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(54) NEUTRAL LINE OVERLAPPING MECHANISM AND DUAL-POWER AUTOMATIC TRANSFER SWITCH INCLUDING THE SAME

(57) This disclosure relates to a neutral line overlapping mechanism for a dual power automatic transfer switch, which comprises a first tie rod assembly and a second tie rod assembly; a first neutral pole moving contact assembly and a first neutral pole static contact assembly and a second neutral pole moving contact assembly and a second neutral pole static contact assembly and is configured to: when the dual-power automatic transfer switch is in the dual-split position, one of neutral poles is in the on state; the first and the second neutral pole moving contact assembly do not operate when the double power automatic transfer switch is switched off; the first neutral pole moving contact assembly and the first moving contact assembly are interlocked or the second neutral pole moving contact assembly and the second moving contact assembly are interlocked when a first power supply of the dual-power automatic transfer switch is switched on.

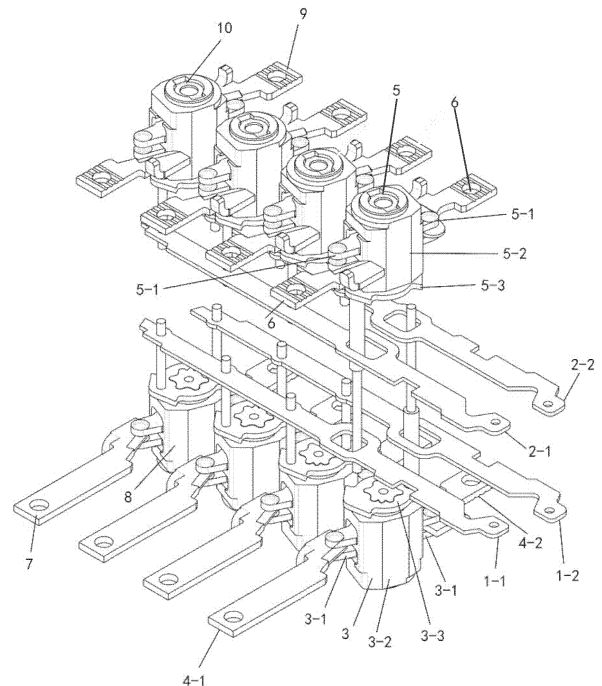


FIG. 2

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Description

FIELD OF TECHNOLOGY

[0001] The present disclosure relates to a neutral line overlapping mechanism of a dual-power automatic transfer switch and a dual-power automatic transfer switch including the neutral line overlapping mechanism.

BACKGROUND ART

[0002] Automatic transfer switches with dual power supplies (ATS) can be divided into two types according to the conversion types of neutral lines: ATS which can be converted at the same time with other poles, and ATS of neutral lines overlap switching type in which the load neutral pole is at least connected with the neutral line of the first or the second power supply during the power conversion process. Overlapping switching of neutral lines is highly valued because it avoids system instability caused by short-time suspension of load neutral pole when ATS is switching. Many manufacturers and research institutions have proposed the neutral line overlap switching technology. However, for a three-position ATS (i.e., ATS with three states: the first power supply on only, the second power supply on only and both power supply off), it is a completely different technical scheme whether the load neutral pole is connected to the neutral line of one of the power supplies or to the neutral lines of both power supplies in the dual division. If it is the latter, the neutral lines may overlap for a long time in the conversion process of ATS, so that the excessive overlapping time will cause the misoperation of the superior leakage sensor and the adverse effect of stray current on the system.

SUMMARY

[0003] A neutral line overlapping scheme provided by this disclosure is suitable for both two-position ATS and three-position ATS. Its structure is simple and reliable. The neutral line overlapping time is short and not affected by the conversion form of ATS, which meets the system requirements.

[0004] In order to solve the above-mentioned one or more defects in the prior art, according to one aspect of the present disclosure, the neutral line overlapping mechanism for a dual-power automatic transfer switch is proposed, which comprises a first static contact assembly, a first moving contact assembly, a second static contact assembly and a second moving contact assembly.

[0005] The neutral line overlapping mechanism comprises a first tie rod assembly and a second tie rod assembly, a first neutral pole moving contact assembly and a first neutral pole static contact assembly, and a second neutral pole moving contact assembly and a second neutral pole static contact assembly.

[0006] Through the cooperation of the first tie rod assembly with the first moving contact assembly, the first

neutral pole moving contact assembly and the second neutral pole moving contact assembly and the cooperation of the second tie rod assembly with the second moving contact assembly, the second neutral pole moving contact assembly and the first neutral pole moving contact assembly, so as to:

[0007] When the dual-power automatic transfer switch is in the dual-split position, one of neutral poles is in the on state.

[0008] The first neutral pole moving contact assembly and the second neutral pole moving contact assembly do not operate when the double power automatic transfer switch is switched off.

[0009] When a first power supply of the dual-power automatic transfer switch is switched on, the first neutral pole moving contact assembly and the first moving contact assembly are interlocked.

[0010] When a second power supply of the dual-power automatic transfer switch is switched on, the second neutral pole moving contact assembly and the second moving contact assembly are interlocked.

[0011] According to the above aspect of the present disclosure, the first neutral pole moving contact assembly comprises a first neutral pole moving contact, a first neutral pole moving contact bracket and a first neutral pole bracket actuating piece.

[0012] The first neutral pole moving contact is held on the first neutral pole moving contact bracket, and the first neutral pole moving contact bracket actuating piece is connected to the first neutral pole moving contact bracket.

[0013] The second neutral pole moving contact assembly comprises a second neutral pole moving contact, a second neutral pole moving contact bracket and a second neutral pole bracket actuating piece.

[0014] The second neutral pole moving contact is held on the second neutral pole moving contact bracket, and the second neutral pole bracket actuating piece is connected to the second neutral pole moving contact bracket.

[0015] According to the above aspects of the present disclosure, the first tie rod assembly comprises a first power supply first tie rod and a first power supply second tie rod.

[0016] The first power supply first tie rod and the first power supply second tie rod are connected to the first moving contact assembly and can drive the first moving contact assembly to contact with or separate from the first static contact assembly.

[0017] The second tie rod assembly comprises a second power supply first tie rod and a second power supply second tie rod.

[0018] The second power supply first tie rod and the second power supply second tie rod are connected to the second moving contact assembly and can drive the second moving contact assembly to contact with or separate from the second static contact assembly.

[0019] According to the above aspects of the present

disclosure, a first neutral pole first boss and a first neutral pole second boss are arranged on the first neutral pole bracket actuating piece.

[0020] The first neutral pole first boss engages with the second tie rod of the first power supply.

[0021] The first neutral pole second boss engages with the second tie rod of the second power supply.

[0022] A second neutral pole first boss and a second neutral pole second boss are arranged on the second neutral pole bracket actuating piece.

[0023] The first boss of the second neutral pole engages with the first tie rod of the second power supply.

[0024] The second boss of the second neutral pole engages with the first tie rod of the first power supply.

[0025] According to the above aspects of the present disclosure, the first neutral pole first boss and the first neutral pole second boss are coaxially arranged and the diameter of the first neutral pole first boss is larger than that of the first neutral pole second boss.

[0026] The second neutral pole first boss and the second neutral pole second boss are coaxially arranged, and the diameter of the second neutral pole first boss is larger than that of the second neutral pole second boss.

[0027] According to the above aspects of the present disclosure, an elongated closed first power supply first tie rod hole is provided on the first power supply first tie rod.

[0028] The first power supply second tie rod is provided with an elongated closed first power supply second tie rod hole.

[0029] The length of the first power supply first tie rod hole is smaller than that of first power supply second tie rod hole.

[0030] The second power supply first tie rod is provided with an elongated closed second power supply first tie rod hole.

[0031] An elongated closed second power supply second tie rod hole is provided on the second power supply second tie rod.

[0032] The length of the second power supply first tie rod hole is greater than that of the second power supply second tie rod hole.

[0033] According to the above aspects of the present disclosure, the first neutral pole first boss fits in the first power supply second tie rod hole only.

[0034] The first neutral pole second boss fits in the second power supply second tie rod hole only.

[0035] The second neutral pole first boss fits in the second power supply first tie rod hole only.

[0036] The second neutral pole second boss fits in first power supply first tie rod hole only.

[0037] The length of the first power supply first tie rod hole is equal to the length of the second power supply second tie rod hole.

[0038] The length of the first power supply second tie rod hole is equal to the length of the second power supply first tie rod hole.

[0039] According to the above aspects of the present

disclosure, the first neutral pole static contact assembly comprises a first neutral pole static contact incoming end and a first neutral pole static contact outgoing end.

[0040] One end of the first neutral pole moving contact is in contact with one of the incoming end of the first neutral pole static contact and the outgoing end of the first neutral pole static contact.

[0041] The other end of the first neutral pole moving contact can contact with or separate from the other one of the first neutral pole static contact incoming end and the first neutral pole static contact outgoing end.

[0042] The second neutral pole static contact assembly comprises a second neutral pole static contact incoming end and a second neutral pole static contact outgoing end.

[0043] One end of the second neutral pole moving contact is in contact with one of the incoming end of the second neutral pole static contact and the outgoing end of the second neutral pole static contact.

[0044] The other end of the second neutral pole moving contact can contact with or separate from the other one of the second neutral pole static contact incoming end and the second neutral pole static contact outgoing end.

[0045] By changing the neutral pole from double fracture to single fracture, i.e. only one side of the neutral pole keeps in contact, which provides the holding force of the neutral pole at the opening position (i.e. opening limit).

[0046] It can also be understood by those skilled in the art that by widening the static contact of the neutral pole, the opening distance is reduced, thereby increasing the contact stroke and ensuring that the neutral pole closes before the phase poles.

[0047] In addition, the moving and static contacts of the neutral pole according to the present disclosure can be pre-assembled into an assembly without special tools or tooling. In this way, it has little influence on assembly difficulty and working hours.

[0048] According to the above aspects of the present disclosure, arc extinguishing grids are not provided on the first neutral pole moving contact and the second neutral pole static contact.

[0049] According to another aspect of the present disclosure, the first neutral pole bracket actuating piece and the second neutral pole bracket actuating piece are integrally formed and connected together through a first connecting post and a second connecting post.

[0050] According to another aspect of the present disclosure, an elongated open first power supply first tie rod slot is provided on the first power supply first tie rod.

[0051] The first power supply second tie rod is provided with an elongated open first power supply second tie rod slot.

[0052] The length of first power supply first tie rod slot is equal to the length of the first power supply second tie rod slot.

[0053] The second power supply first tie rod is provided with an elongated open second power supply first tie rod

slot.

[0054] An elongated open second power supply second tie rod slot is provided on the second power supply second tie rod.

[0055] The length of the second power supply first tie rod slot is equal to that of the second power supply second tie rod slot.

[0056] According to the above another aspect of the present disclosure, the first connecting post is fitted in the first power supply first tie rod slot and the second power supply first tie rod slot.

[0057] The second connecting post is fitted in the first power supply second tie rod slot and the second power supply second tie rod slot.

[0058] The length of the first tie rod slot of the first power supply is equal to the length of the second tie rod slot of the second power supply.

[0059] The length of the first power supply second tie rod slot is equal to the length of the second power supply first tie rod slot.

[0060] The first neutral pole moving contact assembly and the second neutral pole moving contact assembly are connected as a whole by an intermediate turntable (that is to say, the first and the second neutral pole bracket actuator pieces are integrally formed and connected together through the first and second connecting columns). The opening position of the first neutral pole moving contact assembly corresponds to the closing position of the second neutral pole moving contact assembly, and the closing position of the second neutral pole moving contact assembly is limited by the contact holding force, which also limits the opening position of the first neutral pole moving contact assembly. On the contrary, the opening position of the second neutral pole moving contact assembly is limited by the closing position of the first neutral pole moving contact assembly.

[0061] The dual power automatic transfer switch according to the present disclosure can drive ABC (three phase poles) + N1 / N2 (two neutral poles) at the same time when switching on, and only drive its own ABC (three phase poles) when switching off. That is, the switch can drive five switches (when switching on) at the same time or three switches (when switching off) at the same time when switching once.

[0062] According to the present disclosure above, the structure is simple, and the neutral line overlapping time is short and stable during conversion.

[0063] According to another aspect of the present disclosure, a dual power automatic transfer switch is provided, which includes the neutral line overlapping mechanism as described in various aspects above.

[0064] So far, in order that the detailed description of this disclosure can be better understood and the contribution of this disclosure to the prior art can be better recognized, this disclosure has summarized the content of this disclosure quite broadly. Of course, embodiments of the present disclosure will be described below and will form the subject matter of the appended claims.

[0065] Likewise, those skilled in the art will recognize that the concepts on which this disclosure is based can be easily used as a basis for designing other structures, methods and systems for carrying out several purposes of this disclosure. Therefore, it is important that the appended claims should be considered to include such equivalent structures as long as they do not go beyond the spirit and scope of the present disclosure.

10 BRIEF DESCRIPTION OF DRAWINGS

[0066] Those skilled in the art will have a better understanding of this disclosure through the following drawings, and the advantages of this disclosure can be more clearly reflected. The drawings described herein are only for illustrative purposes of selected embodiments, not all possible implementations and are intended to limit the scope of the present disclosure.

20 Fig. 1 shows a perspective assembly view of a neutral line overlapping mechanism of a dual power automatic transfer switch according to a first embodiment of the present disclosure;

25 Fig. 2 shows an exploded perspective view of fig. 1;

Fig. 3 shows a simplified diagram of fig. 2;

30 Fig. 4 shows that the neutral pole is changed from double fracture to single fracture, and only one side keeps in contact;

35 Fig. 5 shows a perspective assembly view of a neutral line overlapping mechanism according to a second embodiment of the present disclosure;

Fig. 6 shows a simplified diagram of fig. 5;

40 Fig. 7 shows that a first neutral pole bracket actuating piece and a second neutral pole bracket actuating piece according to the second embodiment of the present disclosure are integrally formed and connected together through a first connecting post and a second connecting post;

45 Fig. 8 shows a perspective assembly view of a neutral line overlapping mechanism of a dual power automatic transfer switch according to a second embodiment of the present disclosure;

50 Fig. 9 shows an exploded perspective view of fig. 8;

Fig. 10 shows a simplified diagram of fig. 9;

55 Fig. 11 shows a perspective assembly drawing in which the first tie rod assembly and the second tie rod assembly in fig. 8 are omitted;

Fig. 12 illustrates a first neutral pole bracket actuating piece and a second neutral pole bracket actuating piece according to the first embodiment of the present disclosure.

DETAILED DESCRIPTION

[0067] Embodiments according to the present disclosure will be described in detail below with reference to various drawings.

[0068] Fig.1 shows a three-dimensional assembly diagram of a neutral line overlapping mechanism for a dual power automatic transfer switch according to the first embodiment of the present disclosure. The dual power automatic transfer switch includes a first static contact assembly 7, a first moving contact assembly 8, a second static contact assembly 9 and a second moving contact assembly 10.

[0069] The neutral line overlapping mechanism comprises a first tie rod assembly 1 and a second tie rod assembly 2, a first neutral pole moving contact assembly 3 and a first neutral pole static contact assembly 4, and a second neutral pole moving contact assembly 5 and a second neutral pole static contact assembly 6 .

[0070] Through the cooperation of the first tie rod assembly 1 with the first moving contact assembly 8, the first neutral pole moving contact assembly 3 and the second neutral pole moving contact assembly 5 and the cooperation of the second tie rod assembly 2 with the second moving contact assembly 10, the second neutral pole moving contact assembly 5 and the first neutral pole moving contact assembly 3, so as to:

[0071] When the dual-power automatic transfer switch is in the dual-split position, one of the neutral poles is on, that is, the first neutral pole moving contact assembly 3 and the first neutral pole static contact assembly 4 are in the on state or the second neutral pole moving contact assembly 5 and the second neutral pole static contact assembly 6 are in the on state.

[0072] When the dual power automatic transfer is switched off, the first neutral pole moving contact assembly 3 and the second neutral pole moving contact assembly 5 do not operate.

[0073] When a first power supply of the dual-power automatic transfer switch is switched on, the first neutral pole moving contact assembly 3 and the first moving contact assembly 8 are interlocked.

[0074] When a second power supply of the dual-power automatic transfer switch is switched on, the second neutral pole moving contact assembly 5 and the second moving contact assembly 10 are interlocked.

[0075] According to the above embodiment of the present disclosure, the first neutral pole moving contact assembly 3 includes a first neutral pole moving contact 3-1, a first neutral pole moving contact bracket 3-2 and a first neutral bracket actuating piece 3-3.

[0076] The first neutral pole moving contact 3-1 is held on the first neutral pole moving contact bracket 3-2, and

the first neutral pole bracket actuating piece 3-3 is connected to the first neutral pole moving contact bracket 3-2, for example, by splines as shown in fig. 2.

[0077] The second neutral pole moving contact assembly 5 includes a second neutral pole moving contact 5-1, a second neutral pole moving contact bracket 5-2 and a second neutral pole bracket actuating piece 5-3.

[0078] The second neutral pole moving contact 5-1 is held on the second neutral pole moving contact bracket 5-2, and the second neutral pole moving contact actuating piece 5-3 is connected to the second neutral pole moving contact bracket 5-2, for example, by splines as shown in fig. 2.

[0079] According to the above embodiments of the present disclosure, as shown in fig. 2, the first tie rod assembly 1 includes a first power supply first tie rod 1-1 and a first power supply second tie rod 1-2.

[0080] The first power supply first tie rod 1-1 and the first power supply second tie rod 1-2 are connected to the first moving contact assembly 8 and can drive the first moving contact assembly 8 to contact with or separate from the first static contact assembly 7.

[0081] The second tie rod assembly 2 includes a second power supply first tie rod 2-1 and a second power supply second tie rod 2-2.

[0082] The second power supply first tie rod 2-1 and the second power supply second tie rod 2-2 are connected to the second moving contact assembly 10 and can drive the second moving contact assembly 10 to contact with or separate from the second static contact assembly 9.

[0083] According to the above embodiments of the present disclosure, as shown in fig. 2, fig. 3 and fig. 12, a first neutral pole first boss 3-3-1 and a first neutral pole second boss 3-3-2 are provided on the first neutral pole bracket actuating piece 3-3 . For the purpose of clear description, the length of the first neutral pole first boss 3-3-1 and the length of the first neutral pole second boss 3-3-2 are lengthened in figs. 2 and 3.

[0084] The first neutral pole first boss 3-3-1 engages with the second tie rod 1-2 of the first power supply.

[0085] The first neutral pole second boss 3-3-2 engages with the second tie rod 2-2 of the second power supply.

[0086] A second neutral pole first boss 5-3-1 and a second neutral pole second boss 5-3-2 are arranged on the second neutral pole bracket actuating piece 5-3.

[0087] For the purpose of clear description, the length of the second neutral pole first boss 5-3-1 and the length of the second neutral pole second boss 5-3-2 are lengthened in figs. 2 and 3.

[0088] The first boss 5-3-1 of the second neutral pole engages with the first tie rod 2-1 of the second power supply.

[0089] The second boss 5-3-2 of the second neutral pole engages with the first tie rod 1-1 of the first power supply.

[0090] According to the above embodiments of the present disclosure, the first neutral pole first boss 3-3-1

and the first neutral pole second boss 3-3-2 are coaxially arranged and the diameter of the first neutral pole first boss 3-3-1 is larger than that of the first neutral pole second boss 3-3-2.

[0091] The second neutral pole first boss 5-3-1 and the second neutral pole second boss 5-3-2 are coaxially arranged and the diameter of the second neutral pole first boss 5-3-1 is larger than that of the second neutral pole second boss 5-3-2.

[0092] According to the above embodiments of the present disclosure, an elongated closed first power supply first tie rod hole 1-1-1 is provided on the first power supply first tie rod 1-1.

[0093] The first power supply second tie rod 1-2 is provided with an elongated closed first power supply second tie rod hole 1-2-1.

[0094] The length of the first power supply first tie rod hole 1-1-1 is smaller than that of first power supply second tie rod hole 1-2-1.

[0095] The second power supply first tie rod 2-1 is provided with an elongated closed second power supply first tie rod hole 2-1-1.

[0096] An elongated closed second power supply second tie rod hole 2-2-1 is provided on the second power supply second tie rod 2-2.

[0097] The length of the second power supply first tie rod hole 2-1-1 is greater than that of the second power supply second tie rod hole 2-2-1.

[0098] According to the above embodiments of the present disclosure, the first neutral pole first boss 3-3-1 only fits in the first power supply second tie rod hole 1-2-1.

[0099] The first neutral pole second boss 3-3-2 fits in the second power supply second tie rod hole 2-2-1 only.

[0100] The second neutral pole first boss 5-3-1 fits in the second power supply first tie rod hole 2-1-1 only.

[0101] The second neutral pole second boss 5-3-2 fits in first power supply first tie rod hole 1-1-1 only.

[0102] The length of the first power supply first tie rod hole 1-1-1 is equal to the length of the second power supply second tie rod hole 2-2-1.

[0103] The length of the first power supply second tie rod hole 1-2-1 is equal to the length of the second power supply first tie rod hole 2-1-1.

[0104] According to the above embodiments of the present disclosure, the first neutral pole static contact assembly 4 includes a first neutral pole static contact incoming terminal 4-1 and a first neutral pole static contact outgoing terminal 4-2.

[0105] One end of the first neutral pole moving contact 3-1 is in contact with one of the first neutral pole static contact incoming terminal 4-1 and the first neutral pole static contact outgoing terminal 4-2.

[0106] The other end of the first neutral pole moving contact 3-1 can contact with or separate from the other of the first neutral pole static contact incoming terminal 4-1 and the first neutral pole static contact outgoing terminal 4-2.

[0107] As shown in fig. 4, one end of the first neutral

pole moving contact 3-1 is always in contact with the first neutral pole static contact outgoing terminal 4-2, while the other end of the first neutral pole moving contact 3-1 can contact with or separate from the first neutral pole static contact incoming terminal 4-1.

[0108] The second neutral pole static contact assembly 6 includes a second neutral pole static contact incoming terminal 6-1 and a second neutral pole static contact outgoing terminal 6-2.

[0109] One end of the second neutral pole moving contact 5-1 is in contact with one of the second neutral pole static contact incoming terminal 6-1 and the second neutral pole static contact outgoing terminal 6-2.

[0110] The other end of the second neutral pole moving contact 5-1 can contact with or separate from the other of the second neutral pole static contact incoming terminal 6-1 and the second neutral pole static contact outgoing terminal 6-2.

[0111] As shown in fig. 4, one end of the second neutral pole moving contact 5-1 is always in contact with the second neutral pole static contact outgoing terminal 6-2, while the other end of the second neutral pole moving contact 5-1 can contact or separate from the second neutral pole static contact incoming terminal 6-1.

[0112] By changing the neutral pole from double fracture to single fracture, i.e. only one side of the neutral pole keeps in contact, which provides the holding force of the neutral pole at the opening position (i.e. opening limit).

[0113] It can also be understood by those skilled in the art that by widening the static contact of the neutral pole, the opening distance is reduced, thereby increasing the contact stroke and ensuring that the neutral pole closes before the phase poles.

[0114] In addition, the moving and static contacts of the neutral pole according to the present disclosure can be pre-assembled into an assembly without special tools or tooling. In this way, it has little influence on assembly difficulty and working hours.

[0115] According to the above embodiments of the present disclosure, as shown in fig. 4, arc extinguishing grids are not provided on the first neutral pole static contact 4 and the second neutral pole static contact 6.

[0116] According to another embodiment of the present disclosure, as shown in figs. 5 to 11, the same structures in this embodiment as those in the above embodiments have the same reference numerals. The difference between this embodiment and the above embodiment is that the first neutral pole bracket actuating piece 3-3 and the second neutral pole bracket actuating piece 5-3 are integrally formed and connected together by a first connecting post 11 and a second connecting post 12, wherein in figs. 9 to 10, the first connecting post 11 and the second connecting post 12 are lengthened for the purpose of clear description.

[0117] According to another embodiment of the present disclosure, an elongated open first power supply first tie rod slot 1-1-2 is provided on the first power supply

first tie rod 1-1.

[0118] The first power supply second tie rod 1-2 is provided with an elongated open first power supply second tie rod slot 1-2-2.

[0119] The length of first power supply first tie rod slot 1-1-2 is equal to the length of the first power supply second tie rod slot 1-2-2.

[0120] The second power supply first tie rod 2-1 is provided with an elongated open second power supply first tie rod slot 2-1-2.

[0121] An elongated open second power supply second tie rod slot 2-2-2 is provided on the second power supply second tie rod 2-2.

[0122] The length of the second power supply first tie rod slot 2-1-2 is equal to that of the second power supply second tie rod slot 2-2-2.

[0123] According to another embodiment of the present disclosure, the first connecting post 11 is fitted in the first power supply first tie rod slot 1-1-2 and the second power supply first tie rod slot 2-1-2.

[0124] The second connecting post 12 is fitted in the first power supply second tie rod slot 1-2-2 and the second power supply second tie rod slot 2-2-2.

[0125] The length of the first tie rod slot 1-1-2 of the first power supply is equal to the length of the second tie rod slot 2-2-2 of the second power supply.

[0126] The length of the first power supply second tie rod slot 1-2-2 is equal to the length of the second power supply first tie rod slot 2-1-2.

[0127] The first neutral pole moving contact assembly 3 and the second neutral pole moving contact assembly 5 are connected as a whole by an intermediate turntable (that is to say, the first and the second neutral pole bracket actuator pieces are integrally formed and connected together through the first and second connecting columns). The opening position of the first neutral pole moving contact assembly 3 corresponds to the closing position of the second neutral pole moving contact assembly 5, and the closing position of the second neutral pole moving contact assembly 5 is limited by the contact holding force, which also limits the opening position of the first neutral pole moving contact assembly 3. On the contrary, the opening position of the second neutral pole moving contact assembly 5 is limited by the closing position of the first neutral pole moving contact assembly 3.

[0128] Next, the operation sequence of the first embodiment will be described in detail with reference to the drawings.

[0129] In fig. 1 and fig. 2, the first power supply of the dual-power automatic transfer switch is in a closed state, that is, the first moving contact assembly 8 is in contact with the first static contact assembly 7 (phase pole closing), and the first neutral pole moving contact assembly 3 and the first neutral pole static contact assembly 4 are in contact (neutral pole closing). At this time, the second power supply of the dual-power automatic transfer switch is in an opened state, that is, the second moving contact assembly 10 is not in contact with the second static con-

tact assembly 9 (phase pole opening) and the second neutral pole moving contact assembly 5 and the second neutral pole static contact assembly 6 are not in contact (neutral pole opening). The first neutral pole first boss 3-3-1 abuts against one edge of the first power supply second tie rod hole 1-2-1 and the second neutral pole second boss 5-3-2 abuts against one edge of the first power supply first tie rod hole 1-1-1. The second neutral pole first boss 5-3-1 abuts against one edge of the second power supply first tie rod hole 2-1-1 and the first neutral pole second boss 3-3-2 abuts against one edge of the second power supply second tie rod hole 2-2-1.

[0130] When the first power supply changes from closing state to opening state, the first tie rod 1-1 of the first power supply moves to the right and the second tie rod 1-2 of the first power supply moves to the left. The first tie rod 2-1 of the second power supply does not move and the second tie rod 2-2 of the second power supply does not move. The first moving contact assembly 8 and the first static contact assembly 7 start to separate (phase pole opening). Due to the existence of the first power supply first tie rod hole 1-1-1 and the first power supply second tie rod hole 1-2-1, the first neutral pole first boss 3-3-1 and the second neutral pole second boss 5-3-2 will not move, but will be close to the other edge of the first power supply second tie rod hole 1-2-1 and the other edge of the first power supply first tie rod hole 1-1-1 respectively. Therefore, the first neutral pole moving contact assembly 3 and the first neutral pole static contact assembly 4 keep in contact (neutral pole keeps closing), the second neutral pole moving contact assembly 5 and the second neutral pole static contact assembly 6 keep out of contact (neutral pole keeps opening), and the second moving contact assembly 10 keeps out of contact with the second static contact assembly 9 (phase pole opening).

[0131] When the phase pole of the first power supply is opened in place, the first neutral pole first boss 3-3-1 abuts against the other edge of the first power supply second tie rod hole 1-2-1, and the second neutral pole second boss 5-3-2 abuts against the other edge of the first power supply first tie rod hole 1-1-1. The phase pole of the second power supply starts to switch on, that is, the second power supply first tie rod 2-1 starts to move to the right, at the same time the second power supply second tie rod 2-2 moves to the left, but the first tie rod 1-1 of the first power supply does not move and the second tie rod 1-2 of the first power supply does not move too. The first tie rod hole 2-1-1 of the second power supply and the second tie rod hole 2-2-1 of the second power supply respectively actuate the second neutral pole first boss 5-3-1 and the first neutral pole second boss 3-3-2. The first neutral pole first boss 3-3-1 is close to the one edge of the first power supply second tie rod hole 1-2-1, and the second neutral pole second boss 5-3-2 is close to the one edge of the first power supply first tie rod hole 1-1-1, so that the first neutral pole moving contact assembly 3 and the first neutral pole static contact assembly

4 are separated (neutral pole opening) and the second neutral pole moving contact assembly 5 contacts with the second neutral pole static contact assembly 6 (neutral pole opening). The second moving contact assembly 10 is in contact with the second static contact assembly 9 (phase pole closing), while the first moving contact assembly 8 is not in contact with the first static contact assembly 7 (phase pole opening).

[0132] Through the above steps, the transition from the closing state of the first power supply of the dual-power automatic transfer switch to the opening state and then to the closing state of the second power supply of the dual-power automatic transfer switch is completed.

[0133] Those skilled in the art can understand that the transition process from the closing state of the second power supply of the dual-power automatic transfer switch to the opening state and then to the closing state of the first power supply of the dual-power automatic transfer switch is opposite to the above process.

[0134] The dual power automatic transfer switch according to the present disclosure can drive ABC (three phase poles) + N1 / N2 (two neutral poles) at the same time when switching on, and only drive its own ABC (three phase poles) when switching off. That is, the switch can drive five switches (when switching on) at the same time or three switches (when switching off) at the same time when switching once.

[0135] According to the above technology of the present disclosure, the structure is simple and the neutral line overlapping time is short and stable during conversion.

[0136] According to another embodiment of the present disclosure, a dual-power automatic transfer switch is provided, which includes the neutral line overlapping mechanism as described in each embodiment above.

[0137] With reference to specific embodiments, although the present disclosure has been described in the specification and drawings, it should be understood that various changes can be made by those skilled in the art without departing from the scope of the disclosure as defined in the claims, and various equivalents can be substituted for various elements therein. Furthermore, the combination and collocation of technical features, elements and/or functions among specific embodiments in this paper are clear, so according to these disclosures, those skilled in the art can appreciate that the technical features, elements and/or functions of an embodiment can be combined into another specific embodiment as appropriate, unless otherwise described above. In addition, according to the teaching of this disclosure, many changes can be made to adapt to special situations or materials without departing from the scope of the essence of this disclosure. Therefore, the present disclosure is not limited to the specific embodiments illustrated in the drawings and the specific embodiments described in the specification as the best mode presently contemplated for carrying out the present disclosure, but the

present disclosure is intended to include all embodiments falling within the scope of the above description and the appended claims.

Claims

1. A neutral line overlapping mechanism for a dual power automatic transfer switch, the dual power automatic transfer switch comprises a first static contact assembly and a first moving contact assembly, a second static contact assembly and a second moving contact assembly; wherein the neutral line overlapping mechanism comprises a first tie rod assembly and a second tie rod assembly, a first neutral pole moving contact assembly and a first neutral pole static contact assembly, and a second neutral pole moving contact assembly and a second neutral pole static contact assembly; through the cooperation of the first tie rod assembly with the first moving contact assembly, the first neutral pole moving contact assembly and the second neutral pole moving contact assembly and the cooperation of the second tie rod assembly with the second moving contact assembly, the second neutral pole moving contact assembly and the first neutral pole moving contact assembly, so as to:

when the dual-power automatic transfer switch is in the dual-split position, one of neutral poles is in the on state;

the first neutral pole moving contact assembly and the second neutral pole moving contact assembly do not operate when the double power automatic transfer switch is switched off;

when a first power supply of the dual-power automatic transfer switch is switched on, the first neutral pole moving contact assembly and the first moving contact assembly are interlocked;

when a second power supply of the dual-power automatic transfer switch is switched on, the second neutral pole moving contact assembly and the second moving contact assembly are interlocked.

2. The neutral line overlapping mechanism according to claim 1, wherein the first neutral pole moving contact assembly comprises a first neutral pole moving contact, a first neutral pole moving contact bracket and a first neutral pole bracket actuating piece; the first neutral pole moving contact is held on the first neutral pole moving contact bracket, and the first neutral pole moving contact bracket actuating piece is connected to the first neutral pole moving contact bracket; the second neutral pole moving contact assembly comprises a second neutral pole moving contact, a

- second neutral pole moving contact bracket and a second neutral pole bracket actuating piece; the second neutral pole moving contact is held on the second neutral pole moving contact bracket, and the second neutral pole bracket actuating piece is connected to the second neutral pole moving contact bracket.
3. The neutral line overlapping mechanism according to claim 1 or 2, wherein
 the first tie rod assembly comprises a first power supply first tie rod and a first power supply second tie rod; the first power supply first tie rod and the first power supply second tie rod are connected to the first moving contact assembly and can drive the first moving contact assembly to contact with or separate from the first static contact assembly;
 the second tie rod assembly comprises a second power supply first tie rod and a second power supply second tie rod;
 the second power supply first tie rod and the second power supply second tie rod are connected to the second moving contact assembly and can drive the second moving contact assembly to contact with or separate from the second static contact assembly.
4. The neutral line overlapping mechanism according to claim 3, wherein
 a first neutral pole first boss and a first neutral pole second boss are arranged on the first neutral pole bracket actuating piece;
 the first neutral pole first boss engages with the second tie rod of the first power supply;
 the first neutral pole second boss engages with the second tie rod of the second power supply;
 a second neutral pole first boss and a second neutral pole second boss are arranged on the second neutral pole bracket actuating piece;
 the first boss of the second neutral pole engages with the first tie rod of the second power supply;
 the second boss of the second neutral pole engages with the first tie rod of the first power supply.
5. The neutral line overlapping mechanism according to claim 3 or 4, wherein
 the first neutral pole first boss and the first neutral pole second boss are coaxially arranged and the diameter of the first neutral pole first boss is larger than that of the first neutral pole second boss;
 the second neutral pole first boss and the second neutral pole second boss are coaxially arranged, and the diameter of the second neutral pole first boss is larger than that of the second neutral pole second boss.
6. The neutral line overlapping mechanism according to claim 5, wherein
 an elongated closed first power supply first tie rod hole is provided on the first power supply first tie rod; the first power supply second tie rod is provided with an elongated closed first power supply second tie rod hole;
 the length of the first power supply first tie rod hole is smaller than that of first power supply second tie rod hole;
 the second power supply first tie rod is provided with an elongated closed second power supply first tie rod hole;
 an elongated closed second power supply second tie rod hole is provided on the second power supply second tie rod;
 the length of the second power supply first tie rod hole is greater than that of the second power supply second tie rod hole.
7. The neutral line overlapping mechanism according to claim 6, wherein
 the first neutral pole first boss fits in the first power supply second tie rod hole only;
 the first neutral pole second boss fits in the second power supply second tie rod hole only;
 the second neutral pole first boss fits in the second power supply first tie rod hole only;
 the second neutral pole second boss fits in first power supply first tie rod hole only;
 the length of the first power supply first tie rod hole is equal to the length of the second power supply second tie rod hole;
 the length of the first power supply second tie rod hole is equal to the length of the second power supply first tie rod hole.
8. The neutral line overlapping mechanism according to claim 7, wherein
 the first neutral pole static contact assembly comprises a first neutral pole static contact incoming end and a first neutral pole static contact outgoing end; one end of the first neutral pole moving contact is in contact with one of the incoming end of the first neutral pole static contact and the outgoing end of the first neutral pole static contact;
 the other end of the first neutral pole moving contact can contact with or separate from the other one of the first neutral pole static contact incoming end and the first neutral pole static contact outgoing end;
 the second neutral pole static contact assembly comprises a second neutral pole static contact incoming end and a second neutral pole static contact outgoing end;
 one end of the second neutral pole moving contact is in contact with one of the incoming end of the second neutral pole static contact and the outgoing end of the second neutral pole static contact;
 the other end of the second neutral pole moving contact can contact with or separate from the other one of the second neutral pole static contact incoming

end and the second neutral pole static contact outgoing end.

9. The neutral line overlapping mechanism according to any of claims 2 to 8, wherein the first neutral pole moving contact and the second neutral pole static contact are not provided with arc extinguishing grids. 5
10. The neutral line overlapping mechanism according to any of claims 2 to 9, wherein the first neutral pole bracket actuating piece and the second neutral pole bracket actuating piece are integrally formed and connected together through a first connecting post and a second connecting post. 10
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11. The neutral line overlapping mechanism according to any of claims 3 to 10, wherein an elongated open first power supply first tie rod slot is provided on the first power supply first tie rod; the first power supply second tie rod is provided with an elongated open first power supply second tie rod slot; the length of first power supply first tie rod slot is equal to the length of the first power supply second tie rod slot; the second power supply first tie rod is provided with an elongated open second power supply first tie rod slot; an elongated open second power supply second tie rod slot is provided on the second power supply second tie rod; the length of the second power supply first tie rod slot is equal to that of the second power supply second tie rod slot. 20
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12. The neutral line overlapping mechanism according to any of claims 6 to 11, wherein the first connecting post is fitted in the first power supply first tie rod slot and the second power supply first tie rod slot; the second connecting post is fitted in the first power supply second tie rod slot and the second power supply second tie rod slot; the length of the first tie rod slot of the first power supply is equal to the length of the second tie rod slot of the second power supply; the length of the first power supply second tie rod slot is equal to the length of the second power supply first tie rod slot. 40
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13. An automatic transfer switch with dual power supplies, wherein the automatic transfer switch with dual power supplies comprises a neutral line overlapping mechanism according to claim 9. 55

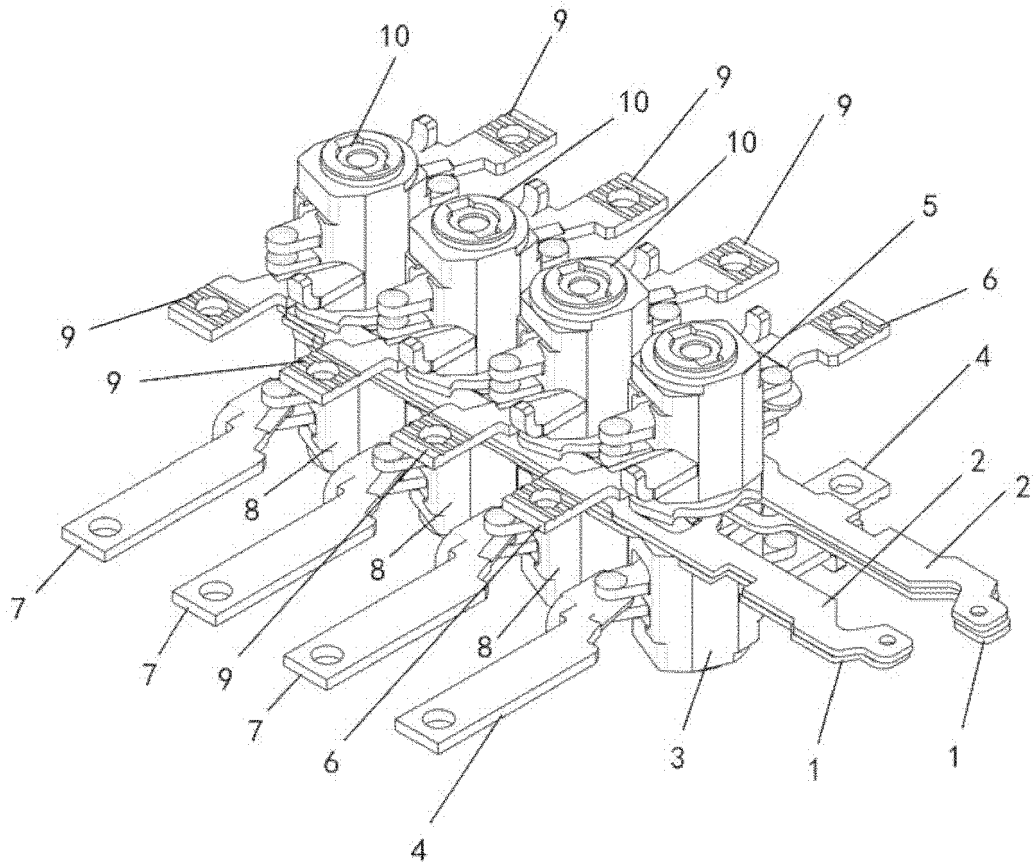


FIG. 1

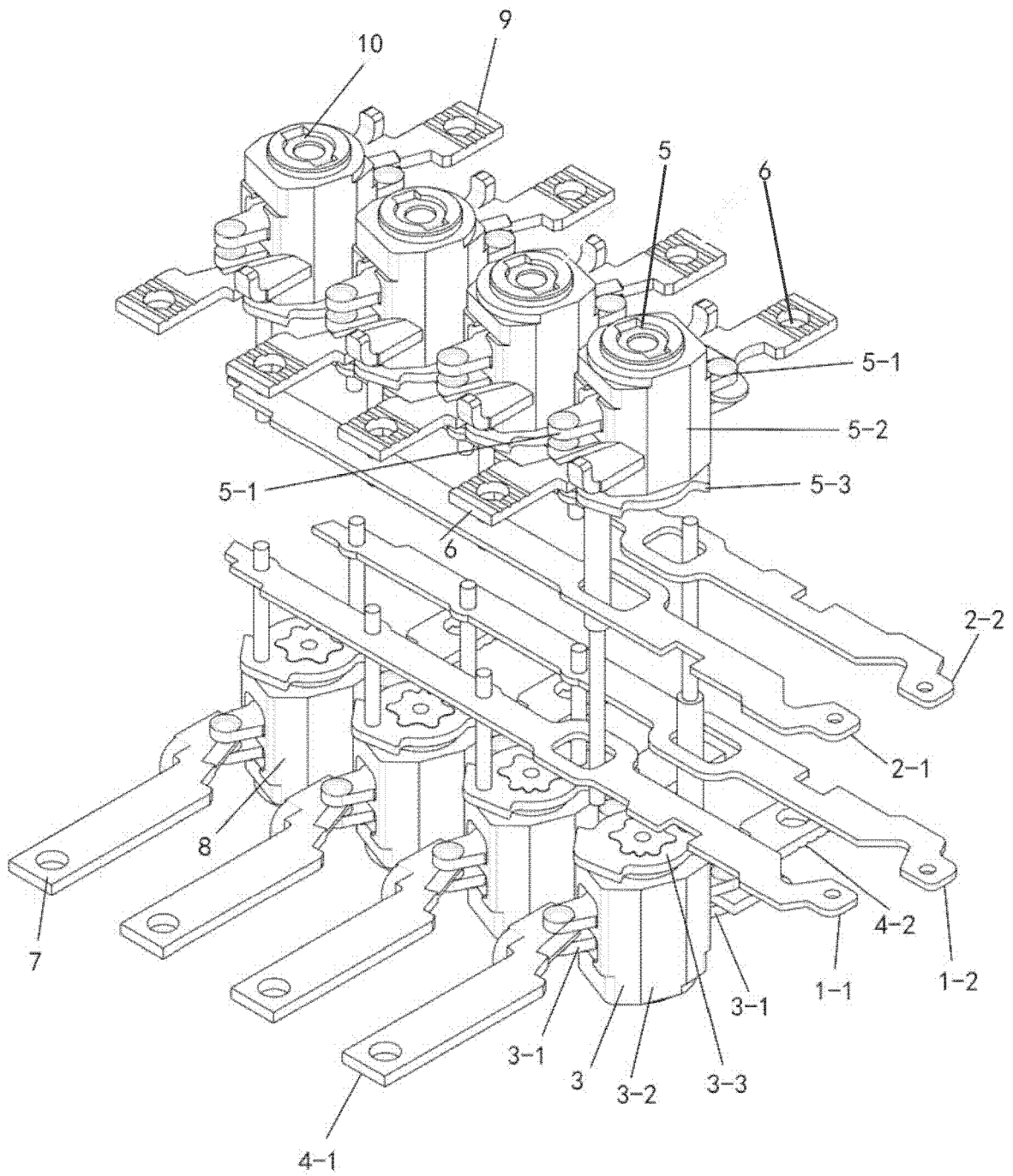


FIG. 2

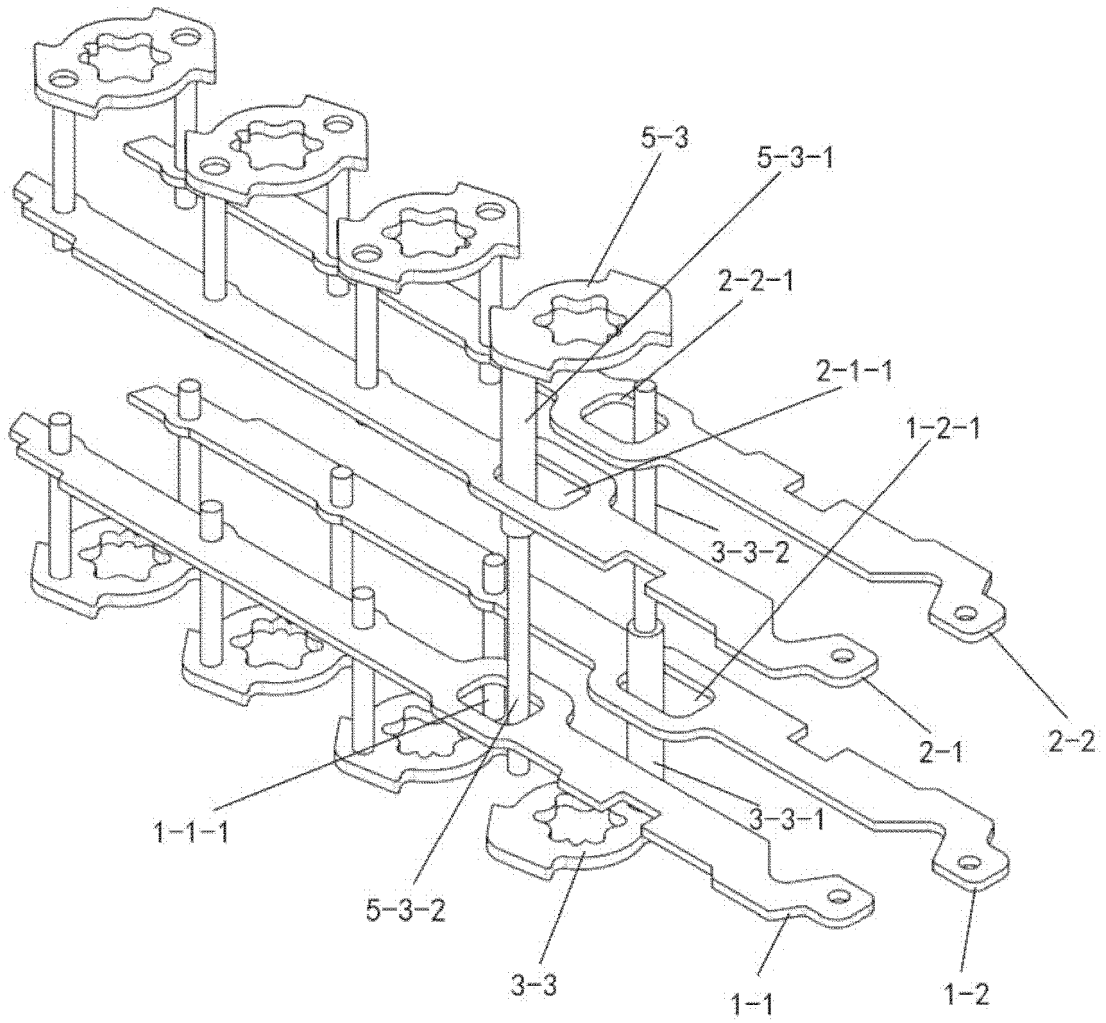


FIG. 3

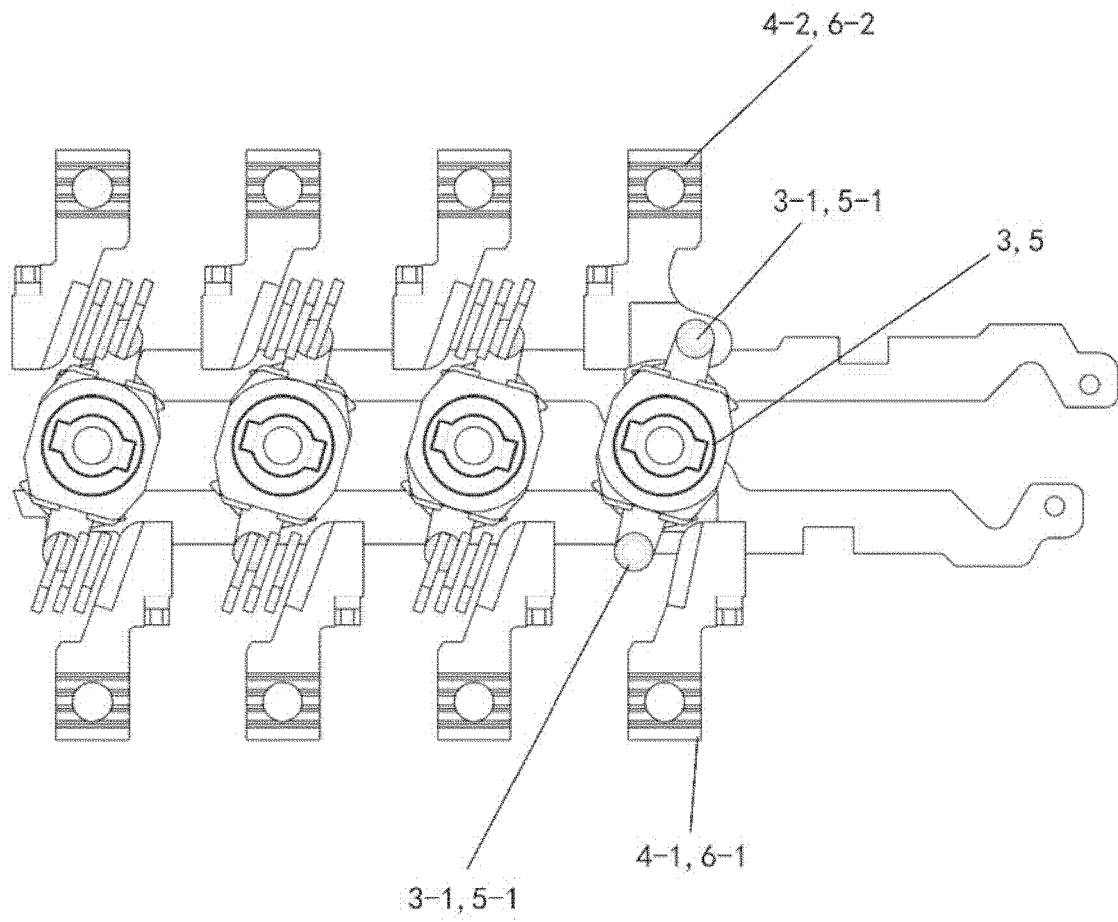


FIG. 4

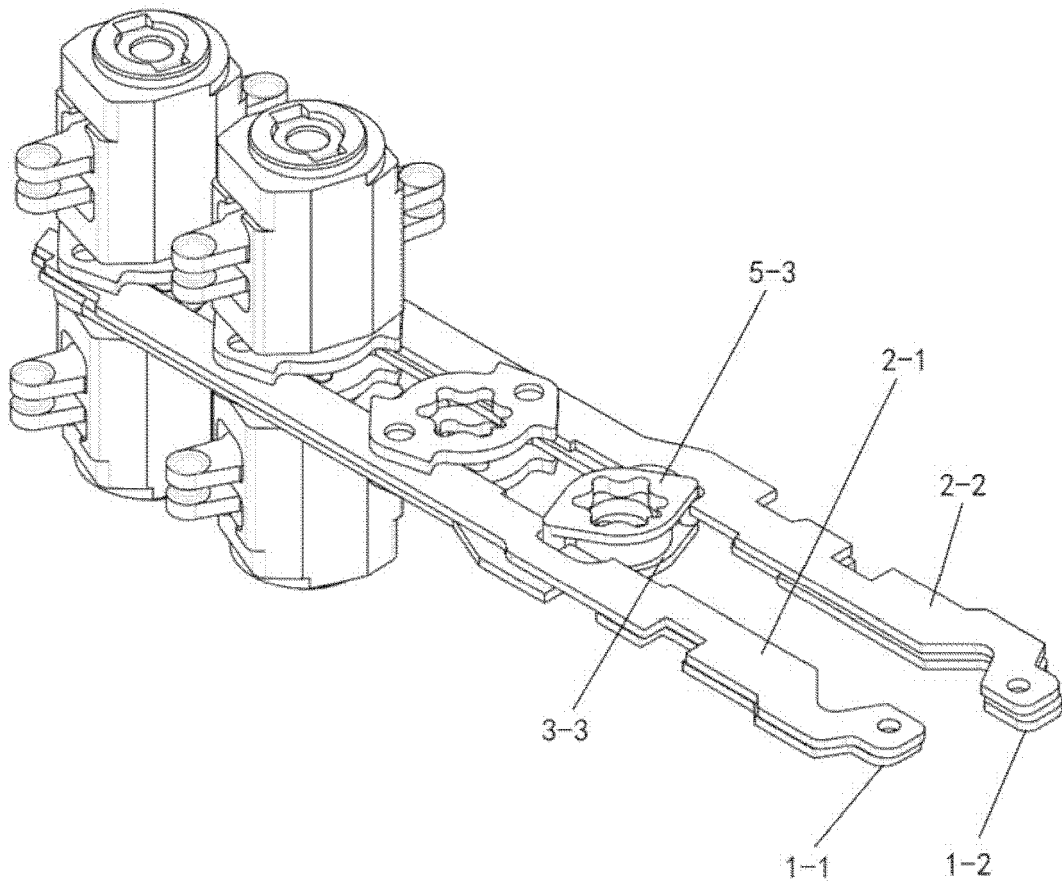


FIG. 5

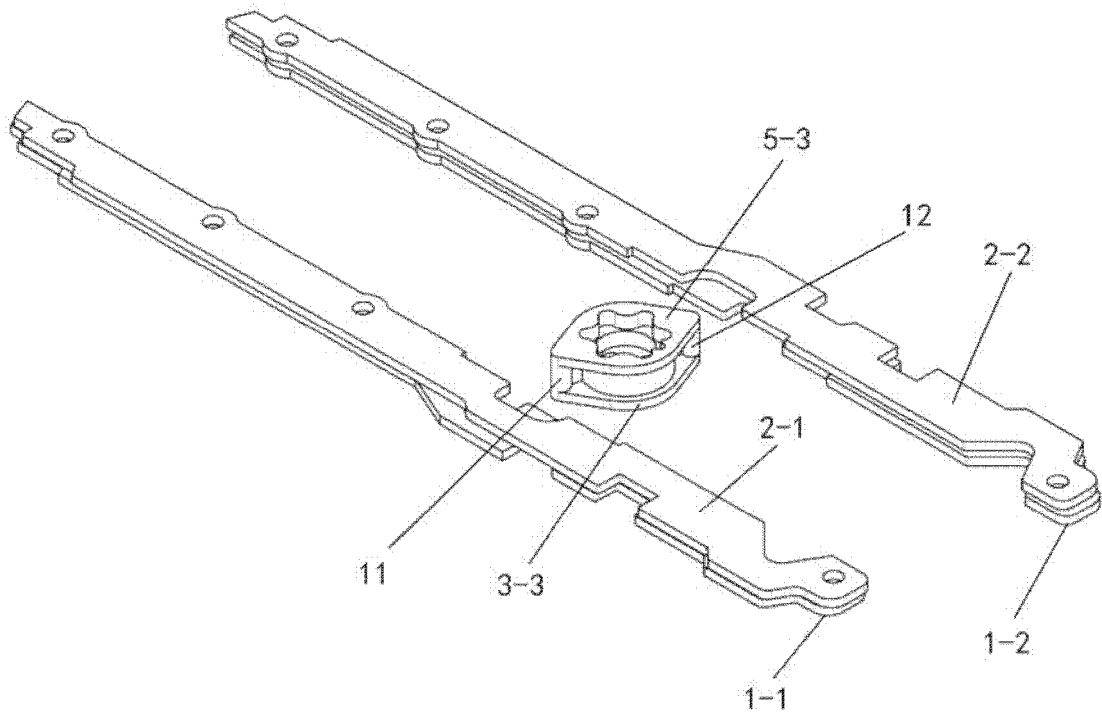


FIG. 6

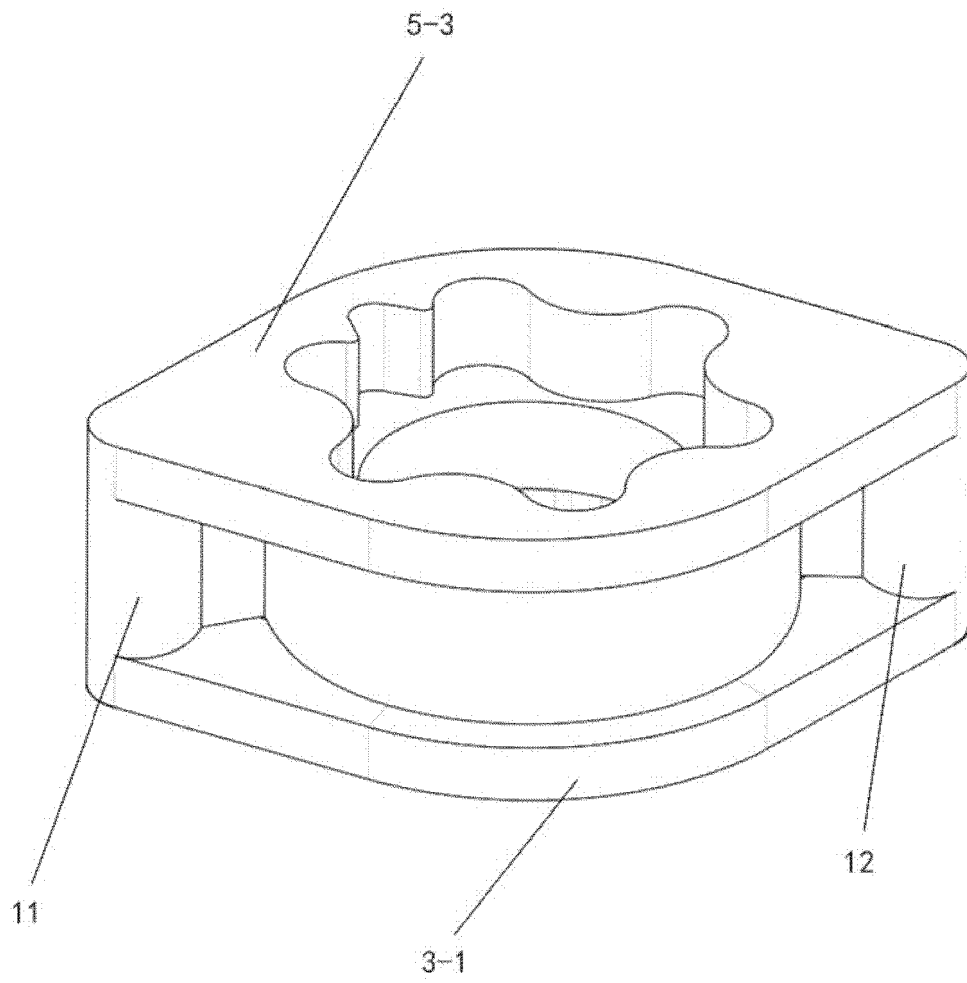


FIG. 7

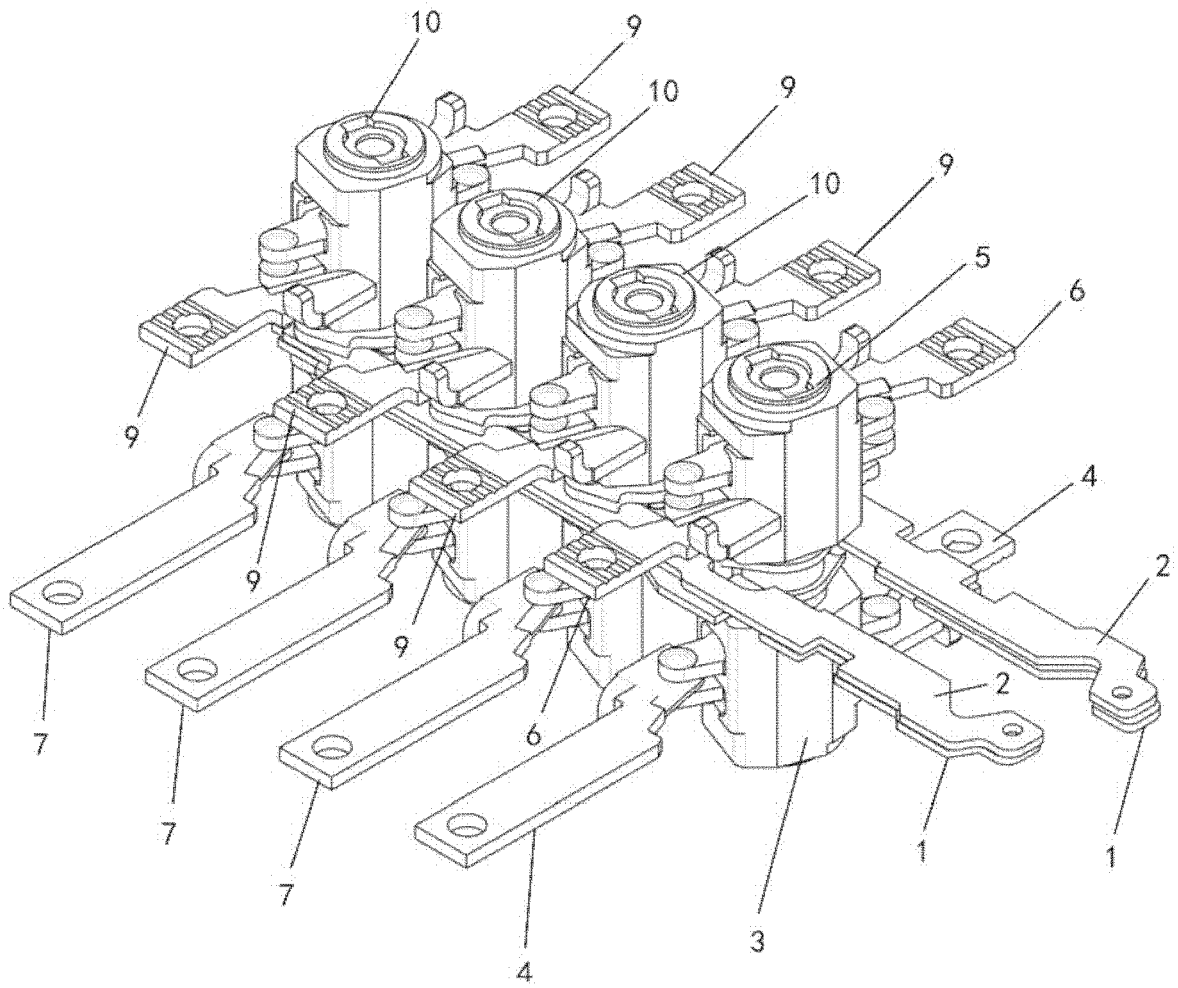


FIG. 8

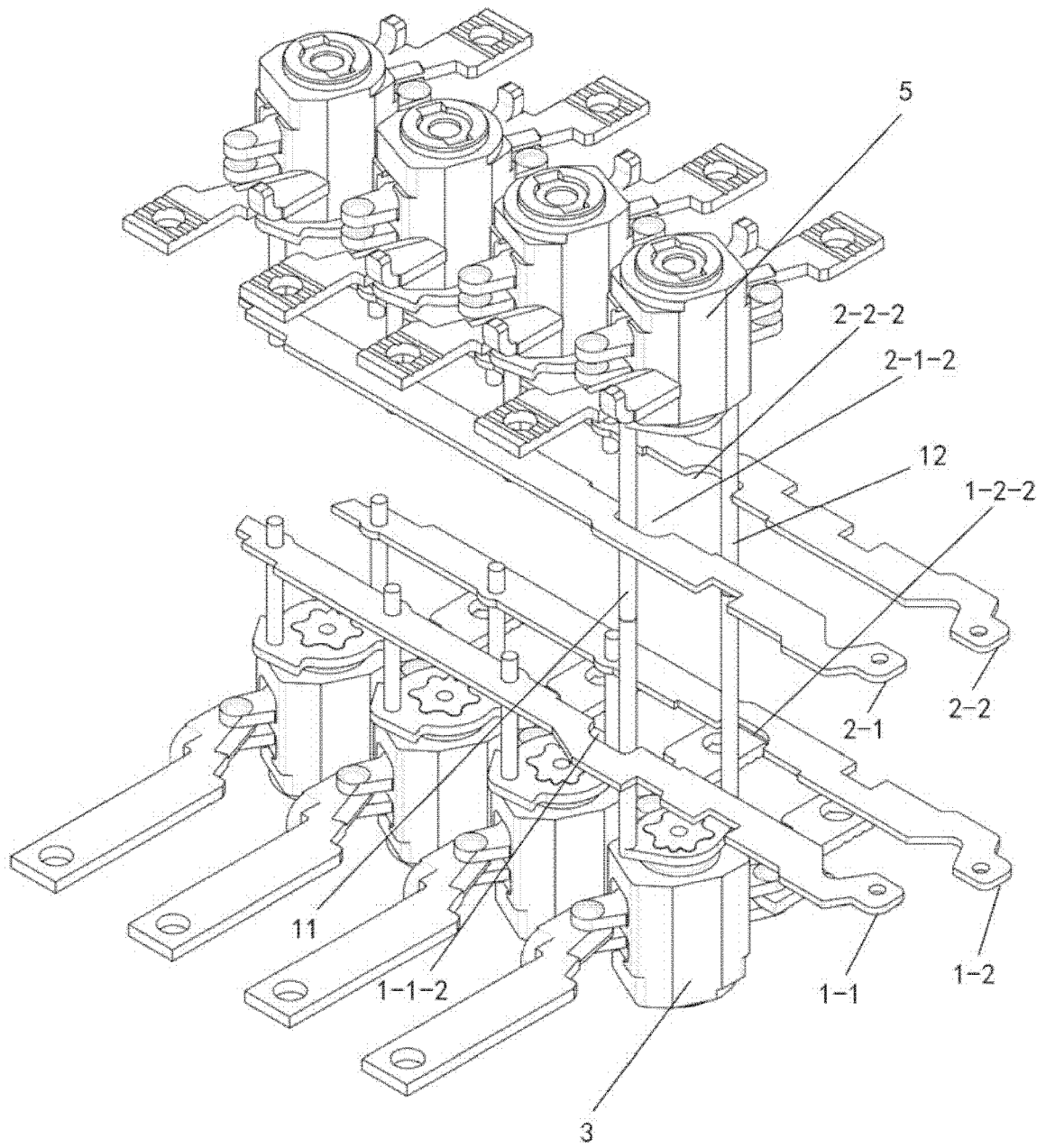


FIG. 9

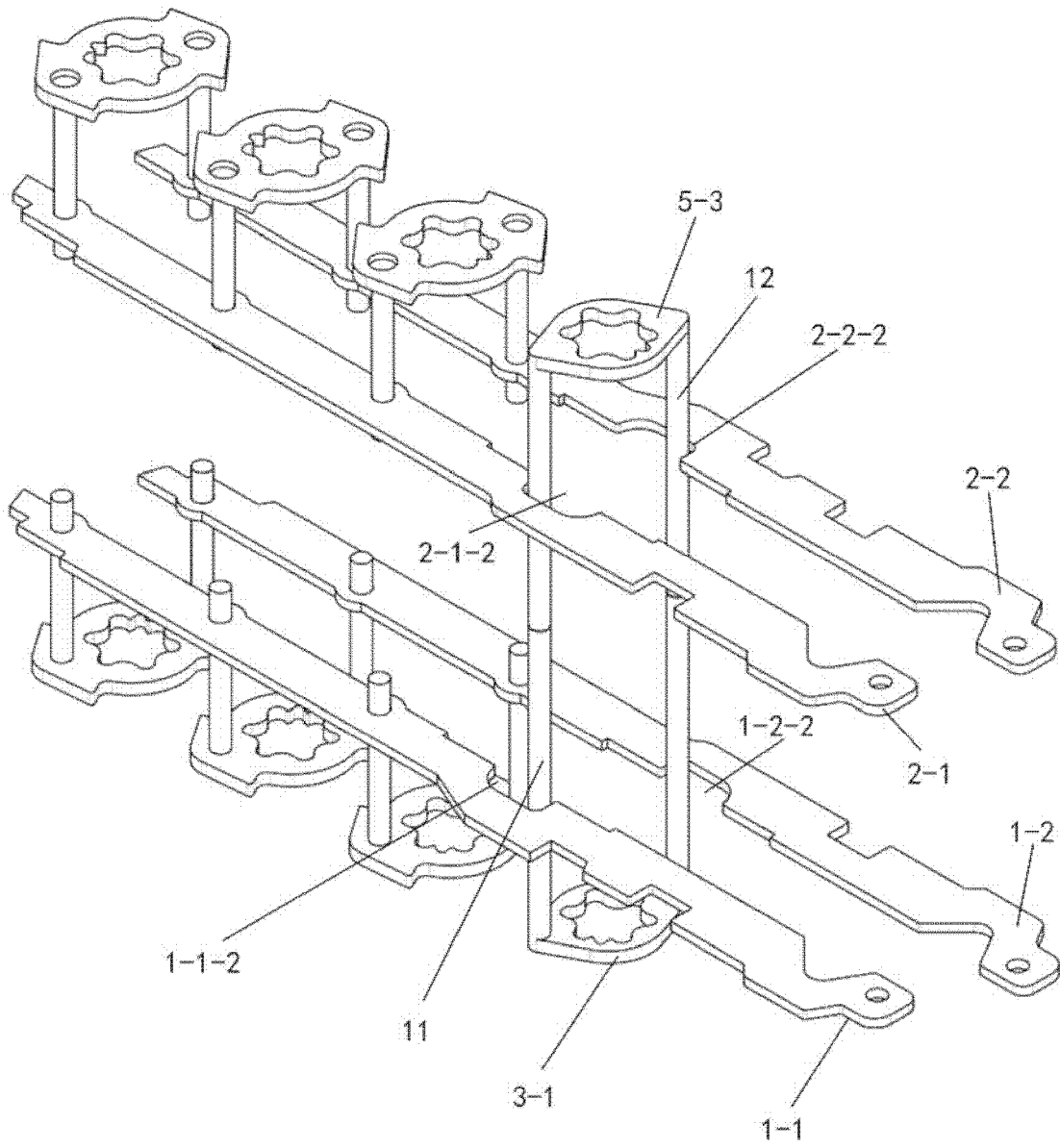


FIG. 10

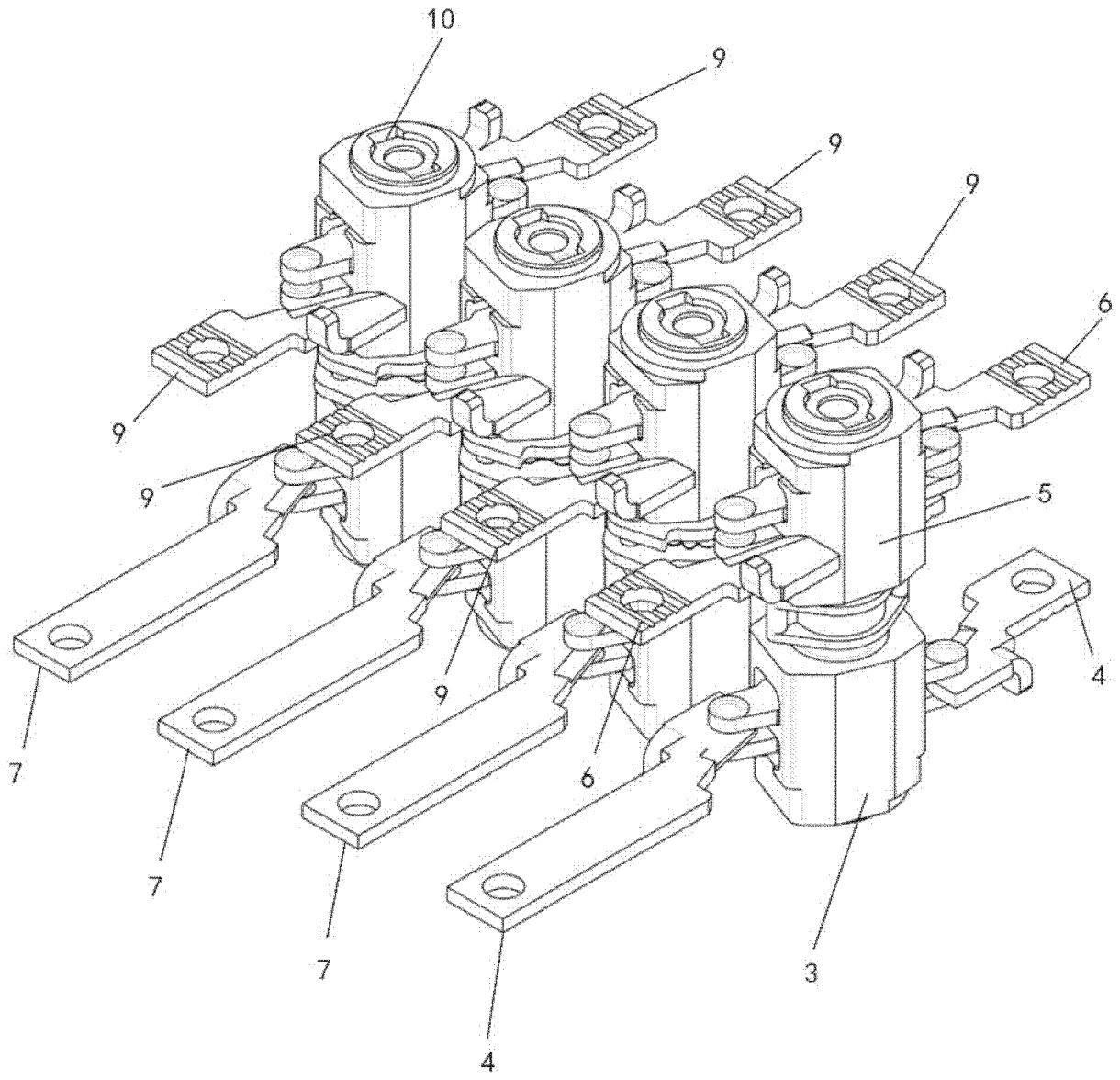


FIG. 11

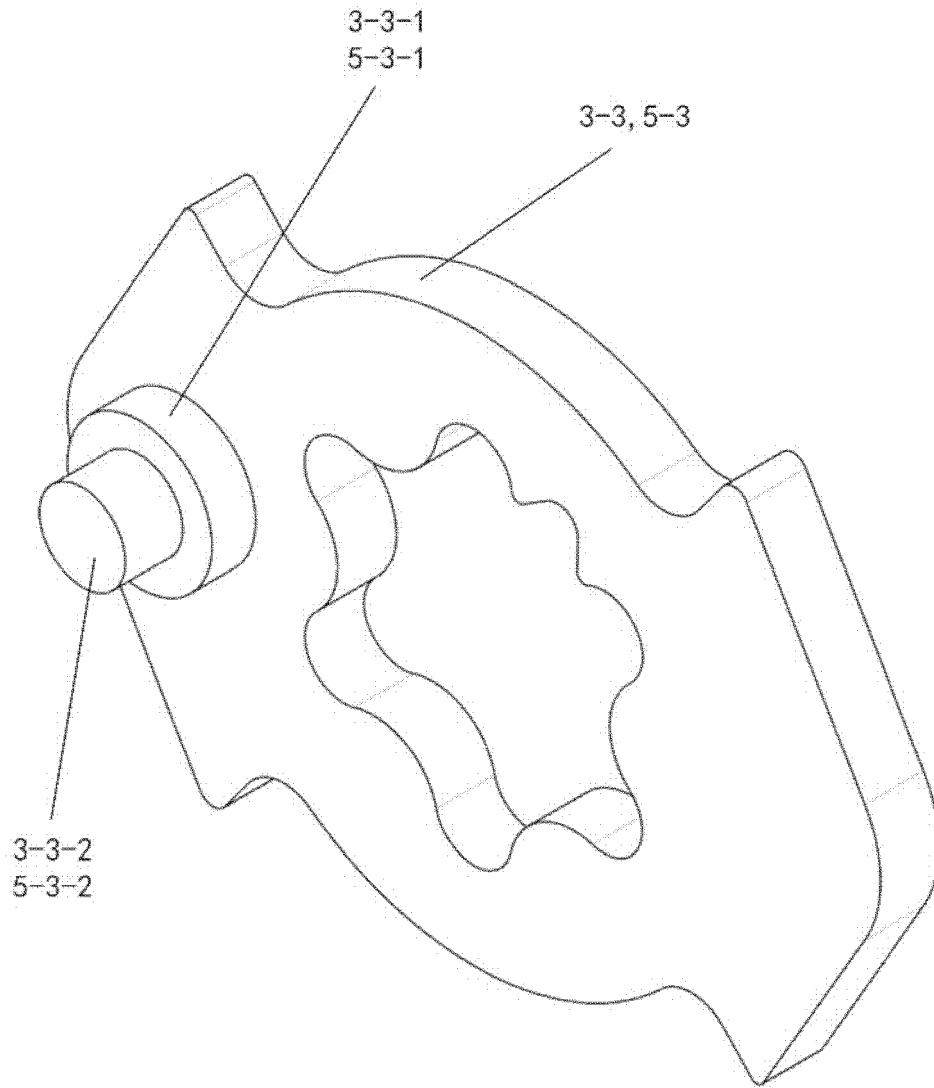


FIG. 12



EUROPEAN SEARCH REPORT

 Application Number
 EP 21 30 5233

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			H01H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 June 2021	Examiner Pavlov, Valeri
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		& : member of the same patent family, corresponding document	

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EP 21 30 5233

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The members are as contained in the European Patent Office EDP file on
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