Claims

1. A rotation angle control device, comprising:

a mandrel (12);

a transmission gear (13) sleeved on the mandrel (12);

a clutch sleeve (15) sleeved on the mandrel (12) and having a first axial counterbore (141) in an end surface located on one side of the clutch sleeve (15) away from the transmission gear (13);

a second worm (18) sleeved on the mandrel (12) and having a second axial counterbore (161) in an end surface located on one side of the second worm (18) adjacent to the transmission gear (13); and

an expansion spring (16) sleeved over the mandrel (12) and having an outer circular surface in interfere fit with inner hole surfaces of the first axial counterbore (141) and the second axial counterbore (161),

wherein the rotation angle control device further comprises:

a spacer sleeve (17) located between the expansion spring (16) and the mandrel (12), wherein an outer circular diameter of the spacer sleeve (17) is smaller than an inner hole size of the expansion spring (16) presenting a retracting tendency, and an outer circular diameter of the spacer sleeve (17) is also smaller than an inner hole size of the expansion spring (16) after interference fitting.

2. The rotation angle control device according to claim 1,

wherein there is a preset rotation clearance between the transmission gear (13) and the clutch sleeve (15) in a circumferential direction, and

the transmission gear (13) is configured to drive the clutch sleeve (15) to rotate along a first rotation direction when rotating to abut against the clutch sleeve (15) relative to the second worm (18) in the first rotation direction, such that the expansion spring (16) is rotated to retract radially by a frictional force of the first axial counterbore (141) of the clutch sleeve (15) against an outer circular surface of the expansion spring (16), thereby causing slippage in rotation of the clutch sleeve (15) relative to the expansion spring (16) and the second worm (18); and

drive the clutch sleeve (15) to rotate along a second rotation direction when rotating to abut against the clutch sleeve (15) relative to the second worm (18) in the second rotation direction opposite to the first rotation direction, such that the expansion spring (16) is rotated to expand radially by a frictional force of the first axial counterbore (141) of the clutch sleeve (15) against the outer circular surface of the expansion spring (16), thereby causing locking of the clutch sleeve (15) relative to the expansion spring (16) and the second worm (18) to implement synchronous rotation.

3. The rotation angle control device according to claim 2, wherein the transmission gear (13) has a slot (13a) extending along an axial direction, an insert block (15a) which is axially

insertable into the slot (13a) is provided at one end of the clutch sleeve (15) away from the second worm (18), the insert block (15a) is rotatable relative to the slot (13a), and a circumferential width of the insert block (15a) is smaller than a circumferential width of the slot (13a) to form the preset rotation clearance between the transmission gear (13) and the clutch sleeve (15).

4. The rotation angle control device according to claim 3, further comprising:

a return torsion spring (14) sleeved over the mandrel (12) and located between the transmission gear (13) and the clutch sleeve (15), wherein hooks at both ends of the return torsion spring (14) are respectively buckled to a side wall of the slot (13a) and the insert block (15a).

5. The rotation angle control device according to claim 1, wherein the expansion spring (16) is a right-handed expansion spring, where the first rotation direction is a counterclockwise direction, and the second rotation direction is a clockwise direction.

6. The rotation angle control device according to claim 1, wherein an axial length of the spacer sleeve (17) is smaller than a sum of depths of the first axial counterbore (141) and the second axial counterbore (161).

7. The rotation angle control device according to claim 1, further comprising:

a shaft sleeve (19) with one end abutting against an end of the second worm (18), and another end having a clearance

elimination cavity (19a); and

a clearance elimination spring (20) sleeved into the clearance elimination cavity (19a),

wherein the shaft sleeve (19) is sleeved on the mandrel (12), and connected to the mandrel (12) through a buckle.

8. The rotation angle control device according to claim 7, wherein the sleeve (19) further comprises a fifth through hole (28) communicating with the clearance elimination cavity (19a), an inner wall of the fifth through hole (28) has an elastic clamping block (29) that extends into the clearance elimination cavity (19a), one side of the elastic clamping block (29) facing the fifth through hole (28) has a guiding bevel (31), and the mandrel (12) has a clamping slot (30) engaging with the elastic clamping block (29).

9. An automatic clearance adjuster, comprising:

a housing (1) having a first through hole (2) and a second through hole (3) that communicate with each other, and a mounting hole (10) parallel to an axis of the first through hole (2) and communicating with the first through hole (2) and the second through hole (3);

a worm gear (4) disposed within the first through hole (2);

a first worm (5) disposed within the second through hole (3) and engaging with the worm gear (4);

a coil spring (6) arranged at one end of the first worm (5);

a clutch gear (7) sleeved on another end of the first worm (5);

a control disc assembly arranged at one end of the first through hole (2) and comprising a gear ring (9); and

the rotation angle control device according to any one of claims 1-8, which is disposed within the mounting hole (10),

wherein the transmission gear (13) in the rotation angle control device engages with the gear ring (9), and the second worm (18) in the rotation angle control device engages with the clutch gear (7).

10. The automatic clearance adjuster according to claim 9, wherein the control disc assembly further comprises:

a cover plate (22) covering one side of the first through hole (2) along an axial direction of the first through hole (2) and shielding an opening of the mounting hole (10); and

a control arm (8), wherein the control arm (8) and the gear ring (9) are respectively located on both sides of the cover plate (22), and fixedly connected to the gear ring (9), and

wherein the control arm (8) and the gear ring (9) are rotatable synchronously relative to the cover plate (22).

11. The automatic clearance adjuster according to claim 9, wherein the mounting hole (10) is a blind hole, the rotation angle control device further comprises a shaft sleeve (19) and a clearance elimination spring (20), and the shaft sleeve (19) is sleeved on the second worm (18) and connected to the mandrel (12) through a buckle, wherein one end of the sleeve (19) abuts against an end of the second worm (18), and another end of the sleeve (19) has a clearance elimination cavity (19a); and one end of

the clearance elimination spring (20) abuts into the clearance elimination cavity (19a), and another end of the clearance elimination spring (20) abuts into the installation hole (10).

12. The automatic clearance adjuster according to claim 9, further comprising:

an upper cover (23) and a lower cover (24) respectively arranged at both ends of the second through hole (3) along an axial direction.

13. The automatic clearance adjuster according to claim 9, wherein the housing further comprises a fourth through hole communicating with the second through hole (3), and the automatic clearance adjuster further comprises an oil nozzle (25) within the fourth through hole and a dustproof cover (26) covered on the oil nozzle (25).

14. An automobile brake comprising the automatic clearance adjuster according to any one of claims 9-13.