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(54) DRIVING DEVICE FOR AIR DEFLECTOR OF AIR CONDITIONER AND AIR CONDITIONER

(57) The present disclosure discloses a driving device for an air deflector of an air conditioner and an air conditioner. The driving device for the air deflector of the air conditioner includes a motor (1), a fixing plate (2), a first transmission shaft (3) and a second transmission shaft (4), the motor (1) is connected with a side of the fixing plate (2), the first transmission shaft (3) and the second transmission shaft (4) are arranged at a side of the fixing plate (2) away from the motor (1), the second transmission shaft (4) is arranged above the first transmission shaft (3), the first transmission shaft (3) is fixedly connected with the motor (1), the second transmission shaft (4) is rotatably connected with the fixing plate (2), and the first transmission shaft (3) is connected with the second transmission shaft (4) through a linkage mechanism.

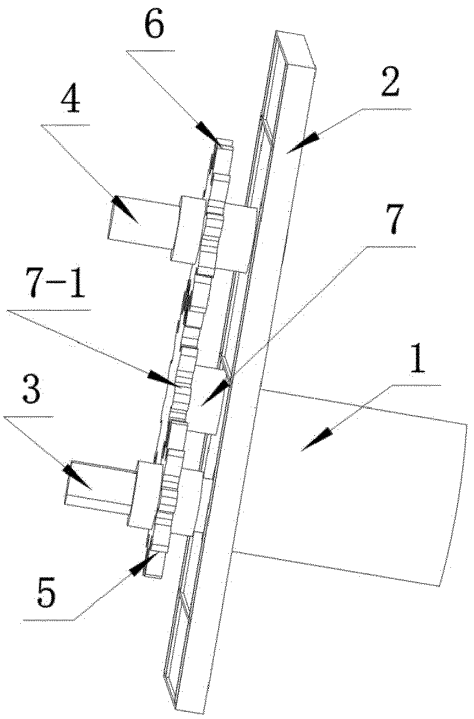

Fig. 1

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Description

FIELD

[0001] The present disclosure relates to the technical field of an air conditioner, and more particularly, to a driving device for an air deflector of an air conditioner and an air conditioner.

BACKGROUND

[0002] At present, an air outlet of an air conditioner on the market is provided with an air deflector of the air conditioner. When the air conditioner is not working, the air deflector of the air conditioner will seal the air outlet, thus effectively preventing dust and water vapor from entering the air conditioner and also ensuring an aesthetic appearance of the air conditioner. When the air conditioner is in a working state, the air deflector of the air conditioner may adjust an air direction to avoid a direct blowing. That is, the air deflector of the air conditioner may change an air blowing direction to avoid blowing directly to a human body, so as to reduce adverse effects on a human health due to the direct blowing.

[0003] The air deflector of the existing air outlet of the air conditioner mounted on a wall is mostly an integral structure, and is driven by a motor to rotate and change the air blowing direction, which however has a limited effect on a degree of a change in the air direction. Therefore, the whole air deflector of the air conditioner is divided into two separate air deflectors, and the two air deflectors rotate simultaneously, which may better change the air blowing direction of the air outlet of the air conditioner. However, if two motors are selected to drive the two air deflectors, respectively, the cost and the power consumption are relatively high, which is not conducive to the protection of environment. Thus, it is necessary to propose a driving device for an air deflector of an air conditioner and an air conditioner, so as to at least partially solve the problems existing in the prior art.

SUMMARY

[0004] Concepts of a serial of simplified forms are introduced in the summary of the present disclosure, which will be further explained in the specific embodiments. The summary of the present disclosure does not mean to try to define the key features and the necessary technical features of the claimed technical solution, nor does it mean to try to determine the protection scope of the claimed technical solution.

[0005] In order to at least partially solve the above problems, the present disclosure provides according to a first aspect a driving device for an air deflector of an air conditioner, including: a motor, a fixing plate, a first transmission shaft and a second transmission shaft. The motor is connected with a side of the fixing plate, the first transmission shaft and the second transmission shaft are arranged at a side of the fixing plate away from the motor, and the second transmission shaft is arranged above the first transmission shaft. The first transmission shaft is fixedly connected with the motor, the second transmission shaft is rotatably connected with the fixing plate, and the first transmission shaft is connected with the second transmission shaft through a linkage mechanism.

[0006] Preferably, the linkage mechanism includes a first gear, a second gear and a gear shaft, the first gear and the first transmission shaft are arranged coaxially, the second gear and the second transmission shaft are arranged coaxially, the gear shaft is arranged between the first gear and the second gear, the gear shaft is rotatably connected with the fixing plate, a third gear is arranged to the gear shaft, and the first gear and the second gear are meshed and connected with the third gear, respectively.

[0007] Preferably, an end face of the third gear adjacent to the fixing plate is fixedly connected with a first shaft body, an end face of the first shaft body away from the third gear is fixedly connected with a first connecting portion, the fixing plate is provided with a first round hole corresponding to the first connecting portion, an end face of the first connecting portion away from the first shaft body is fixedly connected with a first tapered head, and a first U-shaped groove is formed in the first tapered head.

[0008] Preferably, the linkage mechanism includes a first link plate, a second link plate and a third link plate, the first link plate is arranged to the first transmission shaft, the second link plate is arranged to the second transmission shaft, the third link plate is arranged between the first link plate and the second link plate, one end of the third link plate is hinged with an end of the first link plate away from the first transmission shaft, and the other end thereof is hinged with an end of the second link plate away from the second transmission shaft.

[0009] Preferably, the third link plate includes a main plate provided with a first reinforcing rib thereon.

[0010] Preferably, a second round hole is formed in the end of the first link plate away from the first transmission shaft, a third round hole is formed in the end of the second link plate away from the second transmission shaft, one end of the main plate is provided with a first boss corresponding to the second round hole, the other end of the main plate is provided with a second boss corresponding to the third round hole, an end face of the first boss away from the main plate is fixedly connected with a second tapered head, a second U-shaped groove is formed in the second tapered head, an end face of the second boss away from the main plate is fixedly connected with a third tapered head, and a third U-shaped groove is formed in the third tapered head.

[0011] Preferably, the motor includes a motor main body and an output shaft, the output shaft is connected with the motor main body, the motor main body is fixedly connected with the fixing plate, the output shaft is fixedly connected with the first transmission shaft, and the fixing

plate is provided with a fourth round hole corresponding to the output shaft.

[0012] Preferably, the first transmission shaft includes a second shaft body, and a center portion of one end face of the second shaft body adjacent to the fixing plate is provided with an aperture corresponding to the output shaft, and the other end face of the second shaft body is fixedly connected with a second connecting portion.

[0013] Preferably, a fifth round hole is arranged above the fourth round hole, the fifth round hole is formed in the fixing plate, the second transmission shaft is provided with a third connecting portion corresponding to the fifth round hole, one end face of the third connecting portion away from the motor is fixedly connected with a third shaft body, the other end face thereof is fixedly connected with a fourth tapered head, a fourth U-shaped groove is formed in the fourth tapered head, and an end face of the third shaft body away from the third connecting portion is fixedly connected with a fourth connecting portion.

[0014] Preferably, the fixing plate is provided with a second reinforcing rib thereon.

[0015] The present disclosure provides according to a second aspect an air conditioner, including the driving device according to the first aspect of the present disclosure for the air deflector of the air conditioner.

[0016] Compared to the prior art, the present disclosure at least includes following significant effects.

[0017] The present disclosure drives the first transmission shaft and the second transmission shaft to rotate through the one motor, and thus drives two air deflectors of the air conditioner respectively connected with the first transmission shaft and the second transmission shaft to rotate, so as to more effectively adjust the air blowing direction of the air outlet of the air conditioner, such that the present disclosure has the advantages of a low cost, a low power consumption, a contribution to environmental protection, a simple structure and a reliable power transmission.

[0018] Other advantages, objectives and features of the driving device for the air deflector of the air conditioner and the air conditioner described in the present disclosure will be partially reflected by the following descriptions, and also will be understood by those skilled in the related art according to the research and practice of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The accompanying drawings provide a further understanding of the present disclosure and constitute as part of the present disclosure. The accompanying drawings are used to explain the present disclosure with the embodiments of the present disclosure, which do not constitute as a limitation of the present disclosure.

Fig. 1 is a schematic view of a first kind of a connection structure of a first transmission shaft and a second transmission shaft in a driving device for an air deflector of an air conditioner according to the present disclosure.

Fig. 2 is a left view of Fig. 1.

Fig. 3 is a right view of Fig. 1.

Fig. 4 is a schematic view of a gear shaft in Fig. 1.

Fig. 5 is a schematic view of an assembly of a first gear and a first transmission shaft in Fig. 1.

Fig. 6 is a schematic view of an assembly of a second gear and a second transmission shaft in Fig. 1.

Fig. 7 is a schematic view of a second kind of a connection structure of a first transmission shaft and a second transmission shaft in a driving device for an air deflector of an air conditioner according to the present disclosure.

Fig. 8 is a left view of Fig. 7.

Fig. 9 is a right view of Fig. 7.

Fig. 10 is a schematic view of a third link plate in Fig. 7.

Fig. 11 is a schematic view of an assembly of a first link plate and a first transmission shaft in Fig. 7.

Fig. 12 is a schematic view of an assembly of a second link plate and a second transmission shaft in Fig. 7.

Fig. 13 is a schematic view of a motor of a driving device for an air deflector of an air conditioner.

Fig. 14 is a schematic view of a fixing plate of a driving device for an air deflector of an air conditioner.

Fig. 15 is a schematic view of mounting and use of a driving device for an air deflector of an air conditioner.

DETAILED DESCRIPTION

[0020] The present disclosure is further described detailed below in combination with the accompanying drawings and embodiments, such that those skilled in the related art can implement the present disclosure with reference to the literal content of the description.

[0021] It should be understood that terms such as "having," "including," and "comprising" as used herein do not exclude an existence or addition of one or more other elements or combinations thereof.

[0022] As illustrated in Figs. 1- 15, the present disclosure provides a driving device for an air deflector of an air conditioner, which includes a motor 1, a fixing plate 2, a first transmission shaft 3 and a second transmission shaft 4. The motor 1 is connected to a side of the fixing plate 2, the first transmission shaft 3 and the second transmission shaft 4 are arranged to another side of the fixing plate 2 away from the motor 1, and the second transmission shaft 4 is arranged above the first transmission shaft 3. The first transmission shaft 3 is fixedly connected with the motor 1, the second transmission shaft 4 is rotatably connected with the fixing plate 2, and the first transmission shaft 3 is connected with the second transmission shaft 4 through a linkage mechanism.

[0023] The working principle of the above technical solution is described as follows. The motor 1 drives the first

transmission shaft 3 to rotate, the first transmission shaft 3 drives the second transmission shaft 4 to rotate through the linkage mechanism, an end of the first transmission shaft 3 away from the fixing plate 2 is connected with one of two air deflectors 11 of the air conditioner, and drives this air deflector 11 of the air conditioner to rotate, and an end of the second transmission shaft 4 away from the fixing plate 2 is connected with the other one of the two air deflectors 11 of the air conditioner, and drives this air deflector 11 of the air conditioner to rotate.

[0024] The above technical solution has following beneficial effects. The present disclosure drives the first transmission shaft 3 to rotate through the one motor 1, and drives the second transmission shaft 4 to rotate through the linkage mechanism, so as to drive the two air deflectors 11 of the air conditioner respectively connected with the first transmission shaft 3 and the second transmission shaft 4 to rotate, thus more effectively adjusting an air blowing direction of an air outlet 13 of the air conditioner, such that the present disclosure has the advantages of a low cost, a low power consumption, a contribution to environmental protection, a simple structure and a reliable power transmission.

[0025] Figs. 1-6 and 13-14 illustrate a first technical solution for the connection of the first transmission shaft and the second transmission shaft.

[0026] In an embodiment, the linkage mechanism includes a first gear 5, a second gear 6 and a gear shaft 7, the first gear 5 and the first transmission shaft 3 are arranged coaxially, the second gear 6 and the second transmission shaft 4 are arranged coaxially, the gear shaft 7 is arranged between the first gear 5 and the second gear 6, the gear shaft 7 is rotatably connected with the fixing plate 2, a third gear 7-1 is arranged on the gear shaft 7, and the first gear 5 and the second gear 6 are meshed and connected with the third gear 7-1, respectively.

[0027] The working principle of the above technical solution is described as follows. The first gear 5, the second gear 6, and the third gear 7-1 have the same thickness and are spaced from the fixing plate 2 by the same clearance. The first transmission shaft 3 drives the first gear 5 to rotate, the first gear 5 is meshed with the third gear 7-1, and thus the first gear 5 drives the gear shaft 7 to rotate. The second gear 6 is meshed with the third gear 7-1, and thus the second gear 6 is driven to rotate. The second gear 6 drives the second transmission shaft 4 to rotate. The first gear 5, the second gear 6 and the gear shaft 7 may be arranged on a straight line or in a triangle according to actual needs.

[0028] The above technical solution has following beneficial effects. The first transmission shaft 3 effectively drives the second transmission shaft 4 to rotate through the first gear 5, the second gear 6 and the gear shaft 7.

[0029] In an embodiment, an end face of the third gear 7-1 adjacent to the fixing plate 2 is fixedly connected with a first shaft body 7-2, an end face of the first shaft body 7-2 away from the third gear 7-1 is fixedly connected with a first connecting portion 7-3, the fixing plate 2 is provided with a first round hole 2-1 corresponding to the first connecting portion 7-3, an end face of the first connecting portion 7-3 away from the first shaft body 7-2 is fixedly connected with a first tapered head 7-4, and a first U-shaped groove 7-4-1 is formed in the first tapered head 7-4.

[0030] The working principle of the above technical solution is described as follows. The fixing plate 2 is provided with the first round hole 2-1 corresponding to the first connecting portion 7-3, that is, a diameter and a hole depth of the first round hole 2-1 correspond to a diameter and a length of the first connecting portion 7-3, respectively, and the first connecting portion 7-3 is fitted in the first round hole 2-1 with a clearance, such that the first connecting portion 7-3 may rotate in the first round hole 2-1. Also, the first round hole 2-1 limits the degree of freedom of the first connecting portion 7-3 moving forward and back as well as up and down. Further, the third gear 7-1, the first shaft body 7-2, the first connecting portion 7-3 and the first tapered head 7-4 are coaxially arranged, a diameter of the first shaft body 7-2 is greater than that of the first connecting portion 7-3, and a sectional diameter of the first tapered head 7-4 adjacent to the fixing plate 2 is greater than the diameter of the first connecting portion 7-3. The degree of freedom of the first connecting portion 7-3 translating left and right is limited, and the degree of freedom of the first connecting portion 7-3 moving forward and back as well as up and down is also limited by the first round hole 2-1, such that the first connecting portion 7-3 may only rotate freely in the first round hole 2-1. Additionally, a sectional diameter of the first tapered head 7-4 away from the fixing plate 2 is smaller than the diameter of the first connecting portion 7-3, a first U-shaped groove 7-4-1 is formed the first tapered head 7-4, an opening of the first U-shaped groove 7-4-1 faces towards a side away from the fixing plate 2, a bottom of the first U-shaped groove 7-4-1 extends to an end of the first connecting portion 7-3 adjacent to the first tapered head 7-4, and the first tapered head 7-4 deforms to have a smaller diameter while the first tapered head 7-4 is extending into or out of the first round hole 2-1, so as to facilitate the assembling and disassembling of the gear shaft 7 and the fixing plate 2.

[0031] The above technical solution has following beneficial effects. The gear shaft 7 rotates freely in the first round hole 2-1 of the fixing plate 2 along its axial direction, the first transmission shaft 3 drives the first gear 5 to rotate, the first gear 5 drives the gear shaft 7 to rotate through the third gear 7-1, the gear shaft 7 drives the second gear 6 to rotate through the third gear 7-1, and the second gear 6 drives the second transmission shaft 4 to rotate, such that the first transmission shaft 3 effectively transfers the power to the second transmission shaft 4, and the gear shaft 7 and the fixing plate 2 are easy to disassemble and assemble.

[0032] Figs. 7-14 illustrate a second technical solution for the connection of the first transmission shaft 3 and

the second transmission shaft 4.

[0033] In an embodiment, the linkage mechanism includes a first link plate 8, a second link plate 9 and a third link plate 10, the first link plate 8 is arranged to the first transmission shaft 3, the second link plate 9 is arranged to the second transmission shaft 4, and the third link plate 10 is arranged between the first link plate 8 and the second link plate 9. One end of the third link plate 10 is hinged with an end of the first link plate 8 away from the first transmission shaft 3, and the other end thereof is hinged with an end of the second link plate 9 away from the second transmission shaft 4.

[0034] The working principle of the above technical solution is described as follows. The first link plate 8 and the second link plate 9 have the same thickness and are spaced from the fixing plate 2 by the same clearance. The first transmission shaft 3 drives the first link plate 8 to rotate. One end of the third link plate 10 is hinged with the end of the first link plate 8 away from the first transmission shaft 3, and the other end thereof is hinged with the end of the second link plate 9 away from the second transmission shaft 4, such that the first link plate 8 drives the second link plate 9 to rotate through the third link plate 10, and the second link plate 9 drives the second transmission shaft 4 to rotate.

[0035] The above technical solution has following beneficial effects. The first transmission shaft 3 effectively drives the second transmission shaft 4 to rotate through the first link plate 8, the third link plate 10 and the second link plate 9.

[0036] In an embodiment, the third link plate 10 includes a main plate 10-1 provided with a first reinforcing rib 10-1-1 thereon.

[0037] The working principle of the above technical solution is described as follows. One or a plurality of the first reinforcing ribs 10-1-1 are arranged on each of a left side face and a right side face of the main plate 10-1, and the first reinforcing rib 10-1-1 and the third link plate 10 are formed integrally. When a plurality of the first reinforcing ribs 10-1-1 are provided, the first reinforcing ribs 10-1-1 may be arranged horizontally, vertically, or obliquely, and also may be arranged to cross each other, so as to increase the strength of the main plate 10-1. Further, it should be noted to avoid the first reinforcing rib 10-1-1 from affecting the action or assembling of the first transmission shaft 3, the second transmission shaft 4, the first link plate 8, the second link plate 9, and the third link plate 10.

[0038] The above technical solution has following beneficial effects. The strength of the third link plate 10 is strengthened, and the third link plate 10 tends not to deform, so as to ensure the stability of the hinging of the two ends of the third link plate 10 with the first link plate 8 and the second link plate 9, such that it is ensured that the motor 1 transfers the power to the second transmission shaft 4 through the first transmission shaft 3, the first link plate 8, the third link plate 10 and the second link plate 9, and thus the first transmission shaft 3 and the second transmission shaft 4 drive the two air deflectors 11 of the air conditioner to rotate, respectively, thus better adjusting the air blowing direction of the air outlet 13 of the air conditioner.

[0039] In an embodiment, a second round hole 8-1 is formed in the end of the first link plate 8 away from the first transmission shaft 3, a third round hole 9-1 is formed in the end of the second link plate 9 away from the second transmission shaft 4, one end of the main plate 10-1 is provided with a first boss 10-2 corresponding to the second round hole 8-1, and the other end of the main plate 10-1 is provided with a second boss 10-3 corresponding to the third round hole 9-1. An end face of the first boss 10-2 away from the main plate 10-1 is fixedly connected with a second tapered head 10-2-1, a second U-shaped groove 10-2-1-1 is formed in the second tapered head 10-2-1, an end face of the second boss 10-3 away from the main plate 10-1 is fixedly connected with a third tapered head 10-3-1, and a third U-shaped groove 10-3-1 is formed in the third tapered head 10-3-1.

[0040] The working principle of the above technical solution is described as follows. One end of the main plate 10-1 is provided with the first boss 10-2 corresponding to the second round hole 8-1, that is, a diameter and a hole depth of the second round hole 8-1 correspond to a diameter and a length of the first boss 10-2, respectively, and the first boss 10-2 is fitted in the second round hole 8-1 with a clearance. The first boss 10-2 may rotate in the second round hole 8-1, and also, the second round hole 8-1 limits the degree of freedom of the first boss moving forward and back as well as up and down. Further, the first boss 10-2 and the second tapered head 10-2-1 are coaxially arranged, and a sectional diameter of the second tapered head 10-2-1 adjacent to the main plate 10-1 is greater than a diameter of the first boss 10-2. In addition, the main plate 10-1 has a limitation to the first boss 10-2, and thus the degree of freedom of the first boss 10-2 translating left and right is limited, such that the first boss 10-2 may only rotate freely in the second round hole 8-1, thereby completing the hinging of the first link plate 8 and the third link plate 10. Further, a sectional diameter of the second tapered head 10-2-1 away from the main plate 10-1 is smaller than the diameter of the first boss 10-2, the second U-shaped groove 10-2-1-1 is formed in the second tapered head 10-2-1, an opening of the second U-shaped groove 10-2-1-1 faces towards a side away from the main plate 10-1, a bottom of the second U-shaped groove 10-2-1-1 extends to an end of the first boss 10-2 adjacent to the second tapered head 10-2-1, and the second tapered head 10-2-1 deforms to have a smaller diameter while the second tapered head 10-2-1 is extending into or out of the second round hole 8-1, so as to facilitate the assembling and disassembling of the first link plate 8 and the third link plate 10.

[0041] The other end of the main plate 10-1 is provided with the second boss 10-3 corresponding to the third round hole 9-1, that is, a diameter and a hole depth of the third round hole 9-1 correspond to a diameter and a

length of the second boss 10-3, respectively, and the second boss 10-3 is fitted in the third round hole 9-1 with a clearance. The second boss 10-3 may rotate in the third round hole 9-1, and also, the third round hole 9-1 limits the degree of freedom of the second boss 10-3 moving forward and back as well as up and down. Further, the second boss 10-3 and the third tapered head 10-3-1 are coaxially arranged, and a sectional diameter of the third tapered head 10-3-1 adjacent to the main plate 10-1 is greater than a diameter of the second boss 10-3. In addition, the main plate 10-1 has a limitation to the second boss 10-3, and thus the degree of freedom of the second boss 10-3 translating left and right is limited, such that the second boss 10-3 may only rotate freely in the third round hole 9-1, thus completing the hinging of the second link plate 9 and the third link plate 10. Further, a sectional diameter of the third tapered head 10-3-1 away from the main plate 10-1 is smaller than a diameter of the second boss 10-3, the third U-shaped groove 10-3-1-1 is formed in the third tapered head 10-3-1, an opening of the third U-shaped groove 10-3-1-1 faces towards a side away from the main plate 10-1, a bottom of the third U-shaped groove 10-3-1-1 extends to an end of the second boss 10-3 adjacent to the third tapered head 10-3-1, and the third tapered head 10-3-1 deforms to have a smaller diameter while the third tapered head 10-3-1 is extending into or out of the third round hole 9-1, so as to facilitate the assembling and disassembling of the second link plate 9 and the third link plate 10.

[0042] The above technical solution has following beneficial effects. The first transmission shaft 3 drives the first link plate 8 to rotate, the first link plate 8 drives the second link plate 9 to rotate through the third link plate 10, and the second link plate 9 drives the second transmission shaft 4 to rotate, such that the first transmission shaft 3 may effectively transfer the power to the second transmission shaft 4, and the third link plate 10, the first link plate 8 and the second link plate 9 are easy to disassemble and assemble.

[0043] In an embodiment, the motor 1 includes a motor main body 1-1 and an output shaft 1-2, the output shaft 1-2 is connected with the motor main body 1-1, the motor main body 1-1 is fixedly connected with the fixing plate 2, the output shaft 1-2 is fixedly connected with the first transmission shaft 3, and the fixing plate 2 is provided with a fourth round hole 2-2 corresponding to the output shaft 1-2.

[0044] The working principle of the above technical solution is described as follows. The motor main body 1-1 cannot pass through the fourth round hole 2-2, and may be firmly fixed with the fixing plate 2 by means of a threaded connection, adhering or the like. When the motor main body 1-1 is threadedly connected and fixed with the fixing plate 2, the fixing plate 2 may be provided with a hole through which a screw passes, and the motor main body 1-1 is provided with a threaded hole corresponding to the hole through which the screw passes, so as to achieve a threaded connection. The motor main body 1-1 may be connected with a plurality of wires (not illustrated in the drawings), and the plurality of wires are configured to be connected with a power supply device (not illustrated in the drawings) and a control device (not illustrated in the drawings) of the air conditioner. A diameter of the fourth round hole 2-2 is greater than that of the output shaft 1-2, and a cross-section of an end of the output shaft 1-2 away from the motor main body 1-1 may have a shape of an indented circle, a triangle or a polygon. The indented circle refers to a circle whose one or more portions are removed.

[0045] The above technical solution has following beneficial effects. The motor main body 1-1 is firmly fixed with the fixing plate 2 to ensure that the output shaft 1-2 and the fourth round hole 2-2 are in a coaxial position. Further, the diameter of the fourth round hole 2-2 is greater than that of the output shaft 1-2, such that the fourth round hole 2-2 will not be scratched during the rotation of the output shaft 1-2, and the motor main body 1-1 drives the output shaft 1-2 to rotate, so as to stably output the power. The plurality of wires connected with the motor main body 1-1 are connected with the power supply device and the control device of the air conditioner, so as to control the start and stop of the motor 1, and further to control a rotation angle of the air deflector 11 of the air conditioner, thus better adjusting the air blowing direction of the air outlet 13 of the air conditioner. The cross-section of the end of the output shaft 1-2 away from the motor main body 1-1 may have a shape of an indented circle, a triangle or a polygon, so as to better transfer the power of the motor 1 to the first transmission shaft 3.

[0046] In an embodiment, the first transmission shaft 3 includes a second shaft body 3-1, and a center portion of one end face of the second shaft body 3-1 adjacent to the fixing plate 2 is provided with an aperture 3-1-1 corresponding to the output shaft 1-2, and the other end face of the second shaft body 3-1 is fixedly connected with a second connecting portion 3-2.

[0047] The working principle of the above technical solution is described as follows. The aperture 3-1-1 corresponds to the output shaft 1-2, that is, the two are coaxially arranged. Further, when a section of an end of the output shaft 1-2 away from the motor main body 1-1 has a shape of an indented circle, a triangle or a polygon, a section of the aperture 3-1-1 is correspondingly arranged to have a shape of the indented circle, the triangle or the polygon, so as to facilitate that the second shaft body 3-1 and the output shaft 1-2 are fixedly connected through the interference fit and the gluing, such that the degree of freedom of the second shaft body 3-1 moving relative to the output shaft 1-2 is limited. Further, there is a clearance between the second shaft body 3-1 and the fixing plate 2, and thus the output shaft 1-2 may drive the second shaft body 3-1 to rotate freely. The first gear 5 or the first link plate 8 is arranged to the second shaft body 3-1 and is spaced from the fixing plate 2 by a clearance, so as not to affect the rotation of the first gear 5 or the first link plate 8. The second connecting portion 3-2 and the

second shaft body 3-1 are coaxially arranged, the second connecting portion 3-2 is configured to be fixedly connected with the one of the two air deflectors 11 of the air conditioner, so as to drive this air deflector 11 of the air conditioner to rotate.

[0048] The above technical solution has following beneficial effects. The output shaft 1-2 drives the first transmission shaft 3 to rotate, the first transmission shaft 3 drives the one of the two air deflectors 11 of the air conditioner to rotate through the second connecting portion 3-2, so as to further adjust the air blowing direction of the air outlet 13 of the air conditioner through this air deflector 11 of the air conditioner.

[0049] In an embodiment, a fifth round hole 2-3 is arranged above the fourth round hole 2-2, and the fifth round hole 2-3 is formed in the fixing plate 2. The second transmission shaft 4 is provided with a third connecting portion 4-1 corresponding to the fifth round hole 2-3, one end face of the third connecting portion 4-1 away from the motor 1 is fixedly connected with a third shaft body 4-2, and the other end face thereof is fixedly connected with a fourth tapered head 4-3. A fourth U-shaped groove 4-3-1 is formed in the fourth tapered head 4-3, and an end face of the third shaft body 4-2 away from the third connecting portion 4-1 is fixedly connected with a fourth connecting portion 4-4.

[0050] The working principle of the above technical solution is described as follows. The fifth round hole 2-3 is arranged above the fourth round hole 2-2, the second transmission shaft 4 is provided with the third connecting portion 4-1 corresponding to the fifth round hole 2-3, that is, a diameter and a hole depth of the fifth round hole 2-3 correspond to a diameter and a length of the third connecting portion 4-1, respectively, and the third connecting portion 4-1 is fitted in the fifth round hole 2-3 with a clearance. The third connecting portion 4-1 may rotate in the fifth round hole 2-3, and also, the fifth round hole 2-3 limits the degree of freedom of the third connecting portion 4-1 moving forward and back as well as up and down. The third connecting portion 4-1, the third shaft body 4-2, the fourth tapered head 4-3 and the fourth connecting portion 4-4 are coaxially arranged. A diameter of the third shaft body 4-2 is greater than that of the third connecting portion 4-1, and a sectional diameter of the fourth tapered head 4-3 adjacent to the fixing plate 2 is greater than a diameter of the third connecting portion 4-1, such that the degree of freedom of the third connecting portion 4-1 translating left and right is limited. In addition, the degree of freedom of the third connecting portion 4-1 moving forward and back as well as up and down is limited by the fifth round hole 2-3, and thus the third connecting portion 4-1 may only rotate freely in the fifth round hole 2-3. Additionally, a sectional diameter of the fourth tapered head 4-3 away from the fixing plate 2 is smaller than the diameter of the third connecting portion 4-1, the fourth U-shaped groove 4-3-1 is formed in the fourth tapered head 4-3, an opening of the fourth U-shaped groove 4-3-1 faces towards a side away from the fixing plate 2, a bottom of the fourth U-shaped groove 4-3-1 extends to an end of the third connecting portion 4-1 adjacent to the fourth tapered head 4-3, and the fourth tapered head 4-3 deforms to have a smaller diameter while extending into or out of the fifth round hole 2-3, so as to facilitate the assembling and disassembling of the second transmission shaft 4 and the fixing plate 2. Furthermore, the fourth connecting portion 4-4 is configured to be fixedly connected with the other one of the two air deflectors 11 of the air conditioner, so as to drive this air deflector 11 of the air conditioner to rotate. The second gear 6 or the second link plate 9 is arranged to the third shaft body 4-2, and is spaced from the fixing plate 2 by a clearance, so as not to affect the rotation of the second gear 6 or the second link plate 9.

[0051] The above technical solution has following beneficial effects. The first transmission shaft 3 drives the second transmission shaft 4 to rotate through the linkage mechanism, the second transmission shaft 4 drives the other one of the two air deflectors 11 of the air conditioner to rotate through the fourth connecting portion 4-4, so as to further adjust the air blowing direction of the air outlet 13 of the air conditioner through this air deflector 11 of the air conditioner.

[0052] In an embodiment, the fixing plate 2 is provided with a second reinforcing rib 2-4.

[0053] The working principle of the above technical solution is described as follows. One or a plurality of the second reinforcing ribs 2-4 are arranged on each of a left side and a right side of the fixing plate 2, and the second reinforcing rib 2-4 and the fixing plate 2 are formed integrally. When a plurality of the second reinforcing ribs 2-4 are provided, the second reinforcing ribs 2-4 may be arranged horizontally, vertically, or obliquely, and also may be arranged to cross each other, so as to strengthen the strength of the fixing plate 2. Further, it should be noted to avoid the second reinforcing rib 2-4 from affecting the action or the assembling of the motor 1, the first transmission shaft 3, the second transmission shaft 4, the first gear 5, the second gear 6, the gear shaft 7, the first link plate 8, the second link plate 9, and the third link plate 10.

[0054] The above technical solution has following beneficial effects. The strength of the fixing plate 2 is increased, and the fixing plate 2 tends not to deform, so as to ensure the stability of the connection of the first transmission shaft 3, the second transmission shaft 4, the gear shaft 7 with the fixing plate 2, such that it is ensured that the motor 1 transfers the power to the second transmission shaft 4 through the first transmission shaft 3 and the linkage mechanism, and thus the first transmission shaft 3 and the second transmission shaft 4 drive the two air deflectors 11 of the air conditioner to rotate, respectively, thus better adjusting the air blowing direction of the air outlet 13 of the air conditioner.

[0055] An air conditioner includes the above driving device for the air deflector of the air condi ti oner.

[0056] The working principle of the above technical solution is described as follows. The air deflector 11 of the

air conditioner is arranged to a shell 12 of an indoor unit of the air conditioner, the indoor unit of the air conditioner is provided with an air outlet 13, one end of each of the two air deflectors 11 of the air conditioner is rotatably connected to a left side wall of the air outlet 13, the driving device for the air deflector of the air conditioner of the present disclosure is connected to a right side wall of the air outlet 13, a cushion block 14 is arranged between the fixing plate 2 and the right side wall to keep a clearance therebetween, and the side walls of the air outlet 13 do not affect the power output of the driving device for the air deflector of the air conditioner of the present disclosure. Two round holes (not illustrated in the drawings) are formed in the right side wall, diameters of the two round holes are greater than the diameters of the second connecting portion 3-2 and the fourth connecting portion 4-4, the second connecting portion 3-2 and the fourth connecting portion 4-4 are respectively connected with the other ends of the two air deflectors 11 of the air conditioner after passing through the two round holes, and thus the first transmission shaft 3 and the second transmission shaft 4 drive the two air deflectors 11 of the air conditioner to rotate.

[0057] The above technical solution has following beneficial effects. The present disclosure drives the first transmission shaft 3 to rotate through the one motor 1, and drives the second transmission shaft 4 to rotate through the linkage mechanism, so as to drive the two air deflectors 11 of the air conditioner respectively connected with the first transmission shaft 3 and the second transmission shaft 4 to rotate, thus more effectively adjusting the air blowing direction of the air outlet 13 of the air conditioner, such that the present disclosure has the advantages of a low cost, a low power consumption, a contribution to environmental protection, a simple structure and a reliable power transmission.

[0058] In the description of the present disclosure, it should be understood that, terms such as "central," "longitudinal," "lateral," "length," "width," "thickness," "upper," "lower," "front," "rear," "left," "right," "vertical," "horizontal," "top," "bottom," "inner," "outer," "clockwise", "counter clockwise", "axial," "radial", and "circumferential" indicate an orientation or a position relationship based on an orientation or a position relationship illustrated in the accompanying drawings, which is only for convenience of descriptions or for simplifying descriptions of the present disclosure, and does not indicate or imply that the device or element referred to must have a particular orientation or be constructed and operated in a specific orientation, and hence cannot be construed as limitation to the present disclosure.

[0059] In the present disclosure, it should be noted that, unless specified otherwise, terms "mounted," "coupled," "connected," and "fixed," should be understood broadly, the terms may indicate, for example, fixed connections, detachable connections, or integral connections, may also indicate mechanical or electrical connections or mutual communications, may also indicate direct connections or indirect connections via intermediate mediums, and may also indicate an inner communication of two elements or an interaction between two elements. The specific meanings of the terms in embodiments of the present disclosure may be understood by those skilled in the art according to particular circumstances.

[0060] Although disclosed as above, the implementation solutions of the present disclosure are not limited to the applications listed in the description and the embodiments, and can fully be applied to various fields suitable for the present disclosure. For those familiar with the related art, other modifications can be easily achieved. Therefore, without departing from a general concept defined by claims and an equivalent scope, the present disclosure is not limited to specific details and legends illustrated and described herein.

Claims

1. A driving device for an air deflector of an air conditioner, comprising a motor (1), a fixing plate (2), a first transmission shaft (3) and a second transmission shaft (4), the motor (1) being connected with a side of the fixing plate (2), the first transmission shaft (3) and the second transmission shaft (4) being arranged at a side of the fixing plate (2) away from the motor (1), the second transmission shaft (4) being arranged above the first transmission shaft (3), the first transmission shaft (3) being fixedly connected with the motor (1), the second transmission shaft (4) being rotatably connected with the fixing plate (2), and the first transmission shaft (3) being connected with the second transmission shaft (4) through a linkage mechanism.

2. The driving device for the air deflector of the air conditioner according to claim 1, wherein the linkage mechanism comprises a first gear (5), a second gear (6) and a gear shaft (7), the first gear (5) and the first transmission shaft (3) are arranged coaxially, the second gear (6) and the second transmission shaft (4) are arranged coaxially, the gear shaft (7) is arranged between the first gear (5) and the second gear (6), the gear shaft (7) is rotatably connected with the fixing plate (2), a third gear (7-1) is arranged to the gear shaft (7), and the first gear (5) and the second gear (6) are meshed and connected with the third gear (7-1), respectively.

3. The driving device for the air deflector of the air conditioner according to claim 2, wherein an end face of the third gear (7-1) adjacent to the fixing plate (2) is fixedly connected with a first shaft body (7-2), an end face of the first shaft body (7-2) away from the third gear (7-1) is fixedly connected with a first connecting portion (7-3), the fixing plate (2) is provided with a first round hole (2-1) corresponding to the first

connecting portion (7-3), an end face of the first connecting portion (7-3) away from the first shaft body (7-2) is fixedly connected with a first tapered head (7-4), and a first U-shaped groove (7-4-1) is formed in the first tapered head (7-4).

4. The driving device for the air deflector of the air conditioner according to claim 1, wherein the linkage mechanism comprises a first link plate (8), a second link plate (9) and a third link plate (10), the first link plate (8) is arranged to the first transmission shaft (3), the second link plate (9) is arranged to the second transmission shaft (4), the third link plate (10) is arranged between the first link plate (8) and the second link plate (9), one end of the third link plate (10) is hinged with an end of the first link plate (8) away from the first transmission shaft (3), and the other end thereof is hinged with an end of the second link plate (9) away from the second transmission shaft (4).

5. The driving device for the air deflector of the air conditioner according to claim 4, wherein the third link plate (10) comprises a main plate (10-1) provided with a first reinforcing rib (10-1-1) thereon.

6. The driving device for the air deflector of the air conditioner according to claim 5, wherein a second round hole (8-1) is formed in the end of the first link plate (8) away from the first transmission shaft (3), a third round hole (9-1) is formed in the end of the second link plate (9) away from the second transmission shaft (4), one end of the main plate (10-1) is provided with a first boss (10-2) corresponding to the second round hole (8-1), the other end of the main plate (10-1) is provided with a second boss (10-3) corresponding to the third round hole (9-1), an end face of the first boss (10-2) away from the main plate (10-1) is fixedly connected with a second tapered head (10-2-1), a second U-shaped groove (10-2-1-1) is formed in the second tapered head (10-2-1), an end face of the second boss (10-3) away from the main plate (10-1) is fixedly connected with a third tapered head (10-3-1), and the third U-shaped groove (10-3-1-1) is formed in the third tapered head (10-3-1).

7. The driving device for the air deflector of the air conditioner according to any one of claims 1 to 6, wherein the motor (1) comprises a motor main body (1-1) and an output shaft (1-2), the output shaft (1-2) is connected with the motor main body (1-1), the motor main body (1-1) is fixedly connected with the fixing plate (2), the output shaft (1-2) is fixedly connected with the first transmission shaft (3), and the fixing plate (2) is provided with a fourth round hole (2-2) corresponding to the output shaft (1-2).

8. The driving device for the air deflector of the air conditioner according to claim 7, wherein the first transmission shaft (3) comprises a second shaft body (3-1), and a center portion of one end face of the second shaft body (3-1) adjacent to the fixing plate (2) is provided with an aperture (3-1-1) corresponding to the output shaft (1-2), and the other end face of the second shaft body (3-1) is fixedly connected with a second connecting portion (3-2).

9. The driving device for the air deflector of the air conditioner according to claim 7 or 8, wherein a fifth round hole (2-3) is arranged above the fourth round hole (2-2), the fifth round hole (2-3) is formed in the fixing plate (2), the second transmission shaft (4) is provided with a third connecting portion (4-1) corresponding to the fifth round hole (2-3), one end face of the third connecting portion (4-1) away from the motor (1) is fixedly connected with a third shaft body (4-2), the other end face thereof is fixedly connected with a fourth tapered head (4-3), a fourth U-shaped groove (4-3-1) is formed in the fourth tapered head (4-3), and an end face of the third shaft body (4-2) away from the third connecting portion (4-1) is fixedly connected with a fourth connecting portion (4-4).

10. The driving device for the air deflector of the air conditioner according to any one of claims 1 to 9, wherein the fixing plate (2) is provided with a second reinforcing rib (2-4) thereon.

11. An air conditioner, comprising a driving device for an air deflector of an air conditioner according to any one of claims 1-10.

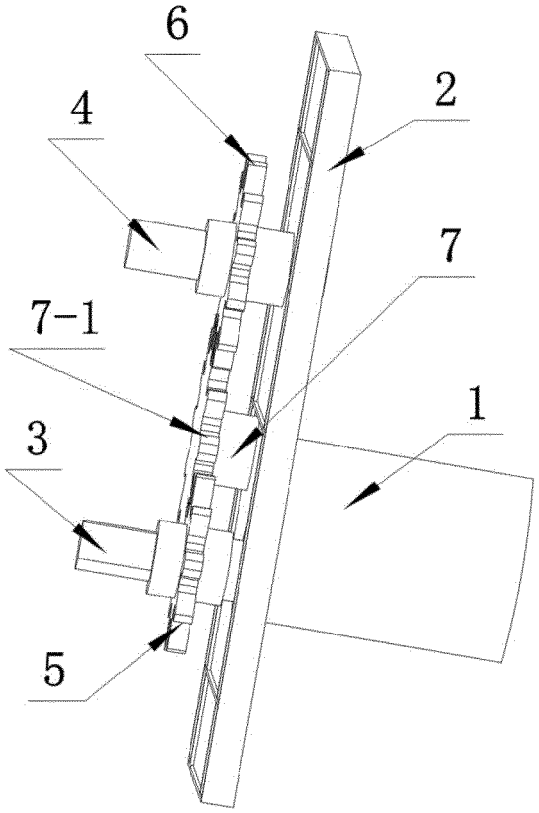

Fig. 1

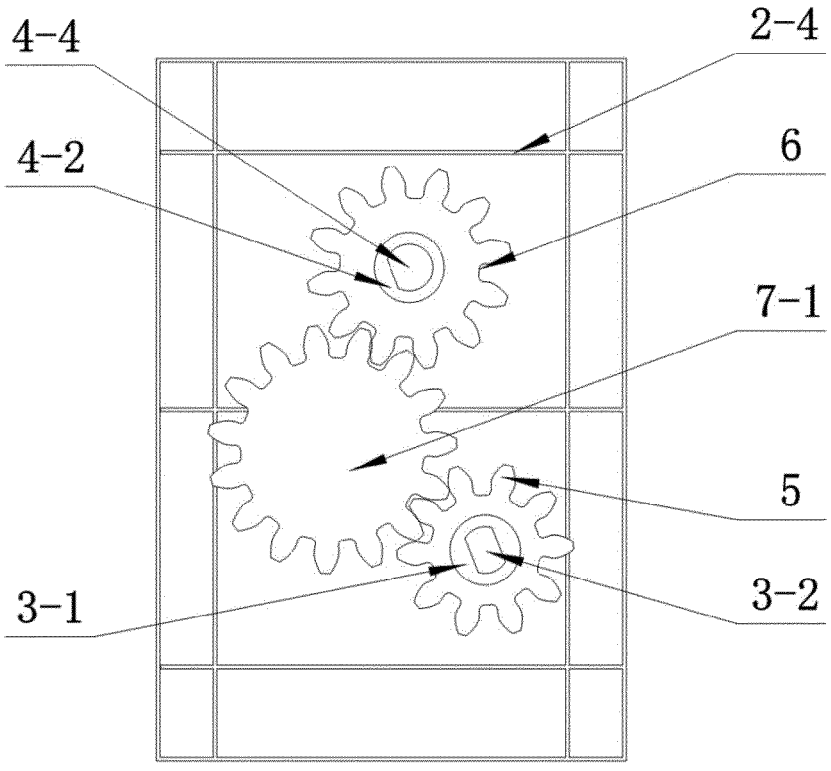

Fig. 2

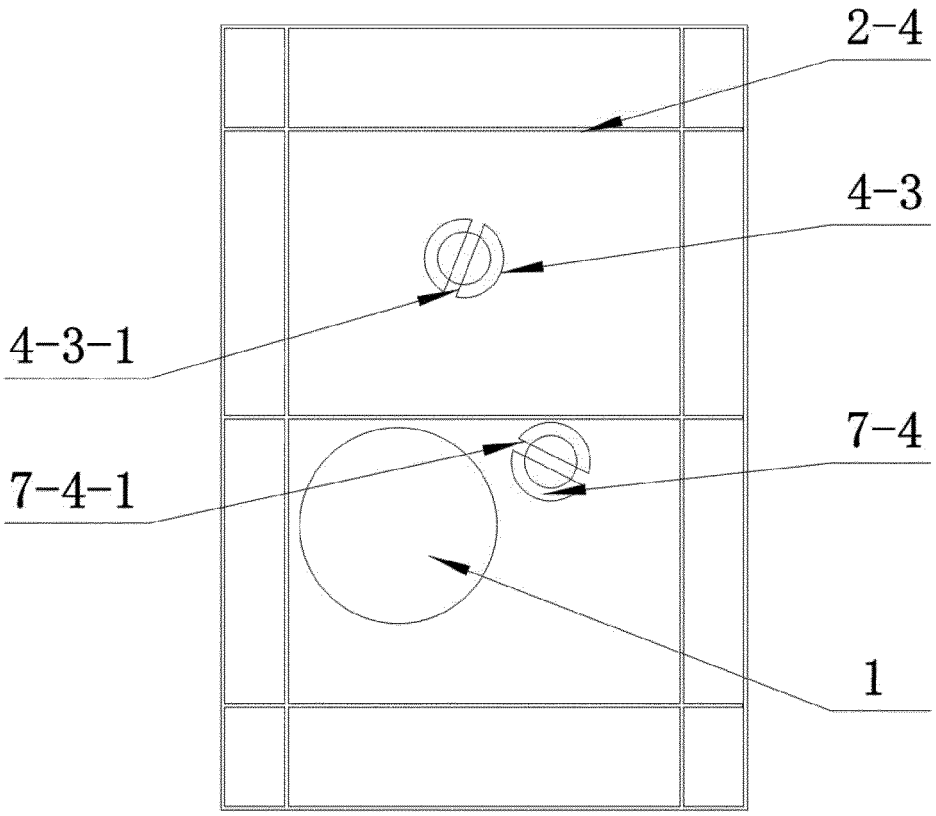

Fig. 3

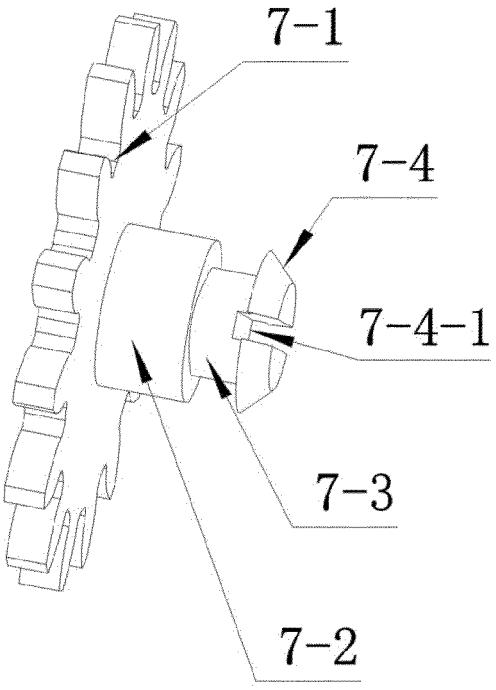

Fig. 4

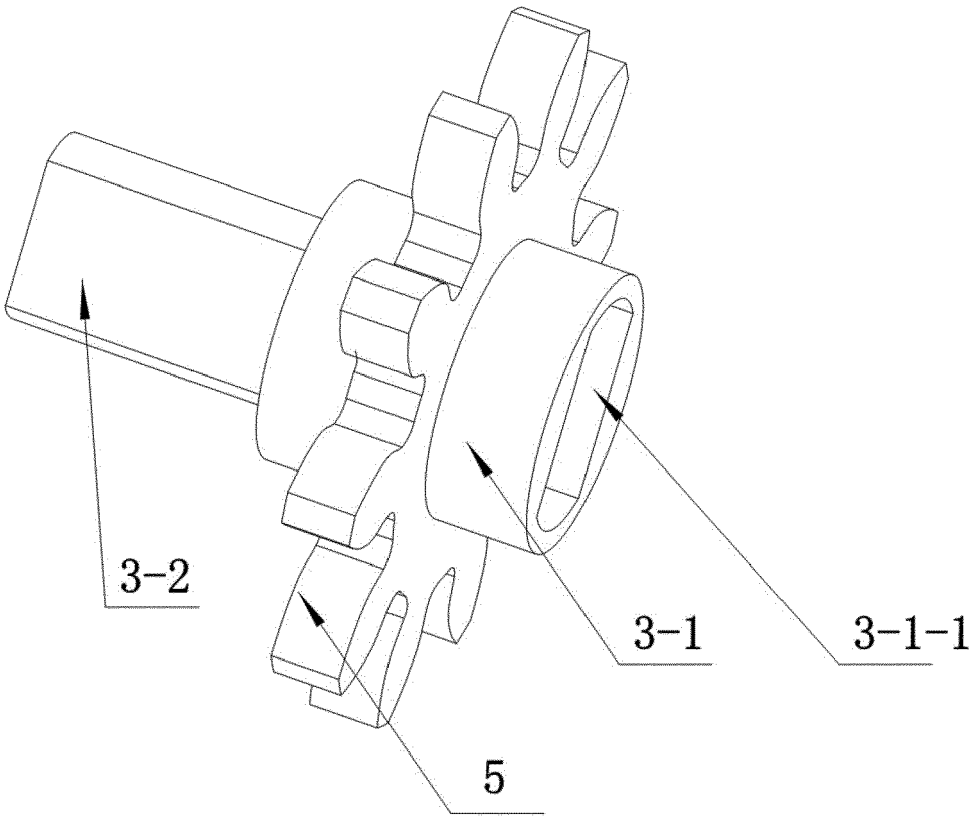

Fig. 5

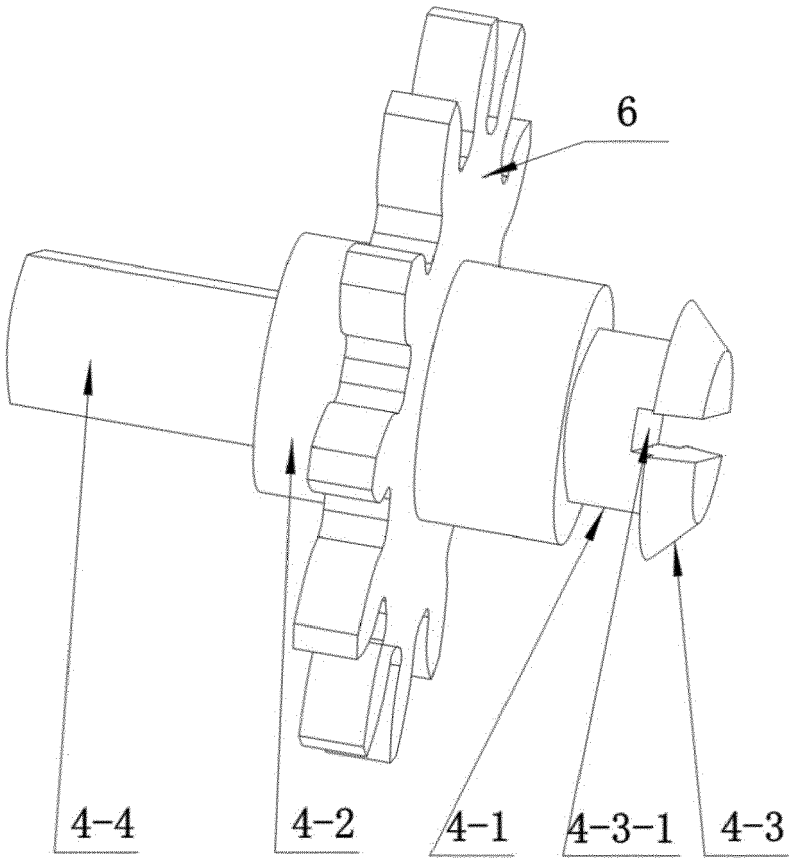

Fig. 6

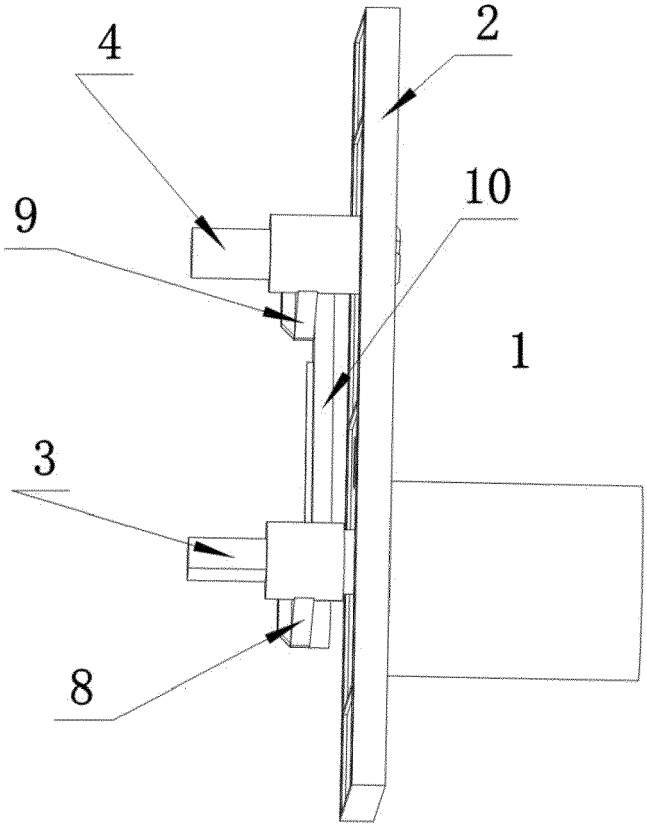

Fig. 7

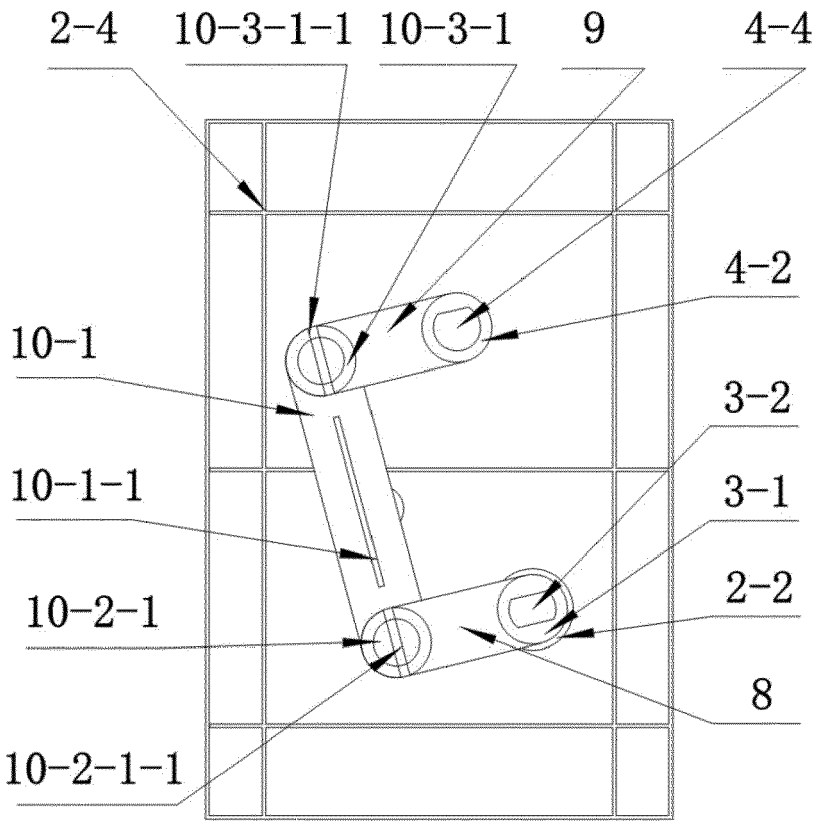

Fig. 8

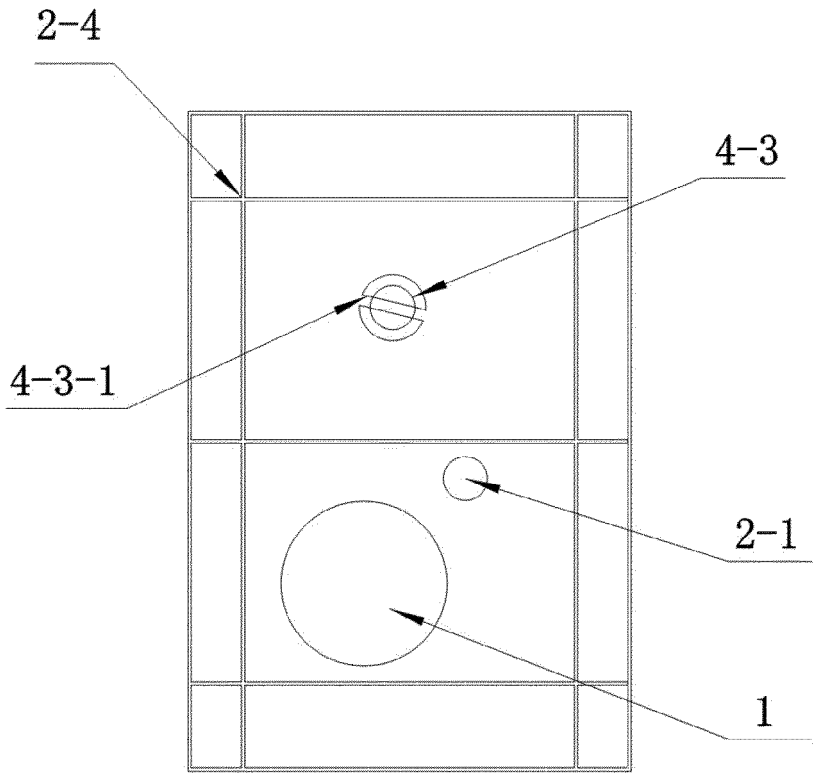

Fig. 9

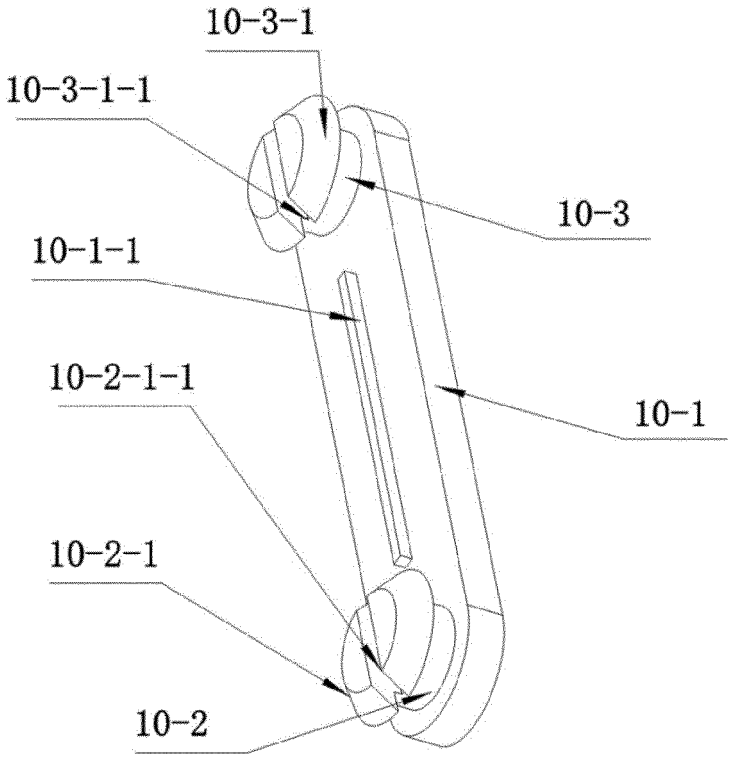

Fig. 10

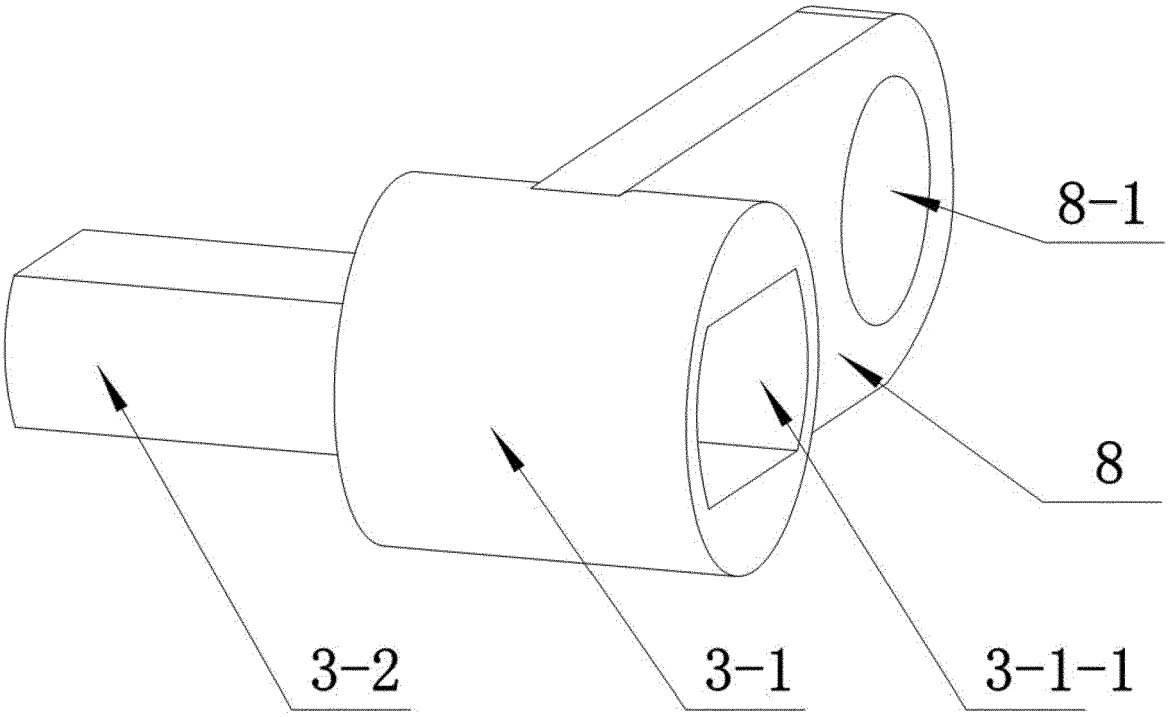

Fig. 11

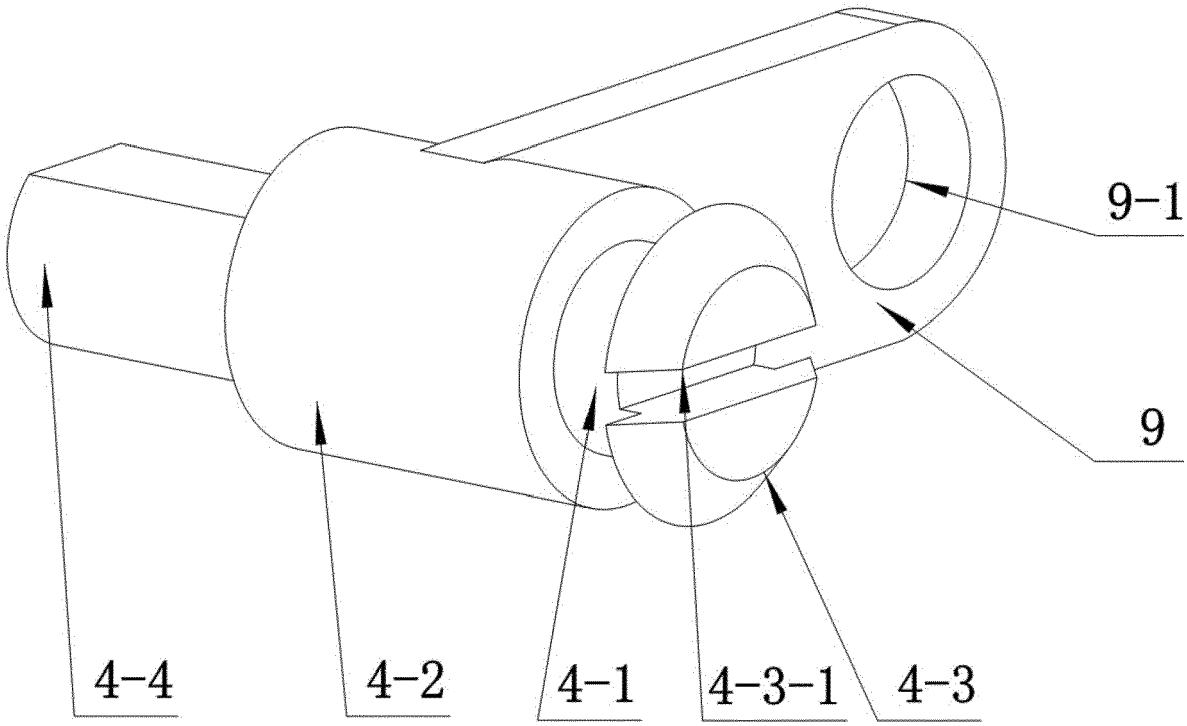

Fig. 12

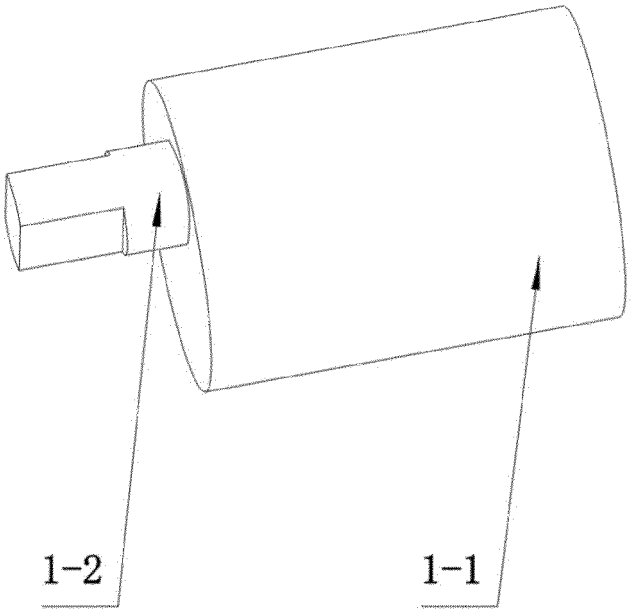

Fig. 13

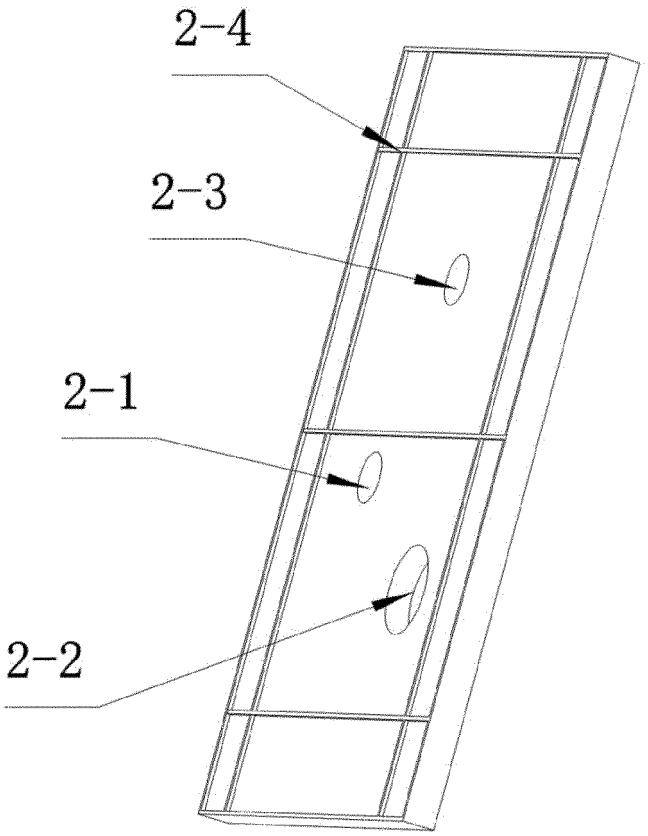

Fig. 14

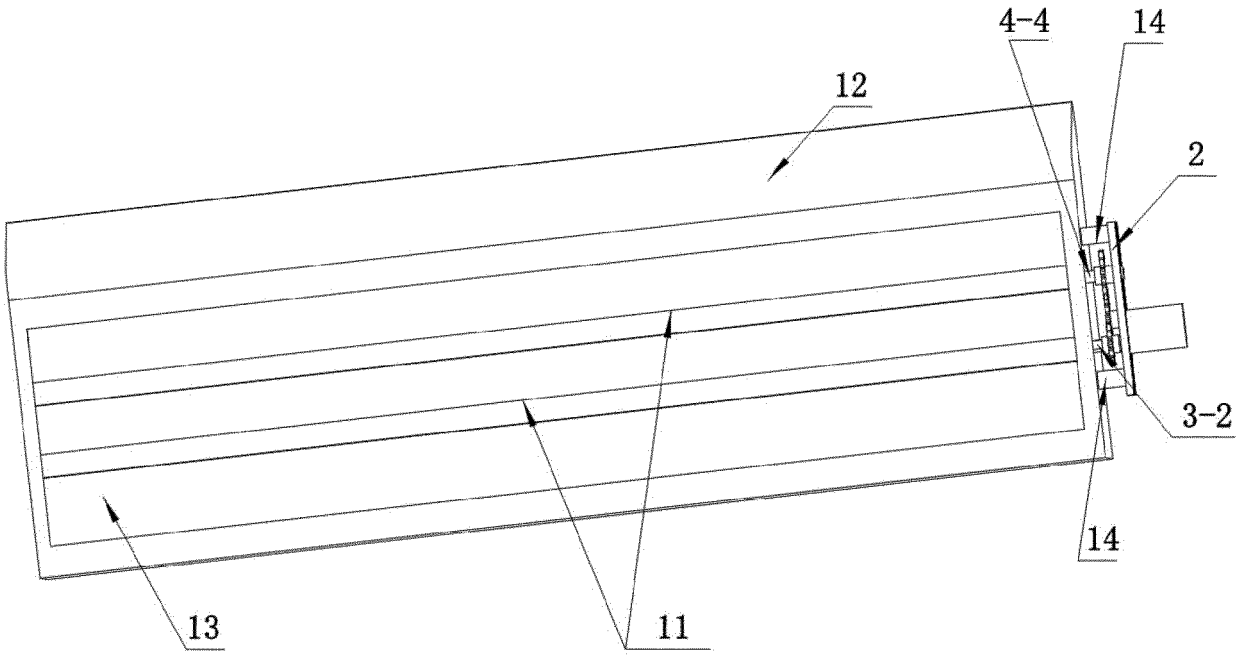

Fig. 15

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EUROPEAN SEARCH REPORT

Application Number
EP 21 15 3973

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 June 2021	Blot, Pierre-Edouard

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