(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 407 129 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
31.07.2024 Bulletin 2024/31

(21) Application number: **24152611.0**

(22) Date of filing: **18.01.2024**

(51) International Patent Classification (IPC):
E05B 79/08 *(2014.01)* ***E05B 83/36*** *(2014.01)*

(52) Cooperative Patent Classification (CPC):
E05B 83/36; E05B 79/08

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

(30) Priority: **23.01.2023 JP 2023008229**

(71) Applicant: **Mitsui Kinzoku ACT Corporation**
Yokohama-shi, Kanagawa 220-0011 (JP)

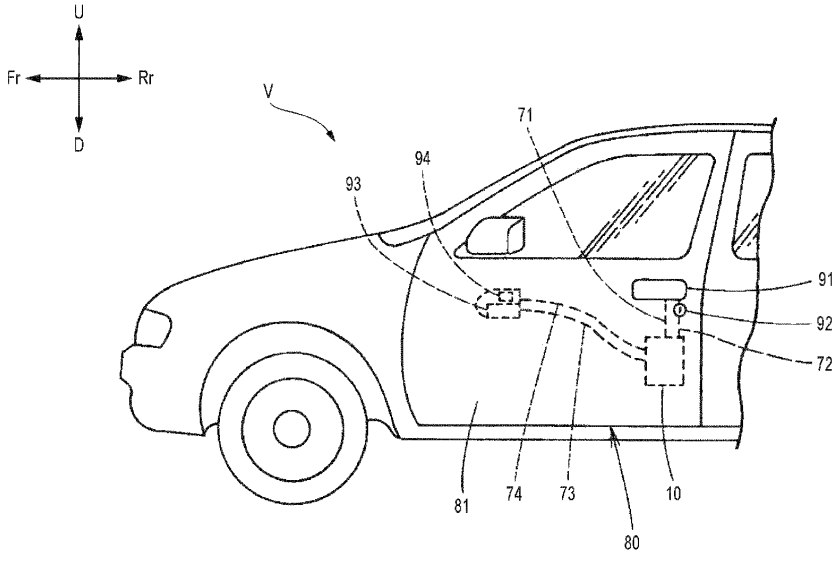
(72) Inventor: **Nagaoka, Tomoharu**
Yokohama-shi, Kanagawa, 220-0011 (JP)

(74) Representative: **Grünecker Patent- und Rechtsanwälte**
PartG mbB
Leopoldstraße 4
80802 München (DE)

(54) VEHICLE DOOR LATCH DEVICE

(57) A vehicle door latch device has a latch mechanism and an operation mechanism. The latch mechanism includes a ratchet engaging with a latch in the latch mechanism, and a release lever of the engagement. The operation mechanism includes three rotary shafts. A first rotary shaft rotatably supports a sub-lever engaging with the release lever and rotating about the first rotary shaft to operate the release lever. The second rotary shaft allows to rotatably support a first input lever or a lever link selectively. The first input lever receives an operation force of an outside handle and rotates about the second rotary shaft to operate the sub-lever. The lever link rotates about the second rotary shaft to operate the sub-lever. The third rotary shaft rotatably supports a second input lever which receives an operation force of an outside handle and rotates about the third rotary shaft to operate the lever link.

FIG. 1



EP 4 407 129 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a vehicle door latch device capable of holding a vehicle door in a closed state.

BACKGROUND ART

[0002] In the related art, there has been a vehicle door latch device capable of holding a vehicle door in a closed state. Generally, a vehicle door is provided with an outside handle and an operation force transmission member for transmitting an operation force applied to the outside handle. In addition, a vehicle door latch device generally includes a latch mechanism including a latch engageable with a striker provided on a vehicle body, and an operation mechanism that is coupled to the operation force transmission member and operates the latch mechanism by an operation force of the outside handle transmitted via the operation force transmission member.

[0003] For example, JP2000-064686A describes a vehicle door lock device that can facilitate the component management while enabling the assembling by improving the assembling performance even if a locked state switching unit for a front side door and a locked state switching unit for a rear side door have different configurations. This reduces the cost. JP4418319B discloses a vehicle door latch device that enables sharing of meshing structures and housings among door latch devices of different types.

[0004] The operation force transmission member for transmitting the operation force of the outside handle may be a bowden cable, a rod, or the like. The operating direction of the operation force transmission member may vary depending on the type of the operation force transmission member for transmitting the operation force of the outside handle. However, the vehicle door latch devices described in JP2000-064686A and JP4418319B are difficult to share between cases where the operating directions of the operation force transmission members for inputting the operation force of the outside handle to the vehicle door latch device are different, which leaves room for consideration.

SUMMARY OF INVENTION

[0005] An object of the present invention is to provide a vehicle door latch device that capable of easily supporting different operating directions of operation force transmission members for inputting an operation force of an outside handle to the vehicle door latch device.

(1) A vehicle door latch device having:

a latch mechanism including a latch configured to engage with a striker provided on a vehicle body; and

an operation mechanism configured to operate the latch mechanism,

in which the latch mechanism includes:

a ratchet configured to engage with the latch; and

a release lever configured to release engagement of the ratchet with the latch,

the operation mechanism includes:

a first rotary shaft;

a second rotary shaft positioned above the first rotary shaft and parallel to the first rotary shaft; and

a third rotary shaft positioned below the second rotary shaft and parallel to the first rotary shaft and the second rotary shaft,

the first rotary shaft rotatably supports a sub-lever configured to engage with the release lever and rotate about the first rotary shaft to operate the release lever,

the second rotary shaft allows to rotatably support a first input lever or a lever link selectively, the first input lever being configured to receive an operation force of an outside handle and rotate about the second rotary shaft to operate the sub-lever, the lever link being configured to rotate about the second rotary shaft to operate the sub-lever, and

the third rotary shaft is configured to rotatably support a second input lever configured to receive an operation force of an outside handle and rotate about the third rotary shaft to operate the lever link.

(2) The vehicle door latch device according to the above-described (1),

in which the sub-lever includes an input-side contact portion configured to come into contact with the first input lever or the lever link when the first input lever or the lever link rotates,

the first input lever includes an output-side contact portion configured to come into contact with the input-side contact portion of the sub-lever when the first input lever rotates,

the lever link includes an output-side contact portion configured to come into contact with the input-side contact portion of the sub-lever when the lever link rotates, and an input-side contact portion configured to come into contact with the second input lever when the second input lever rotates,

the second input lever includes an output-side contact portion configured to come into contact

with the input-side contact portion of the lever link when the second input lever rotates, and
when viewed in an axial direction of the first rotary shaft, the second rotary shaft, and the third rotary shaft, each of a rotary trajectory of the output-side contact portion of the first input lever, a rotary trajectory of the output-side contact portion of the lever link, and a rotary trajectory of the output-side contact portion of the second input lever at least partially overlaps a rotary trajectory of the input-side contact portion of the sub-lever.

(3) The vehicle door latch device according to the above-described (2),

in which the vehicle door latch device further includes a body member to which the latch mechanism and the operation mechanism are attached,
the latch is attached to a first surface on one side of the body member, and
the operation mechanism is attached to a second surface of the body member opposite to the first surface.

(4) The vehicle door latch device according to the above-described (3),

in which the body member is formed with a striker entry groove configured to allow the striker to enter from an inner side of the striker entry groove in a vehicle width direction, and
each of the first rotary shaft, the second rotary shaft, and the third rotary shaft is arranged below the striker entry groove.

(5) The vehicle door latch device according to any one of the above-described (1) to (4),

in which the vehicle door latch device further includes a body member to which the operation mechanism is attached,
the first input lever is provided with a cable coupling portion configured to be coupled to an inner cable of an operation force transmission member, which is a bowden cable including the inner cable and a cable outer through which the inner cable is inserted, configured to transmit an operation force of an outside handle, and
the body member is provided with, above the cable coupling portion of the first input lever, a cable outer fixing portion configured to fix an end of the cable outer of the operation force transmission member.

[0006] According to the present invention, since the configuration is selected whether the second rotary shaft rotatably supports the first input lever, or the second rotary shaft rotatably supports the lever link and the third rotary shaft rotatably supports the second input lever, in accordance with the operating direction of the member for inputting the operation force of the outside handle to the vehicle door latch device, it is easy to support different operating directions of operation force transmission members for inputting the operation force of the outside handle to the vehicle door latch device.

BRIEF DESCRIPTION OF DRAWINGS

[0007]

FIG. 1 is a left side view of a left front portion of a vehicle including a vehicle door latch device according to an embodiment of the present invention.
FIG. 2 is a rear perspective view of the main part of the vehicle door latch device of FIG. 1 as viewed from the right rear side.
FIG. 3 is a rear perspective view of the main part of the vehicle door latch device of FIG. 1 as viewed from the right rear side while omitting a main body.
FIG. 4 is a front perspective view of the main part of the vehicle door latch device of FIG. 1 as viewed from the left front.
FIG. 5 is a front perspective view of the main part of the vehicle door latch device of FIG. 1 as viewed from the right front.
FIG. 6 is a front view of the main part of the vehicle door latch device of FIG. 1 as viewed from the front when an operation force transmission member is a bowden cable and a second rotary shaft rotatably supports a first input lever.
FIG. 7 is a front view of the main part of the vehicle door latch device of FIG. 1 as viewed from the front when the operation force transmission member is a rod cable, the second rotary shaft rotatably supports a lever link, and a third rotary shaft rotatably supports a second input lever.

DESCRIPTION OF EMBODIMENTS

[0008] Hereinafter, a vehicle door latch device according to an embodiment of the present invention will be described with reference to the accompanying drawings. The drawings are to be viewed in the directions of reference signs. In the present description and the like, in order to simplify and clarify the description, the front, rear, left, right, up, and down directions are described according to the directions viewed from the driver of the vehicle on which the vehicle door latch device is mounted. In the drawings, Fr denotes the front side of the vehicle, Rr denotes the rear side, L denotes the left side, R denotes the right side, U denotes the upper side, and D denotes the lower side.

[0009] As illustrated in FIG. 1, a door latch device 10 is mounted on a left front door 80 of a vehicle V The left

front door 80 includes an outer panel 81 and an inner panel (not illustrated). The outer surface of the rear upper portion of the outer panel 81 is provided with an outside handle 91 for opening the door latch device 10 from the outside of the vehicle and a key cylinder 92 for unlocking and locking the door latch device 10 from the outside of the vehicle. The inner surface of the front portion of the inner panel is provided with an inside handle 93 for opening the door latch device 10 from the vehicle interior and a lock knob 94 for unlocking and locking the door latch device 10 from the vehicle interior. Further, the left front door 80 is provided with a first operation force transmission member 71 for transmitting an operation force applied to the outside handle 91 to the door latch device 10, a second operation force transmission member 72 for transmitting an operation force applied to the key cylinder 92 to the door latch device 10, a third operation force transmission member 73 for transmitting an operation force applied to the inside handle 93 to the door latch device 10, and a fourth operation force transmission member 74 for transmitting an operation force applied to the lock knob 94 to the door latch device 10.

[0010] Hereinafter, the left side may be referred to as the outer side in the vehicle width direction, and the right side may be referred to as the inner side in the vehicle width direction.

[0011] As illustrated in FIGS. 2 to 5, the door latch device 10 includes a latch mechanism 20 that can hold the left front door 80 in a closed state by engaging with a striker provided on the vehicle body, and an operation mechanism 30 for operating the latch mechanism 20. The door latch device 10 is a device obtained by integrating the latch mechanism 20 and the operation mechanism 30. FIGS. 4 to 5 illustrate an example in which a second rotary shaft 502 described later rotatably supports a lever link 53, and a third rotary shaft 503 rotatably supports a second input lever 54.

[0012] The door latch device 10 includes a main body 41 fixed to the rear end of the left front door 80, a metallic cover plate (not illustrated) covering at least a part of the rear surface of the main body 41, and a metallic back plate (not illustrated) covering at least a part of the front surface of the main body 41. Accordingly, the main body 41 is sandwiched in the front-rear direction between the cover plate and the back plate. The cover plate and the back plate are attached to the main body 41. The body member of the door latch device 10 includes a main body 41, a cover plate, and a back plate.

[0013] As illustrated in FIG. 2, the main body 41 is formed with a striker entry groove 411 that allows a striker provided on the vehicle body to enter from the inner side of the striker entry groove 411 in the vehicle width direction. The striker entry groove 411 is formed in a hollowed shape that is recessed outward in the vehicle width direction from the inner end in the vehicle width direction of the main body 41.

[0014] As illustrated in FIG. 3, the latch mechanism 20 includes a latch 21 engageable with the striker provided on the vehicle body, a latch shaft 22 rotatably supporting the latch 21, a ratchet 23 engageable with the latch 21, and a release lever 24 for operating the ratchet 23.

[0015] As illustrated in FIGS. 2 and 3, the latch 21 is attached to the rear surface 41b of the main body 41.

[0016] The latch shaft 22 extends in the front-rear direction and is attached to the rear surface 41b of the main body 41. The latch shaft 22 has a front end supported by and fixed to the back plate of the door latch device 10 and a rear end supported by and fixed to the cover plate of the door latch device 10.

[0017] The latch 21 includes a latch body 211 formed with an insertion hole 212 that allows the latch shaft 22 to be inserted. The latch shaft 22 is inserted into the insertion hole 212, so that the latch 21 is rotatably supported by the latch shaft 22. Accordingly, the latch 21 rotates about the latch shaft 22 extending in the front-rear direction.

[0018] The latch 21 is biased by a coil spring 25 clockwise as viewed from the front (see FIG. 4).

[0019] The latch body 211 is formed with a striker engaging groove 213 that allows the striker provided on the vehicle body to be inserted. The striker engaging groove 213 has a concave shape recessed from the outer peripheral edge of the latch body 211 toward the insertion hole 212 when viewed in the front-rear direction. The striker engaging groove 213 at least partially overlaps the striker entry groove 411 formed in the main body 41 when viewed in the front-rear direction.

[0020] The outer peripheral edge of the latch body 211 is formed with a ratchet engaging portion 214 engageable with the ratchet 23. In the present embodiment, the ratchet engaging portion 214 is formed clockwise of the striker engaging groove 213 when viewed from the front.

[0021] The ratchet 23 includes a rotary shaft 231 extending in the front-rear direction, a contact portion 232 extending leftward from the rotary shaft 231 and being in contact with the ratchet engaging portion 214 formed on the latch body 211, and an input portion 233 extending rightward from the rotary shaft 231 and receiving an input from a release lever 24 of the operation mechanism 30 to be described later. In the present embodiment, the input portion 233 is formed to extend rightward from the rotary shaft 231 in front of the contact portion 232.

[0022] The ratchet 23 is arranged such that the rotary shaft 231 is located below and rightward of the latch shaft 22.

[0023] The rotary shaft 231 includes a front rotary shaft 231a and a rear rotary shaft 231b. The front rotary shaft 231a and the rear rotary shaft 231b have coaxial cylindrical shapes. In the present embodiment, the rear rotary shaft 231b has a larger diameter than the front rotary shaft 231a. The front rotary shaft 231a is rotatably supported by the back plate, and the rear rotary shaft 231b is rotatably supported by the main body 41.

[0024] The ratchet 23 is rotatable about the axis of the rotary shaft 231 extending in the front-rear direction, clockwise and counterclockwise when viewed in the

front-rear direction.

[0025] The ratchet 23 is biased counterclockwise when viewed from the front by a coil spring 26.

[0026] When the left front door 80 is closed and approaches the fully closed position, the striker provided on the vehicle body enters the striker entry groove 411 of the main body 41 and also enters the striker engaging groove 213 of the latch 21. When the left front door 80 further approaches the fully closed position, the striker provided on the vehicle body presses the inner wall surface of the striker engaging groove 213 outward in the vehicle width direction while approaching the bottom of the striker engaging groove 213 of the latch 21, thereby rotating the latch 21 against the biasing force of the coil spring 24 counterclockwise when viewed from the front.

[0027] When the left front door 80 reaches the fully closed position, the contact portion 232 of the ratchet 23, which is biased counterclockwise when viewed from the front, comes into contact with the ratchet engaging portion 214 of the latch 21, which rotates counterclockwise when viewed from the front. The ratchet 23, which is biased counterclockwise when viewed from the front, engages with the latch 21, which is biased counterclockwise when viewed from the front. Accordingly, the counterclockwise rotation of the latch 21 as viewed from the front is restricted, and the left front door 80 is held in the closed state.

[0028] The release lever 24 is slidable in the upper-lower direction, and includes a ratchet driving portion 24a that can contact with the ratchet 23 from below. The release lever 24 is provided below the input portion 233 of the ratchet 23. When the release lever 24 slides upward, the ratchet driving portion 24a comes into contact with the input portion 233 of the ratchet 23 upward from below. The lower region of the release lever 24 is formed with an engaging hole 24b penetrating in the left-right direction and allowing an engaging portion 51a to be inserted. The engaging portion 51a is formed on a sub-lever 51 (described later) of the outside handle operation force transmission mechanism 50.

[0029] The operation mechanism 30 further includes various operation levers, linking levers, and motors (not illustrated) assembled to the main body 41, the cover plate, the back plate, a side body (not illustrated), and the like.

[0030] The operation mechanism 30 includes an outside handle operation force transmission mechanism 50 for transmitting the operation force of the outside handle 91 input via the first operation force transmission member 71 to operate the release lever 24.

[0031] (Configuration of Outside Handle Operation Force Transmission Mechanism)

[0032] As illustrated in FIGS. 4 and 5, the outside handle operation force transmission mechanism 50 is attached to a front surface 41a of the main body 41.

[0033] The outside handle operation force transmission mechanism 50 includes a sub-lever 51 that engages with the release lever 24.

[0034] The outside handle operation force transmission mechanism 50 includes a first rotary shaft 501, a second rotary shaft 502 positioned to the left and above the first rotary shaft 501 and parallel to the first rotary shaft 501, and a third rotary shaft 503 positioned to the left and below the first rotary shaft 501, below the second rotary shaft 502, and parallel to the first rotary shaft 501 and the second rotary shaft 502. The axial direction of the first rotary shaft 501, the second rotary shaft 502, and the third rotary shaft 503 parallel to one another is the front-rear direction. Each of the first rotary shaft 501, the second rotary shaft 502, and the third rotary shaft 503 protrudes forward from the front surface 41a of the main body 41.

[0035] The first rotary shaft 501 rotatably supports a sub-lever 51. The sub-lever 51 includes an output-side extension portion 511 extending rightward from the first rotary shaft 501 and an input-side extension portion 512 extending leftward from the first rotary shaft 501.

[0036] The right end of the output-side extension portion 511 of the sub-lever 51 is formed with an engaging portion 51a protruding rightward. The engaging portion 51a is inserted into the engaging hole 24b formed in the release lever 24, whereby the sub-lever 51 is engaged with the release lever 24.

[0037] The upper side of the left end of the input-side extension portion 512 of the sub-lever 51 is formed with an input-side contact portion 51b. The input-side contact portion 51b faces the upper right direction.

[0038] The sub-lever 51 is biased by a coil spring 513 counterclockwise when viewed from the front.

[0039] The second rotary shaft 502 allows to rotatably support a first input lever 52 or a lever link 53 selectively. The first input lever 52 receives an operation force of the outside handle and rotates about the second rotary shaft 502 to operate the sub-lever 51. The lever link 53 rotates about the second rotary shaft 502 to operate the sub-lever 51.

[0040] In the present embodiment, if the first operation force transmission member 71 is a bowden cable 711, the first input lever 52 is selected as the member rotatably supported by the second rotary shaft 502. If the first operation force transmission member 71 is the bowden cable 711, the second rotary shaft 502 rotatably supports the first input lever 52. The bowden cable 711 includes an inner cable 711a and a cable outer 711b through which the inner cable 711a is inserted. When the outside handle 91 is operated, the inner cable 711a is pulled by the operation force of the outside handle 91.

[0041] On the other hand, in the present embodiment, if the first operation force transmission member 71 is a rod 712, the lever link 53 is selected as the member rotatably supported by the second rotary shaft 502. If the first operation force transmission member 71 is the rod 712, the second rotary shaft 502 rotatably supports the lever link 53, and the third rotary shaft 503 rotatably supports the second input lever 54.

[0042] FIG. 6 illustrates a state in which the second

rotary shaft 502 rotatably supports the first input lever 52. FIG. 7 illustrates a state in which the second rotary shaft 502 rotatably supports the lever link 53 and the third rotary shaft 503 rotatably supports the second input lever 54.

[0043] First, with reference to FIG. 6, a state in which the first operation force transmission member 71 is the bowden cable 711 and the second rotary shaft 502 rotatably supports the first input lever 52 will be described.

[0044] As illustrated in FIG. 6, the second rotary shaft 502 rotatably supports the first input lever 52.

[0045] The first input lever 52 includes an output-side extension portion 521 extending rightward from the second rotary shaft 502, and an input-side extension portion 522 extending leftward and downward from the second rotary shaft 502 when viewed in the front-rear direction.

[0046] The right end of the output-side extension portion 521 of the first input lever 52 is formed with an output-side contact portion 52a. The output-side contact portion 52a is oriented leftward and downward, and faces the input-side contact portion 51b of the sub-lever 51.

[0047] The input-side extension portion 522 of the first input lever 52 is formed with a cable coupling portion 52b coupled to the inner cable 711a of the bowden cable 711 as the first operation force transmission member 71.

[0048] The main body 41 is provided with, above the cable coupling portion 52b of the first input lever 52, a cable outer fixing portion 412 fixing the end of the cable outer 711b of the bowden cable 711 as the first operation force transmission member 71. The end of the cable outer 711b is fixed to the latch mechanism 20 and the operation mechanism 30 by being fixed to the cable outer fixing portion 412. The end of the cable outer 711b of the bowden cable 711 as the first operation force transmission member 71 is fixed to the cable outer fixing portion 412 so as to face downward.

[0049] When the outside handle 91 is operated, the inner cable 711a of the bowden cable 711 as the first operation force transmission member 71 is pulled upward. In this way, the inner cable 711a is coupled to the cable coupling portion 52b formed at the input-side extension portion 522 of the first input lever 52, and thus the first input lever 52 rotates about the second rotary shaft 502 counterclockwise when viewed from the front.

[0050] When the first input lever 52 rotates about the second rotary shaft 502 counterclockwise as viewed from the front, the output-side contact portion 52a of the output-side extension portion 521 comes into contact with the input-side contact portion 51b of the input-side extension portion 512 of the sub-lever 51, thereby rotating the sub-lever 51 about the first rotary shaft 501 clockwise as viewed from the front.

[0051] When the sub-lever 51 rotates about the first rotary shaft 501 clockwise as viewed from the front, the engaging portion 51a of the output-side extension portion 511 comes into contact with the wall surface of the engaging hole 24b formed in the release lever 24, thereby displacing the release lever 24 upward.

[0052] When the release lever 24 is displaced upward, the ratchet driving portion 24a comes into contact with the input portion 233 of the ratchet 23, thereby rotating the ratchet 23 about the rotary shaft 231 clockwise when viewed from the front (see FIGS 2 and 3).

[0053] When the ratchet 23 rotates about the rotary shaft 231 clockwise as viewed from the front, the contact portion 232 of the ratchet 23 is separated from the ratchet engaging portion 214 of the latch 21. Accordingly, the restriction of the counterclockwise rotation of the latch 21 as viewed from the front is released. The latch 21, which is biased counterclockwise as viewed from the front, rotates counterclockwise as viewed from the front. The striker provided on the vehicle body becomes capable of separating from the striker engaging groove 213 of the latch 21 and the striker entry groove 411 of the main body 41. Thus, the left front door 80 can be opened.

[0054] Next, with reference to FIG. 7, a state in which the first operation force transmission member 71 is the rod 712, the second rotary shaft 502 rotatably supports the lever link 53, and the third rotary shaft 503 rotatably supports the second input lever 54 will be described.

[0055] As illustrated in FIG. 7, the second rotary shaft 502 rotatably supports the lever link 53.

[0056] The lever link 53 includes an output-side extension portion 531 extending rightward from the second rotary shaft 502, and an input-side extension portion 532 extending downward from the second rotary shaft 502 when viewed in the front-rear direction.

[0057] The right end of the output-side extension portion 531 of the lever link 53 is formed with an output-side contact portion 53a. The output-side contact portion 53a is oriented leftward and downward, and faces the input-side contact portion 51b of the sub-lever 51.

[0058] The right side of the lower end of the input-side extension portion 532 of the lever link 53 is formed with an input-side contact portion 53b. The input-side contact portion 53b faces the lower right direction.

[0059] The third rotary shaft 503 rotatably supports a second input lever 54.

[0060] The second input lever 54 includes an output-side extension portion 541 extending rightward and upward from the third rotary shaft 503, and an input-side extension portion 542 extending leftward and upward from the third rotary shaft 503 when viewed in the front-rear direction.

[0061] The upper left end of the output-side extension portion 541 of the second input lever 54 is formed with an output-side contact portion 54a. The output-side contact portion 54a is oriented leftward and upward, and faces the input-side contact portion 53b of the lever link 53.

[0062] The input-side extension portion 542 of the second input lever 54 has a clip 60 assembled thereto. The clip 60 engages with the rod 712 as the first operation force transmission member 71.

[0063] The second input lever 54 is biased by a coil spring 543 counterclockwise as viewed from the front.

[0064] The rod 712 as the first operation force trans-

mission member 71 is displaced downward when the outside handle 91 is operated. In this way, the rod 712 is engaged with the clip 60 assembled to the input-side extension portion 542 of the second input lever 54, and thus the second input lever 54 rotates about the third rotary shaft 503 clockwise when viewed from the front.

[0065] When the second input lever 54 rotates about the third rotary shaft 503 clockwise as viewed from the front, the output-side contact portion 54a of the output-side extension portion 541 comes into contact with the input-side contact portion 53b of the input-side extension portion 532 of the lever link 53, thereby rotating the lever link 53 about the second rotary shaft 502 counterclockwise as viewed from the front.

[0066] When the lever link 53 rotates about the second rotary shaft 502 counterclockwise as viewed from the front, the output-side contact portion 53a of the output-side extension portion 531 comes into contact with the input-side contact portion 5 1b of the input-side extension portion 512 of the sub-lever 51, thereby rotating the sub-lever 51 about the first rotary shaft 501 clockwise as viewed from the front.

[0067] When the sub-lever 51 rotates about the first rotary shaft 501 clockwise as viewed from the front, the engaging portion 51a of the output-side extension portion 511 comes into contact with the wall surface of the engaging hole 24b formed in the release lever 24, thereby displacing the release lever 24 upward.

[0068] When the release lever 24 is displaced upward, the ratchet driving portion 24a comes into contact with the input portion 233 of the ratchet 23, thereby rotating the ratchet 23 about the rotary shaft 231 clockwise when viewed from the front.

[0069] When the ratchet 23 rotates about the rotary shaft 231 clockwise as viewed from the front, the contact portion 232 of the ratchet 23 is separated from the ratchet engaging portion 214 of the latch 21. Accordingly, the restriction of the counterclockwise rotation of the latch 21 as viewed from the front is released. The latch 21, which is biased counterclockwise as viewed from the front, rotates counterclockwise as viewed from the front. The striker provided on the vehicle body becomes capable of separating from the striker engaging groove 213 of the latch 21 and the striker entry groove 411 of the main body 41. Thus, the left front door 80 can be opened.

[0070] In this way, when the first operation force transmission member 71 is displaced by the operation force of the outside handle 91 counterclockwise with respect to the second rotary shaft 502 when viewed from the front, the first input lever 52 is selected out of the first input lever 52 and the lever link 53, and the second rotary shaft 502 rotatably supports the first input lever 52. On the other hand, when the first operation force transmission member 71 is displaced by the operation force of the outside handle 91 clockwise with respect to the second rotary shaft 502 when viewed from the front, the lever link 53 is selected out of the first input lever 52 and the lever link 53, the second rotary shaft 502 rotatably supports the lever link 53, and the third rotary shaft 503 rotatably supports the second input lever 54.

[0071] Thus, the configuration of the door latch device 10 is selected whether the first input lever 52 or the lever link 53 is rotatably supported by the second rotary shaft 502, the door latch device 10 can easily support different operating directions of the first operation force transmission member 71 provided on the door on which the door latch device 10 is provided. In the present embodiment, the door latch device 10 can easily support the cases where the first operation force transmission member 71 is either displaced counterclockwise or clockwise with respect to the second rotary shaft 502 when viewed from the front by the operation force of the outside handle 91.

[0072] As viewed from the axial direction of the first rotary shaft 501, the second rotary shaft 502, and the third rotary shaft 503 (that is, in the front-rear direction in the present embodiment), each of a rotary trajectory SP2 of the output-side contact portion 52a of the first input lever 52, a rotary trajectory SP3 of the output-side contact portion 53a of the lever link 53, and a rotary trajectory SP4 of the output-side contact portion 54a of the second input lever 54 at least partially overlaps a rotary trajectory SP1 of the input-side contact portion 51b of the sub-lever 51.

[0073] Accordingly, the projected area of the door latch device 10 as viewed from the axial direction of the first rotary shaft 501, the second rotary shaft 502, and the third rotary shaft 503 (that is, the front-rear direction in the present embodiment) can be reduced, and the door latch device 10 can be reduced in size.

[0074] As described above, the latch 21 is attached to the rear surface 41b of the main body 41, whereas the outside handle operation force transmission mechanism 50 is attached to the front surface 41a of the main body 41.

[0075] Accordingly, the main body 41 can be shared regardless of the mode of the door on which the door latch device 10 is provided. Further, the door latch device 10 can be attached to various doors by simply changing the outside handle operation force transmission mechanism 50 attached to the front surface 41a of the main body 41, which further improves the versatility of the door latch device 10.

[0076] Each of the first rotary shaft 501, the second rotary shaft 502, and the third rotary shaft 503 is arranged below the striker entry groove 411 provided on the main body 41.

[0077] Accordingly, the space for arranging the first operation force transmission member 71 can be secured and the door latch device 10 can be reliably coupled to the outside handle even if the door latch device 10 is attached to a rear door, whose layout is strictly limited in the vehicle. In addition, since the release lever 24 can be arranged below the striker entry groove 411, if an unlocking mechanism for locking the operation of the release lever 24 is provided, the unlocking mechanism can be arranged below the striker entry groove 411 together

with the outside handle operation force transmission mechanism 50. This improves the space efficiency. Therefore, in the door latch device 10, various operation levers and linking levers can be arranged with good space efficiency, and the door latch device 10 can be reduced in size.

[0078] Further, the third rotary shaft 503 is arranged below the second rotary shaft 502, whereas the cable outer fixing portion 412 fixing the end of the cable outer 711b of the bowden cable 711 as the first operation force transmission member 71 is provided above the cable coupling portion 52b of the first input lever 52. The cable outer fixing portion 412 is provided on the main body 41 to which the operation mechanism 30 is attached. The cable outer fixing portion 412 may be provided on the cover plate or the back plate that constitutes the body member of the door latch device 10 described above together with the main body 41.

[0079] This can increase the distance between the cable outer fixing portion 412 and the third rotary shaft 503. Therefore, even if the first operation force transmission member 71 is the rod 712, the second input lever 54 is attached to the third rotary shaft 503, and the rod 712 is engaged with the second input lever 54, the cable outer fixing portion 412 can be prevented from interfering with the rod 712. Accordingly, the main body 41 can be shared between the case where the door latch device 10 is provided on a door in which the first operation force transmission member 71 is the bowden cable 711 and the case where the door latch device 10 is provided on a door in which the first operation force transmission member 71 is the rod 712.

[0080] Although an embodiment of the present invention has been described above with reference to the accompanying drawings, it is needless to say that the present invention is not limited to the embodiment. It is apparent to those skilled in the art that various modifications or corrections can be conceived within the scope described in the claims, and it is understood that the modifications or corrections naturally fall within the technical scope of the present invention. In addition, the constituent elements in the above embodiment may be freely combined without departing from the gist of the invention.

[0081] In this specification, at least the following matters are described. The parentheses indicate the corresponding components and the like in the above-described embodiment as examples, but are not limited thereto.

(1) A vehicle door latch device (door latch device 10) including:

a latch mechanism (latch mechanism 20) including a latch (latch 21) configured to engage with a striker provided on a vehicle body; and
an operation mechanism (outside handle operation force transmission mechanism 50) configured to operate the latch mechanism,

in which the latch mechanism includes:

a ratchet (ratchet 23) configured to engage with the latch; and
a release lever (release lever 24) configured to release engagement of the ratchet with the latch,

the operation mechanism includes:

a first rotary shaft (first rotary shaft 501);
a second rotary shaft (second rotary shaft 502) positioned above the first rotary shaft and parallel to the first rotary shaft; and
a third rotary shaft (third rotary shaft 503) positioned below the second rotary shaft and parallel to the first rotary shaft and the second rotary shaft,

the first rotary shaft rotatably supports a sub-lever (sub-lever 51) configured to engage with the release lever and rotate about the first rotary shaft to operate the release lever,
the second rotary shaft allows to rotatably support a first input lever (first input lever 52) or a lever link (lever link 53) selectively, the first input lever being configured to receive an operation force of an outside handle and rotate about the second rotary shaft to operate the sub-lever, the lever link being configured to rotate about the second rotary shaft to operate the sub-lever, and
the third rotary shaft is configured to rotatably support a second input lever (second input lever 54) configured to receive an operation force of an outside handle and rotate about the third rotary shaft to operate the lever link.
According to (1), since the configuration is selected whether the second rotary shaft rotatably supports the first input lever, or the second rotary shaft rotatably supports the lever link and the third rotary shaft rotatably supports the second input lever, in accordance with the operating direction of the member for inputting the operation force of the outside handle to the vehicle door latch device, it is easy to support different operating directions of operation force transmission members for inputting the operation force of the outside handle to the vehicle door latch device.

(2) The vehicle door latch device according to (1),

in which the sub-lever includes an input-side contact portion (input-side contact portion 5 1b) configured to come into contact with the first input lever or the lever link when the first input lever or the lever link rotates,
the first input lever includes an output-side contact portion (output-side contact portion 52a)

configured to come into contact with the input-side contact portion of the sub-lever when the first input lever rotates,
the lever link includes an output-side contact portion (output-side contact portion 53a) configured to come into contact with the input-side contact portion of the sub-lever when the lever link rotates, and an input-side contact portion (input-side contact portion 53b) configured to come into contact with the second input lever when the second input lever rotates,
the second input lever includes an output-side contact portion (output-side contact portion 54a) configured to come into contact with the input-side contact portion of the lever link when the second input lever rotates, and
when viewed in an axial direction of the first rotary shaft, the second rotary shaft, and the third rotary shaft, each of a rotary trajectory of the output-side contact portion of the first input lever (rotary trajectory SP2), a rotary trajectory of the output-side contact portion of the lever link (rotary trajectory SP3), and a rotary trajectory of the output-side contact portion of the second input lever (rotary trajectory SP4) at least partially overlaps a rotary trajectory of the input-side contact portion of the sub-lever (rotary trajectory SP1).
According to (2), the projected area of the vehicle door latch device as viewed from the axial direction of the first rotary shaft, the second rotary shaft, and the third rotary shaft can be reduced, and the vehicle door latch device can be reduced in size.

(3) The vehicle door latch device according to (2),

in which the vehicle door latch device further includes a body member (main body 41) to which the latch mechanism and the operation mechanism are attached,
the latch is attached to a first surface (rear surface 41b) on one side of the body member, and
the operation mechanism is attached to a second surface (front surface 41a) of the body member opposite to the first surface.
According to (3), the body member can be shared regardless of the mode of the door on which the vehicle door latch device is provided. Further, the vehicle door latch device can be provided on various doors by simply changing the operation mechanism attached to the second surface of the body member, which further improves the versatility of the vehicle door latch device.

(4) The vehicle door latch device according to (3),

in which the body member is formed with a striker entry groove (striker entry groove 411) configured to allow the striker to enter from an inner side of the striker entry groove in a vehicle width direction, and
each of the first rotary shaft, the second rotary shaft, and the third rotary shaft is arranged below the striker entry groove.
According to (4), the space for arranging the first operation force transmission member for transmitting the operation force of the outside handle can be secured and the vehicle door latch device can be reliably coupled to the outside handle even if the vehicle door latch device is provided on a door whose layout is strictly limited in the vehicle. In addition, since the release lever can be arranged below the striker entry groove, if an unlocking mechanism for locking the operation of the release lever is provided, the unlocking mechanism can be arranged below the striker entry groove together with the operation mechanism. This improves the space efficiency. Therefore, in the vehicle door latch device, various operation levers and linking levers can be arranged with good space efficiency, and the vehicle door latch device can be reduced in size.

(5) The vehicle door latch device according to any one of (1) to (4),

in which the vehicle door latch device further includes a body member (main body 41) to which the operation mechanism is attached,
the first input lever is provided with a cable coupling portion (cable coupling portion 52b) configured to be coupled to an inner cable (inner cable 711a) of an operation force transmission member (first operation force transmission member 71), which is a bowden cable (bowden cable 711) including the inner cable and a cable outer (cable outer 711b) through which the inner cable is inserted, configured to transmit an operation force of an outside handle, and
the body member is provided with, above the cable coupling portion of the first input lever, a cable outer fixing portion (cable outer fixing portion 412) configured to fix an end of the cable outer of the operation force transmission member.
According to (5), it is possible to increase the distance between the cable outer fixing portion and the third rotary shaft. Therefore, even if the operation force transmission member for transmitting the operation force of the outside handle is the rod, the second input lever is attached to the third rotary shaft, and the rod is engaged with the second input lever, the cable outer fixing portion can be prevented from interfering with

the rod. Accordingly, the body member to which the operation mechanism is attached can be shared between the case where the vehicle door latch device is provided on a door in which the operation force transmission member is a bowden cable and the case where the vehicle door latch device is provided on a door in which the operation force transmission member is a rod.

Claims

1. A vehicle door latch device comprising:

a latch mechanism including a latch configured to engage with a striker provided on a vehicle body; and
an operation mechanism configured to operate the latch mechanism,
wherein the latch mechanism includes:

a ratchet configured to engage with the latch; and
a release lever configured to release engagement of the ratchet with the latch,

the operation mechanism includes:

a first rotary shaft;
a second rotary shaft positioned above the first rotary shaft and parallel to the first rotary shaft; and
a third rotary shaft positioned below the second rotary shaft and parallel to the first rotary shaft and the second rotary shaft,

the first rotary shaft rotatably supports a sub-lever configured to engage with the release lever and rotate about the first rotary shaft to operate the release lever,
the second rotary shaft allows to rotatably support a first input lever or a lever link selectively, the first input lever being configured to receive an operation force of an outside handle and rotate about the second rotary shaft to operate the sub-lever, the lever link being configured to rotate about the second rotary shaft to operate the sub-lever, and
the third rotary shaft is configured to rotatably support a second input lever configured to receive an operation force of an outside handle and rotate about the third rotary shaft to operate the lever link.

2. The vehicle door latch device according to claim 1,

wherein the sub-lever includes an input-side contact portion configured to come into contact with the first input lever or the lever link when the first input lever or the lever link rotates,
the first input lever includes an output-side contact portion configured to come into contact with the input-side contact portion of the sub-lever when the first input lever rotates,
the lever link includes an output-side contact portion configured to come into contact with the input-side contact portion of the sub-lever when the lever link rotates, and an input-side contact portion configured to come into contact with the second input lever when the second input lever rotates,
the second input lever includes an output-side contact portion configured to come into contact with the input-side contact portion of the lever link when the second input lever rotates, and
when viewed in an axial direction of the first rotary shaft, the second rotary shaft, and the third rotary shaft, each of a rotary trajectory of the output-side contact portion of the first input lever, a rotary trajectory of the output-side contact portion of the lever link, and a rotary trajectory of the output-side contact portion of the second input lever at least partially overlaps a rotary trajectory of the input-side contact portion of the sub-lever.

3. The vehicle door latch device according to claim 2,

wherein the vehicle door latch device further includes a body member to which the latch mechanism and the operation mechanism are attached,
the latch is attached to a first surface on one side of the body member, and
the operation mechanism is attached to a second surface of the body member opposite to the first surface.

4. The vehicle door latch device according to claim 3,

wherein the body member is formed with a striker entry groove configured to allow the striker to enter from an inner side of the striker entry groove in a vehicle width direction, and
each of the first rotary shaft, the second rotary shaft, and the third rotary shaft is arranged below the striker entry groove.

5. The vehicle door latch device according to any one of claims 1 to 4,

wherein the vehicle door latch device further includes a body member to which the operation mechanism is attached,
the first input lever is provided with a cable coupling portion configured to be coupled to an inner

cable of an operation force transmission member, which is a bowden cable including the inner cable and a cable outer through which the inner cable is inserted, configured to transmit an operation force of an outside handle, and
the body member is provided with, above the cable coupling portion of the first input lever, a cable outer fixing portion configured to fix an end of the cable outer of the operation force transmission member.

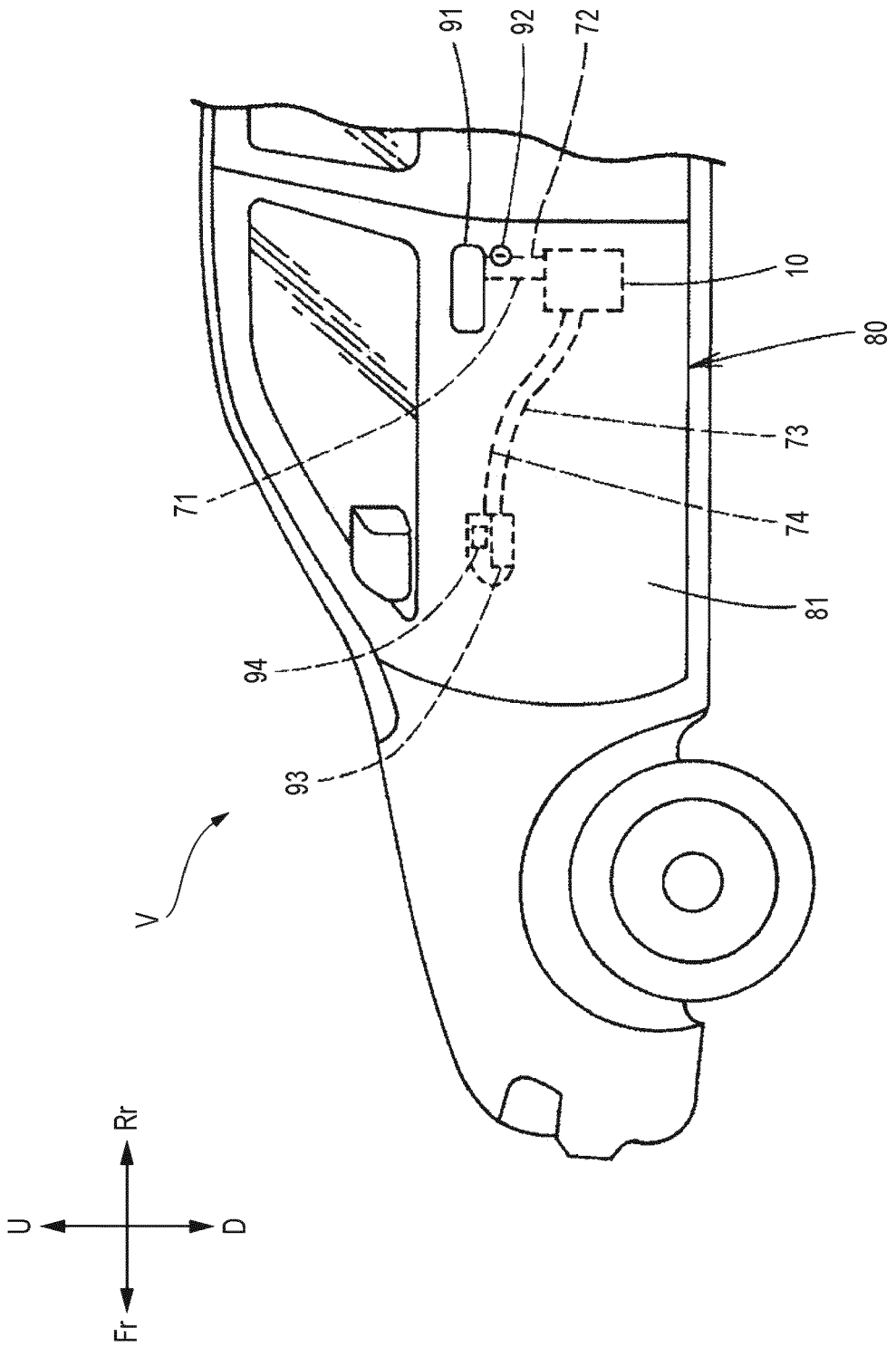


FIG. 1

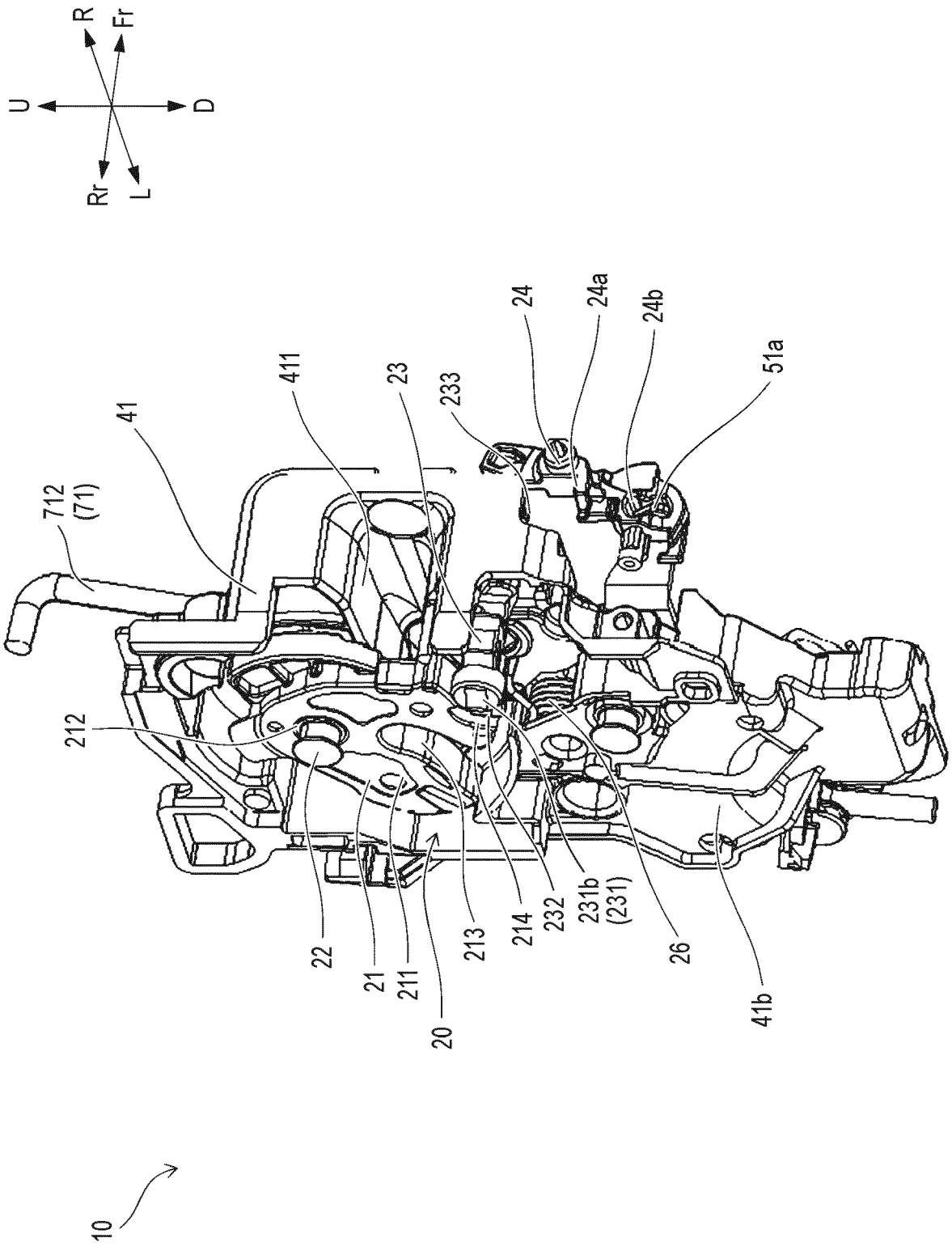

R
Fr
U
D
Rr
L
24
24a
24b
51a
411
23
233
41
712
(71)
212
22
21
211
20
213
214
232
231b
(231)
26
41b
10

FIG. 2

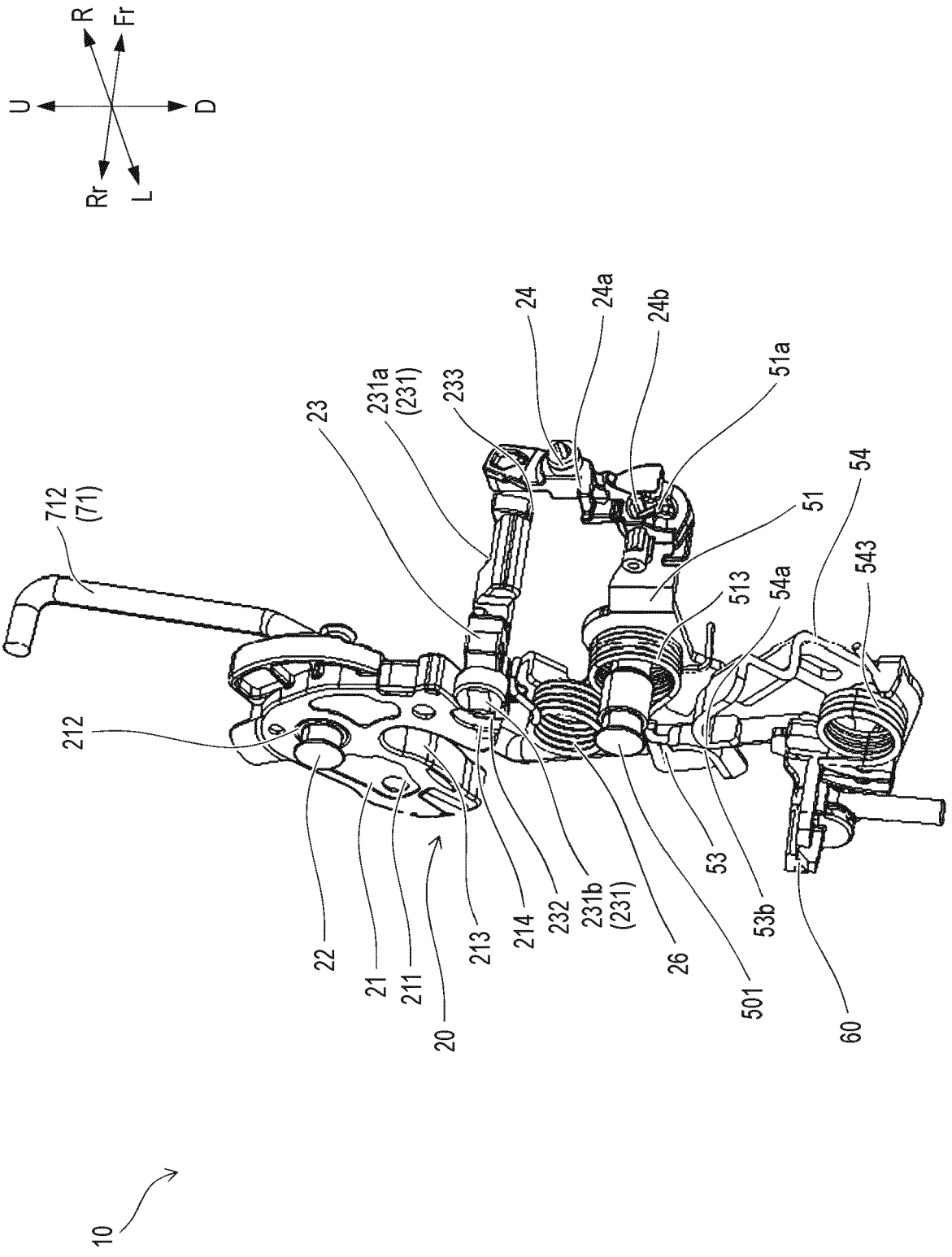

R
Fr
U
D
Rr
L
712
(71)
212
23
231a
(231)
233
24
24a
24b
51a
51
54
543
513
54a
53
53b
501
60
26
231b
(231)
232
214
213
22
21
211
20
10

FIG. 3

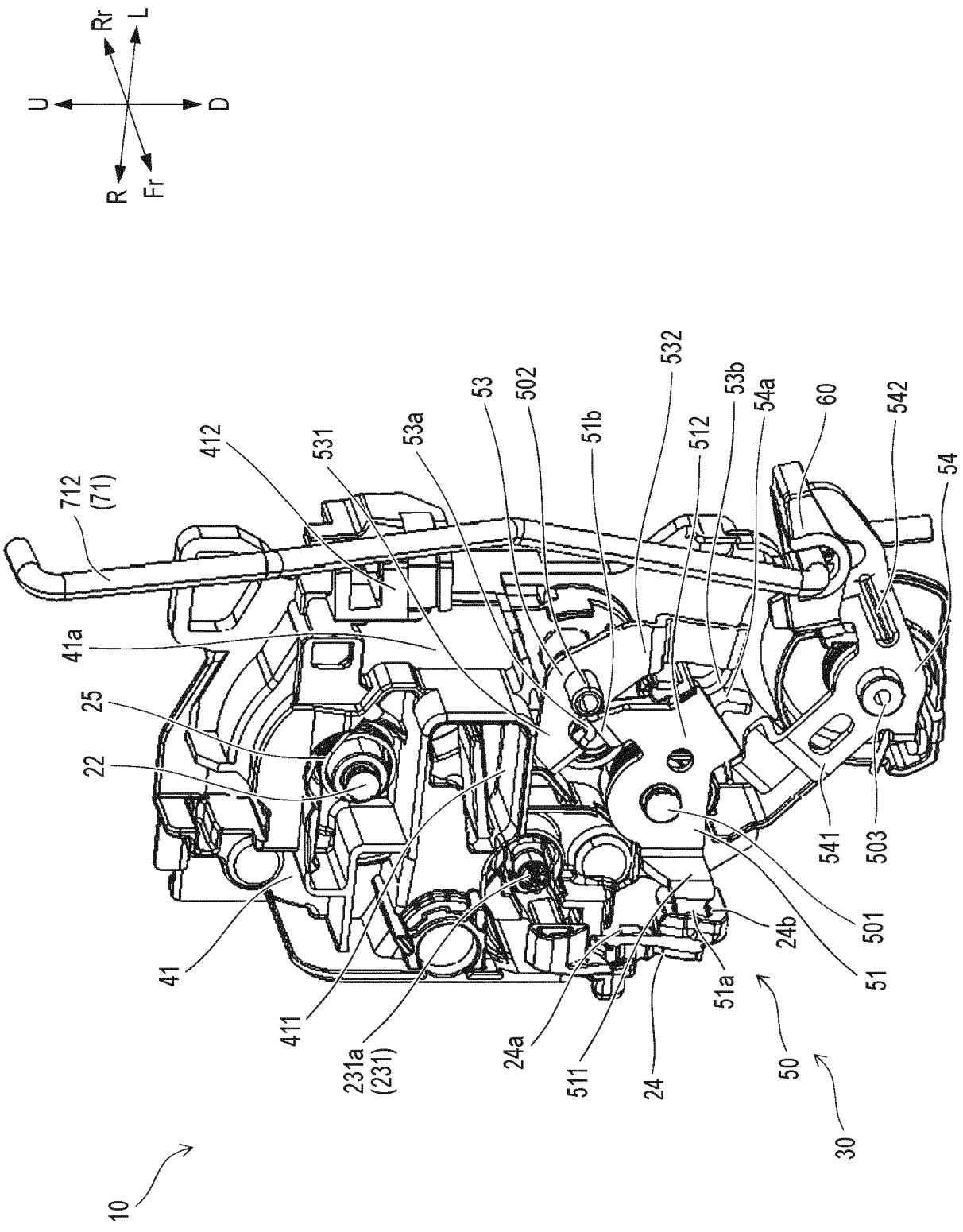

U
D
Rr
L
R
Fr
712
(71)
412
531
53a
53
502
51b
532
512
53b
54a
60
542
54
41a
25
22
41
411
231a
(231)
24a
511
24
51a
50
30
24b
501
51
541
503

FIG. 4

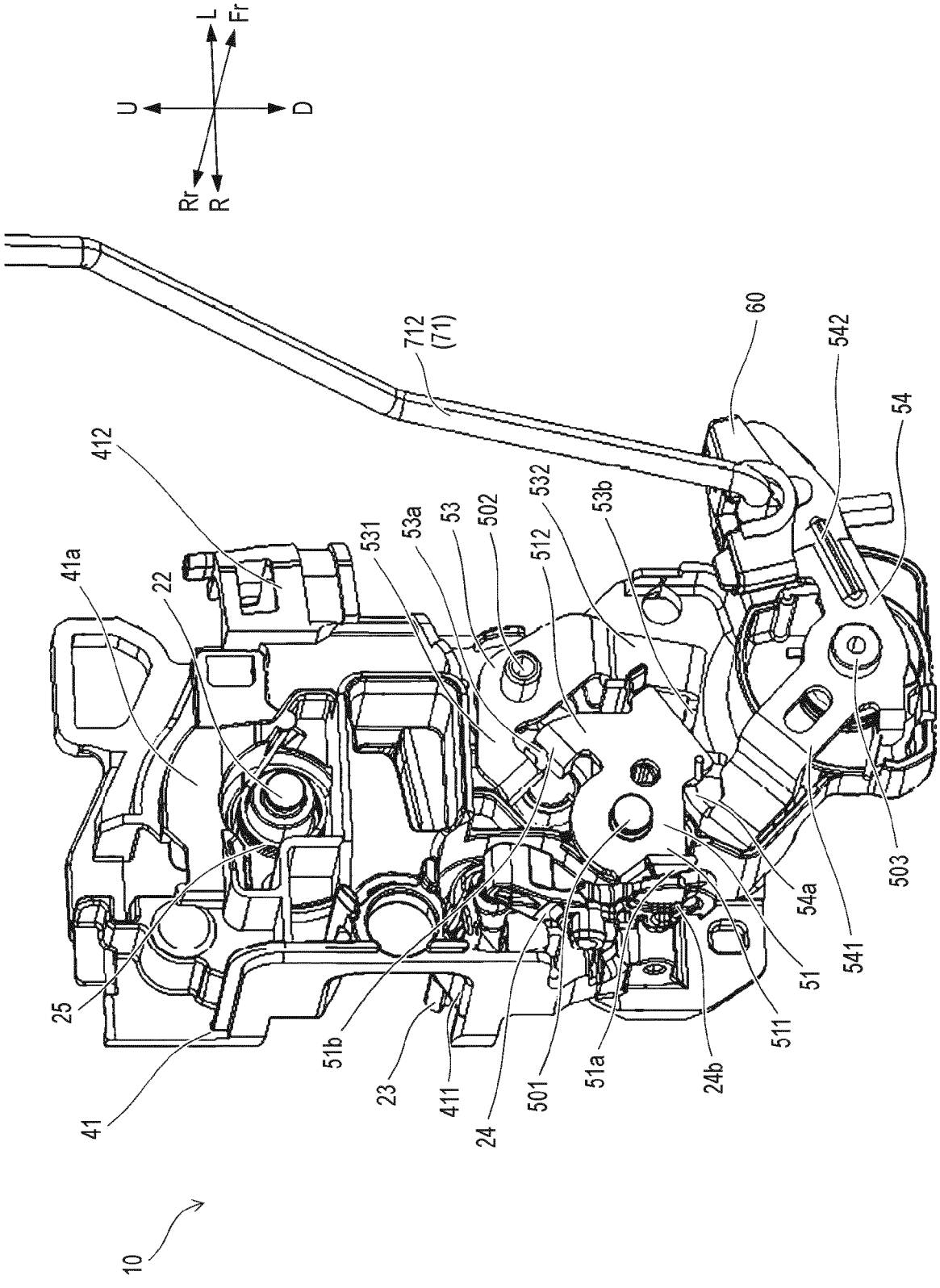

L
Fr
U
D
Rr
R
712
(71)
60
542
54
412
41a
22
531
53a
53
502
532
53b
512
503
54a
541
51
511
25
51b
23
411
24
501
51a
24b
41
10

FIG. 5

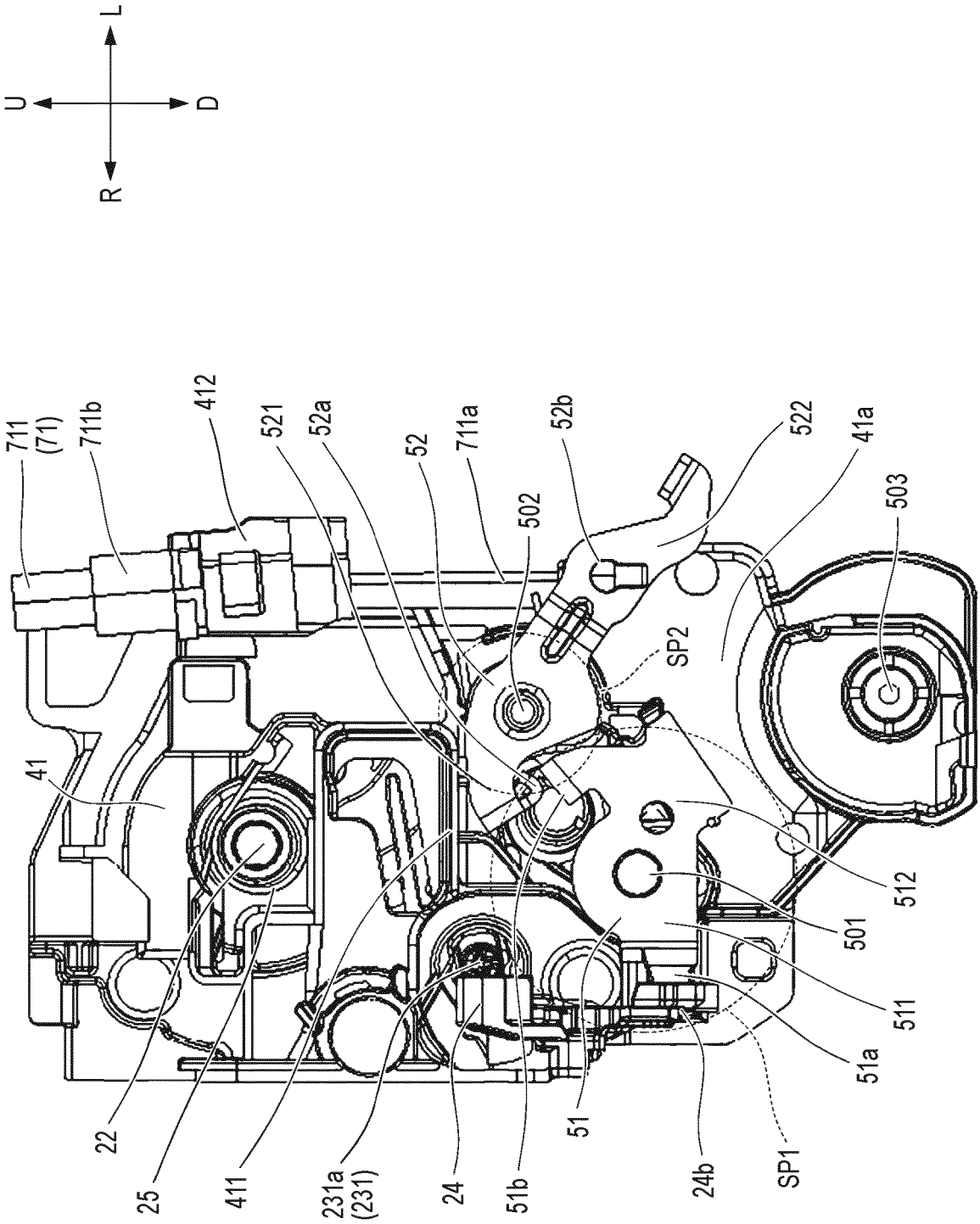

U
D
L
R
711
(71)
711b
412
521
52a
52
711a
52b
502
522
41a
503
SP2
41
512
501
511
51a
22
25
411
231a
(231)
24
51b
51
24b
SP1

FIG. 6

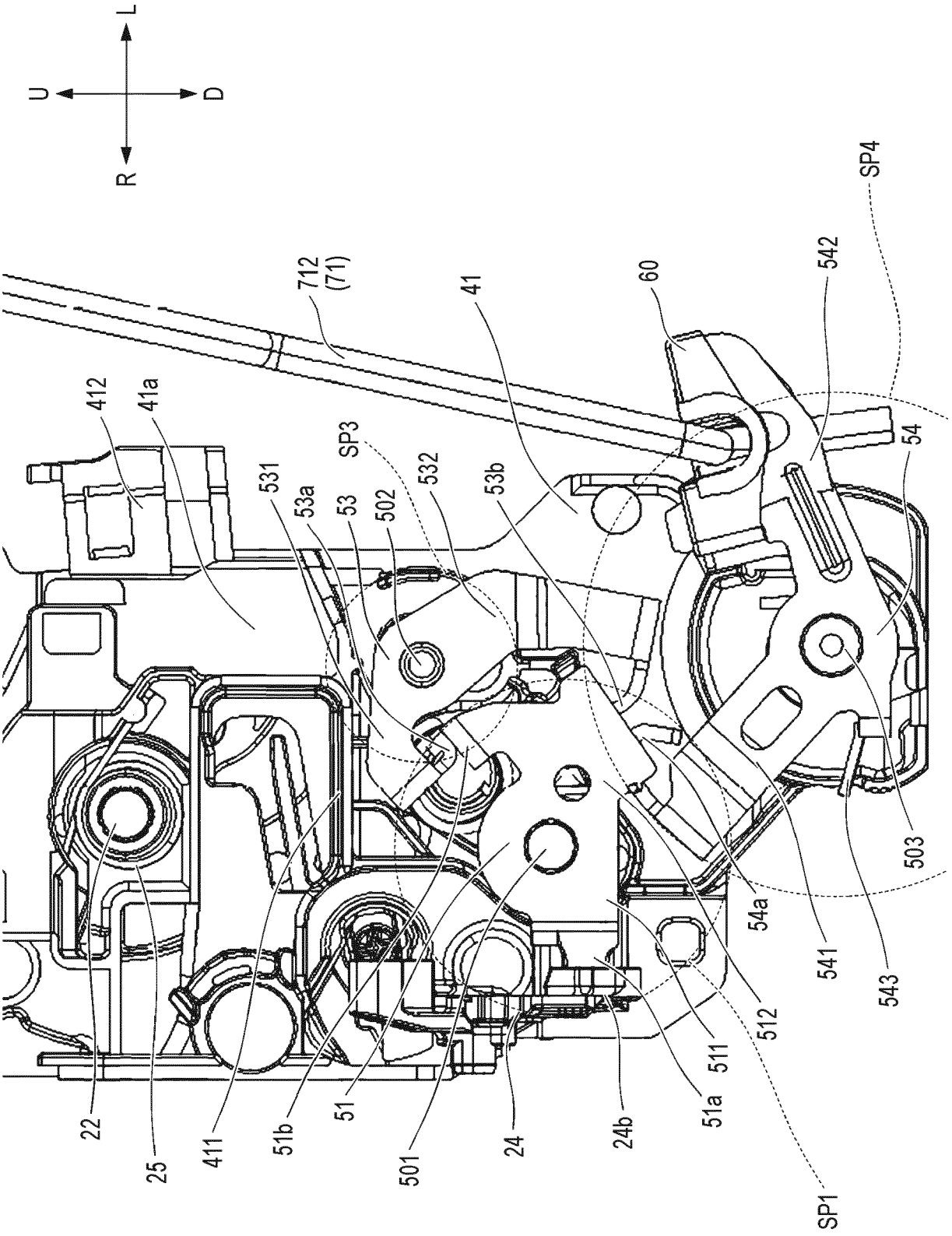

L
U
D
R
712
(71)
41
60
542
SP4
412
41a
SP3
531
53a
53
502
532
53b
54
503
54a
541
543
512
511
51a
24b
24
501
51
51b
411
25
22
SP1

FIG. 7

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 24 15 2611

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	JP 2000 064686 A (HONDA LOCK MFG CO LTD) 29 February 2000 (2000-02-29) * the whole document * -----	1-5	INV. E05B79/08 E05B83/36
			TECHNICAL FIELDS SEARCHED (IPC)
			E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 June 2024	Van Beurden, Jason

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons
.....
& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 24 15 2611

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-06-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2000064686 A	29-02-2000	JP 3276926 B2	22-04-2002
		JP 2000064686 A	29-02-2000

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2000064686 A **[0003] [0004]**
- JP 4418319 B **[0003] [0004]**