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United States Patent Application Publication	20250264140
Kind Code	A1
Publication Date	August 21, 2025
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BRAKE ACTUATOR AND BRAKE APPARATUS INCLUDING THE SAME

Abstract

A brake actuator and a brake apparatus including the same. The brake actuator includes a case, a first motor installed in the case, a transfer gear rotatably installed in the case and connected to the first motor, a first parking member rotated along with the transfer gear, a second motor disposed to be spaced apart from the first motor, a second parking member connected to the second motor and configured to limit the rotation of the first parking member as the second parking member is rotated in a first rotation direction, and a support member disposed to face the second parking member and configured to limit a rotation range of the second parking member in a second rotation direction that is opposite to the first rotation direction.

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Appl. No.: **18/936187**

Filed: **November 04, 2024**

Foreign Application Priority Data

KR	10-2024-0022834	Feb. 16, 2024

Publication Classification

Int. Cl.: **F16D65/16** (20060101); **B60T13/74** (20060101); **F16D55/226** (20060101); **F16D63/00** (20060101); **F16D65/18** (20060101); **F16D121/24** (20120101); **F16D125/48**

(20120101); **F16D127/02** (20120101); **F16D127/06** (20120101)

U.S. Cl.:

CPC **F16D65/16** (20130101); **B60T13/746** (20130101); **F16D55/226** (20130101); **F16D63/006** (20130101); **F16D65/18** (20130101); F16D2121/24 (20130101); F16D2125/48 (20130101); F16D2127/02 (20130101); F16D2127/06 (20130101)

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from and the benefit of Korean Patent Application No. 10-2024-0022834, filed on Feb. 16, 2024, which is hereby incorporated by reference for all purposes as if set forth herein.

BACKGROUND

Field

[0002] Exemplary embodiments of the present disclosure relate to a brake actuator and a brake apparatus including the same, and more particularly, to a brake actuator capable of securing stable parking braking performance and a brake apparatus including the same.

Discussion of the Background

[0003] In general, a brake apparatus for a vehicle is an apparatus that brings a pad and a disk closer to each other by pushing a piston by a driving force and that brakes a vehicle by using a frictional force between the pad and the disk.

[0004] Among brake apparatuses, an electro mechanical brake (EMB) is an apparatus that generates a braking force by pressurizing the piston through a mechanism, such as a gear or a screw, by using a motor driving actuator that is directly mounted on a caliper, without using oil pressure. Such an EMB has advantages in that the EMB is capable of additional function implementations, such as an ABS, ESC, a TCS, and AEB, in addition to common parking braking because the EMB is capable of active braking and independent braking for each wheel and can implement higher performance because oil pressure transfer delay is not present.

[0005] A conventional EMB secures quick responsiveness and high efficiency of the piston through a ball screw. However, such a ball screw is incapable of self-locking by which self-rotation can be limited due to the nature of its structural characteristic. When the supply of power to a motor is stopped, the conventional EMB has a problem in that a braking force is arbitrarily released by repulsive power of the pad and the piston.

[0006] The Background Technology of the present disclosure is disclosed in Korean Patent Application Publication No. 10-2010-0098846 (Sep. 10, 2010 entitled “DISK BRAKE HAVING PARKING FUNCTION”).

SUMMARY

[0007] Various embodiments are directed to providing a brake actuator capable of securing stable parking braking performance and a brake apparatus including the same.

[0008] In an embodiment, a brake actuator includes a case, a first motor installed in the case, a transfer gear rotatably installed in the case and connected to the first motor, a first parking member rotating along with the transfer gear, a second motor disposed to be spaced apart from the first motor, a second parking member connected to the second motor and configured to limit the rotation of the first parking member as the second parking member is rotated in a first rotation direction, and a support member disposed to face the second parking member and configured to limit a rotation range of the second parking member in a second rotation direction that is opposite to the first rotation direction.

[0009] The first parking member may include a first parking body connected to a first output shaft of the first motor and a plurality of extension parts extended from the first parking body and arranged along the circumferential surface of the first parking body.
[0010] At least one extension part among the plurality of extension parts may be inclined with respect to a radial direction of the first parking body.
[0011] The second parking member may include a second parking body connected to a second output shaft of the second motor and rotates in the first rotation direction or the second rotation direction, a trap member extended from the second parking body and inserts between adjacent extension parts among the plurality of extension parts as the second parking body is rotated in the first rotation direction, and a return member connected to the second parking body and configured to add rotatory power in the second rotation direction to the second parking body.
[0012] The return member may add rotatory power in the second rotation direction to the second parking member when the second parking member comes into contact with the support member.
[0013] The return member may be elastically deformable.
[0014] The return member may be a torsion spring.
[0015] The second parking member may further include a distribution member in the second parking body.
[0016] The second motor may include a neck part disposed to surround the second output shaft. The distribution member may include a motor boss extended from the second parking body and disposed to surround the neck part.
[0017] The distribution member may include a case boss extended from the second parking body and inserted into the case.
[0018] The support member may protrude from the case, and may come into contact with the second parking body when the second parking body is rotated at a set angle or more in the second rotation direction.
[0019] The end of the support member may have a curved surface shape.
[0020] The first parking body may be movably installed in the length direction of the first output shaft. When weight that acts between the trap member and at least one extension part among the plurality of extension parts is a set size or more, the first parking body may be moved in a departure direction parallel to the length direction of the first output shaft.
[0021] A side surface of the extension part may be inclined with respect to the length direction of the first output shaft.
[0022] The brake actuator may further include a restoration member configured to pressurize the first parking member in a direction opposite to the departure direction.
[0023] The restoration member may include a restoration body disposed to face the first parking body and a pressurization member disposed between the restoration body and the first parking body, wherein the pressurization member is elastically deformable.
[0024] The pressurization member may be a compression spring.
[0025] In an embodiment, a brake apparatus includes a caliper body, a piston unit movably installed in the caliper body and configured to come into contact with or to be separated from a brake pad in a moving direction of the piston unit, and a brake actuator connected to the piston unit and configured to move the piston unit. The brake actuator includes a case, a first motor installed in the case, a transfer gear rotatably installed in the case and connected to the first motor and the piston unit, a first parking member rotating along with the transfer gear, a second motor disposed to be spaced apart from the first motor, a second parking member connected to the second motor and configured to limit the rotation of the first parking member as the second parking member is rotated in a first rotation direction, and a support member disposed to face the second parking member and configured to limit a rotation range of the second parking member in a second rotation direction that is opposite to the first rotation direction.
[0026] The brake actuator and the brake apparatus according to an embodiment of the present

disclosure can maintain a parking braking force although an operation of the first motor is released upon parking braking by the first parking member and the second parking member.
[0027] The brake actuator and the brake apparatus according to an embodiment of the present disclosure can adjust an operation of the second parking body through only on/off control of the second motor because the second parking body can be returned to its initial location by the return member even without the driving of the second motor.
[0028] The brake actuator and the brake apparatus according to an embodiment of the present disclosure can reduce the stroke length of the second parking member upon parking braking and increase the utilization of a space, by limiting the rotation range of the second parking member in the second rotation direction by the second support member.
[0029] The brake actuator and the brake apparatus according to an embodiment of the present disclosure can prevent damage to the second output shaft by distributing a reaction that occurs between the extension part and the trap member upon parking braking through the distribution member.
[0030] The brake actuator and the brake apparatus according to an embodiment of the present disclosure can prevent a loss of the traveling ability of a vehicle by forcedly releasing a braking force by the slant structure of the extension part and the restoration member if the braking force is not smoothly released due to damage to the first parking member and the second parking member or a false operation of the first parking member and the second parking member.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0031] FIG. **1** is a perspective view schematically illustrating a construction of a brake apparatus according to an embodiment of the present disclosure.
[0032] FIG. **2** is a cross-sectional view schematically illustrating a construction of the brake apparatus according to an embodiment of the present disclosure.
[0033] FIG. **3** is a perspective view schematically illustrating a construction of a brake actuator according to an embodiment of the present disclosure.
[0034] FIG. **4** is a front view schematically illustrating a construction of the brake actuator according to an embodiment of the present disclosure.
[0035] FIG. **5** is a perspective view schematically illustrating a construction of a first parking member and a second parking member according to an embodiment of the present disclosure.
[0036] FIG. **6** is a front view schematically illustrating a construction of the first parking member and the second parking member according to an embodiment of the present disclosure.
[0037] FIG. **7** is a side view schematically illustrating a construction of the first parking member and the second parking member according to an embodiment of the present disclosure.
[0038] FIG. **8** is an enlarged view schematically illustrating a construction of a distribution member according to an embodiment of the present disclosure.
[0039] FIG. **9** is an enlarged view illustrating a modified example of the distribution member illustrated in FIG. **8**.
[0040] FIG. **10** is an enlarged view illustrating another modified example of the distribution member illustrated in FIG. **8**.
[0041] FIGS. **11** to **13** are diagrams schematically illustrating a process of generating a parking braking force.
[0042] FIGS. **14** and **15** are diagrams schematically illustrating a process of releasing a parking braking force.
[0043] FIGS. **16** and **17** are diagrams schematically illustrating a process of forcedly releasing a parking braking force.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

[0044] Hereinafter, a brake actuator and a brake apparatus including the same according to embodiments of the present disclosure are described with reference to the accompanying drawings.

[0045] In this process, the thicknesses of lines or the sizes of components illustrated in the drawings may have been exaggerated for the clarity of a description and for convenience' sake. Terms to be described below have been defined by taking into consideration their functions in the present disclosure, and may be changed depending on a user or operator's intention or practice. Accordingly, such terms should be defined based on the overall contents of this specification.

[0046] Furthermore, throughout the specification, when it is described that one part is “connected (or coupled)” to another part, the one part may be “directly connected (or coupled)” to the another part or may be “indirectly connected (or coupled)” to the another part with another member interposed therebetween. When it is said that one component “includes (or comprises)” the other component, this means that the one component may further “include (or comprise)” another component not the exclusion of another component unless explicitly described to the contrary.

[0047] Furthermore, throughout this specification, the same reference numerals may denote the same components. Although not mentioned or described in a specific drawing, the same reference numerals or similar reference numerals may be described on the basis of another drawing. Furthermore, although a reference numeral is not indicated in a portion of a specific drawing, the portion may be described on the basis of another drawing. Furthermore, the number, shapes, and sizes of detailed components included in the drawings of this application, a relative difference between the sizes, etc. have been set for convenience of understanding, and do not limit embodiments, and may be implemented in various forms.

[0048] FIG. **1** is a perspective view schematically illustrating a construction of a brake apparatus according to an embodiment of the present disclosure. FIG. **2** is a cross-sectional view schematically illustrating a construction of the brake apparatus according to an embodiment of the present disclosure.

[0049] Referring to FIGS. **1** and **2**, a brake apparatus **1** according to the present embodiment includes a caliper body **10**, a piston unit **20**, and a brake actuator **30**.

[0050] The caliper body **10** forms a schematic appearance of the brake apparatus, and may generally support the piston unit **20** and the brake actuator **30**.

[0051] The caliper body **10** according to the present embodiment may include a bridge **11**, a finger **12**, and a cylinder **13**.

[0052] The bridge **11** forms an appearance of a central part of the caliper body **10**, and may support the finger **12** and the cylinder **13**. The bottom of the bridge **11** may be disposed to face the circumferential surface of a brake disk D by being spaced apart from the circumferential surface of the brake disk D at a predetermined interval. Both sides of the bridge **11** may be extended in opposite directions in a direction (i.e., an X axis direction in FIG. **1**) parallel to the central axis of the brake disk D. A detailed shape of the bridge **11** is not limited to the shape illustrated in FIGS. **1** and **2**, and the design of the bridge **11** may be changed in various shapes.

[0053] A pair of brake pads P may be disposed under the bridge **11**. The pair of brake pads P may be spaced apart from each other along the central axis of the brake disk D. The pair of brake pads P may be disposed to face each other with the brake disk D interposed therebetween. The pair of brake pads P may be supported by a carrier **2** or the bridge **11** so that the pair of brake pads P can slide and move in the direction parallel to the central axis of the brake disk D. A friction pad including a material having a high friction coefficient, such as rubber, may be attached to one surface of the brake pad P, which faces the brake disk D.

[0054] The bridge **11** may be movably connected to the carrier **2** that is fixed to a knuckle (not illustrated) through the medium of a guide rod **11***a*. The bridge **11** may slide and move in the direction parallel to the central axis of the brake disk D by a reaction that is generated between the brake pad P and the piston unit **20** upon braking of a vehicle.

[0055] The finger **12** may be downward extended from one side of the bridge **11**. The finger **12** may be integrally connected to the bridge **11** by welding, press processing, or bending processing. The finger **12** may be disposed to face any one of the pair of brake pads P. The finger **12** may pressurize any one of the pair of brake pads P toward the brake disk D or release the pressurization of any one of the pair of brake pads P, by the slide and movement of the bridge **11**.
[0056] The cylinder **13** may be downward extended from the other side of the bridge **11**. The cylinder **13** may be formed to have a cylindrical shape having an inside emptied and one side opened. The central axis of the cylinder **13** may be disposed in parallel to the central axis of the brake disk D. The opened side of the cylinder **13** may be disposed to face the other of the pair of brake pads P.
[0057] The piston unit **20** may be movably installed in the caliper body **10**. The piston unit **20** may come into contact with the other of the pair of brake pads P or may be separated from the other of the pair of brake pads P in a moving direction thereof. When coming into contact with the brake pad P, the piston unit **20** may pressurize the brake pad P toward the brake disk D. The brake pad P is brought closer to the brake disk D, and may apply a braking force to a vehicle. When being separated from the brake pad P, the piston unit **20** may release pressure that is applied to the brake pad P. The brake pad P is separated from the brake disk D, and may release a braking force applied to the vehicle.
[0058] The piston unit **20** may include a piston **21**, a bolt screw **22**, and a nut screw **23**.
[0059] The piston **21** may be formed to have a cup shape having one side opened. A closed side of the piston **21** may be disposed toward the brake pad P that is disposed to face the cylinder **13**. The opened side of the piston **21** may be disposed toward an internal space of the cylinder **13**. The outside of the piston **21** may be supported by the inside of the cylinder **13** so that the piston **21** can slide and move thereon. On the contrary, the outside of the piston **21** may form a gap by being spaced apart from the inside of the cylinder **13** at a predetermined distance.
[0060] The piston **21** may be moved to advance and retreat in a direction (i.e., a direction parallel to the X axis in FIG. **1**) parallel to the central axis of the cylinder **13**. The piston **21** protrudes toward the outside of the cylinder **13** upon an advance movement, and may pressurize the brake pad P that is disposed to face the cylinder **13** toward the brake disk D. In this case, the bridge **11** may be moved in a direction opposite to the moving direction of the piston **21** by a reaction that is generated between the piston **21** and the brake pad P. Upon a retreat movement, the piston **21** releases pressure that is applied to the brake pad P, and may separate the brake pad P from the brake disk D.
[0061] The bolt screw **22** is disposed within the cylinder **13**, and may be rotated by a driving force that is applied by the brake actuator **30**.
[0062] For example, the bolt screw **22** may be formed to have a pole shape having approximately a circular cross section. The bolt screw **22** is disposed within the cylinder **13**, and may have a central axis disposed on the same axis as the central axis of the cylinder **13**. One end of the bolt screw **22** may be disposed to face the end of the inside of the piston **21** by being spaced apart from the end of the inside of the piston **21** at a predetermined interval. The other end of the bolt screw **22** penetrates the closed side of the cylinder **13**, and may protrude to the outside of the caliper body **10**. When the brake actuator **30** operates, the bolt screw **22** may be rotated clockwise or counterclockwise around the central axis thereof.
[0063] A groove in which the circumference of an electric body having a spherical shape on one side thereof is seated may be formed in the outer circumferential surface of the bolt screw **22**. The groove is extended in a spiral shape in the length direction of the bolt screw **22**, and may provide the circulation path of the electric body.
[0064] The nut screw **23** is disposed within the cylinder **13**, and may be connected to the bolt screw **22**. The nut screw **23** may be moved to reciprocate in a straight line in a direction parallel to the length direction of the bolt screw **22** within the cylinder **13** in conjunction with the rotation of the

bolt screw **22**. The nut screw **23** may pressurize the piston **21** toward the brake pad P or release the pressurization of the piston **21** in the moving direction thereof.

[0065] For example, the nut screw **23** may be formed to have a cylindrical shape having a hollow shape. The inner circumferential surface of the nut screw **23** may be disposed to face the outer circumferential surface of the bolt screw **22** by being spaced apart from the outer circumferential surface of the bolt screw **22** at a predetermined interval. A groove in which the circumference of the electric body on the other side thereof is seated may be formed in the inner circumferential surface of the nut screw **23**. The groove is extended in a spiral shape in the length direction of the nut screw **23**, and may provide the circulation path of the electric body.

[0066] The nut screw **23** may receive rotatory power of the bolt screw **22** through the medium of the electric body. When the bolt screw **22** is rotated, the nut screw **23** may be moved to advance and retreat in the length direction of the bolt screw **22** by the circulation movement of the electric body.

[0067] Upon an advance movement, the nut screw **23** comes into contact with the inside of the piston **21**, and may pressurize the piston **21** toward the brake disk D. Upon a retreat movement, the nut screw **23** is separated from the inside of the piston **21**, and may release pressure that is applied to the piston **21**.

[0068] The brake actuator **30** is connected to the piston unit **20**, and may move the piston unit **20**. That is, the brake actuator **30** may function as a component that generates a driving force for applying a braking force to a vehicle or releasing the braking force and that transfers a generated driving force to the piston unit **20**.

[0069] FIG. **3** is a perspective view schematically illustrating a construction of a brake actuator according to an embodiment of the present disclosure. FIG. **4** is a front view schematically illustrating a construction of the brake actuator according to an embodiment of the present disclosure.

[0070] Referring to FIGS. **3** and **4**, a brake actuator **30** according to the present embodiment includes a case **100**, a first motor **200**, a transfer gear **300**, a first parking member **400**, a second motor **500**, a second parking member **600**, and a support member **700**.

[0071] The case **100** is fixed to the caliper body **10**, and may generally support the first motor **200**, the transfer gear **300**, the first parking member **400**, the second motor **500**, and the second parking member **600**.

[0072] The case **100** may include a case body **110** and a case cover **120**.

[0073] The case body **110** may be formed to have a barrel shape having an inside emptied and one side opened. A closed side of the case body **110** may be disposed to face a rear surface of the cylinder **13**. The case body **110** may be fixed to the rear surface of the cylinder **13** by various types of coupling methods, such as bolting, welding, and fitted coupling. A cross section shape of the case body **110** is not limited to the shape illustrated in FIGS. **3** and **4**, and the design of the cross section shape may be changed in various shapes.

[0074] The case cover **120** is disposed to face the case body **110**, and may close an internal space of the case body **110**. The case cover **120** is formed to have approximately a plate shape, and may be disposed to face the opened side of the case body **110**. The case cover **120** may be fixed to the opened side of the case body **110** by various types of coupling methods, such as bolting, welding, and fitted coupling. A cross section shape of the case cover **120** may be formed to correspond to the cross section shape of the case body **110**.

[0075] The first motor **200** is installed in the case **100**, and generates rotatory power for moving the piston unit **20**. For example, the first motor **200** may be exemplified as various types of electric motors which may rotate a first output shaft **210** by receiving power from the outside. The first motor **200** may be fixed to the outside of the case body **110** by various types of coupling methods, such as bolting, welding, and fitted coupling. The first output shaft **210** penetrates the case body **110**, and may protrude into the internal space of the case body **110**. The length direction of the first

output shaft **210** may be parallel to the length direction of the cylinder **13** and the bolt screw **22**, for example, an X axis in FIG. **3**. The first motor **200** is electrically connected to the battery of a vehicle, and may be supplied with power therefrom.

[0076] The transfer gear **300** may be rotatably installed in the case **100**. The transfer gear **300** is connected to the first motor **200**, and is rotated in conjunction with rotatory power that is generated by the first motor **200**. The transfer gear **300** may function as a component that transfers, to the piston unit **20**, the rotatory power that is generated by the first motor **200**.

[0077] The transfer gear **300** may include a first transfer gear **310**, a second transfer gear **320**, and a third transfer gear **330**.

[0078] The first transfer gear **310** may be connected to the first output shaft **210** of the first motor **200**. For example, the first transfer gear **310** may be exemplified as a helical gear or spur gear having a hollow shape in which a tooth shape has been formed in the outer circumferential surface thereof. The central axis of the first transfer gear **310** may be disposed on the same axis as the central axis of the first output shaft **210** of the first motor **200**. The inner circumferential surface of the first transfer gear **310** may be spline-coupled to the outer circumferential surface of the first output shaft **210**. Accordingly, when the first motor **200** operates, the first transfer gear **310** may be rotated at the same angular speed as the first output shaft **210**.

[0079] The second transfer gear **320** is engaged and coupled to the first transfer gear **310**, and may be rotated in conjunction with the rotation of the first transfer gear **310**. For example, the second transfer gear **320** may be exemplified as a helical gear or spur gear having a hollow shape in which a tooth shape has been formed in the outer circumferential surface thereof. The central axis of the second transfer gear **320** may be disposed in parallel to the central axis of the first transfer gear **310**. The second transfer gear **320** may be rotatably supported by a separate shaft (not illustrated) around its central axis within the case **100**. The outer circumferential surface of the second transfer gear **320** may be engaged and coupled to the outer circumferential surface of the first transfer gear **310**. When the first transfer gear **310** is rotated, the second transfer gear **320** may be rotated in a direction opposite to the direction of the first transfer gear **310**. The diameter of the second transfer gear **320** may be greater than the diameter of the first transfer gear **310**. Accordingly, the second transfer gear **320** may amplify the size of rotatory power that is transferred by the first transfer gear **310**.

[0080] The third transfer gear **330** is engaged and coupled to the second transfer gear **320**, and may be rotated in conjunction with the rotation of the second transfer gear **320**. The third transfer gear **330** may function as a component that that finally transfers, to the piston unit **20**, rotatory power that is generated by the first motor **200**. For example, the third transfer gear **330** may be exemplified as a helical gear or spur gear having a hollow shape in which a tooth shape has been formed in the outer circumferential surface thereof. The central axis of the third transfer gear **330** may be disposed in parallel to the central axis of the second transfer gear **320**. The central axis of the third transfer gear **330** may be placed on the same axis as the central axis of the bolt screw **22** of the piston unit **20**. The outer circumferential surface of the third transfer gear **330** may be engaged and coupled to the outer circumferential surface of the second transfer gear **320**. The third transfer gear **330** may be rotated in a direction opposite to the direction of the second transfer gear **320** around its central axis when the second transfer gear **320** is rotated. A rear end of the bolt screw **22** that protrudes from the rear surface of the cylinder **13** may be inserted into the central part of the third transfer gear **330**. The outer circumferential surface of the bolt screw **22** may be spline-coupled to the inner circumferential surface of the third transfer gear **330**. Accordingly, when the third transfer gear **330** is rotated, the bolt screw **22** is rotated along with the third transfer gear **330**, and may move the nut screw **23** so that the nut screw **23** is advanced and retreated. The third transfer gear **330** may be formed to have a greater diameter than the second transfer gear **320**. Accordingly, when the second transfer gear **320** is rotated, the third transfer gear **330** is rotated at a smaller angular speed than the second transfer gear **320**, and may amplify the size of rotatory

power that is transferred to the piston unit **20**.
[0081] When the first output shaft **210** is rotated in a braking application direction, the rotatory power of the first output shaft **210** are sequentially transferred to the first transfer gear **310**, the second transfer gear **320**, the third transfer gear **330**, and the bolt screw **22**. The nut screw **23** and the piston **21** are advanced, and may bring the brake pad P closer to the brake disk D.
[0082] When the first output shaft **210** is rotated in a braking release direction, the rotatory power of the first output shaft **210** is sequentially transferred to the first transfer gear **310**, the second transfer gear **320**, the third transfer gear **330**, and the bolt screw **220**. The nut screw **23** and the piston **21** are retreated, and may separate the brake pad P from the brake disk D.
[0083] The first parking member **400** is rotated along with the transfer gear **300**, and may function as a component that maintains a parking braking force along with the second parking member **600**.
[0084] FIG. **5** is a perspective view schematically illustrating a construction of a first parking member and a second parking member according to an embodiment of the present disclosure. FIG. **6** is a front view schematically illustrating a construction of the first parking member and the second parking member according to an embodiment of the present disclosure. FIG. **7** is a side view schematically illustrating a construction of the first parking member and the second parking member according to an embodiment of the present disclosure.
[0085] Referring to FIGS. **1** to **7**, the first parking member **400** may include a first parking body **410** and an extension part **420**.
[0086] The first parking body **410** may be connected to the first output shaft **210** of the first motor **200**. For example, the first parking body **410** may be formed to have a ring shape in which a hollow has been formed at the central part of the first parking body. The central axis of the first parking body **410** may be placed on the same axis as the central axis of the first output shaft **210**. The inner circumferential surface of the first parking body **410** may be spline-coupled to the outer circumferential surface of the first output shaft **210**. When the first output shaft **210** is rotated, the first parking body **410** may be rotated at the same angular speed the first output shaft **210** and the first transfer gear **310**. Accordingly, the size of weight that is applied to the second parking member **600** can be reduced, compared to a case in which the first parking body **410** is connected to the second transfer gear **320** or the third transfer gear **330** the rotatory power of which is distributed by a gear ratio. When the first output shaft **210** is rotated, the first parking body **410**, together with the first output shaft **210**, may be rotated in the braking application direction or the braking release direction.
[0087] The extension part **420** is extended from the first parking body **410**, and may function as a component that forms an interference structure along with the second parking member **600**. For example, the extension part **420** may protrude from the circumferential surface of the first parking body **410** to the outside of the first parking body **410**. The extension part **420** may be provided in a plural number. The plurality of extension parts **420** may be arranged along the circumferential surface of the first parking body **410** around the central axis of the first parking body **410**. An interval between the extension parts **420** that neighbor each other may be identically formed.
[0088] The extension part **420** may be inclined with respect to the radial direction of the first parking body **410**. For example, the extension part **420** may be slanted in the braking release direction, that is, clockwise in FIG. **6**, or extended in a shape in which the extension part has been bent in a spiral line shape, at a set angle from the circumferential surface of the first parking body **410**. Accordingly, when the extension part **420** is fastened to the second parking member **600**, the extension part **420** may permit the first parking body **410** to be rotated in the braking application direction and also limit the rotation of the first parking body **410** in the braking release direction.
[0089] The second motor **500** is installed in the case **100**, and generates rotatory power for rotating the second parking member **600**. For example, the second motor **500** may be exemplified as various types of electric motors which may rotate a second output shaft **510** by receiving power from the outside. The second motor **500** may be disposed by being spaced apart from the first

motor **200**. The second motor **500** may be disposed within the case body **110** or may be disposed on the outside of the case body **110**. The second motor **500** may be fixed to the case body **110** by various types of coupling methods, such as bolting, welding, and fitted coupling. The second output shaft **510** may be disposed in the internal space of the case body **110**. The length direction of the second output shaft **510** may be parallel to the length direction of the first output shaft **210**. On the contrary, the length direction of the second output shaft **510** may intersect the length direction of the first output shaft **210**. The second motor **500** is electrically connected to the battery of a vehicle, and may be supplied with power therefrom.

[0090] The second parking member **600** may be rotatably installed in the case **100**. The second parking member **600** may be connected to the second motor **500**. The second parking member **600** may be rotated in a first rotation direction and a second rotation direction that are opposite to each other around the second output shaft **510** by receiving rotatory power from the second motor **500**. The second parking member **600** may selectively limit the rotation of the first parking member **400** depending on its rotation direction. More specifically, when being rotated in the first rotation direction, the second parking member **600** may limit the rotation of the first parking member **400**. Accordingly, the second parking member **600** can prevent the piston unit **20** from losing a parking braking force because the piston unit **20** is arbitrarily separated from the brake pad P although an operation of the first motor **200** is suspended upon parking braking of a vehicle. When being rotated in the second rotation direction, the second parking member **600** may permit the rotation of the first parking member **400**. Accordingly, when a vehicle operates normally, the second parking member **600** may enable the parking braking operation of the first motor **200** to be smoothly performed.

[0091] The second parking member **600** may include a second parking body **610**, a trap member **620**, and a return member **630**.

[0092] The second parking body **610** forms a schematic appearance of the second parking member **600**, and may support the trap member **620**. The second parking body **610** may be connected to the second output shaft **510**. The second parking body **610** may be rotated in the first rotation direction and the second rotation direction in conjunction with the rotation of the second output shaft **510**.

[0093] For example, the second parking body **610** may be formed to have approximately a pole shape. The second output shaft **510** may be inserted into the second parking body **610**. The outer circumferential surface of the second output shaft **510** may be spline-coupled to the inside of the second parking body **610**. Accordingly, when the second output shaft **510** is rotated, the second parking body **610** may be rotated in the first rotation direction and the second rotation direction around the second output shaft **510** along with the second output shaft **510**. The rotation of the second parking body **610** in the first rotation direction may mean that the second parking body **610** is rotated counterclockwise along with the second output shaft **510** in FIG. **6**. The rotation of the second parking body **610** in the second rotation direction may mean that the second parking body **610** is rotated clockwise along with the second output shaft **510** in FIG. **6**.

[0094] The trap member **620** may be extended from the second parking body **610**. The trap member **620** may limit or permit the rotation of the extension part **420** depending on the rotation direction of the second parking body **610**.

[0095] For example, the trap member **620** may be extended from one end of the second parking body **610**. The end of the trap member **620** may be disposed toward the first parking member **400**. The length direction of the trap member **620** may be extended to be curved from the one end of the second parking body **610** toward the first parking member **400**. The trap member **620** may be inserted into a pair of extension parts **420** that neighbors each other as the second parking body **610** is rotated in the first rotation direction. In this case, the trap member **620** is engaged and coupled to the extension part **420**, and may limit the rotation of the first parking body **410**. The trap member **620** may fall outside from a pair of extension parts **420** that neighbors each other, as the second parking body **610** is rotated in the second rotation direction. In this case, the trap member **620** is

separated from the extension part **420**, and may permit the rotation of the first parking body **410**.
[0096] The trap member **620** may be formed to have a width that is gradually narrowed toward the end thereof. Accordingly, when the second parking body **610** is rotated in the first rotation direction, the trap member **620** can be more easily inserted between a pair of extension parts **420** that neighbors each other.
[0097] The return member **630** is connected to the second parking body **610**, and may add rotatory power in the second rotation direction to the second parking body **610**. The return member **630** may be provided to be elastically deformable. The return member **630** may function as a component that rotates the second parking body **610** in the second rotation direction by its self-elastic restoration force when the trap member **620** is separated from the extension part **420**. Accordingly, when parking braking is released, the return member **630** can return the second parking body **610** to its initial angle even without the driving of the second motor **500**. Accordingly, the bi-directional rotation of the second parking body **610** can be implemented by only on/off control of the second motor **500**.
[0098] For example, the return member **630** may be exemplified as a torsion spring capable of storing or discharging rotatory power through its elastic deformation. The central axis of the return member **630** may be placed on the same axis as the central axis of the second output shaft **510**. One end of the return member **630** may be connected to the second parking body **610**. The other end of the return member **630** may be connected to a part that is fixed when the second parking body **610** is rotated, for example, the case **100** or the second motor **500**.
[0099] When the trap member **620** is inserted between the pair of extension parts **420** that neighbors each other, the return member **630** may be installed to be compressed or extended in the first rotation direction in its neutral state. Accordingly, when parking braking is released, the return member **630** may separate the trap member **620** from the extension part **420** by always adding rotatory power in the second rotation direction to the second parking body **610**.
[0100] The second parking member **600** may further include a distribution member **640**.
[0101] The distribution member **640** may be provided in the second parking body **610**. The distribution member **640** may function as a component that distributes weight that is applied to the second output shaft **510** when the extension part **420** and the trap member **620** are trapped and coupled.
[0102] FIG. **8** is an enlarged view schematically illustrating a construction of the distribution member according to an embodiment of the present disclosure.
[0103] Referring to FIG. **8**, a neck part **501** may be formed in the second motor **500**. The neck part **501** may be extended in the length direction of the second output shaft **510** from one surface of the second motor **500**. The central axis of the neck part **501** may be placed on the same axis as the central axis of the second output shaft **510**. The inner circumferential surface of the neck part **501** may be disposed to surround the outer circumferential surface of the second output shaft **510**. The neck part **501** may be formed to have a greater diameter than the second output shaft **510**. Accordingly, the neck part **501** may provide a space in which a bush or a bearing may be installed between the neck part **501** and the second output shaft **510**.
[0104] The distribution member **640** may include a motor boss **641**.
[0105] The motor boss **641** may be extended from the second parking body **610** toward the second motor **500**. The length direction of the motor boss **641** may be parallel to the length direction of the second output shaft **510**. The central axis of the motor boss **641** may be placed on the same axis as the central axis of the second output shaft **510**. The inner circumferential surface of the motor boss **641** may be disposed to surround the outer circumferential surface of the neck part **501**. The inner circumferential surface of the motor boss **641** may come into contact with the outer circumferential surface of the neck part **501**. Accordingly, when the extension part **420** and the trap member **620** are trapped and coupled, the motor boss **641** can prevent the bending of the second output shaft **510** or damage to the second output shaft **510** by distributing a reaction that is generated between the

extension part **420** and the trap member **620** to the neck part **501**. The motor boss **641** may be relatively rotated with respect to the neck part **501** when the second parking body **610** is rotated.
[0106] FIG. **9** is an enlarged view illustrating a modified example of the distribution member illustrated in FIG. **8**.
[0107] Referring to FIG. **9**, the distribution member **640** may include a case boss **642**.
[0108] The case boss **642** may be extended from the second parking body **610** toward the case **100**, for example, the case cover **120**. The length direction of the case boss **642** may be parallel to the length direction of the second output shaft **510**. The case boss **642** may be inserted into the case cover **120**. The outside of the case boss **642** may come into contact with the inside of the case cover **120**. Accordingly, when the extension part **420** and the trap member **620** are trapped and coupled, the case boss **642** can prevent the bending of the second output shaft **510** or damage to the second output shaft **510** by distributing a reaction that is generated between the extension part **420** and the trap member **620** to the case **100**. The case boss **642** is not limited to such contents, and may be inserted into the case body **110** depending on the location of the second motor **500**. The case boss **642** may be relatively rotated with respect to the case **100** when the second parking body **610** is rotated.
[0109] The case boss **642** may be provided in a plural number. The plurality of case bosses **642** may be arranged on a circumference around the second output shaft **510**.
[0110] FIG. **10** is an enlarged view illustrating another modified example of the distribution member illustrated in FIG. **8**.
[0111] Referring to FIG. **10**, the distribution member **640** may be constructed to include both the motor boss **641** and the case boss **642**. In this case, the motor boss **641** and the case boss **642** may be extended in opposite directions with the second parking body **610** interposed therebetween. For example, in FIG. **9**, the motor boss **641** may be downward extended from the second parking body **610**, and the case boss **642** may be upward extended from the second parking body **610**.
[0112] The support member **700** may be disposed to face the second parking member **600** within the case **100**. The support member **700** may limit the rotation range of the second parking member **600** in the second rotation direction. That is, the support member **700** may function as a component that limits the second parking body **610** from being rotated at a set angle or more in the second rotation direction by the elastic force of the return member **630**.
[0113] For example, the support member **700** may protrude from an inner wall surface of the case body **110** toward the second parking body **610**. The support member **700** may be disposed to face the first parking member **400** with the second parking body **610** interposed therebetween. The location of the support member **700** may be variously designed and changed within the range of a location where the support member **700** may come into contact with the outside of the second parking body **610** that is rotated in the second rotation direction by the elastic force of the return member **630**, after the trap member **620** is separated from the extension part **420**. The end of the support member **700** with which the outside of the second parking body **610** comes into contact may be formed to have a curved surface shape. Accordingly, the support member **700** can prevent damage to the second parking body **610** due to the concentration of stress when the support member **700** comes into contact with the second parking body **610**.
[0114] When the second parking body **610** comes into contact with the support member **700**, the return member **630** may maintain the state in which the return member **630** adds rotatory power in the second rotation direction to the second parking member **600**. That is, when the second parking body **610** comes into contact with the support member **700**, the return member **630** may be installed in the state in which the return member **630** has been compressed or extended in the first rotation direction from the neutral state. Accordingly, when a separate external force is not applied to the second parking body **610**, the return member **630** can prevent noise from being generated or the second parking body **610** or the support member **700** from being damaged because the second parking body **610** repeatedly comes into contact with or is separated from the support member **700**

due to external vibration.
[0115] The initial location of the second parking body **610** may mean that the second parking body **610** has come into contact with the support member **700**.
[0116] The first parking body **410** may be installed to reciprocate and move in the length direction of the first output shaft **210**. For example, the inner circumferential surface of the first parking body **410** may be spline-coupled to the outer circumferential surface of the first output shaft **210**.
[0117] A side surface of the extension part **420** may be inclined with respect to the length direction of the first output shaft **210**. For example, the extension part **420** may be formed to have a cross section that is downward narrowed in FIG. **5**.
[0118] A side surface of the trap member **620** may be formed in parallel to the length direction of the first output shaft **210**. On the contrary, the side surface of the trap member **620** may be inclined with respect to the length direction of the first output shaft **210**. In this case, the side surface of the trap member **620** may be formed at an angle corresponding to the slant of the side surface of the extension part **420** so that the side surface of the trap member **620** comes into contact with the side surface of the extension part **420**.
[0119] Some of a reaction that acts between the extension part **420** and the trap member **620** may be transferred in a direction parallel to the length direction of the first output shaft **210** due to the slant angle of the side surface of the extension part **420**. In this case, when the reaction that acts between the extension part **420** and the trap member **620** is greater than a set size or more, the first parking body **410** may be moved in a straight line in a departure direction that is parallel to the length direction of the first output shaft **210**. When the first parking body **410** is moved in the departure direction, the extension part **420** may fall outside from the trap member **620**. For example, the departure direction may mean an upward direction in FIG. **5**. Accordingly, if the second parking body **610** is not rotated smoothly in the second rotation direction due to the trapping of the extension part **420** and the trap member **620** or damage to the return member **630**, the extension part **420** may be separated from the trap member **620** by the forced rotation of the first output shaft **210**.
[0120] The brake actuator **30** may further include a restoration member **800**.
[0121] The restoration member **800** may move the first parking body **410** in a direction opposite to the departure direction after the first parking body **410** is moved in the departure direction. Accordingly, the restoration member **800** can prevent parking braking maintenance performance of the brake actuator **30** from being permanently lost by restoring the first parking body **410** to its initial location after the extension part **420** and the trap member **620** are forcedly separated from each other.
[0122] The restoration member **800** may include a restoration body **810** and an elastic member **820**.
[0123] The restoration body **810** may be spaced apart from the first parking body **410** in the direction parallel to the length direction of the first output shaft **210**. For example, the restoration body **810** may be formed to have a circular plate shape that is extended in the radial direction of the first output shaft **210** from the circumferential surface of the first output shaft **210**. The bottom of the restoration body **810** may be disposed to face the top of the first parking body **410**. In contrast, the top of the restoration body **810** may face the bottom of the first parking body **410**.
[0124] The elastic member **820** may be provided to be elastically deformable in a direction parallel to the length direction of the first output shaft **210**. For example, the elastic member **820** may be exemplified as a compression spring that is elastically deformable in) the length direction thereof. The length direction of the elastic member **820** may be parallel to the length direction of the first output shaft **210**. The central axis of the elastic member **820** may be placed on the same axis as the central axis of the first output shaft **210**. Both ends of the elastic member **820** may come into contact with surfaces of the restoration body **810** and the first parking body **410** that face each other, respectively.
[0125] When the first parking body **410** is placed at its initial location, the elastic member **820** may

be installed in a neutral state in which the elastic member **820** is not extended or compressed. When the first parking body **410** is moved in the departure direction, the elastic member **820** may accumulate elastic energy while being extended or compressed in the length direction. After the extension part **420** and the trap member **620** are forcedly separated from each other, the elastic member **820** may return the first parking body **410** to its initial location by pressurizing or advancing the first parking body **410** in the direction opposite to the departure direction by using elastic energy that has been accumulated in the elastic member **820**. When the first parking body **410** is rotated in the first rotation direction, the initial location of the first parking body **410** may be variously designed and changed within the range of a location where the trap member **620** can be inserted between the pair of extension parts **420** that neighbors each other.

[0126] An example in which the first parking body **410** is installed to be capable of reciprocating and moving in the length direction of the first output shaft **210** has been described above, but the present disclosure is not limited thereto. The second parking body **610** may be installed to be capable of reciprocating and moving in the length direction of the second output shaft **510**.

[0127] In this case, the restoration member **800** may be installed to have a location and structure in which the restoration member **800** can pressurize the second parking body **610** in the direction opposite to the departure direction.

[0128] The brake actuator **30** may further include a control module.

[0129] The control module is connected to the first motor **200** and the second motor **500**, and controls operations of the first motor **200** and the second motor **500**. More specifically, the control module may control operations of the first motor **200** and the second motor **500** based on a braking signal or braking release signal that is generated by a brake pedal manipulation or parking braking command of a user. The control module is electrically connected to the first motor **200** and the second motor **500**, and may be implemented with an integrated circuit (IC), a microcontroller (μC), a microprocessor, or an application-specific integrated circuit (ASIC), which can control whether to rotate the first output shaft **210** and the second output shaft **510** and the rotation speeds of the first output shaft **210** and the second output shaft **510**, or a combination of them. The control module may control the rotation directions of the first output shaft **210** and the second output shaft **510** only in one direction by an on/off operation. On the contrary, the control module may control the rotation directions of the first output shaft **210** and the second output shaft **510** in both directions through a plurality of circuits. The control module may be disposed within the case **100**. On the contrary, the control module may be coupled to the outside of the case **100**.

[0130] Hereinafter, an operation of the brake actuator **30** according to an embodiment of the present disclosure is described.

[0131] FIGS. **11** to **13** are diagrams schematically illustrating a process of generating a parking braking force.

[0132] Referring to FIGS. **11** to **13**, upon parking braking, the first motor **200** may rotate the first output shaft **210** in the braking application direction (i.e., counterclockwise in FIG. **11**) in the state in which the second parking body **610** has been placed at its initial location.

[0133] When the first output shaft **210** is rotated in the braking application direction, the rotatory power of the first output shaft **210** is transferred to the piston unit **20** through the transfer gear **300**. The brake pad P is brought into contact with the brake disk D, so that a braking force for a vehicle may be generated.

[0134] In this case, the first parking member **400** may be rotated in the braking application direction along with the first output shaft **210**.

[0135] Thereafter, the second motor **500** may rotate the second output shaft **510** in the first rotation direction (i.e., counterclockwise in FIG. **12**).

[0136] When the second output shaft **510** is rotated in the first rotation direction, the second parking body **610** is rotated in the first rotation direction along with the second output shaft **510**. The trap member **620** is moved toward the first parking member **400**.

[0137] When the second parking body **610** is rotated at a set angle or more in the first rotation direction, the trap member **620** may be inserted between a pair of extension parts **420** that neighbors each other.
[0138] The return member **630** is elastically deformed as the second parking body **610** is rotated in the first rotation direction, and may accumulate elastic energy for rotating the second parking body **610** in the second rotation direction.
[0139] Thereafter, the operation of the first motor **200** is suspended. Rotatory power in the braking release direction (i.e., clockwise in FIG. **13**) is applied to the first output shaft **210** by a reaction that acts between the brake disk D and the brake pad P.
[0140] The extension part **420** and the trap member **620** are trapped and coupled by the rotatory power in the braking release direction, which is applied to the first output shaft **210**.
[0141] Thereafter, the rotatory power in the braking release direction, which is applied to the first output shaft **210**, is offset by a reaction between the extension part **420** and the trap member **620**, and the rotation of the first parking body **410** and the first output shaft **210** is limited. Accordingly, the parking braking state can be maintained.
[0142] FIGS. **14** and **15** are diagrams schematically illustrating a process of releasing a parking braking force.
[0143] Referring to FIGS. **1** to **15**, when parking braking is released, in the state of FIG. **12**, the first motor **200** may rotate the first output shaft **210** at a predetermined angle in the braking application direction (i.e., counterclockwise in FIG. **14**).
[0144] When the first output shaft **210** is rotated in the braking application direction, the size of a reaction that acts between the extension part **420** and the trap member **620** is reduced.
[0145] Due to the reduction of the reaction, the second parking body **610** may be rotated in the second rotation direction (i.e., clockwise in FIG. **14**) by elastic energy that is accumulated by the elastic deformation of the return member **630**.
[0146] When the second parking body **610** is rotated in the second rotation direction, the trap member **620** falls outside from a pair of extension parts **420** that neighbors each other, and the rotation of the first parking body **410** and the first output shaft **210** is permitted.
[0147] When the second parking body **610** is rotated at a set angle or more in the second rotation direction, the second parking body **610** comes into contact with the support member **700**, and the rotation of the second parking body **610** in the second rotation direction may be suspended.
[0148] Thereafter, the first output shaft **210** is rotated in the braking release direction (i.e., clockwise in FIG. **15**), and the parking braking force may be released.
[0149] FIGS. **16** and **17** are diagrams schematically illustrating a process of forcedly releasing a parking braking force.
[0150] Referring to FIGS. **1** to **17**, if the first output shaft **210** is not rotated in the braking application direction (i.e., counterclockwise in FIG. **15**) or the second parking body **610** is not rotated in the second rotation direction (i.e., clockwise in FIG. **15**) due to the trapping of the extension part **420** and the trap member **620** or damage to the return member **630**, the first motor **200** forcedly rotates the first output shaft **210** in the braking release direction (i.e., clockwise in FIG. **15**).
[0151] When the first output shaft **210** is rotated in the braking release direction, the size of a reaction that acts between the extension part **420** and the trap member **620** is increased.
[0152] Some of the reaction that acts between the extension part **420** and the trap member **620** is transferred in the direction parallel to the length direction of the first output shaft **210** by the slant angle of the side surface of the extension part **420**.
[0153] When the size of the reaction that acts between the extension part **420** and the trap member **620** is a set size or more, the first parking body **410** is moved in a straight line in the departure direction (i.e., upward in FIG. **17**) parallel to the length direction of the first output shaft **210**.
[0154] The extension part **420** is relatively moved in the length direction of the first output shaft

210 with respect to the trap member **620**. The extension part **420** and the trap member **620** may be separated from each other.
[0155] In this process, the elastic member **820** is elastically deformed in the length direction of the first output shaft **210**, and accumulates elastic energy for returning the first parking body **410** to its initial location.
[0156] Thereafter, when the second parking body **610** is returned to its initial location by the elastic restoring force of the return member **630**, the driving force of the second motor **500**, or manually, the first parking body **410** is moved in the direction (i.e., downward in FIG. **17**) opposite to the departure direction, and may be returned to its initial location.
[0157] Although exemplary embodiments of the present disclosure have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the present disclosure as defined in the accompanying claims.
[0158] Thus, the true technical scope of the present disclosure should be defined by the following claims.

Claims

1. A brake actuator comprising: a case; a first motor installed in the case; a transfer gear rotatably installed in the case and connected to the first motor; a first parking member rotating along with the transfer gear; a second motor disposed to be spaced apart from the first motor; a second parking member connected to the second motor and configured to limit the rotation of the first parking member as the second parking member is rotated in a first rotation direction; and a support member disposed to face the second parking member and configured to limit a rotation range of the second parking member in a second rotation direction that is opposite to the first rotation direction.
2. The brake actuator of claim 1, wherein the first parking member comprises: a first parking body connected to a first output shaft of the first motor; and a plurality of extension parts extended from the first parking body and arranged along a circumferential surface of the first parking body.
3. The brake actuator of claim 2, wherein at least one extension part among the plurality of extension parts is inclined with respect to a radial direction of the first parking body.
4. The brake actuator of claim 2, wherein the second parking member comprises: a second parking body connected to a second output shaft of the second motor and rotates in the first rotation direction or the second rotation direction; a trap member extended from the second parking body and inserts between adjacent extension parts among the plurality of extension parts as the second parking body is rotated in the first rotation direction; and a return member connected to the second parking body and configured to add rotatory power in the second rotation direction to the second parking body.
5. The brake actuator of claim 4, wherein the return member adds rotatory power in the second rotation direction to the second parking member when the second parking member comes into contact with the support member.
6. The brake actuator of claim 4, wherein the return member is elastically deformable.
7. The brake actuator of claim 6, wherein the return member is a torsion spring.
8. The brake actuator of claim 4, wherein the second parking member further comprises a distribution member in the second parking body.
9. The brake actuator of claim 8, wherein: the second motor comprises a neck part disposed to surround the second output shaft, and the distribution member comprises a motor boss extended from the second parking body and disposed to surround the neck part.
10. The brake actuator of claim 8, wherein the distribution member comprises a case boss extended from the second parking body and inserted into the case.
11. The brake actuator of claim 4, wherein the support member protrudes from the case and comes

into contact with the second parking body when the second parking body is rotated at a set angle or more in the second rotation direction.

12. The brake actuator of claim 11, wherein an end of the support member has a curved surface shape.

13. The brake actuator of claim 4, wherein: the first parking body is movably installed in a length direction of the first output shaft, and when weight that acts between the trap member and at least one extension part among the plurality of extension parts is a set size or more, the first parking body is moved in a departure direction parallel to a length direction of the first output shaft.

14. The brake actuator of claim 13, wherein a side surface of the extension part is inclined with respect to the length direction of the first output shaft.

15. The brake actuator of claim 13, further comprising a restoration member configured to pressurize the first parking member in a direction opposite to the departure direction.

16. The brake actuator of claim 15, wherein the restoration member comprises: a restoration body disposed to face the first parking body; and a pressurization member disposed between the restoration body and the first parking body, wherein the pressurization member is elastically deformable.

17. The brake actuator of claim 16, wherein the pressurization member is a compression spring.

18. A brake apparatus comprising a caliper body; a piston unit movably installed in the caliper body and configured to come into contact with or to be separated from a brake pad in a moving direction of the piston unit; and a brake actuator connected to the piston unit and configured to move the piston unit, wherein the brake actuator comprises: a case; a first motor installed in the case; a transfer gear rotatably installed in the case and connected to the first motor and the piston unit; a first parking member rotating along with the transfer gear; a second motor disposed to be spaced apart from the first motor; a second parking member connected to the second motor and configured to limit the rotation of the first parking member as the second parking member is rotated in a first rotation direction; and a support member disposed to face the second parking member and configured to limit a rotation range of the second parking member in a second rotation direction that is opposite to the first rotation direction.