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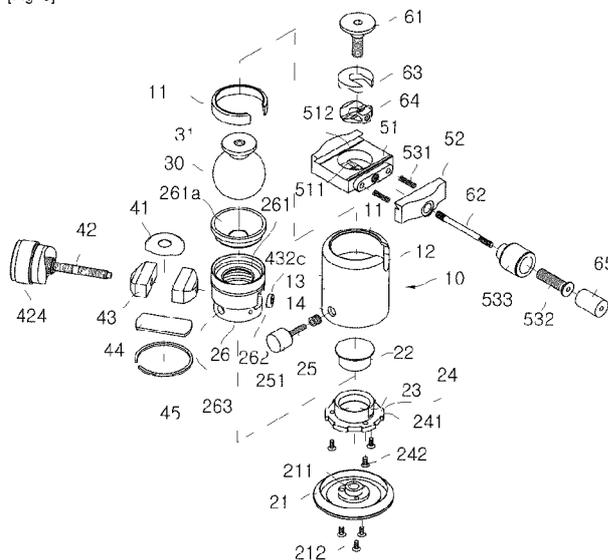
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(54) **Title:** BALL HEAD FOR TRIPOD

[Fig 3]



(57) **Abstract:** A ball head for a tripod is disclosed, in which a ball is rotatable in the interior of a housing in all directions, and a table part supports a lower side of the ball, and a ball engaging part formed on an upper side of the housing presses an upper side of the ball, and a housing moving member is provided for moving up and down the housing for thereby not changing the accurately fixed position of a certain instrument such as a camera or something as the ball is fixed by the housing moving member and does not move, and a clamp engaged to an instrument is rotatably connected, so it is possible to take a picture in a vertical direction such as a panorama picture irrespective of a tilted angle.



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Description

BALL HEAD FOR TRIPOD

Technical Field

- [1] The present invention relates to a ball head for a tripod, and in particular to a ball head for a tripod in which a ball is rotatable in the interior of a housing in all directions, and a table part supports a lower side of the ball, and a ball engaging part formed on an upper side of the housing presses an upper side of the ball, and a housing moving member is provided for moving up and down the housing for thereby not changing the accurately fixed position of a certain instrument such as a camera or something as the ball is fixed by the housing moving member and does not move, and a clamp engaged to an instrument is rotatably connected, so it is possible to take a picture in a vertical direction such as a panorama picture irrespective of a tilted angle.

[2]

Background Art

- [3] When an industrial instrument such as a camera, telescope, video picturing instrument, measuring instrument, lighting instrument or something is used, a lever type 3-way head and a ball type ball head are generally used for easily adjusting the horizontal and vertical angles and directions and their rotations.
- [4] The 3-way head and ball head used for fixing the above instruments require high accuracy and durability and stability along with their advanced features.
- [5] However, the lever type 3-way head consists of an angle adjusting lever, a rotation adjusting lever, and a horizontal adjusting lever which are separately controlled, which lead to many inconveniences when in use, and since they are heavy, it is not easy to carry and install. In addition, an accurate adjusting operation is impossible.
- [6] The conventional ball type ball head is implemented by means of a tight engagement or a wedge fixing method using an eccentric cam fixed in one side or a bolt. It might be formed of an ordinary cam or a cone, so there is a certain limit in its engaging force and durability due to a friction between a ball and lubricant. Since an eccentric cam or a wedge is used, a ball might not be fixed in a gravity axis of a ball head as well as might be inclined in one side, which lead to a problem when fixing a ball in place.
- [7] So as to overcome the above problems in the conventional ball head, the patent laid-open number 2001-001 1144 of the patent registration publication(laid-open date: May 31, 2002) discloses a multifunctional ball head for a tripod for industry which overcomes the problems that the ball is not fixed in the gravity axis of the ball head when using a cam or a wedge along with a pair of transfer cams but is eccentric in one side.

[8] However, as shown in Figures 1 and 2, a lower ball ace 17', which presses the ball 12' from its lower side by means of the transfer cam 19', fixes the ball 12' while being moved upward, so the ball 12' moves upward when fixing the ball 12', and it is hard for a user to fix an instrument such as a camera or something at a desired position.

[9] In particular, when a high accuracy is needed, for example, when remotely taking a picture or remotely measuring a distance by using a telescope or something, even when a very small deviation occurs in the up and down directions, the position to be taken might greatly change in proportion to the distance. In the above conventional ball head, when fixing the ball 12', the ball 12' moves upward, and the position of the instrument might also move upward, and its position might change. So, it seems that the above ball head is not proper when taking a picture and is not proper for a remote distance picturing(measuring) work which need a high accuracy.

[10] In case that an instrument engaged to a ball head is a camera, a housing 10' of a conventional ball head is capable of taking a picture like a panorama while being rotated in a horizontal direction on a rotation plate 32'. In this case, the instrument engaged to the ball 12' does not keep a horizontal state but is tilted at a certain angle, so it is impossible to perform a desired panorama-like picturing in which a previously taken picture and the current taken picture are connected seamlessly. There is a limit for keeping the instrument engaged to the ball 12' substantially horizontal due to the natural characteristic of the ball head, which leads to the failure of a panorama-like picturing.

[11] In particular, so as to take a picture in a vertical direction, the ball 12' is tilted between the concave parts 14' formed in the housing 10 at an angle of 90°. In this case, it is impossible to take a picture like a panorama in a vertical direction.

[12]

Disclosure of Invention

Technical Problem

[13] Accordingly, it is an object of the present invention to provide a ball head for a tripod which overcomes the above-described problems.

[14] It is an object of the present invention to provide a ball head for a tripod in which a ball is rotatable in the interior of a housing in all directions, and a table part supports a lower side of the ball, and a ball engaging part formed on an upper side of the housing presses an upper side of the ball, and a housing moving member is provided for moving up and down the housing for thereby not changing the accurately fixed position of a certain instrument such as a camera or something as the ball is fixed by the housing moving member and does not move.

[15] It is another object of the present invention to provide a ball head for a tripod in

which a clamp engaged to an instrument is rotatably connected, so it is possible to take a picture in a vertical direction such as a panorama picture irrespective of a tilted angle.

[16]

Technical Solution

[17]

To achieve the above objects, there is provided a ball head for a tripod which comprises a cylindrical housing which has a ball engaging part in its upper side; a ball which has an upwardly protruded clamp connection member and is closely mounted in the interior of the housing and is movable in all directions; a clamp which is connected with the clamp connection member on an upper side of the housing and engages an instrument; a table part which is inserted into a lower side of the housing and supports a lower side of the ball; and a housing moving means which moves the housing in the upward and downward direction so that the ball engaging part presses the ball from its upper side for thereby stably fixing the ball.

[18]

The housing moving means includes a fixing sliding cam which is provided in the table part; a transfer screw which has first and second threads being opposite to each other and is inserted into the housing horizontally with respect to the fixing sliding cam and rotates; and a pair of transfer cams which are engaged with the first and second threads of the transfer screw, respectively, and move in the directions that the transfer cams come closer to each other or are distanced from each other by means of the rotation of the transfer screw and move in the upward and downward directions as being engaged with the fixing sliding cam.

[19]

A protrusion insertion groove cut in the upward and downward directions is formed in a lower side of the housing, and the table part includes a table which has a tripod engaging groove; a cylindrical disk which is fixed to the table; a disk holder which covers the disk with a C-shaped band and rotates with its one side being pressed by means an external force, and closely and fixedly contacts with the disk; a housing rotation plate which is connected to the disk holder and integrally rotates along with the disk holder or is fixed and has a protrusion corresponding to a protrusion insertion groove of the housing with a lower end of the housing being inserted; a panning fixing screw which rotates and moves forward and backward and presses one side surface of the disk holder; and a cylindrical housing guide which is fixed to the housing rotation plate, with its upper side supporting a lower side of the ball, with the fixing sliding cam being fixed in the interior of the same, and with its side surface being adapted to guide a rotation of the housing and the upward and downward movements.

[20]

There is further provided a clamp rotation fixing means for fixing the rotation of the clamp wherein the clamp is rotatably connected with the clamp connection member with respect to a clamp rotary shaft which passes the clamp in its upward and

downward direction and is fixed to the clamp connection member.

- [21] The clamp rotation fixing means includes an upper clamp fixing cam which is connected with an upper side of the clamp rotary shaft; a clamp rotation screw which is inserted into one side of the clamp and rotates in a lower side of the upper clamp fixing cam; and a lower clamp fixing cam which is engaged to one end of the clamp rotation screw and moves forward or backward by means of a rotation of the clamp rotation screw and is engaged with the upper clamp fixing cam and presses the clamp in a direction of the clamp connection member and releases the pressed state of the same.

[22]

Advantageous Effects

- [23] With the above-described construction of the present invention, a ball is rotatable in the interior of a housing in all directions, and a table part supports a lower side of the ball, and a ball engaging part formed on an upper side of the housing presses an upper side of the ball, and a housing moving member is provided for moving up and down the housing for thereby not changing the accurately fixed position of a certain instrument such as a camera or something as the ball is fixed by the housing moving member and does not move.

- [24] In the ball head for a tripod according to the present invention, a clamp engaged to an instrument is rotatably connected, so it is possible to take a picture in a vertical direction such as a panorama picture irrespective of a tilted angle.

[25]

Brief Description of the Drawings

- [26] Figure 1 is a disassembled perspective view of a conventional ball head for a tripod.

- [27] Figure 2 is a cross sectional view of a conventional ball head for a tripod.

- [28] Figure 3 is a disassembled perspective view of a ball head for a tripod according to an embodiment of the present invention.

- [29] Figure 4 is a perspective view of a ball head for a tripod according to an embodiment of the present invention.

- [30] Figure 5 is a cross sectional view of a ball head for a tripod according to an embodiment of the present invention.

- [31] Figure 6 is a cross sectional perspective view of a housing according to an embodiment of the present invention.

- [32] Figure 7 is a cross sectional view of an operation state of a table part according to an embodiment of the present invention.

- [33] Figure 8 is a cross sectional view of an operation state of a ball fixing member according to an embodiment of the present invention.

- [34] Figure 9 is a cross sectional view of a clamp rotation fixing member according to an

embodiment of the present invention.

[35] Figure 10 is a view of a panorama function use state of a ball head for a tripod according to an embodiment of the present invention.

[36]

Best Mode for Carrying Out the Invention

[37] A ball head for a tripod, comprises a cylindrical housing which has a ball engaging part in its upper side; a ball which has an upwardly protruded clamp connection member and is closely mounted in the interior of the housing and is movable in all directions; a clamp which is connected with the clamp connection member on an upper side of the housing and engages an instrument; a table part which is inserted into a lower side of the housing and supports a lower side of the ball; and a housing moving means which moves the housing in the upward and downward direction so that the ball engaging part presses the ball from its upper side for thereby stably fixing the ball.

[38]

Mode for the Invention

[39] The ball head for a tripod according to the present invention will be described with reference to the accompanying drawings.

[40] Figure 3 is a disassembled perspective view of a ball head for a tripod according to an embodiment of the present invention. Figure 4 is a perspective view of a ball head for a tripod according to an embodiment of the present invention. Figure 5 is a cross sectional view of a ball head for a tripod according to an embodiment of the present invention. Figure 6 is a cross sectional perspective view of a housing according to an embodiment of the present invention. Figure 7 is a cross sectional view of an operation state of a table part according to an embodiment of the present invention. Figure 8 is a cross sectional view of an operation state of a ball fixing member according to an embodiment of the present invention. Figure 9 is a cross sectional view of a clamp rotation fixing member according to an embodiment of the present invention. Figure 10 is a view of a panorama function use state of a ball head for a tripod according to an embodiment of the present invention.

[41] As shown in the drawings, the ball head 1 for a tripod according to the present invention comprises a housing 10, a table member 20, a ball 30, a housing moving member 40, a clamp 50 and a clamp rotation fixing member 60.

[42] Here, the housing 10 allows the ball 30 to rotate in its inner side in all directions and is equipped with a ball engaging part in its upper side and is formed in a cylindrical shape.

[43] The ball engaging part has a contractive engaging shoulder 11 in an upper side of the cylindrical housing 10, and a ball upper lining 111 is attached to an inner side of the

engaging shoulder 11.

- [44] The ball engaging part is designed to allow the ball 30 to move in all directions with a certain gap while preventing the ball 30 stably disposed in the interior of the housing 10 from escaping to the upper side, and it presses the ball 30 from its upper side when the housing 10 moves in the down direction by means of the housing moving member 40.
- [45] The ball upper lining 111 is provided so as to reliably press and fix the ball 40 and is preferably made of an elastic material. As shown in the drawings, the ball upper lining 111 is formed in a C shape for matching with the shape of a concave part 12 formed in the housing 10.
- [46] As the housing 10 moves downward by means of the housing moving member 40, the ball engaging part of the housing 10 presses an outer surface of a center upper side of the ball 30, and the ball 30 is pressed in a weight center direction, so it is possible to prevent the ball 30 from being eccentric in one side when fixing the ball 30.
- [47] As shown in Figure 6, a concave part 13 is formed in one side of the housing 10 for accommodating a clamp connection part 31 of the ball 30 therein, so that the clamp 50 is tilted at an angle of 90° as the ball 30 moves, and a transfer screw insertion groove 13 is formed in another side surface of the same for accommodating the transfer screw 42 therein. In addition, a panning fixing screw move groove 14 having a certain size so enough that the panning fixing screw 25 can move up and down is formed in a lower side of another side surface of the same.
- [48] A housing connection washer engaging groove 15 is formed in the opposite side of the transfer screw insertion groove 14 in an inner side surface of the housing 10 for engaging the housing connection washer 423 of the transfer screw 42. A guide plate support ring engaging groove 16 is formed in an inner side lower than the position of the transfer screw insertion groove 13 for engaging with the guide plate support ring 45 of the housing moving member 40, and a protrusion insertion groove 17, which is cut in up and down directions, is formed in a lower inner side for accommodating a protrusion 241 of the housing rotation plate 24.
- [49] The elements 11, 12, 13, 14, 15, 16 and 17 of the housing 10 merely work organically with the helps of the other elements 20, 30, 40, 50 and 60, so the descriptions of the elements 20, 30, 40, 50 and 60 will be omitted.
- [50] A tripod T is connected to a underneath of the table part 20 and is inserted into a lower side of the housing 10 while allowing the housing 10 to rotate(panning) horizontally on the table part 20 and supporting the lower side of the ball 30. The tripod T comprises a table 21, a disk 22, a disk holder 23, a housing rotation plate 24, a panning fixing screw 25 and a housing guide 26.
- [51] The table 21 is equipped with a tripod engaging groove 211 in its center portion for

engaging the tripod T, and the disk 22 is fixed by means of the disk fixing bolt 212.

[52] Namely, the ball head 1 for a tripod according to the present invention is attached to an upper side of the tripod T.

[53] The disk 22 is formed in a cylindrical shape and is fixed to the table 21 by means of the disk fixing bolt 212.

[54] As the disk 22 is fixed to the table part 21, the housing 10 rotates (panning) in the horizontal direction on the table part 20 with the helps of the disk holder 23 rotating and being fixed while covering the disk 22, and the housing rotation plate 24 connected to the disk holder 23.

[55] The disk holder 23 is formed of a C-shaped band while covering the disk 22 and rotating, with one side of the same being pressed by means of the panning fixing screw 25, and the disk holder 23 is fixed as being compressed along with the disk 22 and is connected with the housing rotation plate 24 while integrally rotating along with the housing rotation plate 24 and being fixed.

[56] The disk holder 23 is connected with the housing rotation plate 24 along with a certain cut gap 232. Here, the cut gap 232 is provided, so the disk holder 23 is pressed by means of the panning fixing screw 25. It is preferably connected in a state cut by 2/3 with respect to the disk holder 23.

[57] As shown in Figure 7, it is preferred that the disk 22 and the disk holder 23 are equipped with matching tapered parts 221 and 231.

[58] As shown in Figure 7, the panning fixing screw 25 is inserted into the panning fixing screw move groove 14 of the housing 10 and the panning fixing screw insertion groove 263 of the housing guide 26 and rotate and moves forward and backward by means of a panning fixing dial 251 outwardly protruded from the housing 10 while pressing one side of the disk holder 23 and allowing the disk holder 23 to be compressed with respect to the disk 22 and to be fixed.

[59] The housing rotation plate 24 is connected with the disk holder 23 with a cut gap 232 and integrally rotate along with the disk holder 23 and is fixed and is equipped with a protrusion 241 matching with the protrusion insertion groove 17 of the housing 10 for thereby being inserted into the protrusion insertion groove 17 formed in a lower side of the housing 10. The housing guide 26 is fixed in the upper side of the housing rotation plate 24 by means of the housing guide fixing bolt 242.

[60] The protrusion 241 of the housing rotation plate 24 is inserted into the protrusion insertion groove 17 cut in upward and downward directions in the inner side of the housing 10 for thereby allowing the rotation (panning) in the horizontal direction of the housing 10 to be restricted and allowing the movement in the upward and downward directions not to be restricted. Namely, the housing 10 rotates along with the disk holder 23 and the housing rotation plate 24, but moves by means of the housing moving

member 40 independently from the housing rotation plate 24 which is always fixed in the upward and downward directions.

[61] In brief, the table 21 and the disk 22 do not rotate and are fixed while not moving in the upward and downward directions. The disk holder 23, the housing rotation plate 24 and the housing guide 26 rotate in the horizontal direction but does not move in the upward and downward directions, and the housing 10 can rotate in the horizontal direction and can move in the upward and downward directions.

[62] Figure 7 is a view of an operation state of the table part 20 according to an embodiment of the present invention. The state A represents that the housing 10 can rotate(panning) in the horizontal direction, and the state B represents that the housing 10 does not rotate(panning) in the horizontal direction as being fixed.

[63] The panning fixing screw move groove 14 of the housing 10 has a diameter greater than that of the panning fixing screw 25 because the panning fixing screw does not move in the upward and downward directions since it is inserted into the panning fixing screw insertion groove 263 of the housing guide 26 which does not move in the upward and downward directions whereas the housing 10 can move in the upward and downward directions by means of the housing moving member 40, so the diameter of the panning fixing screw move groove 14 formed in the housing 10 should be the maximum upward and downward movement distance of the housing 10.

[64] The housing guide 26 is cylindrical and is fixed to the housing rotation plate 24 using the housing guide fixing bolt 242, and a fixing sliding cam 41 is fixed in the interior of the housing guide. The side surface of the housing guide 26 works for guiding the rotation and upward and downward movements of the housing 10. The housing guide 26 is equipped with a ball lower side support member mounting part 261, a side surface opening 262 and a panning fixing screw insertion groove 263.

[65] The ball lower side support member mounting part 261 supports the upper side of the housing guide 26 as well as the lower side of the ball 30. The ball lower side support member 261a is provided in the ball lower side support member mounting part 261 for supporting the lower side of the ball 30 for thereby more stably supporting the ball 30.

[66] Since the housing guide 26 does not move in the upward and downward directions, the ball lower side support member 261 provided in its upper side does not move as well in the upward and downward directions. With the above features, the ball 30 does not move in the upward and downward directions when fixing the ball 30.

[67] The side surface opening 262 is formed in both side surfaces of the housing guide 26. The transfer screw 42 and the guide plate 44 of the housing moving unit 40 pass through the side surface opening 262. The transfer screw 42 and the guide plate 44 move in the upward and downward directions and allow the housing 10 to move in the upward and downward directions. Here, since the housing guide 26 does not move in

the upward and downward directions, the upward and downward movements of the transfer screw 42 and the guide plate 44 are not restricted by forming the side surface opening 262 in both side surfaces.

[68] The panning fixing screw insertion groove 263 is formed in one side surface of a lower end of the housing guide 26 for accommodating the panning fixing screw 25.

[69] The ball 30 is mounted in the interior of the housing 10 and is equipped with an upwardly protruded clamp connection member 31.

[70] The clamp connection member 31 is connected with the fixing clamp 51, and the fixing clamp 51 rotates about the clamp rotary shaft 61.

[71] The clamp connection member 31 is upwardly protruded and is connected with the clamp 50, so it is caught by the upper end of the housing 10 for thereby adjusting a tilting angle of the clamp 50. It allows the clamp 50 to be tilted on the upper side of the housing 10 in a tilting angle range of about $+45^\circ$ to -45° .

[72] In case of taking a picture in a vertical direction, since it is needed to tilt the clamp 50 at an angle of 90° , the concave part 12 is formed in an upper side of the housing 10, so the clamp connection member 31 is inserted into the concave part 12 while allowing the clamp 50 to be tilted at an angle of 90° .

[73] When the angle is determined by rotating the ball 30 in all directions, it is needed to fix the ball 30. In this case, it is important to fix the ball 30 not to move in all directions.

[74] One of the technical features of the present invention is to prevent the ball 30 from moving in the upward and downward directions when fixing the ball 30. So as to implement the above operations, the lower side of the ball 30 is supported on the table part 20 which does not move in the upward and downward directions, and the housing 10 is moved in the downward direction by means of the housing moving unit 40, and the ball engaging part provided in the upper side of the housing 10 presses the ball 30 from only its upper side, so the ball can be reliably fixed.

[75] Namely, the ball 30 is stably mounted on the upper side of the table part 20 while closely contacting with the same irrespective of its rotatable state or fixed state in a state that the ball 30 is stably positioned on a bottom with the helps of the weight of the instrument C. In this state, the housing 10 moves in the downward direction by means of the housing moving unit 40. When the ball 30 is fixed by pressing the same only in the downward direction, the ball 30 can be stably fixed without the upward and downward movements.

[76] The housing moving unit 40 moves the housing 10 in the upward and downward directions so that the ball engaging part of the housing 10 presses the ball 30 from its upper side and comprises a fixing sliding cam 41, a transfer screw 42, a transfer cam 43, a guide plate 44 and a guide plate support ring 45.

- [77] The fixing sliding cam 41 is equipped with a cam part which is protruded at a slanted angle from the lower side of the ball lower side support member mounting part 261 in both lower directions in the interior of the housing guide 26.
- [78] Since the fixing sliding cam 41 is provided in the interior of the housing guide 26 which does not move in the upward and downward directions, it does not move in the upward and downward directions.
- [79] The transfer screw 42 is formed of opposite first and second threads 421 and 422 and is inserted into the transfer screw insertion groove 13 of the housing 10 in a horizontal direction with respect to the fixing sliding cam 41 and passes through the side surface opening 262 formed in both sides of the housing guide 26 and is inserted into the opposite side, in which the transfer screw insertion groove 13 of the housing 10 is formed, along with the housing connection washer 423.
- [80] A ball fixing dial 423c is engaged to an end of the transfer screw 42 outwardly protruded from the outer side of the transfer screw insertion groove 13 of the housing 10 for thereby easily rotating the transfer screw 42.
- [81] One end of the transfer screw 42 is inserted into the transfer screw insertion groove 13 of the housing 10, and the other end of the same is connected to the opposite side of the housing 10 along with the housing connection washer 423, so the upward and downward movements of the transfer screw 42 correspond to the upward and downward movements of the housing 10.
- [82] In addition, a torque adjusting bolt 46, which is one of the known elements adapted in the conventional head, might be installed in a certain position of the ball fixing dial 424 for preventing the ball fixing dial 424 and the transfer screw 42 from being reverse-rotated by means of a certain external environment when the instrument C is fixed at a normal position.
- [83] Here, the transfer cam 43 is provided in one pair, and each transfer cam is equipped with a cam part which is upwardly protruded and is engaged to the first and second threads 421 and 422 of the transfer screw 42, respectively. The transfer cams 43 are designed to move in the nearing or distancing direction depending on the rotation of the transfer screw 42 and is engaged with the fixing sliding cam 41 and moves in the upward and downward directions.
- [84] Namely, since the first and second threads 421 and 422 of the transfer screw 42 are formed in opposite directions to each other, the rotation of the transfer screw 42 allows the transfer cam 43 engaged with the first and second threads 421 and 422 to move in the nearing or distancing direction, and the cam part upwardly protruded at a slanted angle from the upper side of the transfer cam 43 is engaged with the cam part downwardly protruded at a slanted angle from the lower side of the fixing sliding cam 41, so the transfer cam 43 moves in the upward and downward directions.

[85] The upward and downward movements of the transfer cam 43 correspond to the upward and downward movements of the transfer screw 42, and the upward and downward movements of the transfer screw 42 correspond to the upward and downward movements of the housing 10.

[86] The guide plate 44 supports the lower side of the transfer cam 43 and guides the leftward and rightward movements of the transfer cam 43 and passes through the side surface opening 262 of the housing guide 26 in the lower side of the transfer cam 43 while nearly reaching the inner side surface of the housing 10. The lower side of the guide plate 44 is supported by means of the guide plate support ring 45 fixed in the inner surface of the housing 10.

[87] The guide plate support ring 45 is engaged to the guide plate support engaging groove 16 formed in the inner surface of the housing 10 in a C shape while supporting both ends of the guide plate 44.

[88] With the helps of the above constructions, the transfer screw 42 moves in the upward and downward directions by means of the transfer cam 43 for thereby moving the housing 10 in the upward and downward directions. In this case, the weight of the transfer screw 42 is distributed to the guide plate 44 and the guide plate support ring 45, respectively.

[89] Figure 8 is a view of an operation state of the housing moving unit 40 according to an embodiment of the present invention.

[90] As shown in the drawings, the state A of Figure 8 represents that the ball is not fixed, and a pair of the transfer cams 43 are close to each other, and the lower end of the housing 10 is mounted with a height on the table 21. As a result, since the ball upper side lining 111 is not pressed by means of the ball, the ball can be movable in all directions.

[91] The state B of Figure 8 represents that the ball is fixed. A pair of the transfer cams 43 move in the direction distancing from each other while moving downward. The transfer screw 42 connected to the transfer cam 43 moves downward, and the housing 10, the guide plate 44 and the guide plate support ring 45 move downward, so the lower end of the housing 10 becomes closer to the table 21. As a result, the ball upper side lining 111 contacts closely to the ball 30, so the ball 30 is fixed.

[92] The clamp 50 is connected to the clamp connection member 31, and comprises a fixing clamp 51, a movable clamp 52 and a clamp moving member 53, which are provided for engaging the instrument C on the upper side of the housing 10.

[93] The fixing clamp 51 is connected to the clamp connection member 31 as being rotatable with respect to the clamp rotary shaft 61 as a clamp rotary shaft through groove 511 passes through the center in the upward and downward directions.

[94] With the helps of the above constructions, the clamp 50 is rotatable, and as shown in

Figure 10A, it is possible to take a picture like a panorama irrespective of the tilting angle of the clamp 50. In particular, as shown in Figure 10B, it is possible to take a picture like a panorama in the vertical direction in a state that it is tilted at an angle of 90°.

[95] So as to take a picture like a panorama with the helps of the rotating camp 50, it is preferred that an index scale is formed on the upper side of the ball 30 around the clamp connection member 31.

[96] A clamp fixing cam insertion groove 512 is formed on the upper surface of the fixing clamp 51 around the clamp rotary shaft through groove 511, so the upper clamp fixing cam 63 and the lower clamp fixing cam 64 are inserted into the same for fixing the rotation of the fixing clamp 51.

[97] Here, the movable clamp 52 moves in the nearing or distancing direction with respect to the fixing clamp 51 by means of the clamp moving unit 53 on a side surface of the fixing clamp 51 for thereby engaging or disengaging the instrument C.

[98] The connection part of the instrument C is inserted into between the fixing clamp 51 and the movable clamp 52 by widening the same, and the movable clamp 52 is moved toward the fixing clamp 51, and the connection part of the instrument C is pressed, and the instrument C is finally engaged.

[99] Here, the clamp moving unit 53 comprises a spring 531 for providing an elastic force in the direction that the movable clamp 52 is distanced from the fixing clamp 51, a clamp moving screw 532 which has threads and is connected with the movable clamp 52, and a clamp moving dial 533 which rotates on the clamp moving screw 532 while moving forward and backward for thereby moving the movable clamp 52 toward the fixing clamp 51.

[100] The clamp rotation fixing unit 60 is provided for fixing the rotating clamp 50 and comprises a clamp rotary shaft 61, a camp rotation screw 62, an upper clamp fixing cam 63 and a lower clamp fixing cam 64.

[101] The clamp rotary shaft 61 is connected with the upper clamp fixing cam 63 through its upper end, and is fixed to the clamp connection member 31 through the lower clamp fixing cam 64 and the fixing clamp 51 through its lower side.

[102] The fixing clamp 51 is rotatably connected with the clamp connection member 31 with respect to the clamp rotary shaft 61.

[103] The upper clamp fixing cam 63 is connected to an upper side of the clamp rotary shaft 61. According to an embodiment of the present invention, a head part is formed on the upper side of the clamp rotary shaft 61, and the upper clamp fixing cam 63 is positioned in a lower side of the head part, so the upper clamp fixing cam 63 does not escape toward the upper side of the clamp rotary shaft 61. The upper claim fixing cam 63 is engaged as the lower clamp fixing cam 64 moves forward or backward for

thereby pressing the fixing clamp 51 in the downward direction.

[104] The clamp rotation screw 62 is positioned in a lower side of the upper clamp fixing cam 63 and is inserted into one side of the fixing clamp 51 and rotates. One end of the clamp rotation screw 62 is connected with the lower clamp for thereby allowing the lower clamp fixing cam 64 to move forward or backward by means of the rotation of the clamp rotation screw 62. It is preferred to provide the clamp rotation dial 65 at the other end of the same for more easily rotating the clamp rotation screw 62.

[105] The lower clamp fixing cam 64 is connected with one end of the clamp rotation screw 62 and moves forward or backward by means of the rotation of the clamp rotation screw between the upper clamp fixing cam 63 and the fixing clamp 51 and is engaged with the upper clamp fixing cam 63 for thereby allowing the fixing clamp 51 to be pressed or non-pressed in the direction of the clamp connection member 31, namely, in the downward direction.

[106] Figure 9 is a view of an operation state of the clamp rotation fixing unit 60 according to an embodiment of the present invention.

[107] As shown therein, the state A of Figure 9 represents that the clamp 50 is rotatable. The lower clamp fixing cam 64 is distanced from the center by means of the rotation of the clamp rotation screw 62, and at the same time it is not restricted by means of the upper clamp fixing cam 63 for thereby releasing the press in the downward direction. So, a friction force decreases between the lower surface of the fixing clamp 51 and an upper surface of the clamp connection member 31, and the clamp 50 is rotatable with respect to the clamp rotary shaft 61.

[108] The state B of Figure 9 represents that the rotation of the clamp 50 is fixed. The lower clamp fixing cam 64 moves toward the center by means of the rotation of the clamp rotation screw 62 and, at the same time, is engaged with the upper clamp fixing cam 63 for thereby pressing in the downward direction. So, the lower surface of the fixing clamp 51 closely contacts with the upper surface of the clamp connection member 31, so the rotation of the clamp 50 is fixed.

[109]

Industrial Applicability

[110] In the present invention, there is provided a ball head for a tripod which is capable of preventing the accurately adjusted position of an instrument such as a camera or something from moving when fixing the ball. The clamp engaged with an instrument is rotatably connected with the ball, so it is possible to take a picture like a panorama in a vertical direction irrespective of the tilting angle.

[III]

Claims

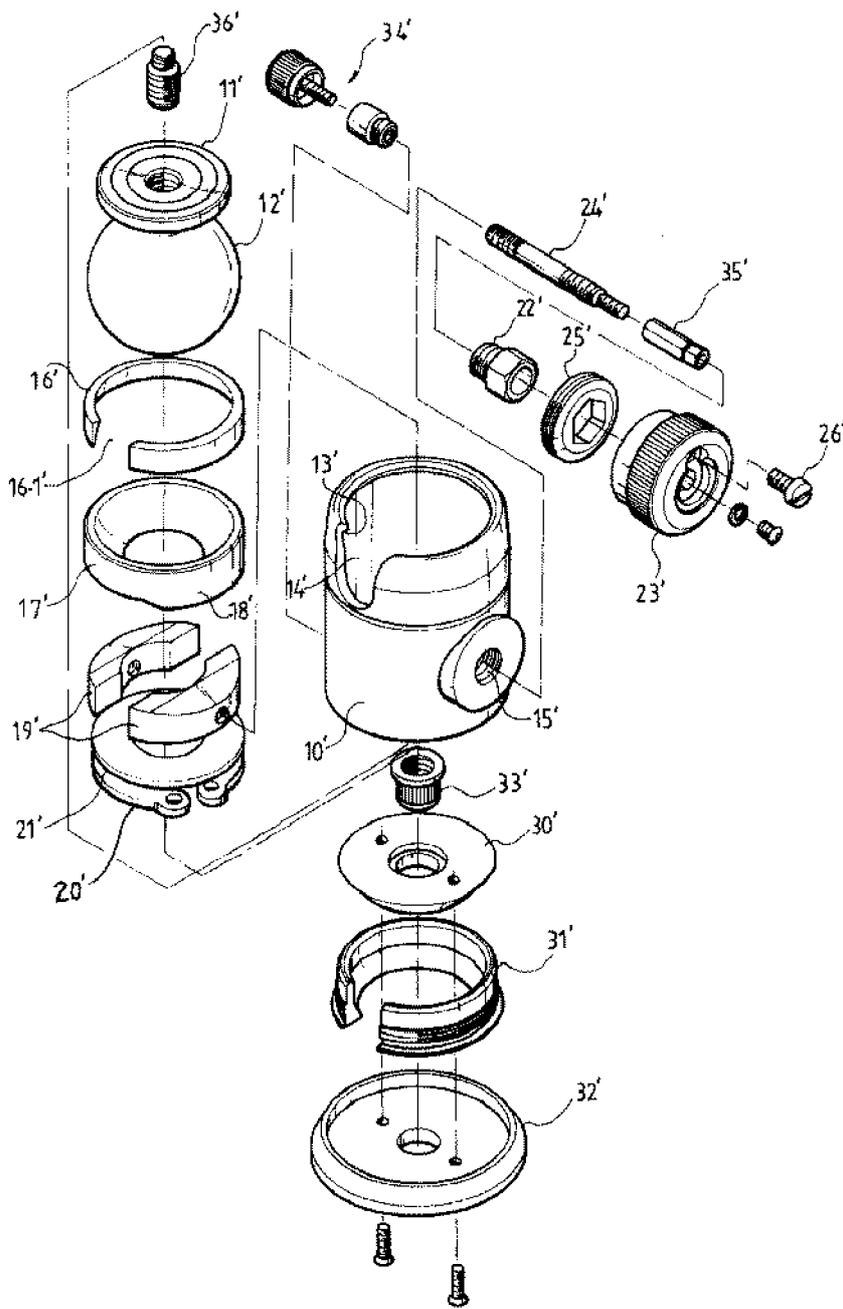
- [1] A ball head for a tripod, comprising:
a cylindrical housing which has a ball engaging part in its upper side;
a ball which has an upwardly protruded clamp connection member and is closely mounted in the interior of the housing and is movable in all directions;
a clamp which is connected with the clamp connection member on an upper side of the housing and engages an instrument;
a table part which is inserted into a lower side of the housing and supports a lower side of the ball; and
a housing moving means which moves the housing in the upward and downward direction so that the ball engaging part presses the ball from its upper side for thereby stably fixing the ball.
- [2] The ball head of claim 1, wherein said housing moving means includes:
a fixing sliding cam which is provided in the table part;
a transfer screw which has first and second threads being opposite to each other and is inserted into the housing horizontally with respect to the fixing sliding cam and rotates; and
a pair of transfer cams which are engaged with the first and second threads of the transfer screw, respectively, and move in the directions that the transfer cams come closer to each other or are distanced from each other by means of the rotation of the transfer screw and move in the upward and downward directions as being engaged with the fixing sliding cam.
- [3] The ball head of claim 2, wherein a protrusion insertion groove cut in the upward and downward directions is formed in a lower side of the housing, and said table part includes:
a table which has a tripod engaging groove;
a cylindrical disk which is fixed to the table;
a disk holder which covers the disk with a C-shaped band and rotates with its one side being pressed by means an external force, and closely and fixedly contacts with the disk;
a housing rotation plate which is connected to the disk holder and integrally rotates along with the disk holder or is fixed and has a protrusion corresponding to a protrusion insertion groove of the housing with a lower end of the housing being inserted;
a panning fixing screw which rotates and moves forward and backward and presses one side surface of the disk holder; and
a cylindrical housing guide which is fixed to the housing rotation plate, with its

upper side supporting a lower side of the ball, with the fixing sliding cam being fixed in the interior of the same, and with its side surface being adapted to guide a rotation of the housing and the upward and downward movements.

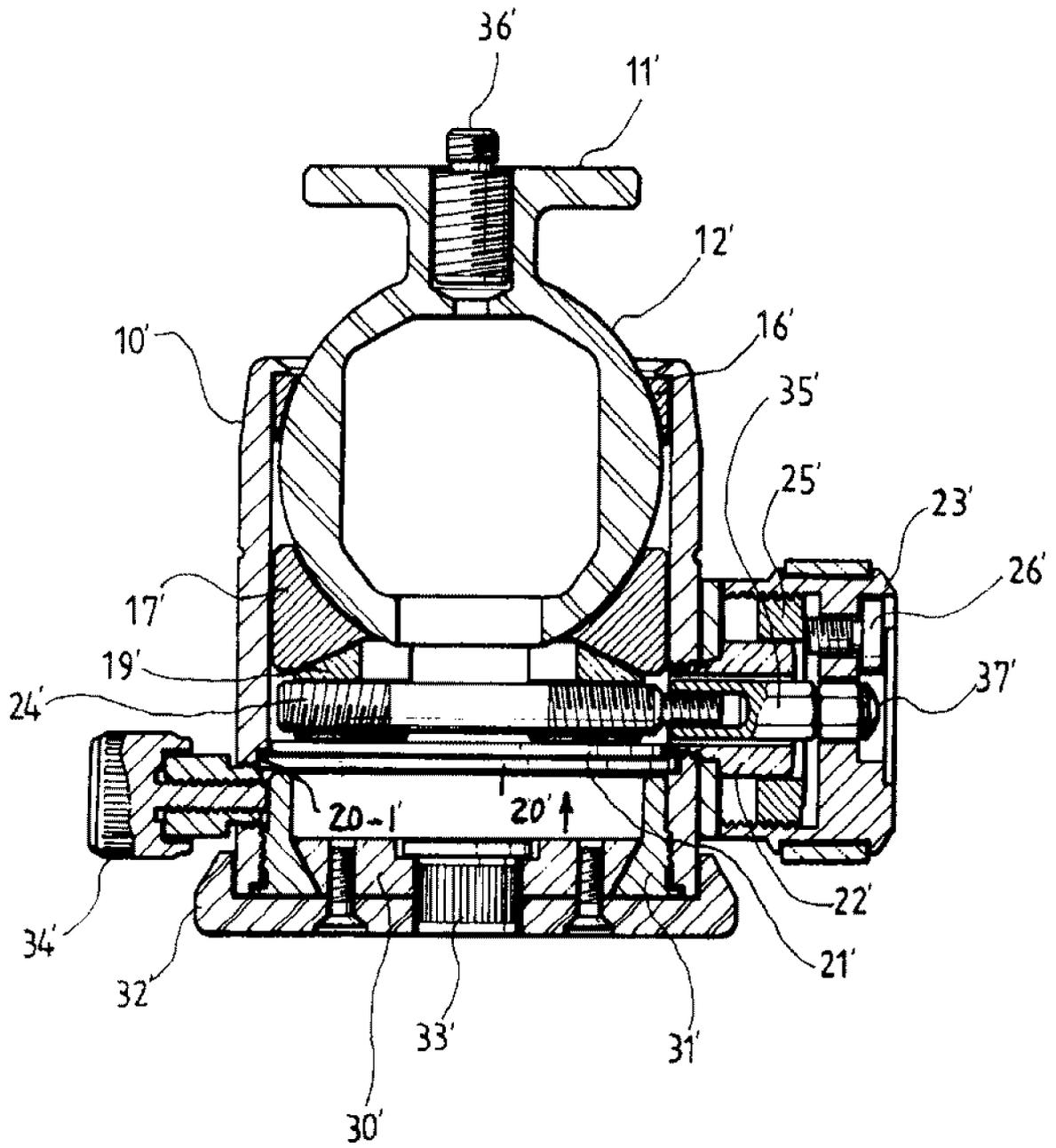
[4] The ball head of one among claims 1 through 3, further comprising a clamp rotation fixing means for fixing the rotation of the clamp wherein said clamp is rotatably connected with the clamp connection member with respect to a clamp rotary shaft which passes the clamp in its upward and downward direction and is fixed to the clamp connection member.

[5] The ball head of claim 4, wherein said clamp rotation fixing means includes:
an upper clamp fixing cam which is connected with an upper side of the clamp rotary shaft;
a clamp rotation screw which is inserted into one side of the clamp and rotates in a lower side of the upper clamp fixing cam; and
a lower clamp fixing cam which is engaged to one end of the clamp rotation screw and moves forward or backward by means of a rotation of the clamp rotation screw and is engaged with the upper clamp fixing cam and presses the clamp in a direction of the clamp connection member and releases the pressed state of the same.

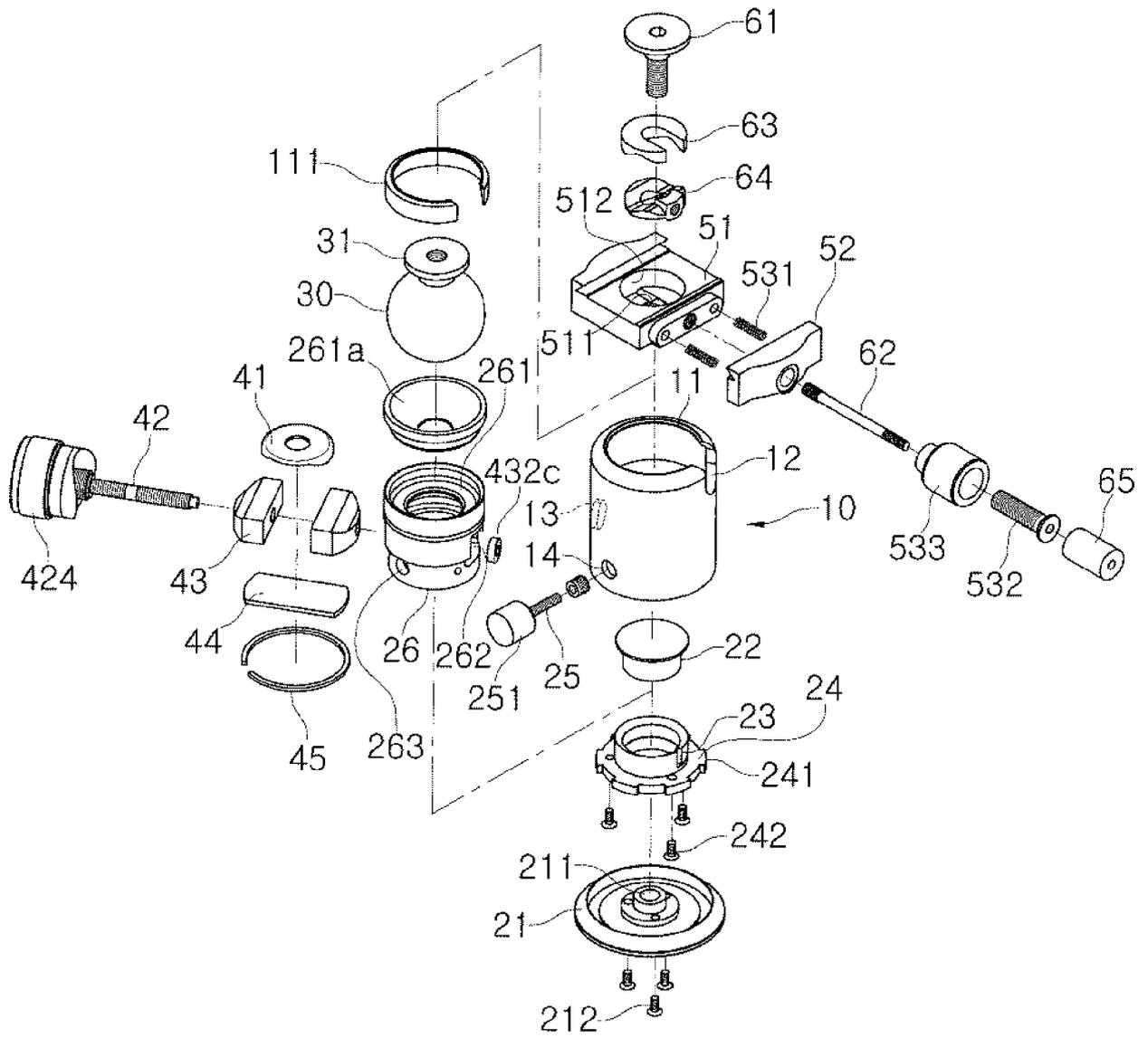
[Fig. 1]



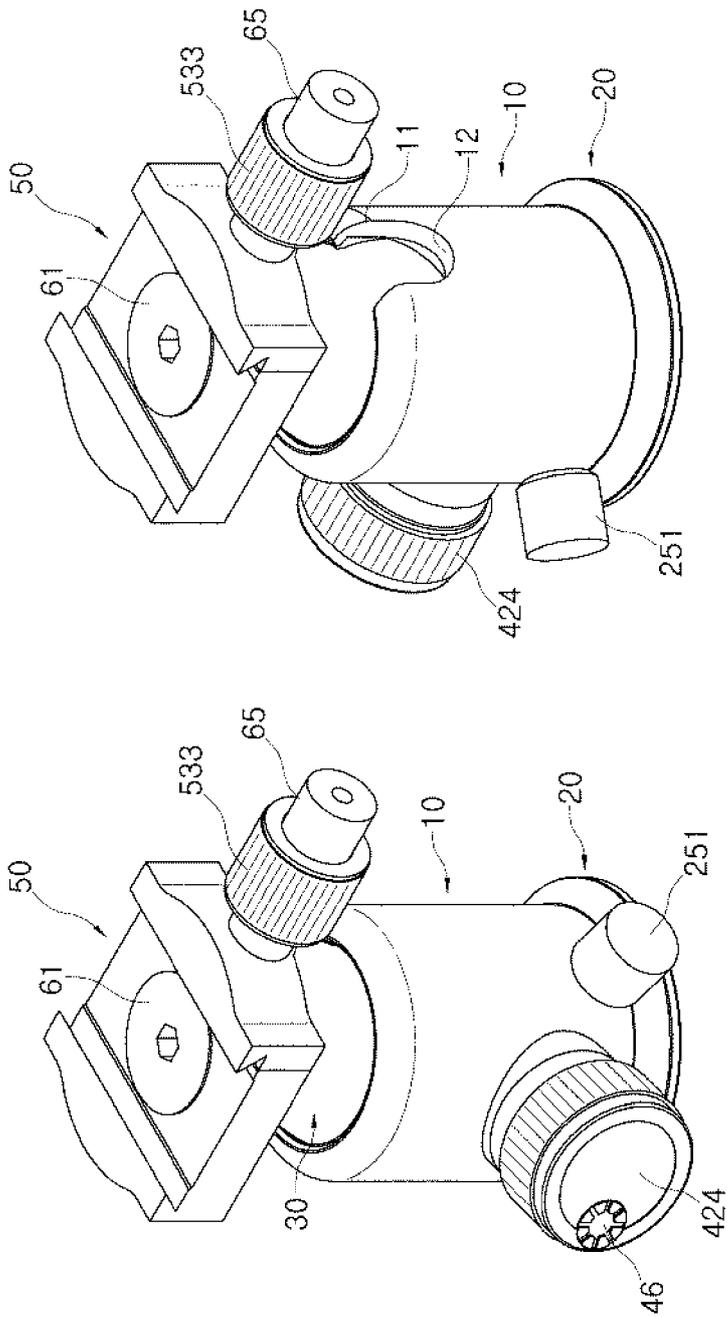
[Fig. 2]



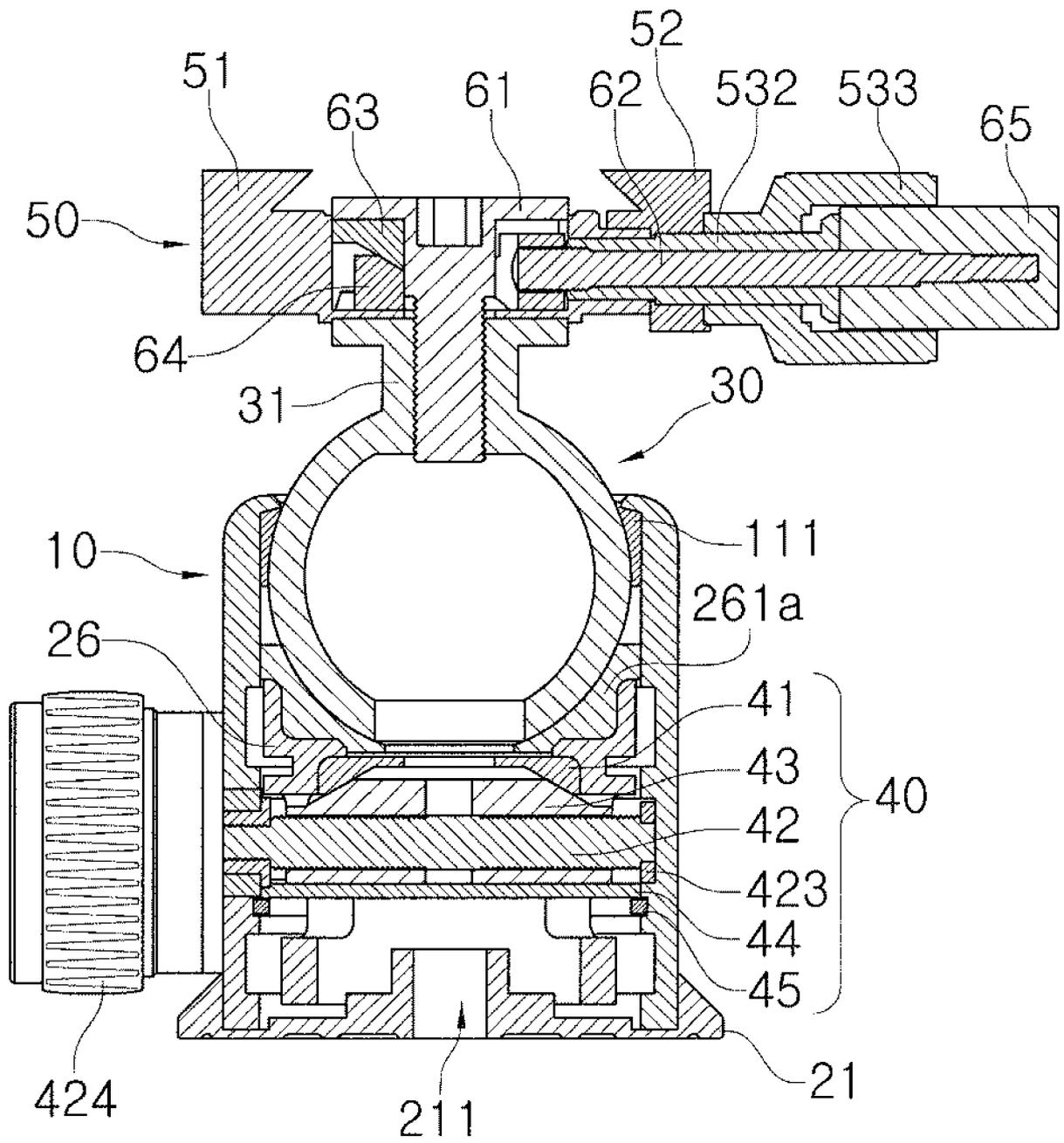
[Fig. 3]



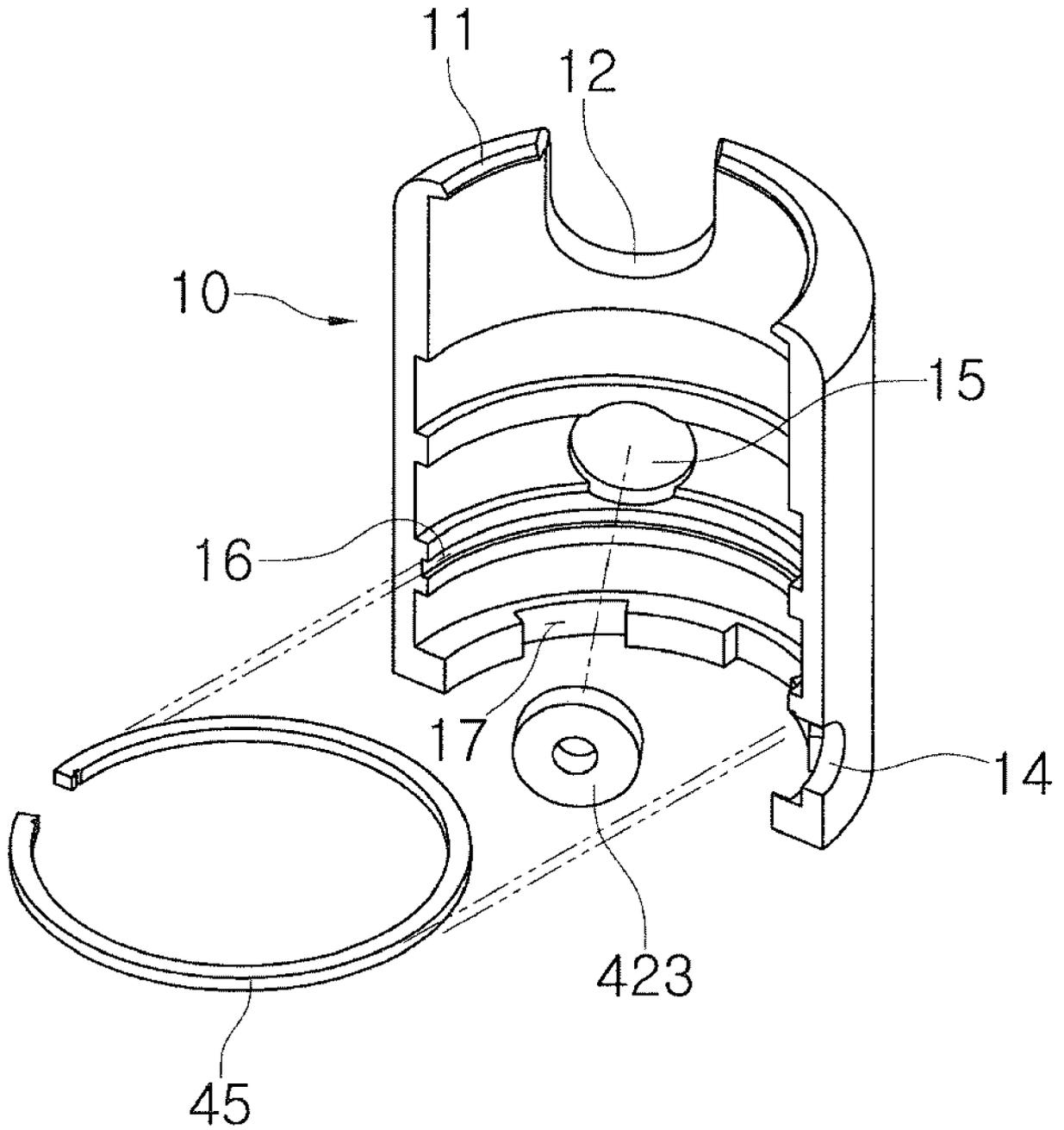
[Fig. 4]



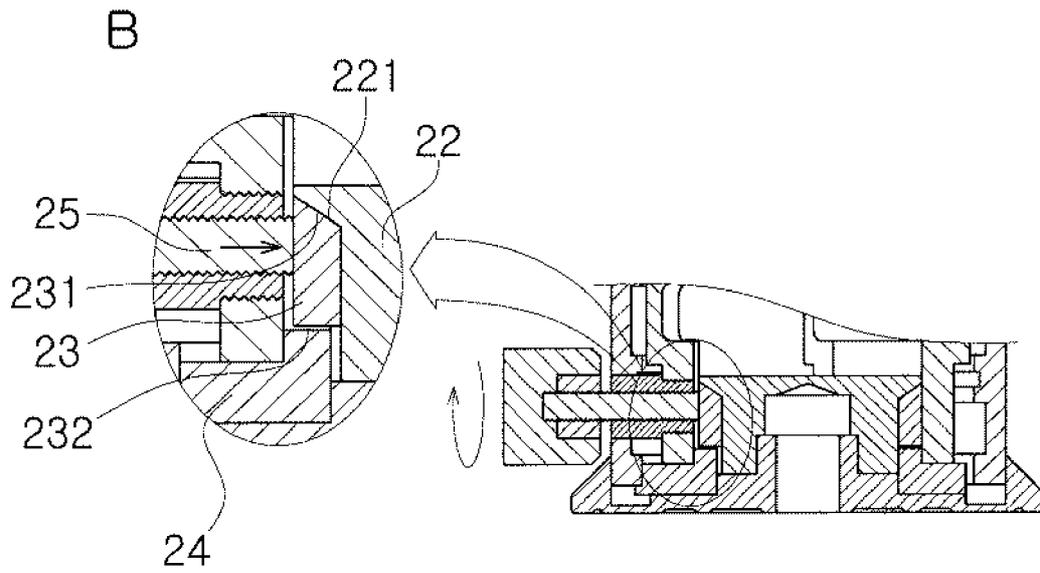
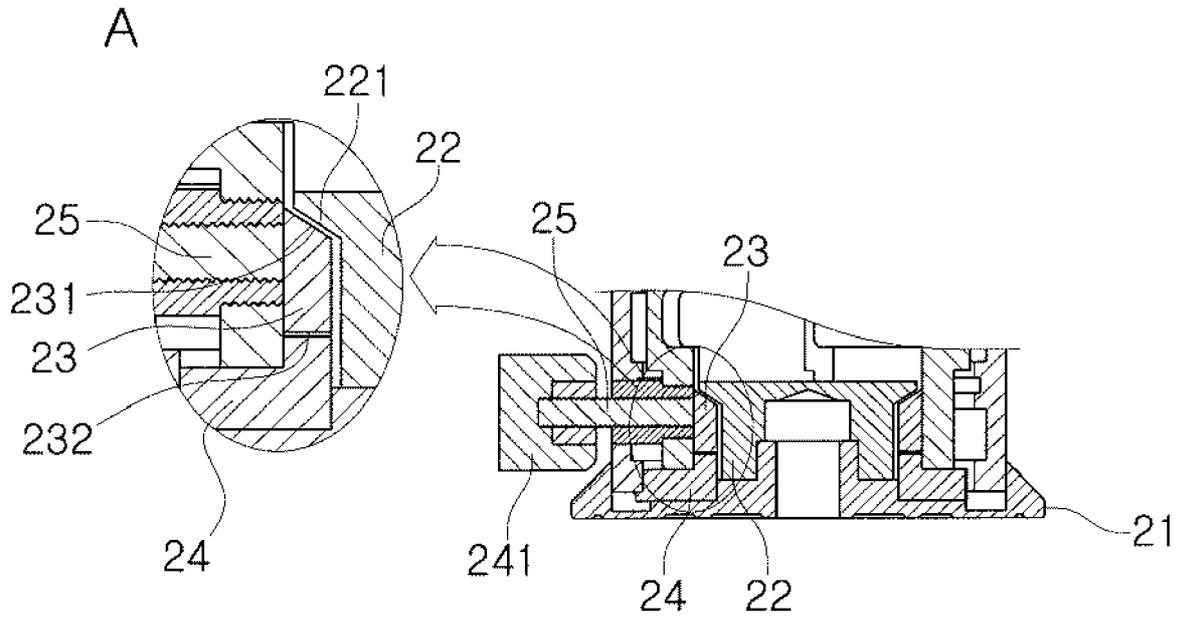
[Fig. 5]



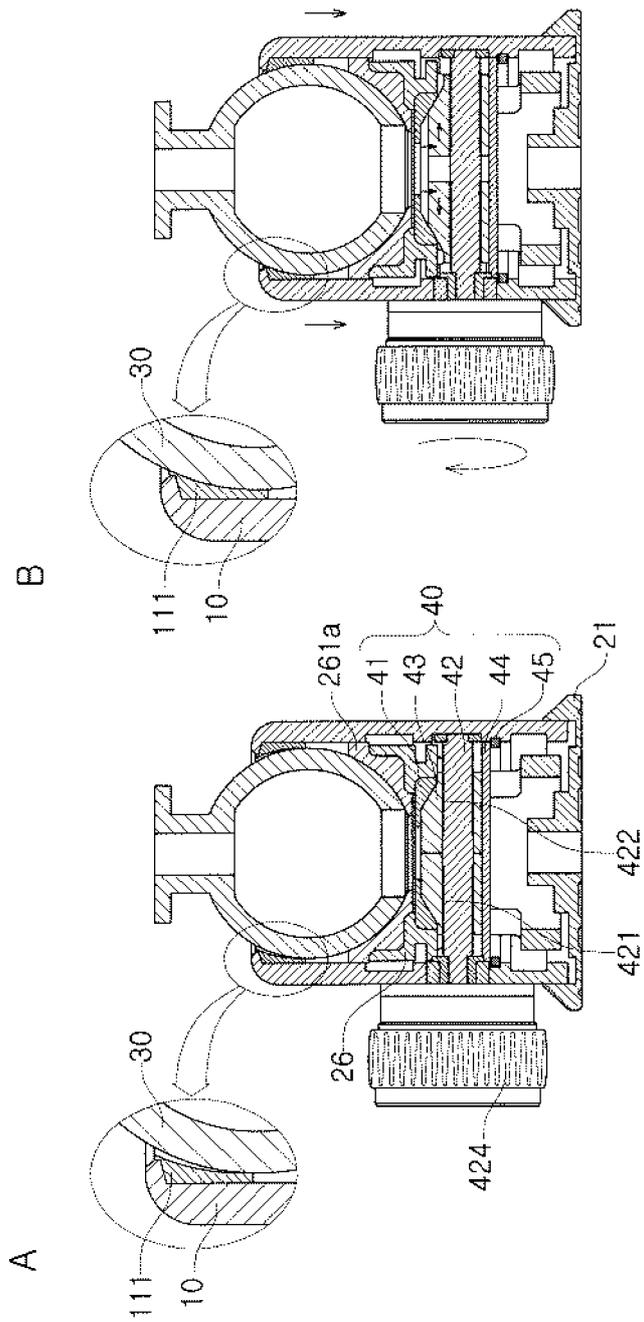
[Fig. 6]



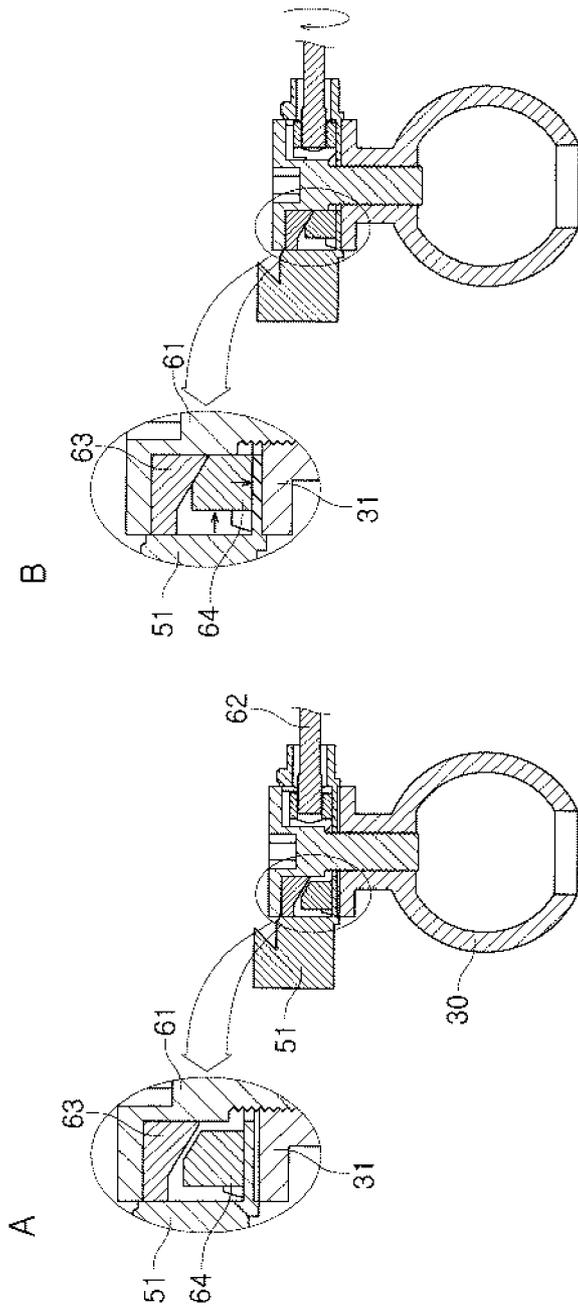
[Fig. 7]



[Fig. 8]



[Fig. 9]



[Fig. 10]

