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

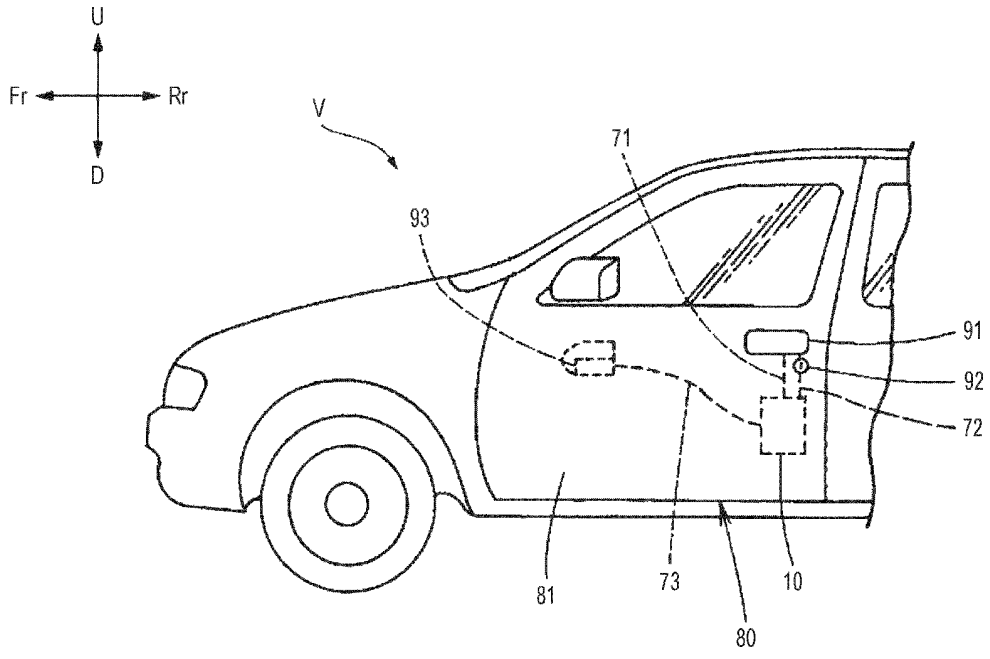
(72) Inventor: **Nagaoka, Tomoharu**
Yokohama-shi, Kanagawa, 2200011 (JP)

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

(54) **VEHICLE DOOR LATCH DEVICE**

(57) A vehicle door latch device includes a latch configured to engage with a striker provided on a vehicle body, a ratchet configured to engage with the latch, a lever link configured to release engagement of the ratchet with the latch, a sub-lever configured to rotate about a first rotary shaft and operate the lever link, and a handle lever configured to rotate about a second rotary shaft and operate the sub-lever. The handle lever is provided with a coupling portion to which an operation force transmission member for transmitting an operation force applied to a door handle is to be coupled. The first rotary shaft and the second rotary shaft are arranged parallel to each other and at different positions in a vehicle upperlower direction and in a vehicle front-rear direction.

FIG. 1



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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 a door handle and an operation force transmission member for transmitting an operation force applied to the door handle. Moreover, in general, a vehicle door latch device includes a latch that can be engaged with a striker provided on a vehicle body, a ratchet that can be engaged with the latch, a lever link for releasing the engagement of the ratchet with the latch, and various levers for operating the lever link.

[0003] In a vehicle door latch device, the positional correlation between the door handle and the vehicle door latch device changes depending on the door in which the vehicle door latch device is installed. From the viewpoint of cost reduction, it is desirable that the vehicle door latch device is highly versatile and can be installed in a plurality of types of doors having different positions of door handles.

[0004] For example, JP6446854B discloses a vehicle door latch device including a fork capable of holding a striker provided on a vehicle body, a pawl for operating the fork, and an open lever that is coupled with a transmission cable for transmitting an operation force applied to the door handle and that operates the pawl with the operation force applied to the door handle. In the vehicle door latch device of JP6446854B, the open lever is formed with two coupling portions including a first coupling portion and a second coupling portion. The transmission cable is coupled to one of the first coupling portion and the second coupling portion in accordance with the positional correlation between the door handle and the vehicle door latch device. Thus, the vehicle door latch device described in JP6446854B can be installed in a plurality of types of doors having different positions of the door handle.

[0005] However, in the vehicle door latch device of JP6446854B, the angle formed by the rotation direction of the open lever and the transmission cable differs greatly between the case where the transmission cable is coupled to the first coupling portion and the case where the transmission cable is coupled to the second coupling portion. Therefore, in the vehicle door latch device of JP6446854B, the operation force of the door handle required to operate the fork and the pawl differs greatly between the case where the transmission cable is coupled to the first coupling portion and the case where the transmission cable is coupled to the second coupling portion.

SUMMARY OF INVENTION

[0006] The present invention provides a vehicle door latch device capable of being installed in a plurality of types of doors having different positions of the door handle while preventing a change in the operation force to be applied to the door handle necessary for operating the ratchet.

(1) A vehicle door latch device including:

a latch configured to engage with a striker provided on a vehicle body;
a ratchet configured to engage with the latch;
a lever link configured to release engagement of the ratchet with the latch;
a sub-lever configured to rotate about a first rotary shaft and operate the lever link; and
a handle lever configured to rotate about a second rotary shaft and operate the sub-lever,
in which the handle lever is provided with a coupling portion to which an operation force transmission member for transmitting an operation force applied to a door handle is to be coupled, and
the first rotary shaft and the second rotary shaft are arranged parallel to each other and at different positions in a vehicle upper-lower direction and in a vehicle front-rear direction.

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

in which when viewed in an axial direction of the first rotary shaft and the second rotary shaft,
the coupling portion has at least a part positioned in a region where a rotation region of the sub-lever and a rotation region of the handle lever overlap each other, in a state where the handle lever is in a standby position.

(3) The vehicle door latch device according to the above-described (1) or (2),
in which the second rotary shaft is located below and on a vehicle front side of the first rotary shaft.

(4) The vehicle door latch device according to any one of the above-described (1) to (3),
in which a lower end of the sub-lever being in a standby position is provided with a weight.

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

a lever lock configured to switch between a locked state where the latch is locked not to be operated and an unlocked state where the latch

is not locked to be operated,
in which the handle lever includes a lever lock operating portion configured to come into contact with the lever lock to operate the lever lock.

[0007] According to the present invention, the operation force applied to the door handle of the door in which the door latch device is installed can be efficiently transmitted to operate the ratchet, by simply replacing the sub-lever and the handle lever according to the position of the door handle. Thus, the vehicle door latch device can be installed in a plurality of types of doors having different positions of the door handle, while preventing a change in the operation force to be applied to the door handle necessary for operating the ratchet, by simply replacing the sub-lever and the handle lever.

BRIEF DESCRIPTION OF DRAWINGS

[0008]

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 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 perspective view of the main part of the vehicle door latch device of FIG. 2 as viewed from the right rear side with a cover plate omitted.
FIG. 4 is a perspective view of the main part of the vehicle door latch device of FIG. 3 as viewed from the right front side.
FIG. 5 is a side view from the right of the main part of the vehicle door latch device of FIG. 1 when the lever lock is in the unlocked state and the sub-lever and the handle lever are in the standby positions.
FIG. 6 is a side view from the right of the main part of the vehicle door latch device of FIG. 1 when the lever lock is in the locked state and the sub-lever and the handle lever are in the standby positions.
FIG. 7 is a side view from the right of the main part of the vehicle door latch device of FIG. 1 when the sub-lever and the handle lever are operated from the state where the lever lock is in the locked state and the sub-lever and the handle lever are in the standby positions.
FIG. 8 is a side view from the right of the main part of the vehicle door latch device of FIG. 1 when a replacement lever is attached instead of the sub-lever and the handle lever, the lever lock is in the unlocked state, and the replacement lever is in the standby position.

DESCRIPTION OF EMBODIMENTS

[0009] 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.

[0010] As illustrated in FIG. 1, the 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 side surface of the front side of the inner panel is provided with an inside handle 93 for opening the door latch device 10 from the vehicle interior. Further, the left front door 80 is provided with an operation force transmission rod 71 for transmitting an operation force applied to the outside handle 91 to the door latch device 10, an operation force transmission member 72 for transmitting an operation force applied to the key cylinder 92 to the door latch device 10, and a first operation force transmission rod 73 that is another operation force transmission member for transmitting an operation force applied to the inside handle 93 to the door latch device 10.

[0011] 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.

[0012] As illustrated in FIGS. 2 and 3, 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.

[0013] The door latch device 10 further includes a main body 41 made of resin, a cover plate 42 made of metal and covering at least a part of the rear surface of the main body 41, and a plate member 43. The main body 41 includes a rear plate 411 extending in the left-right direction and in the upper-lower direction, and a side plate 412 extending forward from the inner end of the rear plate 411 in the vehicle width direction and extending in the front-rear direction and in the upper-lower direction. The main body 41 is substantially L-shaped when viewed in the upper-lower direction.

[0014] The cover plate 42 faces the rear plate 411 of the main body 41 and covers at least a part of the rear side of the rear plate 411 of the main body 41.

[0015] The cover plate 42 is formed with a striker entry

groove 421 that allows a striker provided on the vehicle body to enter from the inner side of the striker entry groove 421 in the vehicle width direction. The striker entry groove 421 is provided at a substantially central portion in the upper-lower direction of the cover plate 42, and 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 cover plate 42.

[0016] The plate member 43 extends in the left-right direction and in the upper-lower direction between the rear plate 411 of the main body 41 and the cover plate 42.

[0017] The latch mechanism 20 includes a latch 21 that can be engaged with a striker (not illustrated) provided on the vehicle body, a latch shaft 22 that rotatably supports the latch 21, and a ratchet 23 that can be engaged with the latch 21.

[0018] The latch shaft 22 extends in the front-rear direction, and has a front end supported by and fixed to the plate member 43 and a rear end supported by and fixed to the cover plate 42 of the door latch device 10.

[0019] 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.

[0020] The latch 21 is biased by a coil spring (not illustrated) in the clockwise direction as viewed from the front.

[0021] 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 partially overlaps at least the striker entry groove 421 formed in the cover plate 42 when viewed in the front-rear direction.

[0022] 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 counterclockwise of the striker engaging groove 213 when viewed from the rear.

[0023] 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 lever link 31 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.

[0024] The ratchet 23 is arranged such that the rotary shaft 231 is located below and rightward of the latch shaft 22.

[0025] The rotary shaft 231 has a front end rotatably supported by the plate member 43, and a rear end rotatably supported by the cover plate 42.

[0026] 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.

[0027] The ratchet 23 is biased counterclockwise when viewed from the front by a coil spring (not illustrated).

[0028] 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 421 of the cover plate 42 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.

[0029] 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.

[0030] As illustrated in FIGS. 2 to 7, the operation mechanism 30 further includes various operation levers, linking levers, motors, and the like assembled to the main body 41, the cover plate 42, the plate member 43, and the like. In FIGS. 2 to 7, only the members related to the present invention are illustrated, and the other members are omitted.

[0031] The operation mechanism 30 includes a lever link 31 for operating the ratchet 23 of the latch mechanism 20 to release the engagement of the ratchet 23 with the latch 21, a sub-lever 32 for operating the lever link 31, a handle lever 33 for operating the sub-lever 32, and a lever lock 34 that can switch between a locked state where the latch 21 is locked not to be operated and an unlocked state where the latch 21 is not locked to be operated.

[0032] In the present embodiment, the lever link 31, the sub-lever 32, the handle lever 33, and the lever lock 34 are all provided inward of the side plate 412 of the main body 41 in the vehicle width direction.

[0033] The lever link 31 is slidable in the upper-lower direction, and includes a ratchet driving portion 31a that can come into contact with the ratchet 23 from below. The lever link 31 is provided below the input portion 233 of the ratchet 23. When the lever link 31 slides upward, the ratchet driving portion 31a comes into contact with

the input portion 233 of the ratchet 23 upward from below. The upper region of the lever link 31 is formed with a lever lock engaging portion 31b protruding outward in the vehicle width direction to engage with the lever lock 34.

[0034] The sub-lever 32 is arranged below the lever link 31. The lever link 31 is made of resin. The lever link 31 is rotatable about a first rotary shaft 51.

[0035] The handle lever 33 is arranged inward of the sub-lever 32 in the vehicle width direction. The handle lever 33 is rotatable about a second rotary shaft 52.

[0036] The first rotary shaft 51 and the second rotary shaft 52 are parallel to each other and both extend in the vehicle width direction. The first rotary shaft 51 and the second rotary shaft 52 are arranged at different positions in the vehicle upper-lower direction and in the vehicle front-rear direction.

[0037] The first rotary shaft 51 is located below and on the vehicle rear side of the lever link 31.

[0038] The sub-lever 32 includes a lever 321 that has an upper end rotatably supported by the first rotary shaft 51 and that extends from the first rotary shaft 51 toward the obliquely lower front side of the vehicle when being in the standby position thereof, and a protrusion 322 protruding from the lever 321 toward the obliquely upper front side of the vehicle.

[0039] The distal end of the protrusion 322 of the sub-lever 32 is formed with a lever link operating portion 32a that can come into contact with the lower end of the lever link 31. The surface of the sub-lever 32 that faces the vehicle rear lower side is formed with a handle lever contact portion 32b to be in contact with a sub-lever operating portion 33a of the handle lever 33 to be described later.

[0040] When the sub-lever 32 rotates about the first rotary shaft 51 from the standby position counterclockwise when viewed from the inner in the vehicle width direction, the lever link operating portion 32a comes into contact with the lower end of the lever link 31 from below to push the lever link 31 upward.

[0041] When the lever link 31 is pushed upward, the ratchet driving portion 31a 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.

[0042] 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 421 of the cover plate 42. Thus, the left front door 80 can be opened.

[0043] The lower end of the sub-lever 32 being in the standby position is provided with a weight 323. In the present embodiment, the weight 323 is formed by bending and folding the metal forming the sub-lever 32.

[0044] As a result, the sub-lever 32 returns to the standby position by its own weight after the operation. Therefore, the sub-lever 32 is normally maintained to be in the standby position without providing a biasing member. This eliminates the need for a biasing member, and the sub-lever 32 can stably operate over a long period of time.

[0045] The second rotary shaft 52 is located below and on the vehicle front side of the first rotary shaft 51.

[0046] The handle lever 33 includes a lever 331 that has a lower end rotatably supported by a second rotary shaft 52 and that extends from the second rotary shaft 52 toward the obliquely upper rear side of the vehicle when being in the standby position thereof, a first protrusion 332 protruding outward in the vehicle width direction from the rear end of the lever 331, and a second protrusion 333 protruding from the lever 331 toward the obliquely upper front side of the vehicle.

[0047] The surface of the first protrusion 332 of the handle lever 33 that is oriented forward and upward is formed with a sub-lever operating portion 33a that comes in contact with the handle lever contact portion 32b of the sub-lever 32 to operate the sub-lever 32. The surface of the second protrusion 333 of the handle lever 33 that is oriented forward and upward is formed with a first lever lock operating portion 33b 1 that comes in contact with the handle lever contact portion 34b of the lever lock 34 to operate the lever lock 34. The upper end of the lever 331 of the handle lever 33 is formed with a second lever lock operating portion 33b2 that comes in contact with the handle lever contact portion 34b of the lever lock 34 to operate the lever lock 34.

[0048] The upper end of the lever 331 of the handle lever 33 is provided with an operation force transmission portion 33c to be coupled with the operation force transmission rod 73 for transmitting the operation force applied to the inside handle 93 to the door latch device 10.

[0049] When the door latch device 10 is arranged substantially horizontally with the inside handle 93 and the operation force transmission rod 73 is coupled to the door latch device 10 in a substantially horizontal direction from the vehicle front side, the operation force transmission rod 73 is coupled to the operation force transmission portion 33c of the handle lever 33.

[0050] Since the lever 331 of the handle lever 33 extends from the second rotary shaft 52 toward the obliquely upper rear side of the vehicle, when viewed from the inner side in the vehicle width direction, the lever 331 of the handle lever 33 is pulled forward by the operation force transmission rod 73 at an angle close to right angle from the operation force transmission rod 73. When the operation force transmission portion 33c of the handle lever 33 is pulled forward by the operation force transmission rod 73, the handle lever 33 rotates about the second rotary shaft 52 clockwise when viewed from the inner side in the vehicle width direction.

[0051] When the handle lever 33 rotates about the second rotary shaft 52 from the standby position clockwise

when viewed from the inner side in the vehicle width direction, the sub-lever operating portion 33a comes into contact with the handle lever contact portion 32b of the sub-lever 32 from the obliquely lower rear side of the vehicle to rotate the sub-lever 32 counterclockwise.

[0052] Thus, the ratchet 23 can be operated by the operation force applied to the inside handle 93 via the operation force transmission rod 73.

[0053] On the other hand, when the door latch device 10 is arranged below the inside handle 93 and the operation force transmission rod 73 is coupled to the door latch device 10 from the obliquely upper front side of the vehicle as illustrated in FIG. 8, a replacement lever 35 is attached instead of the sub-lever 32 and the handle lever 33. The replacement lever 35 includes a lever 351 that has an upper end rotatably supported by the first rotary shaft 51 and that extends from the first rotary shaft 51 toward the obliquely lower front side of the vehicle when being in the standby position thereof, and a protrusion 352 protruding from the lever 351 toward the obliquely upper front side of the vehicle. The distal end of the protrusion 352 is formed with a lever link operating portion 35a that can come into contact with the lower end of the lever link 31. The lower end of the lever 351 of the replacement lever 35 is further provided with an operation force transmission portion 35c to be coupled with the operation force transmission rod 73.

[0054] In this case, since the lever 351 of the replacement lever 35 extends from the first rotary shaft 51 toward the obliquely lower front side of the vehicle, when viewed from the inner side in the vehicle width direction, the replacement lever 35 is pulled forward by the operation force transmission rod 73 at an angle close to right angle from the operation force transmission rod 73. When the operation force transmission portion 35c of the replacement lever 35 is pulled forward by the operation force transmission rod 73, the replacement lever 35 rotates about the first rotary shaft 51 counterclockwise when viewed from the inner side in the vehicle width direction.

[0055] Thus, the ratchet 23 can be operated by the operation force applied to the inside handle 93 more efficiently via the operation force transmission rod 73.

[0056] Thus, the operation force applied to the inside handle 93 can be efficiently transmitted to operate the ratchet 23, by simply replacing the sub-lever 32 and the handle lever 33 with the replacement lever 35 according to the position of the inside handle 93 of the door in which the door latch device 10 is installed. Thus, the vehicle door latch device 10 can be installed in a plurality of types of doors having different positions of the inside handle 93, while preventing a change in the operation force to be applied to the inside handle 93 necessary for operating the ratchet 23, by simply replacing the sub-lever 32 and the handle lever 33 with the replacement lever 35. This improves the versatility.

[0057] Returning to FIGS. 5 to 7, when viewed in the vehicle width direction, that is, the axial direction of the first rotary shaft 51 and the second rotary shaft 52, the operation force transmission portion 33c is provided in a region where the rotation region SP1 of the sub-lever 32 and the rotation region SP2 of the handle lever 33 overlap each other.

[0058] Thus, the force necessary for rotating the sub-lever 32 is decreased in the region where the force necessary for rotating the handle lever 33 is large, and the force necessary for rotating the sub-lever 32 is increased in the region where the force necessary for rotating the handle lever 33 is small. Therefore, the force necessary for operating the inside handle 93 becomes uniform during the operation of the inside handle 93, which improves the operability of the inside handle 93.

[0059] Further, as described above, since the second rotary shaft 52 is positioned below and on the vehicle front side of the first rotary shaft 51, the door latch device 10 can be installed in a door whose rear end is inclined forward at a larger angle with respect to the vertical direction toward the lower side, such as a rear door of a vehicle mounted with a large-diameter tire. This further improves the versatility.

[0060] The lever lock 34 rotates about a third rotary shaft 53. The third rotary shaft 53 is positioned on the upper front side of the vehicle of the first rotary shaft 51 and above the second rotary shaft 52. The lever lock 34 can rotate about the third rotary shaft 53 to be displaced to an unlocked position in an unlocked state where the lever link 31 is not locked (see FIG. 5), and a locked position in a locked state where the lever link 31 is locked (see FIG. 6). The lever lock 34 can rotate about the third rotary shaft 53 to displace between a locked position and an unlocked position, thereby switching between a locked state where the latch 21 is locked not to be operated and an unlocked state where the latch 21 is not locked to be operated.

[0061] At the unlocked position, the lever lock 34 includes an upper extension portion 341 extending from the third rotary shaft 53 toward the obliquely upper rear side of the vehicle, an upper extension portion 341 extending from the third rotary shaft 53 toward the obliquely upper rear side of the vehicle, and a lower extension portion 342 extending from the third rotary shaft 53 toward the obliquely upper front side of the vehicle.

[0062] The upper end of the upper extension portion 341 of the lever lock 34 is formed with a lever link engaging surface 34a for engaging with the lever lock engaging portion 3 1b of the lever link 31. The lever lock engaging portion 3 1b of the lever link 31 is engaged with the lever link engaging surface 34a of the lever lock 34 in a manner slidable along the lever link engaging surface 34a.

[0063] As illustrated in FIG. 5, the lever link engaging surface 34a of the lever lock 34 is formed to extend substantially vertically when the lever lock 34 is at the unlocked position. When the lever lock 34 is at the unlocked position, the lever link 31 is slidable substantially vertically along the lever link engaging surface 34a. When the lever link 31 is displaced vertically upward, the ratchet driving portion 31a comes into contact with the input por-

tion 233 of the ratchet 23 to operate the ratchet 23 and the latch 21.

[0064] As illustrated in FIG. 6, the locked position of the lever lock 34 is a position displaced by a predetermined angle from the unlocked position clockwise when viewed from the inner side in the vehicle width direction. Therefore, when the lever lock 34 is at the locked position, the lever link engaging surface 34a of the lever lock 34 is inclined upward toward the vehicle front side. When the lever lock 34 is at the locked position, the lever link 31 is displaced upward while being displaced toward the vehicle front side along the lever link engaging surface 34a. When the lever link 31 is displaced upward when the lever lock 34 is at the locked position, the lever link 31 is displaced upward while being displaced toward the vehicle front side, so that the ratchet driving portion 31a passes through the vehicle front side of the input portion 233 of the ratchet 23 without coming into contact with the input portion 233 of the ratchet 23. As a result, when the lever lock 34 is at the locked position, the ratchet 23 does not operate even when the lever link 31 operates, which locks the latch 21 not to be operated.

[0065] The lower end of the lower extension portion 342 of the lever lock 34 is formed with a handle lever contact portion 34b oriented toward the obliquely lower rear side of the vehicle at the unlocked position.

[0066] As illustrated in FIG. 7, when the lever lock 34 is at the locked position, the operation force transmission portion 33c of the handle lever 33 is pulled forward by the operation force transmission rod 73, and the handle lever 33 rotates about the second rotary shaft 52 clockwise when viewed from the inner side in the vehicle width direction. Thereby, the first lever lock operating portion 33b 1 of the handle lever 33 comes into contact with the handle lever contact portion 34b of the lever lock 34, and rotates the lever lock 34 about the third rotary shaft 53 counterclockwise when viewed from the inner side in the vehicle width direction.

[0067] When the lever lock 34 rotates about the third rotary shaft 53 counterclockwise when viewed from the inner side in the vehicle width direction, the lever lock 34 rotates from the locked position toward the unlocked position. Thus, the lever link 31 can be displaced upward along the lever link engaging surface 34a substantially vertically.

[0068] At the same time, as described above, when the operation force transmission portion 33c of the handle lever 33 is pulled forward by the operation force transmission rod 73, the handle lever 33 rotates about the second rotary shaft 52 clockwise when viewed from the inner side in the vehicle width direction. Thereby, the sub-lever operating portion 33a comes into contact with the handle lever contact portion 32b of the sub-lever 32 from the obliquely lower rear side of the vehicle to rotate the sub-lever 32 counterclockwise. When the sub-lever 32 rotates about the first rotary shaft 51 from the standby position counterclockwise when viewed from the inner in the vehicle width direction, the lever link operating portion 32a comes into contact with the lower end of the lever link 31 from below to push the lever link 31 upward.

[0069] At this time, the lever lock 34 rotates from the locked position toward the unlocked position, and the lever link 31 can be displaced upward along the lever link engaging surface 34a substantially vertically. Therefore, the ratchet driving portion 31a is displaced upward substantially vertically and comes into contact with the input portion 233 of the ratchet 23 to rotate the ratchet 23 about the rotary shaft 231 clockwise when viewed from the front.

[0070] As described above, the handle lever 33 includes the first lever lock operating portion 33b1 that comes into contact with the lever lock 34 to operate the lever lock 34, so that the user can operate the inside handle 93 to unlock the door lock (turn the lever lock 34 from the locked state to the unlocked state) and open the door by one motion. This improves the convenience of the user while effectively utilizing the space inside the door latch device 10.

[0071] When the operation force transmission portion 33c of the handle lever 33 is further pulled forward by the operation force transmission rod 73 and the handle lever 33 further rotates about the second rotary shaft 52 clockwise when viewed from the inner side in the vehicle width direction, the first lever lock operating portion 33b1 of the handle lever 33 is separated from the handle lever contact portion 34b of the lever lock 34, and the second lever lock operating portion 33b2 of the handle lever 33 comes into contact with the handle lever contact portion 34b of the lever lock 34. Thus, the lever lock 34 is stably maintained at the unlocked position.

[0072] 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.

[0073] For example, in the present embodiment, when the door latch device 10 is arranged below the inside handle 93 and the operation force transmission rod 73 is coupled to the door latch device 10 from the obliquely upper front side of the vehicle, another lever may be attached to the first rotary shaft 51 instead of the sub-lever 32 and the handle lever 33. However, the lower end of the sub-lever 32 may be provided with a cable coupling portion to be coupled with the operation force transmission rod 73. Thus, when the door latch device 10 is arranged below the inside handle 93 and the operation force transmission rod 73 is coupled to the door latch device 10 from the obliquely upper front side of the vehicle, the sub-lever 32 can be used as it is by simply omitting the handle lever 33, which further improves the

versatility of the door latch device 10.

[0074] 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 (vehicle door latch device 10) including:

a latch (latch 21) configured to engage with a striker provided on a vehicle body;
a ratchet (ratchet 23) configured to engage with the latch;
a lever link (lever link 31) configured to release engagement of the ratchet with the latch;
a sub-lever (sub-lever 32) configured to rotate about a first rotary shaft (first rotary shaft 51) and operate the lever link; and
a handle lever (handle lever 33) configured to rotate about a second rotary shaft (second rotary shaft 52) and operate the sub-lever,
in which the handle lever is provided with a coupling portion (operation force transmission portion 33c) to which an operation force transmission member (operation force transmission rod 73) for transmitting an operation force applied to a door handle (inside handle 93) is to be coupled, and
the first rotary shaft and the second rotary shaft are arranged parallel to each other and at different positions in a vehicle upper-lower direction and in a vehicle front-rear direction.

According to (1), the operation force applied to the door handle can be efficiently transmitted to operate the ratchet, by simply replacing the sub-lever and the handle lever according to the position of the door handle of the door in which the door latch device is installed. Thus, the vehicle door latch device can be installed in a plurality of types of doors having different positions of the door handle, while preventing a change in the operation force to be applied to the door handle necessary for operating the ratchet, by simply replacing the sub-lever and the handle lever. This improves the versatility.

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

in which when viewed in an axial direction of the first rotary shaft and the second rotary shaft,
the coupling portion has at least a part positioned in a region where a rotation region of the sub-lever (rotation region SP1) and a rotation region of the handle lever (rotation region SP2) overlap each other, in a state where the handle lever is in a standby position.

According to (2), the force necessary for rotating the sub-lever is decreased in a region where the force necessary for rotating the handle lever is large, and the force necessary for rotating the sub-lever is increased in a region where the force necessary for rotating the handle lever is small. Therefore, the force necessary for operating the door handle becomes uniform during the operation of the door handle, which improves the operability of the door handle.

(3) The vehicle door latch device according to (1) or (2),
in which the second rotary shaft is located below and on a vehicle front side of the first rotary shaft.

According to (3), since the second rotary shaft is positioned below and on the vehicle front side of the first rotary shaft, the door latch device can be installed in a door whose rear end is inclined forward at a larger angle with respect to the vertical direction toward the lower side, such as a rear door of a vehicle mounted with a large-diameter tire. This further improves the versatility.

(4) The vehicle door latch device according to any one of (1) to (3),
in which a lower end of the sub-lever being in a standby position is provided with a weight (weight 323).

According to (4), the sub-lever returns to the standby position by its own weight after the operation. Therefore, the sub-lever is normally maintained to be in the standby position without providing a biasing member. This eliminates the need for a biasing member, and the sub-lever can stably operate over a long period of time.

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

a lever lock (lever lock 34) configured to switch between a locked state where the latch is locked not to be operated and an unlocked state where the latch is not locked to be operated,
in which the handle lever includes a lever lock operating portion (first lever lock operating portion 33b 1) configured to come into contact with the lever lock to operate the lever lock.

[0075] According to (5), the handle lever includes the lever lock operating portion that comes into contact with the lever lock to operate the lever lock, so that the user can operate the door handle to unlock the door lock and open the door by one motion. This improves the convenience of the user while effectively utilizing the space inside the door latch device.

Claims

1. A vehicle door latch device comprising:

a latch configured to engage with a striker pro-

vided on a vehicle body;
a ratchet configured to engage with the latch;
a lever link configured to release engagement of the ratchet with the latch;
a sub-lever configured to rotate about a first rotary shaft and operate the lever link; and
a handle lever configured to rotate about a second rotary shaft and operate the sub-lever,
wherein the handle lever is provided with a coupling portion to which an operation force transmission member for transmitting an operation force applied to a door handle is to be coupled, and
the first rotary shaft and the second rotary shaft are arranged parallel to each other and at different positions in a vehicle upper-lower direction and in a vehicle front-rear direction.

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

wherein when viewed in an axial direction of the first rotary shaft and the second rotary shaft,
the coupling portion has at least a part positioned in a region where a rotation region of the sub-lever and a rotation region of the handle lever overlap each other, in a state where the handle lever is in a standby position.

3. The vehicle door latch device according to claim 1 or 2,
wherein the second rotary shaft is located below and on a vehicle front side of the first rotary shaft.

4. The vehicle door latch device according to any one of claims 1 to 3,
wherein a lower end of the sub-lever being in a standby position is provided with a weight.

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

a lever lock configured to switch between a locked state where the latch is locked not to be operated and an unlocked state where the latch is not locked to be operated,
wherein the handle lever includes a lever lock operating portion configured to come into contact with the lever lock to operate the lever lock.

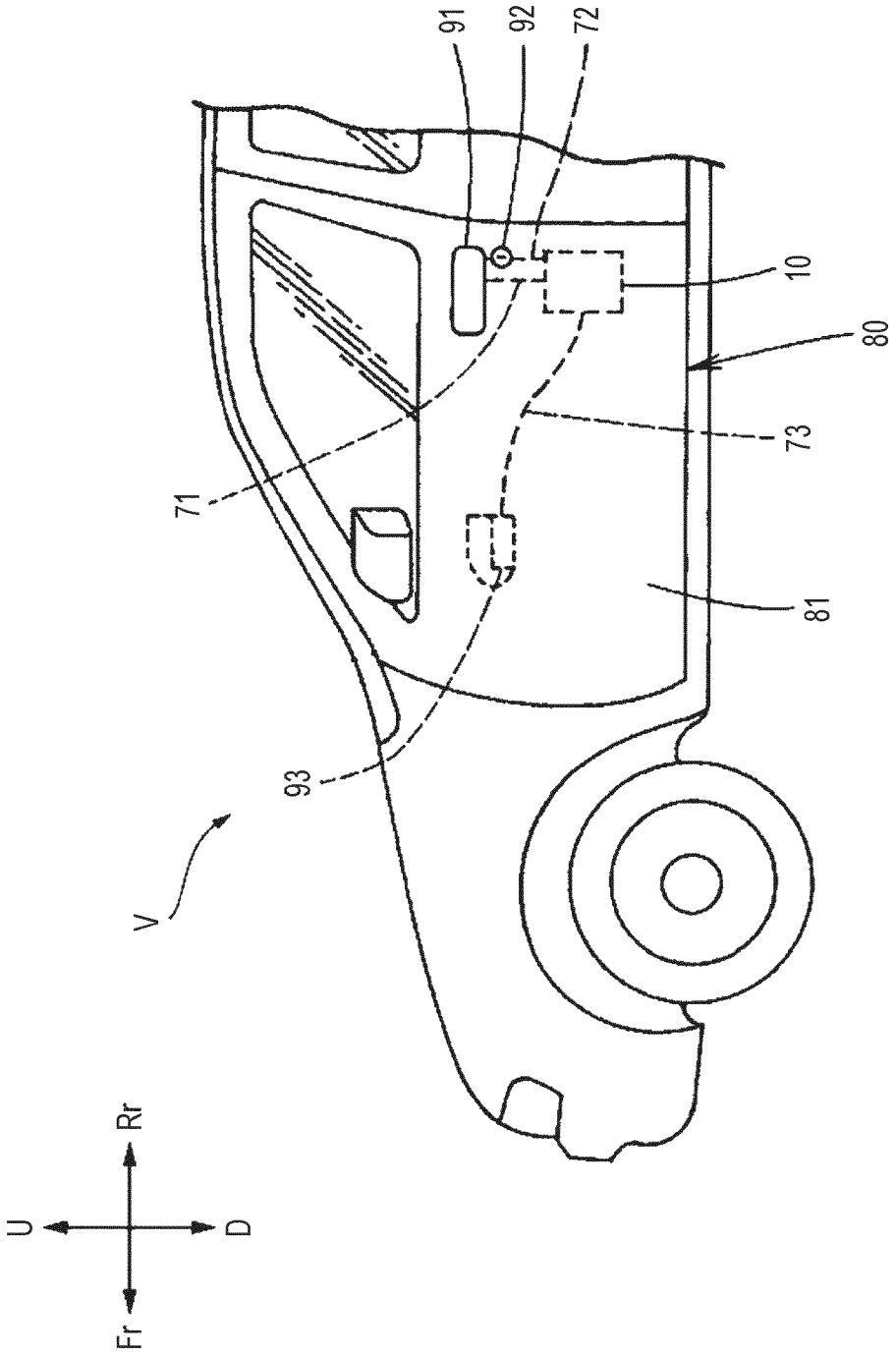
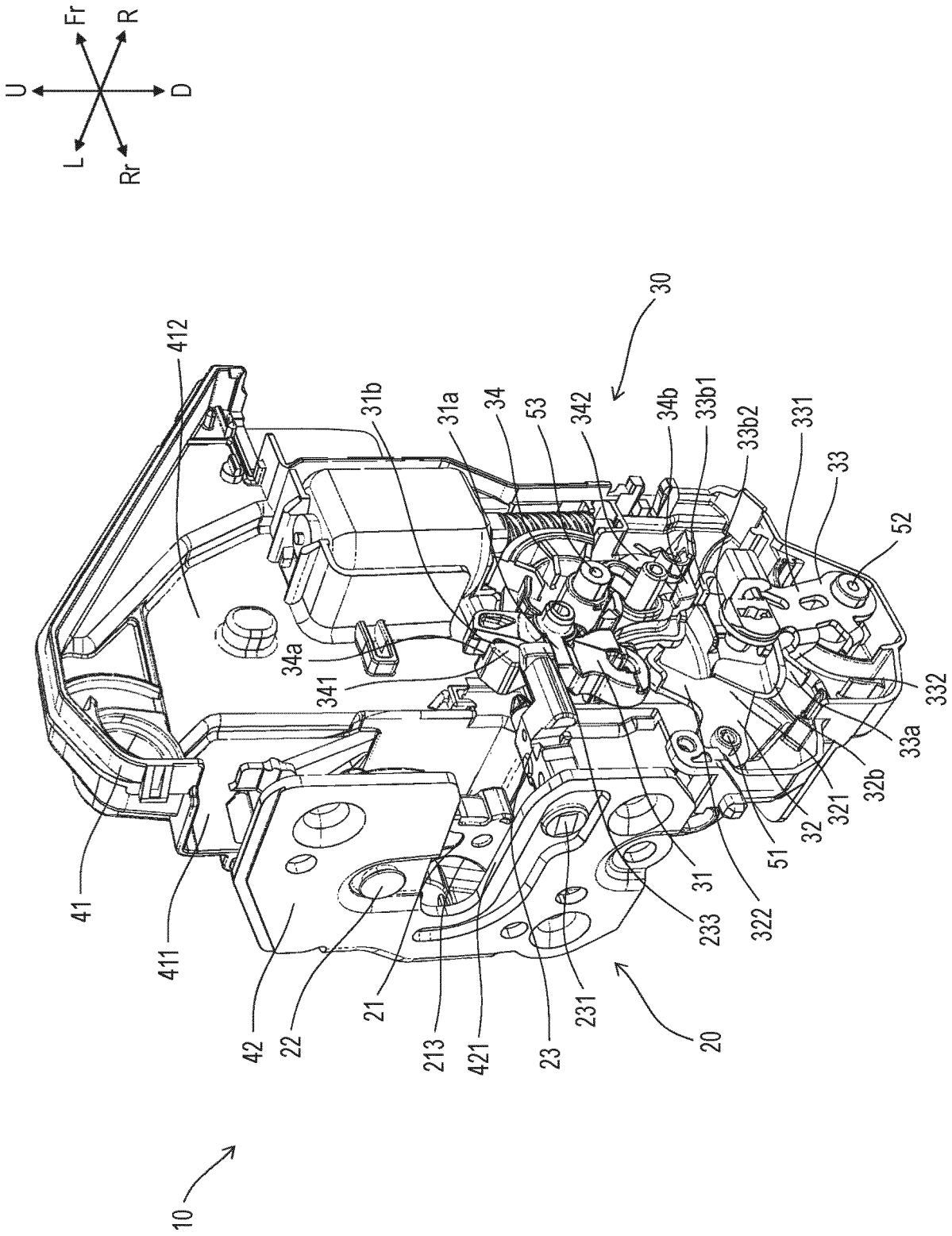


FIG. 1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33b1
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34a

FIG. 2

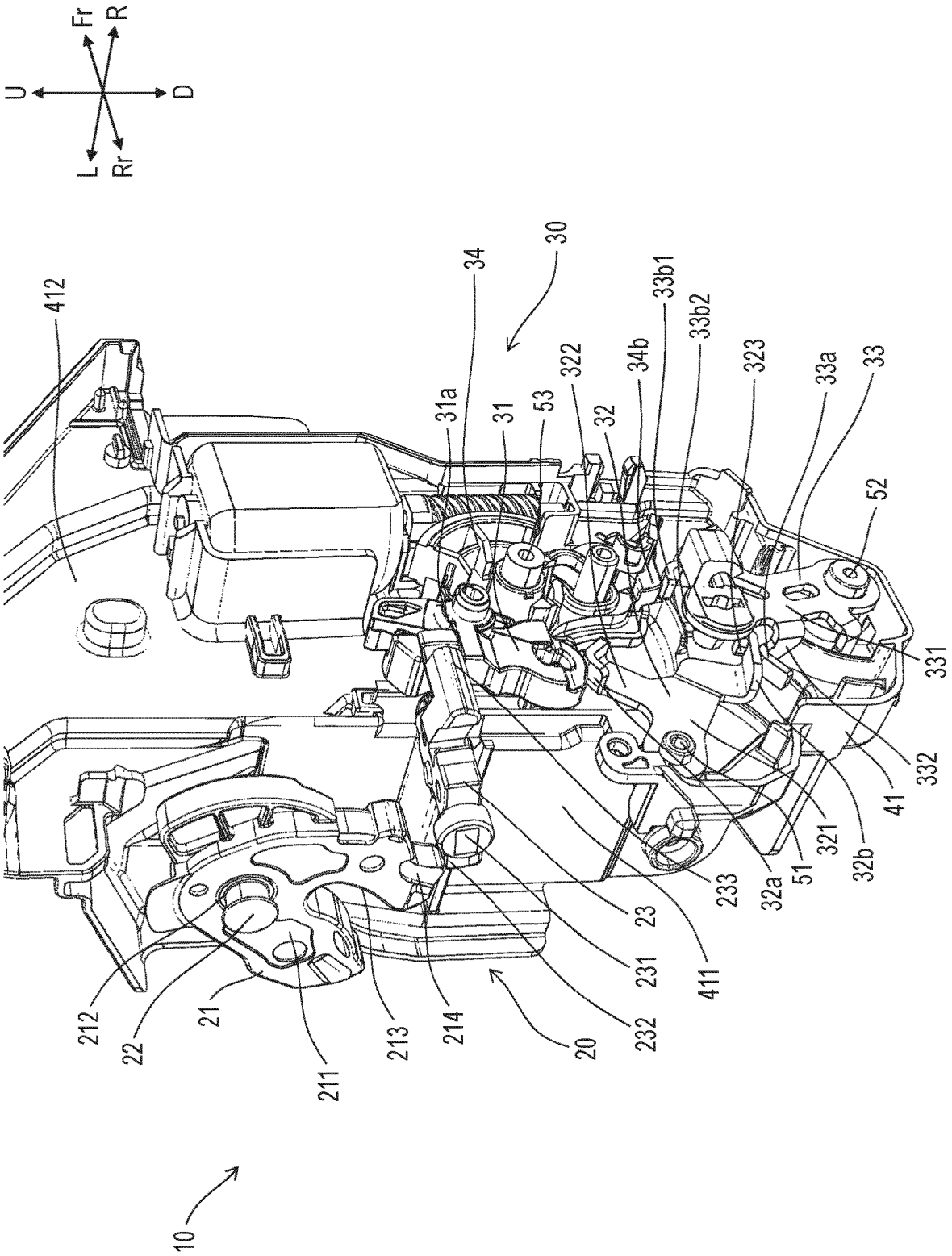
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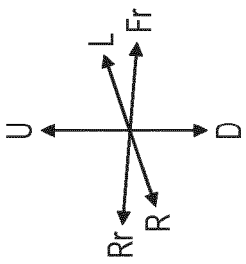
FIG. 3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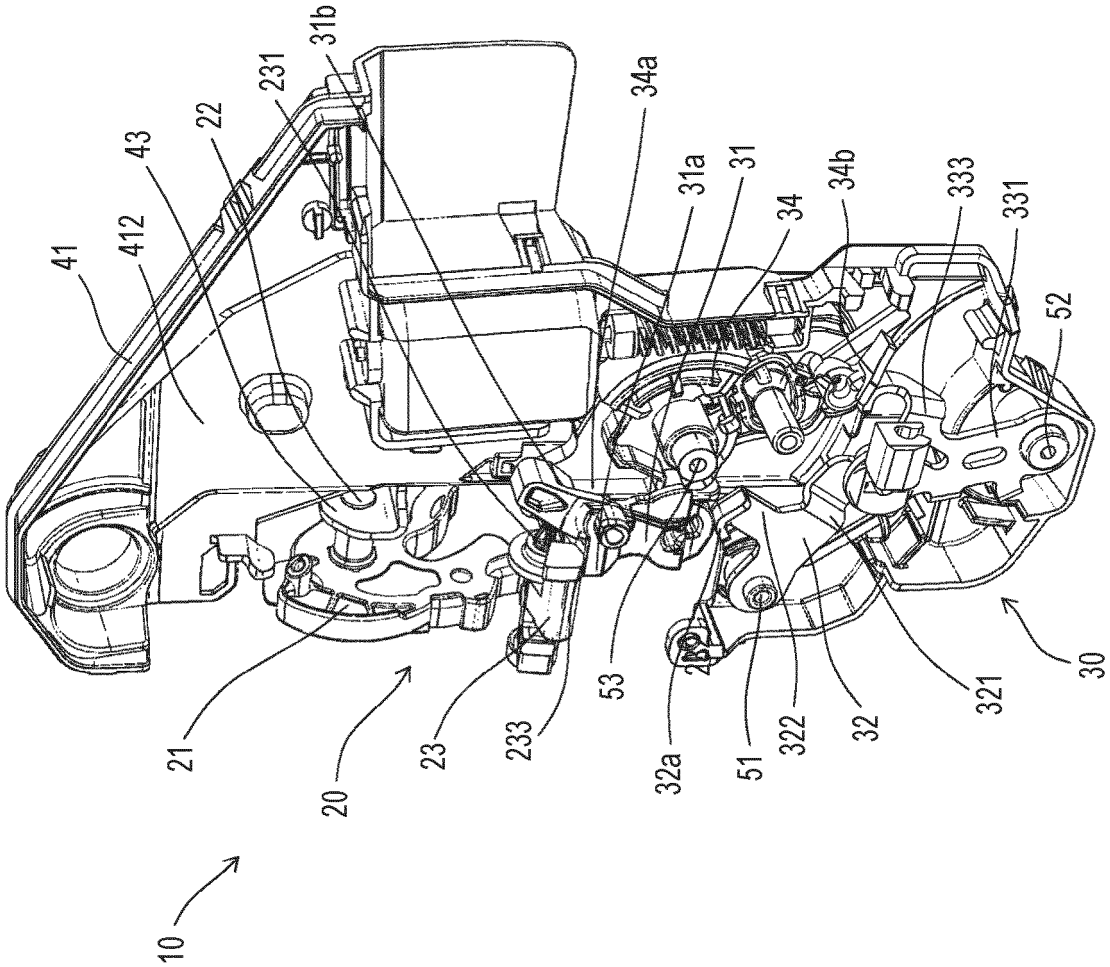
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FIG. 4

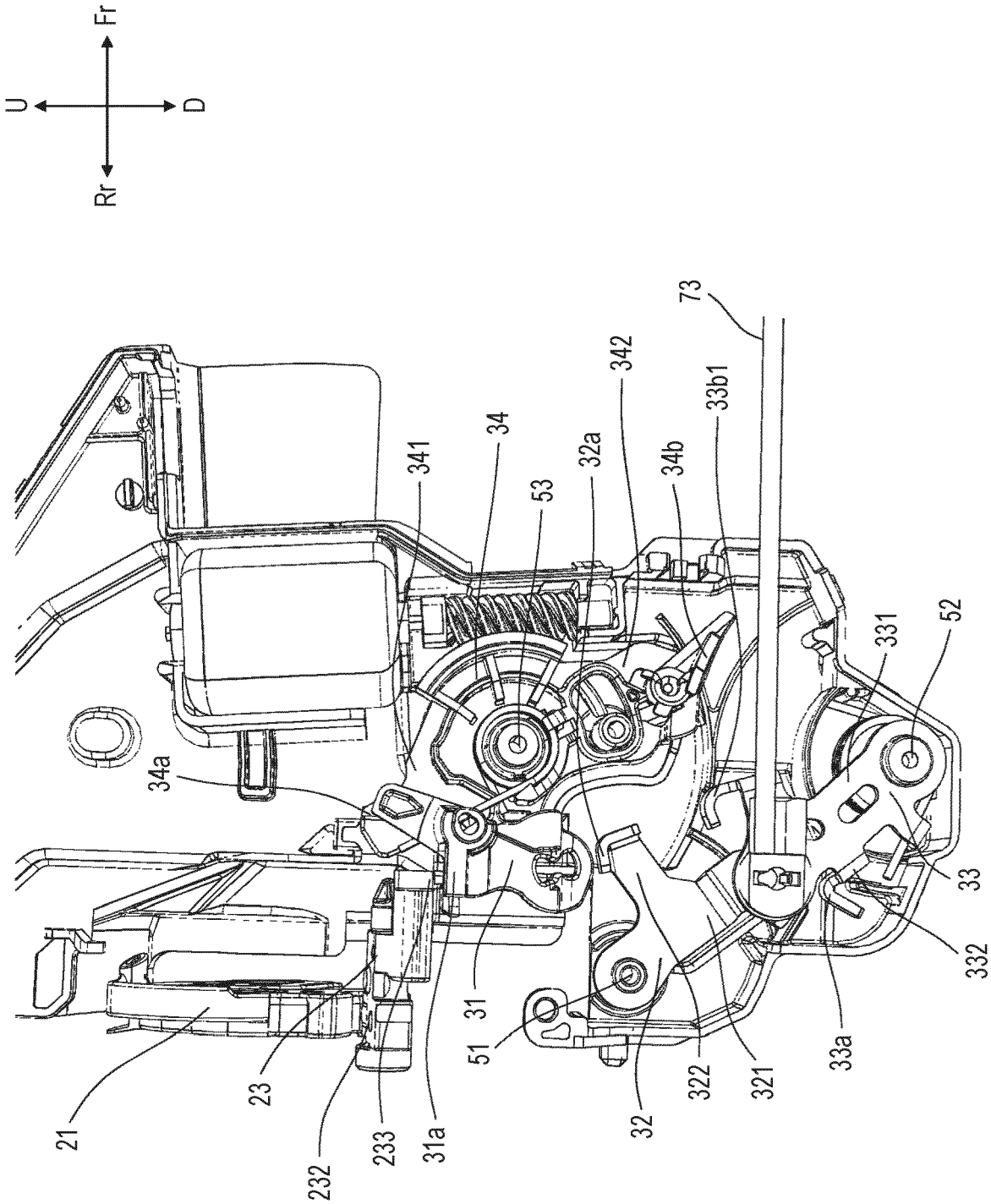
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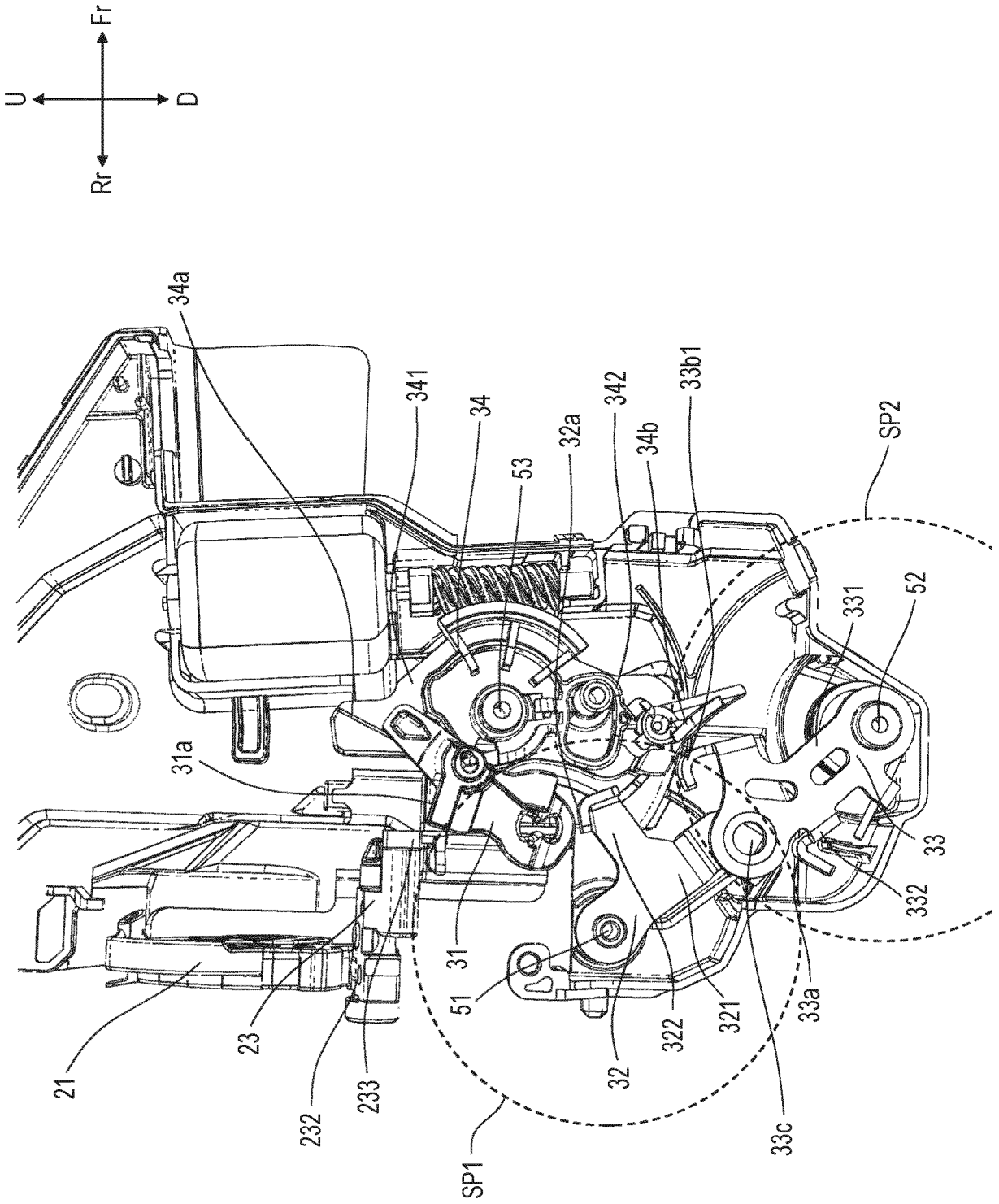
FIG. 5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33a
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33c
SP1

FIG. 6

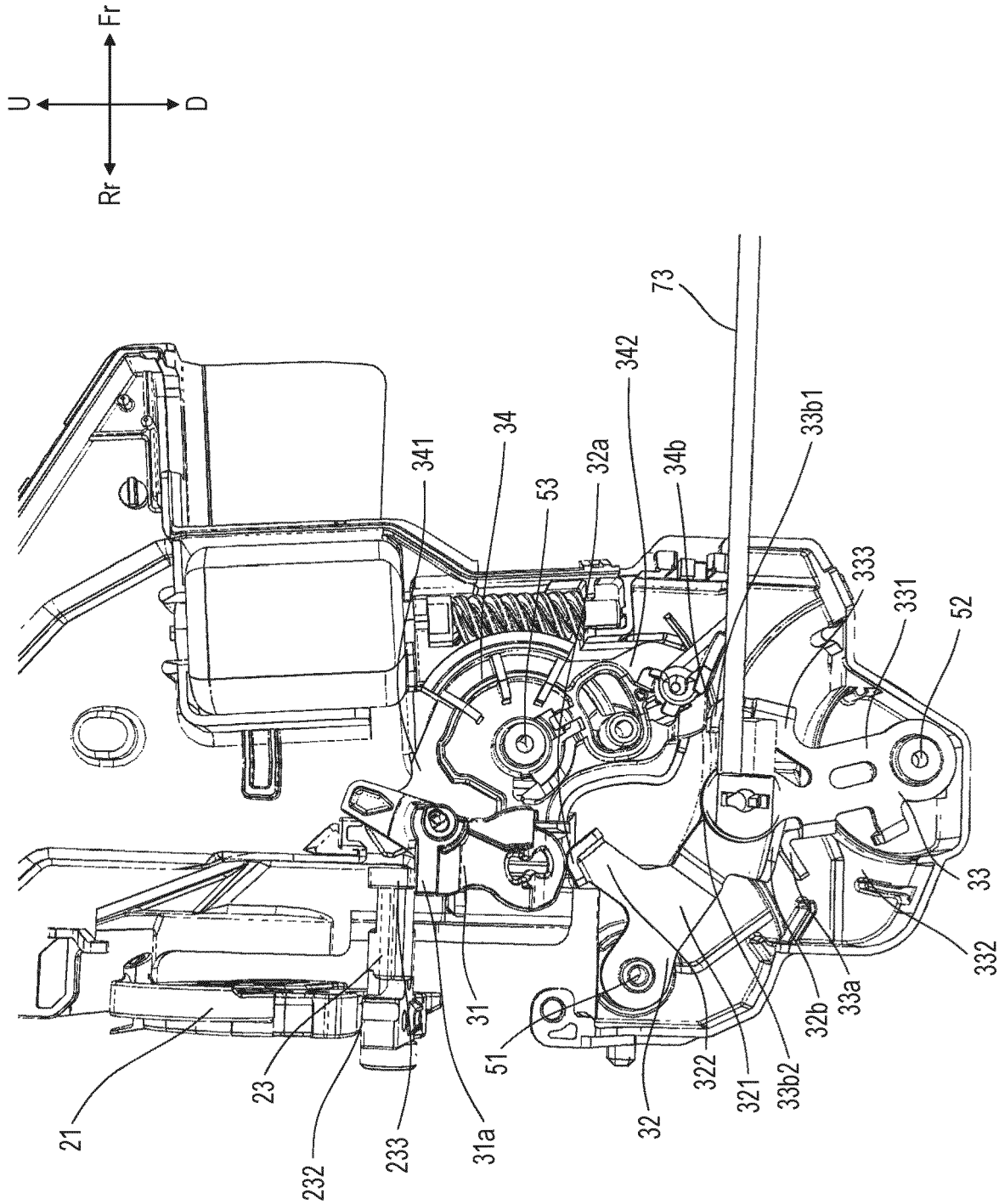
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FIG. 7

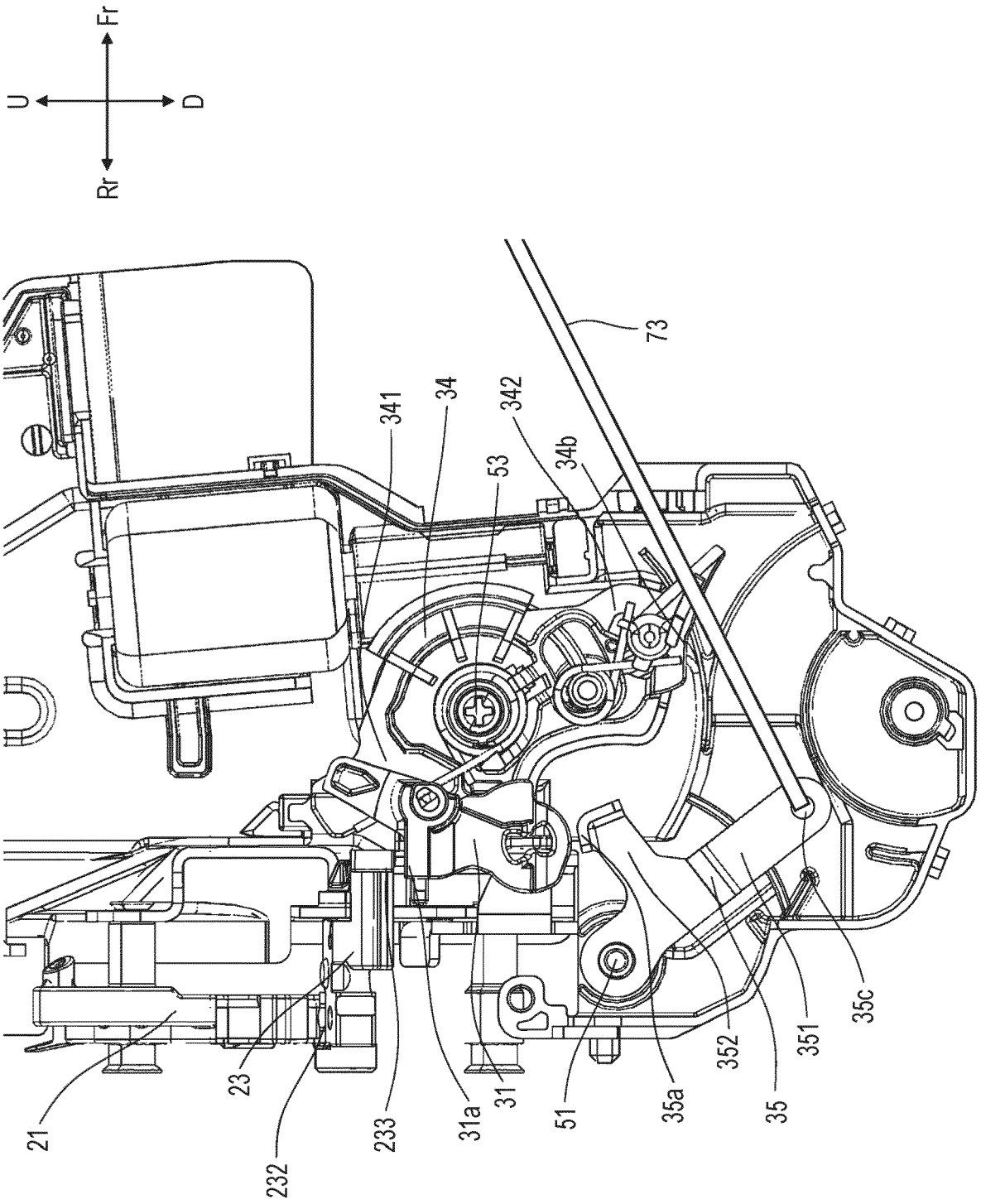
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FIG. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 23 21 4238

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Place of search	Date of completion of the search	Examiner
The Hague	29 April 2024	Van Beurden, Jason

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