) and a side edge of the safety linkage board (123) are in abutting cooperation, and the safety toggling pin (1132) is configured to drive the safety linkage board (123) to rotate in the first rotation direction.
8. Automobile door lock according to any preceding claim, wherein the inward-opening handle assembly (200) comprises an inward-opening handle base (210), an inward-opening hand shank (220) and a safety button (230) that are rotatably provided on the inward-opening handle base (210), wherein the inward-opening hand shank (220) is connected to the inward-opening linkage board (113) via a first stay wire component (221), and the safety button (230) is connected to the safety linkage board (123) via a second stay wire component (231).
9. Automobile door lock according to any preceding claim, wherein the outward-opening handle assembly (300) comprises an outward-opening handle base (310), an outward-opening hand shank (320), and an outward-opening switching mechanism (360), wherein one end of the outward-opening hand shank (320) is rotatably provided on the outward-opening handle base (310), the other end of the outward-opening hand shank (320) is connected to the outward-opening linkage board (112) via the outward-opening switching mechanism (360), the outward-opening hand shank (320) is further provided with a PEPS button (330), and the PEPS button (330) is electrically connected to the controller in the vehicle.
10. Automobile door lock according to any preceding claim, wherein the central structure assembly (100) further comprise a child lock structure (115), wherein the child lock structure (115) comprises a switch board (1150) and a driving shaft (1151), the switch

board (1150) is rotatably provided on the bottom board (111), the driving shaft (1151) is connected between the switch board (1150) and the inward-opening linkage board (113), and the switch board (1150) is capable of driving the driving shaft (1151) to selectively abut against the outward-opening linkage (112) board. 5

11. Automobile door lock according to any preceding claim, wherein the lock body assembly (400) comprises a mounting shell body (410), a lock body transmission mechanism (420), and a switching swing arm mechanism (430); 10

the lock body transmission mechanism (420) is provided inside the mounting shell body (410), and the lock body transmission mechanism (420) and a U-shaped lock latch (500) on the automobile door in impaction cooperation; and the switching swing arm mechanism (430) comprises a mounting base (431) and a switching swing arm member (432), the switching swing arm member (432) is rotatably provided on the mounting base (431), one end of the switching swing arm member (432) is connected to the lock body transmission mechanism (420), and the other end of the switching swing arm member (432) is connected to the opening linkage board (114). 15 20 25 30

12. Automobile door lock according to claim 11, wherein the switching swing arm member (432) is connected to the safety linkage board (123) via an anti-mislock connection rod (450). 35

13. Automobile door for a recreation vehicle comprising an automobile door lock according to anyone of claims 1 to 12. 40 45 50 55

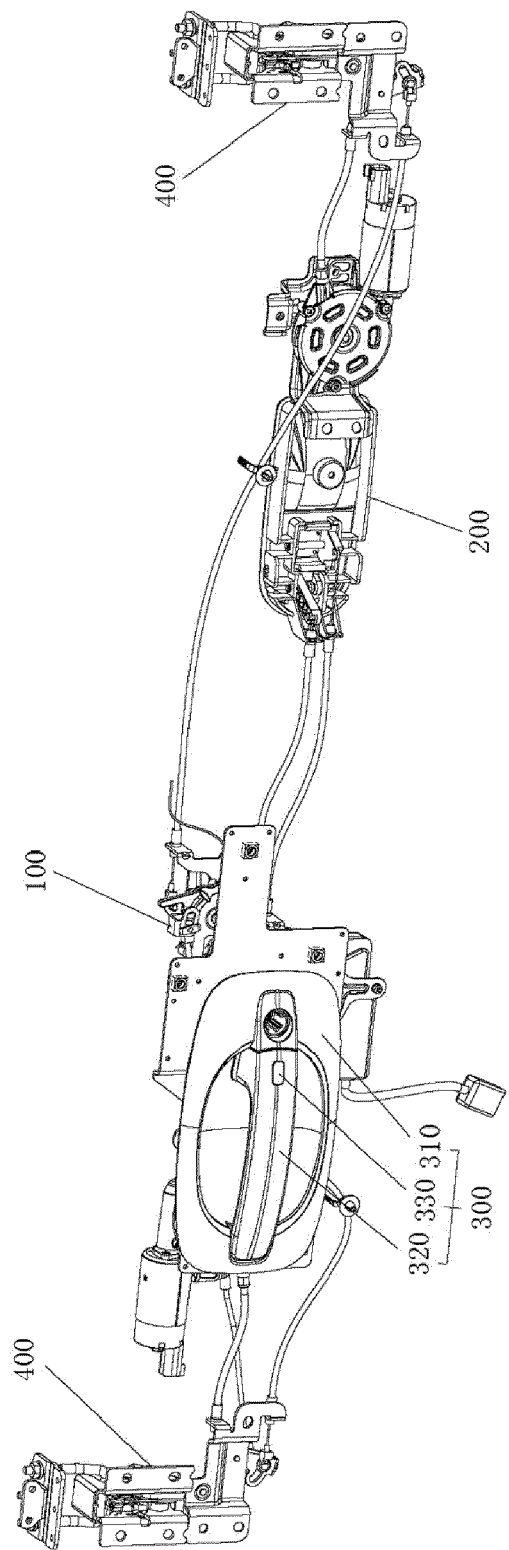


Fig. 1

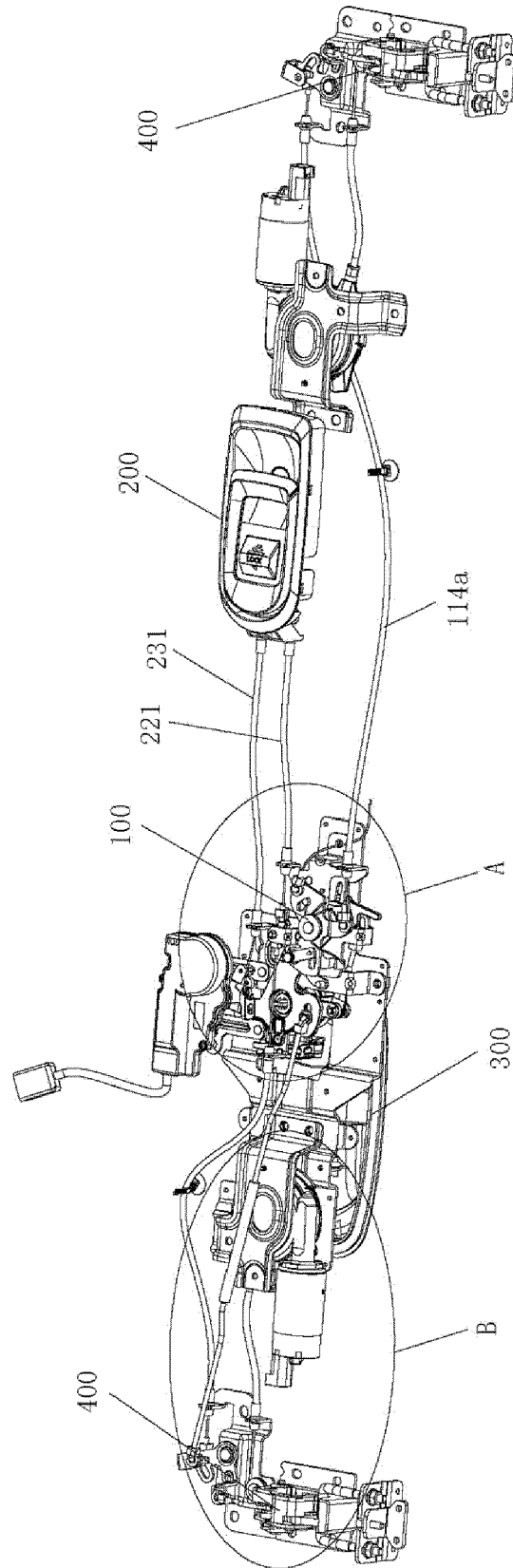


Fig. 2

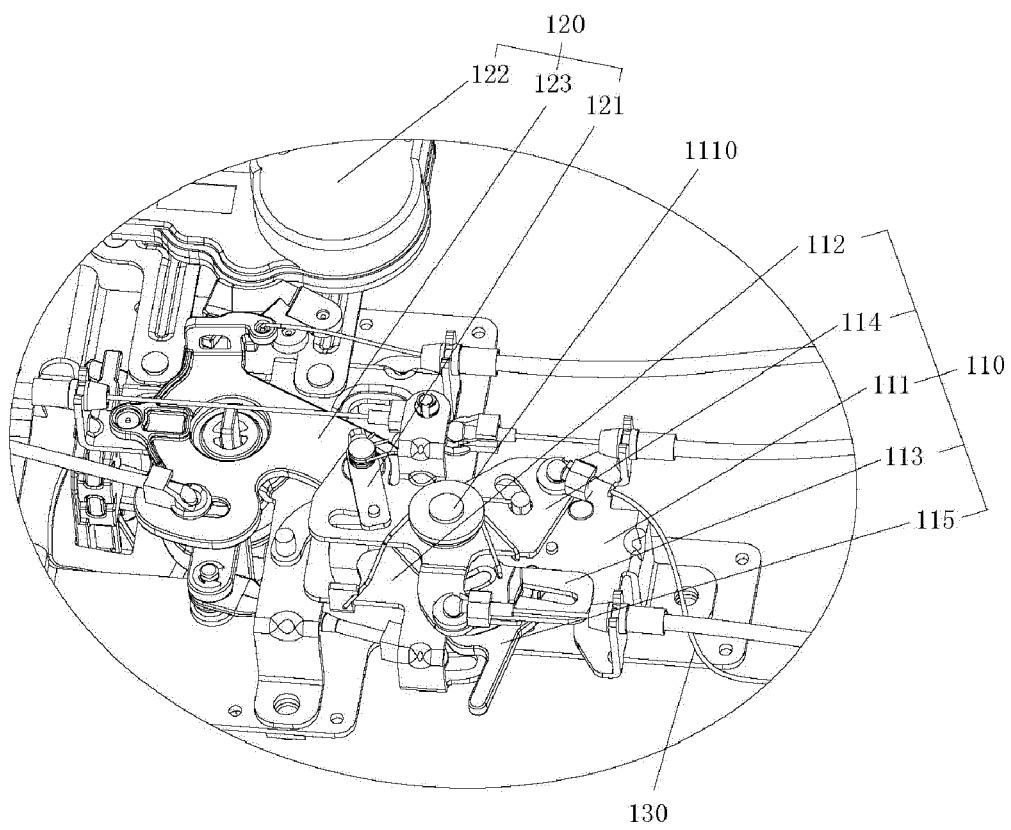


Fig. 3

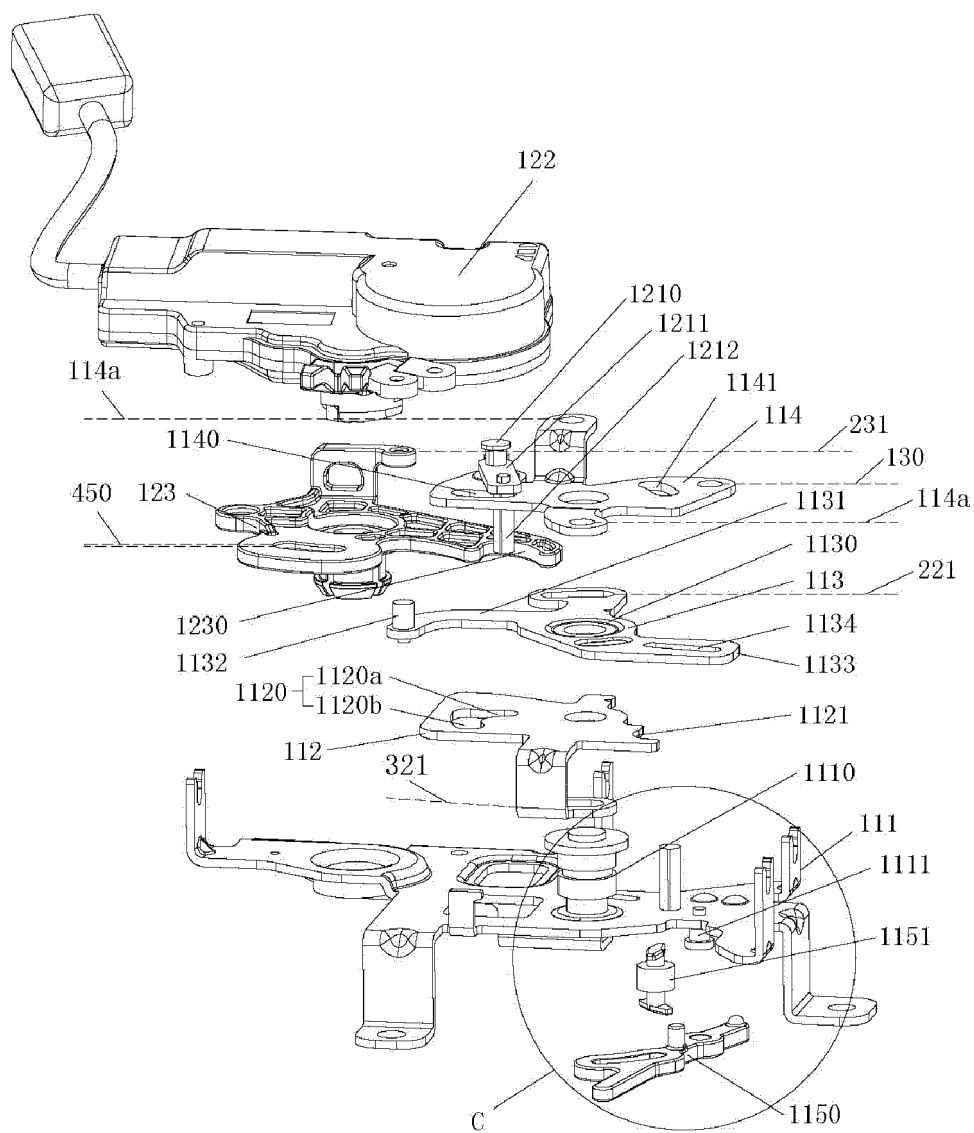


Fig. 4

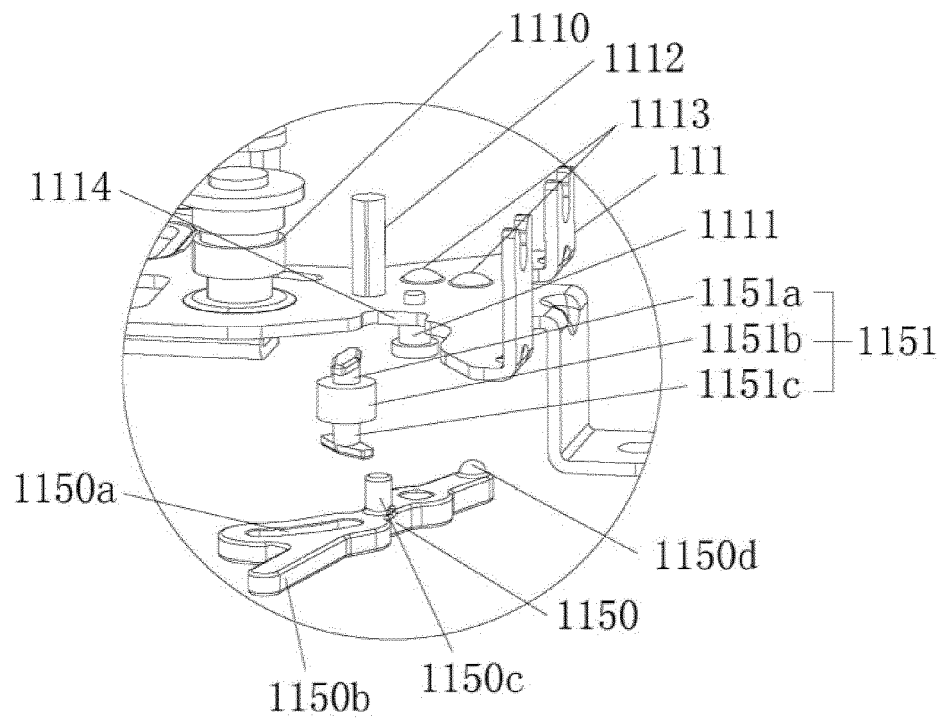


Fig. 5

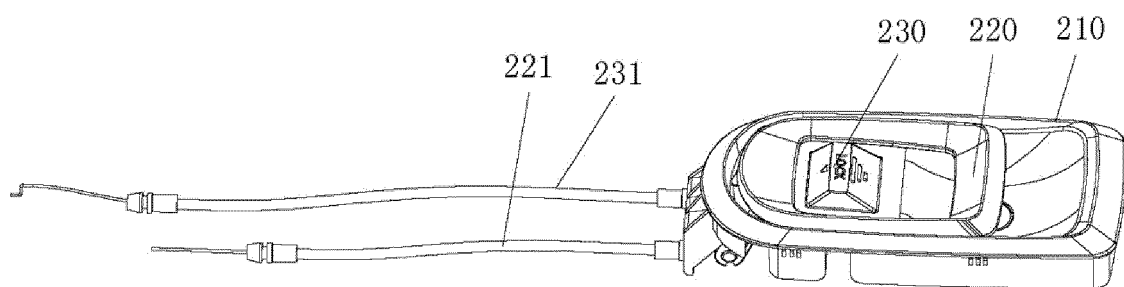


Fig. 6

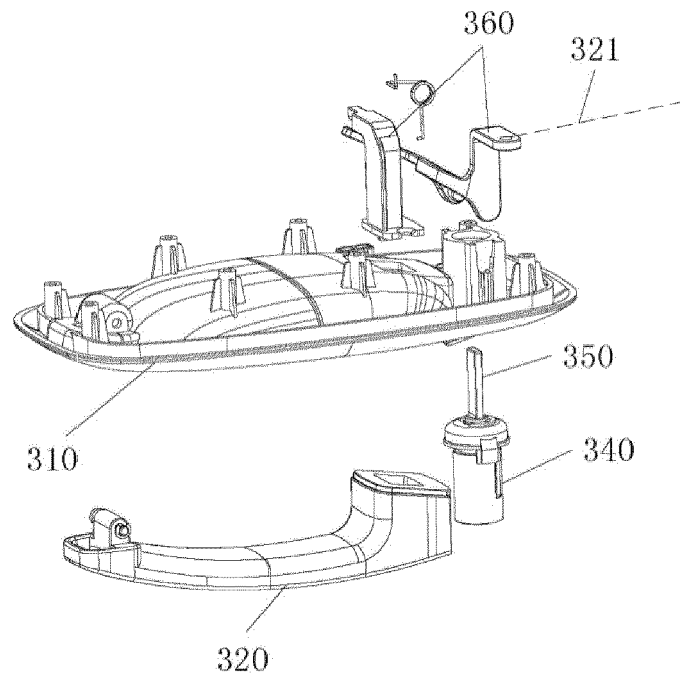


Fig. 7

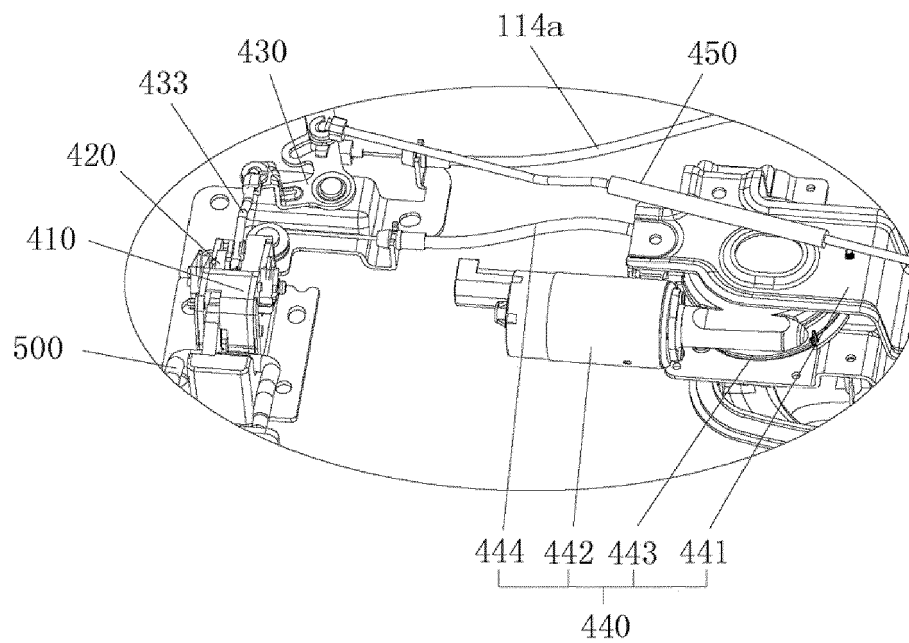


Fig. 8

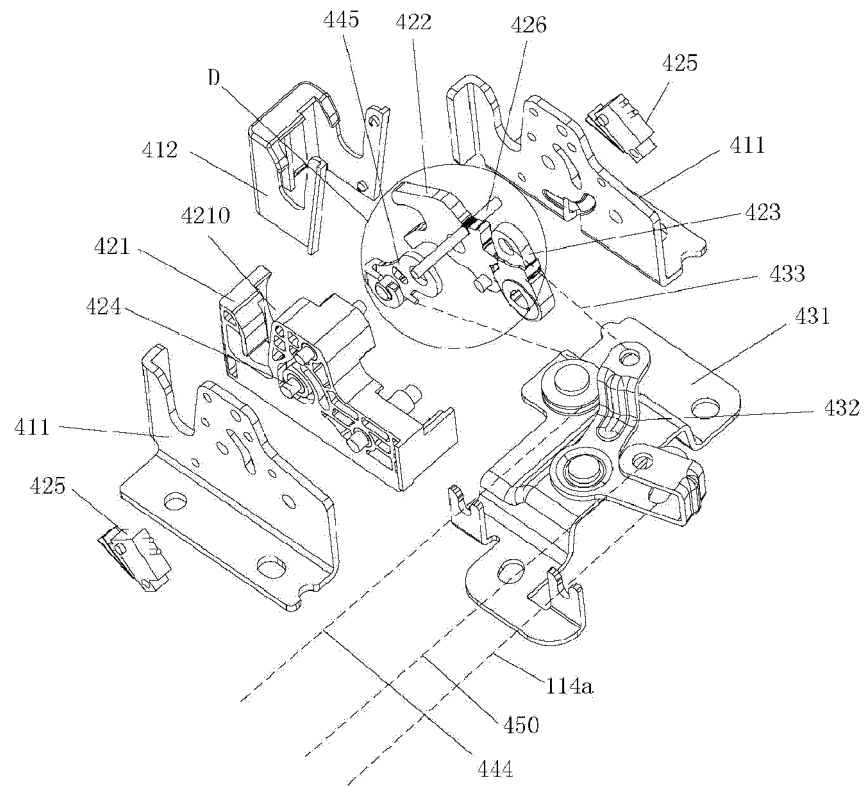


Fig. 9

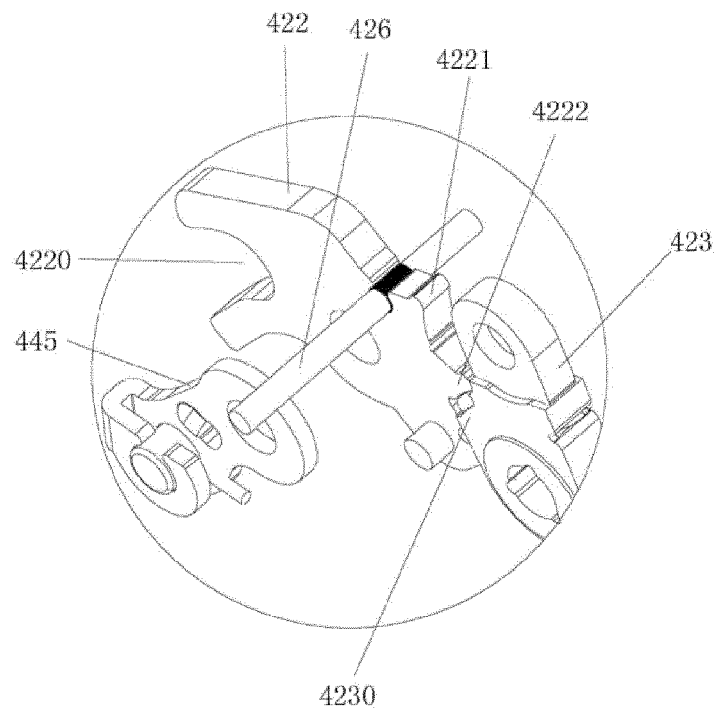


Fig. 10

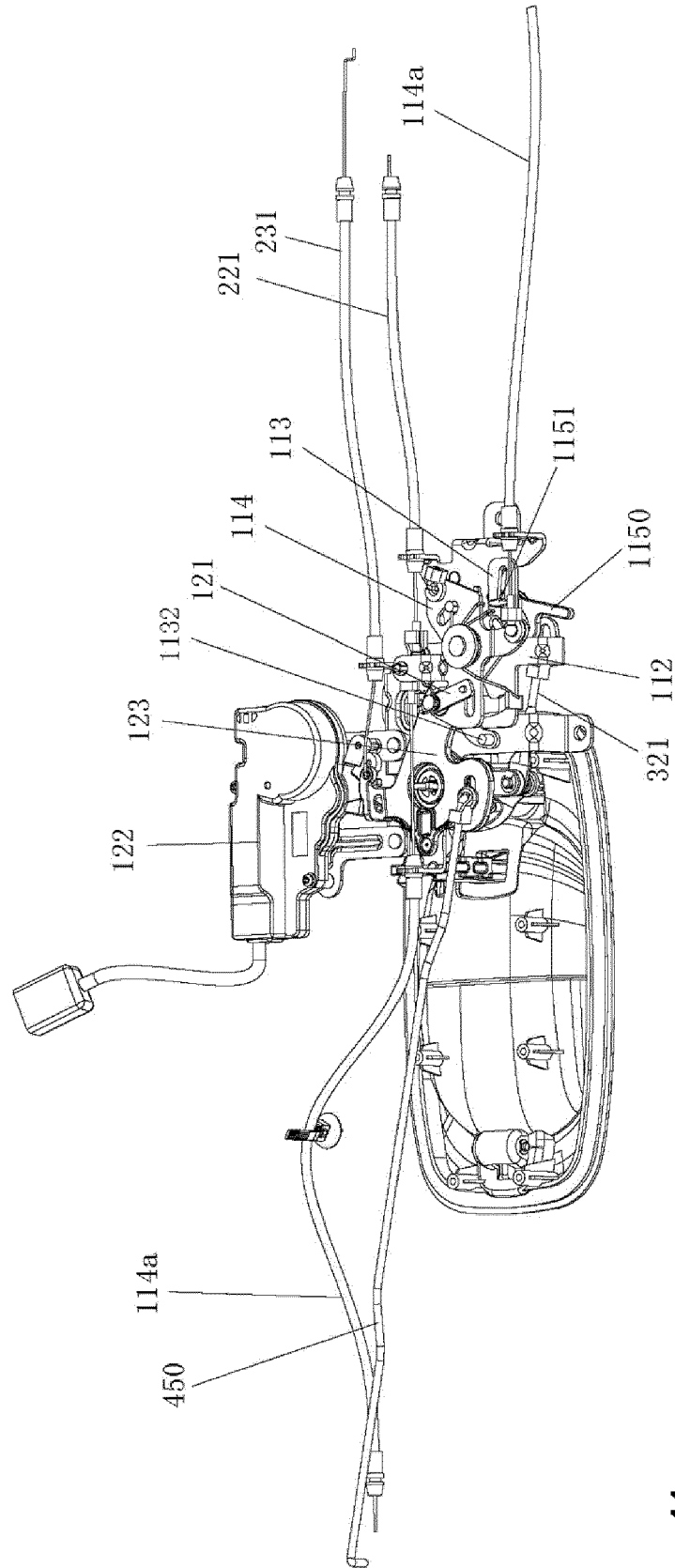


Fig. 11

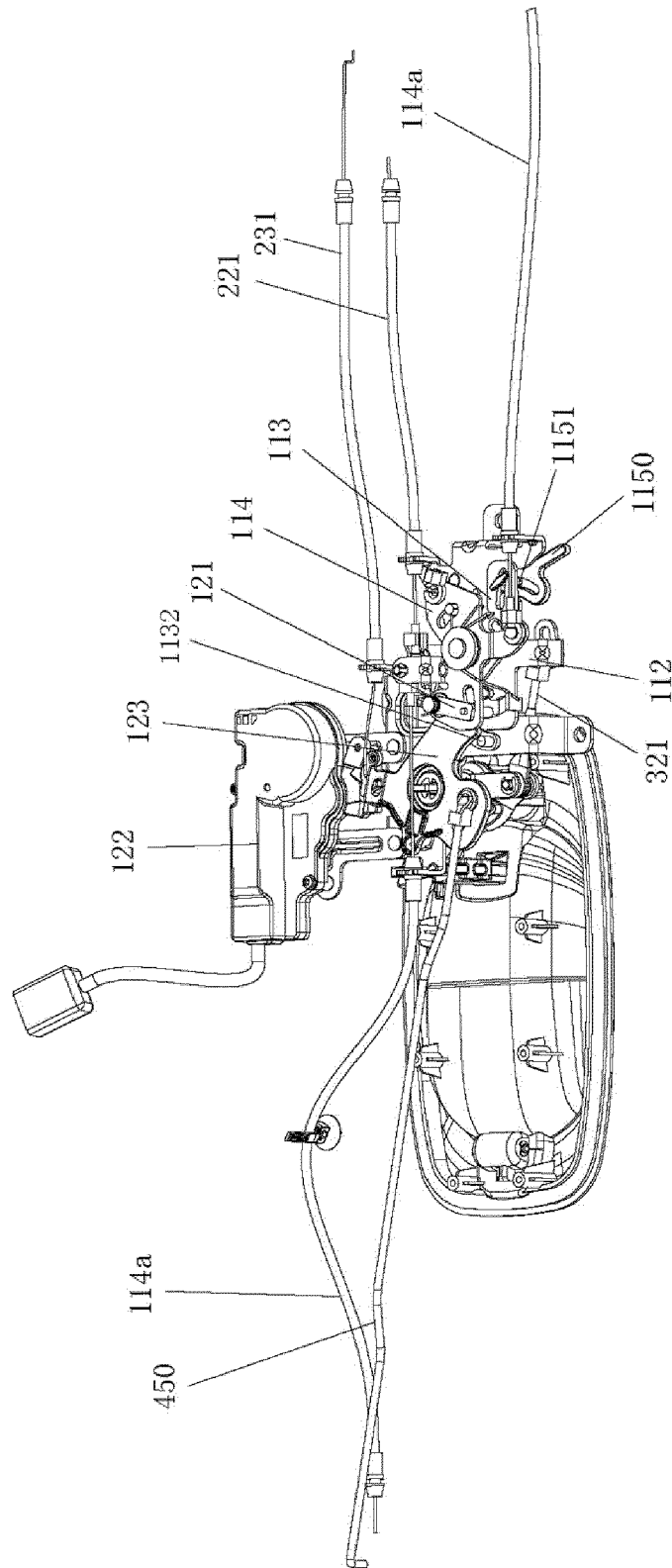


Fig. 12



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