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(54) **CHANGE-OVER CONTACT PIECE ASSEMBLY AND AUXILIARY SWITCH WITH SAME**

UMSCHALTUNGSKONTAKTSTÜCKANORDNUNG UND HILFSSCHALTER DAMIT

ENSEMBLE DE PIÈCES DE CONTACT DE COMMUTATION ET COMMUTATEUR AUXILIAIRE LE
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Description**Technical Field**

5 **[0001]** The present invention relates to the field of low-voltage electrics, and in particular to a contact piece assembly and an auxiliary switch having the change-over contact piece assembly.

Background Art

10 **[0002]** With regard to an auxiliary switch used in cooperation with a circuit breaker, it is necessary to provide a change-over contact piece assembly inside the auxiliary switch to achieve switching between different electrical circuits.

[0003] In general, with regard to a single-break change-over contact piece assembly with three terminals, it is very challenging to keep a movable contact piece in good contact with stationary contact pieces on upper and lower sides thereof during movement. In particular, taking materials and manufacturing tolerance into consideration, one of the most
15 urgent problems for those skilled in the art is how to ensure that the movable contact piece applies the same contact piece pressure to the stationary contact pieces on the upper and lower sides and maintains the same opening and closing characteristics to thereby ensure the stability of electrical contact and ensure the safety and reliability of products.

[0004] EP 2 009 657 A2 discloses a contact piece assembly according to the first part of claim 1. Further contact piece assembly are known from WO 2010/052077 A1 and EP 0 667 630 A1.
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Summary of the Invention

[0005] An object of the present invention is to provide a contact piece assembly for change-over which can ensure that a movable contact carrier applies the same contact piece pressure to stationary contact pieces on upper and lower
25 sides to thereby ensure the stability of electrical contact between a movable contact and a stationary contact. The object is met by a contact piece assembly according to claim 1 and an auxiliary switch according to claim 7 or 8. Preferred embodiments are disclosed in the subclaims.

[0006] The present invention provides a change-over contact piece assembly for achieving switching between different electrical circuits, the change-over contact piece assembly comprising: a first stationary contact piece with a first stationary
30 contact provided thereon; a second stationary contact piece with a second stationary contact provided thereon; and a movable contact piece assembly comprising: a movable contact carrier connectable to a rotary member; a movable contact fixed on the movable contact carrier; and a reset member, with one end thereof being connected to the movable contact carrier, and the other end thereof being connected to the rotary member, wherein as the rotary member rotates, the movable contact can be driven into contact with the first stationary contact or the second stationary contact.

35 **[0007]** In a further exemplary embodiment of the change-over contact piece assembly, the movable contact carrier has a plate-like structure and has a thickness, and the movable contact carrier is provided with at least two clamping portions so as to be separately fitted with and clamped onto the rotary member. With the above design, the movable contact carrier has a large current-carrying section, which can not only improve a current-carrying capacity, but also effectively reduce an increase in temperature and power consumption.

40 **[0008]** In yet another exemplary embodiment of the change-over contact piece assembly, the movable contact carrier comprises a first extension and a second extension, and the first extension and the second extension form an L-shaped structure, the movable contact being located at an end of the first extension. With the above design, the connection relationship between the movable contact carrier and the first rotating plate or the second rotating plate is made more stable and reliable.

45 **[0009]** In another exemplary embodiment of the change-over contact piece assembly, a bent portion bent toward the first extension is further provided at an end of the second extension, and the rotary member is provided with an accommodation groove for accommodating the bent portion, such that the bent portion can be clamped in the accommodation groove. With the above design, the connection stability between the movable contact carrier and the first rotating plate or the second rotating plate can be further improved.

50 **[0010]** In another exemplary embodiment of the change-over contact piece assembly, the first extension is also provided with a first mounting groove, the rotary member is also provided with a clamping hook, and the first mounting groove and the clamping hook can be fitted and clamped together.

[0011] In another exemplary embodiment of the change-over contact piece assembly, the first extension is also provided with a second mounting groove, and the rotary member is also provided with a mounting post, one end of the reset
55 member being hooked in the second mounting groove, and the other end of the reset member being sleeved over the mounting post.

[0012] In the change-over contact piece assembly, the rotary member is also provided with two locating protrusions for bearing the movable contact carrier, when the rotary member drives the movable contact carrier to rotate in a first

direction and into place, the movable contact carrier takes a first locating protrusion as a rotation fulcrum, and when the rotary member drives the movable contact carrier to rotate in a second direction and into place, the movable contact carrier takes a second locating protrusion as the rotation fulcrum. With the change of the two rotation fulcrums, contact pressure reverses, so that when the movable contact is brought into contact with different stationary contacts, contact pressure is provided by the reset member, and the stability of the contact pressure is ensured.

[0013] At the same time, the present invention also provides an auxiliary switch, a housing of the auxiliary switch being internally provided with at least one change-over contact piece assembly which has the above-mentioned structure and features or a combination thereof and which is located on at least one side of the housing. The movable contact carrier of the change-over contact piece assembly is selectively connected to a rotating plate of the auxiliary switch. The first stationary contact piece and the second stationary contact piece are each connected to two wiring terminals located on one side of the housing, and as the rotating plate rotates, the movable contact can be driven into contact with the first stationary contact or the second stationary contact so as to achieve switching between at least two electrical circuits. By using the above design, the product structure is more compact, the movable contact carrier does not easily experience plastic deformation, and moreover, the stability of the electrical contact of the movable contact is better, the current-carrying capability is stronger, and at the same time, the increase in temperature and the power consumption are reduced.

[0014] In addition, the present invention also provides an auxiliary switch, a housing of which being internally provided with two change-over contact piece assemblies which have the above-mentioned structure and features or a combination thereof, and a first rotating plate and a second rotating plate which are arranged concentrically, wherein a first change-over contact piece assembly and a second change-over contact piece assembly are respectively located on two sides of the housing, the movable contact carrier of the first change-over contact piece assembly is connected to the first rotating plate of the auxiliary switch, and the movable contact carrier of the second change-over contact piece assembly is connected to the second rotating plate of the auxiliary switch, as the first rotating plate rotates, the movable contact can be driven into contact with the first stationary contact or the second stationary contact, and as the second rotating plate rotates, the movable contact can be driven into contact with the first stationary contact or the second stationary contact so as to achieve switching between four electrical circuits. By using the above design, the product structure is more compact, the movable contact carrier does not easily experience plastic deformation, and moreover, the stability of the electrical contact of the movable contact is better, the current-carrying capability is stronger, and at the same time, the increase in temperature and the power consumption are reduced.

[0015] Preferred embodiments will be explained in a clear and comprehensible manner hereinafter with reference to the accompanying drawings, and the above characteristics, technical features, advantages and implementations of the auxiliary switch will be further described.

Brief Description of the Drawings

[0016] The following accompanying drawings merely describe and explain the present invention in an illustrative manner and do not limit the scope of the present invention.

Fig. 1 is a structural schematic diagram of an exemplary embodiment of an auxiliary switch having a change-over contact piece assembly of the present invention;

Figs. 2 and 3 are respectively structural schematic diagrams of a handle of the auxiliary switch of the present invention being in OFF and ON positions;

Fig. 4 is a partial enlarged view of Fig. 1, and mainly shows the structure of the change-over contact piece assembly on one side of a housing;

Fig. 5 is a structural schematic diagram of an exemplary embodiment of a first rotating plate of the present invention; and

Fig. 6 is a structural schematic diagram of an exemplary embodiment of a second rotating plate of the present invention.

Reference numerals

[0017]

Auxiliary switch 100

Housing 10

Operating handle 101

Release assembly 20

Connection rod assembly 30

Mounting post 603; 503

First locating protrusion 604; 504

Second locating protrusion 605; 505

(continued)

First lock rod 40
 Second lock rod 70
 5 First stationary contact piece 81a; 81b
 Second stationary contact piece 82a; 82b
 Movable contact piece assembly 83a; 83b
 Movable contact carrier 84a; 84b
 10 Movable contact 85a; 85b
 Reset member 86a; 86b
 Wiring terminals T1, T2, T3, T4, T5, T6
 First stationary contact S2; S5
 Second stationary contact S3; S6
 15 Clamping portion 841a, 848a; 841b, 848b
 First extension 843a; 843b
 Second extension 842a; 842b
 Bent portion 844a; 844b
 Accommodation groove 601; 501
 20 First mounting groove 845a; 845b
 Second mounting groove 846a; 846b
 Second rotating plate 60
 First rotating plate 50
 25 Clamping hook 602; 502

Detailed Description of Embodiments

30 **[0018]** In order to better understand the technical features, objects and effects of the present invention, the particular embodiments of the present invention will now be described with reference to the accompanying drawings, wherein throughout the drawings, the same numeral denotes components which have the same or a similar structure and the same function.

35 **[0019]** As used herein, the term "exemplary" means "serving as an example, instance, or description," and any illustration and embodiment described as "exemplary" herein should not be interpreted as a more preferred or a more advantageous technical solution.

40 **[0020]** The present invention relates to a change-over contact piece assembly which can be used for achieving switching between different electrical circuits. The change-over contact piece assembly comprises a first stationary contact piece 81a; 81b, a second stationary contact piece 82a; 82b and a movable contact piece assembly 83a; 83b. The first stationary contact piece is provided with a first stationary contact S2; S5. The second stationary contact piece is provided with a second stationary contact S3; S6.

45 **[0021]** It should be noted that the movable contact piece assembly 83a; 83b comprises a movable contact 85a; 85b, a movable contact carrier 84a; 84b, and a reset member 86a; 86b, wherein the movable contact carrier 84a; 84b is connectable to a rotary member 60; 50 (equivalent to a second rotating plate 60 and a first rotating plate 50 described below). The movable contact 85a; 85b is fixed on the movable contact carrier 84a; 84b. One end of the reset member 86a; 86b is connected to the movable contact carrier 84a; 84b, and the other end of the reset member 86a; 86b is connected to the rotary member 60; 50. As the rotary member 60; 50 rotates, the movable contact 85a; 85b can be driven into contact with the first stationary contact S2; S5 or the second stationary contact S3; S6 so as to achieve switching between different circuits.

50 **[0022]** The present invention further relates to an auxiliary switch 100, a housing 10 of which is internally provided with a change-over contact piece assembly having the above-mentioned structure and features or a combination thereof. With reference to Fig. 1, a structural schematic diagram of the interior of the auxiliary switch 100 of the present invention is shown. Furthermore, Figs. 2 and 3 are respectively structural schematic diagrams of the interior of the auxiliary switch when an operating handle 101 is in an OFF position and in an ON position.

55 **[0023]** Specifically, according to a preferred embodiment of the present invention, two mechanisms, namely, an AS mechanism and an FC mechanism, are arranged inside the housing 10 of the auxiliary switch 100 of the present invention, and the AS mechanism and the FC mechanism can be linked to achieve different functions. The AS mechanism comprises an operating handle 101, a release assembly 20, a connection rod assembly 30, a first lock rod 40, and a first rotating plate 50. The FC mechanism comprises an operating handle 101, a release assembly 20, a connection rod assembly

30, a first lock rod 40, a second lock rod 70, and a second rotating plate 60. It should be noted that the first rotating plate 50 and the second rotating plate 60 are arranged concentrically, the first rotating plate 50 can drive the second rotating plate 60 to rotate, and the AS mechanism and the FC mechanism share the operating handle 101, the release assembly 20, the first lock rod 40 and the connection rod assembly 30 therebetween. Six wiring terminals T1, T2, T3, T4, T5 and T6 are arranged on two sides of the housing 10, three wiring terminals T1, T2, T3 and T4, T5, T6 being arranged on each side of the housing 10 so that four different electrical circuits can be formed inside the housing 10.

[0024] As a first preferred embodiment, two change-over contact piece assemblies are arranged inside the housing 10. As shown in Figs. 1 to 3, a first change-over contact piece assembly and a second change-over contact piece assembly are respectively located on the two sides of the housing 10, the movable contact carrier 84a of the first change-over contact piece assembly is connected to the second rotating plate 60 of the auxiliary switch 100, and the movable contact carrier 84b of the second change-over contact piece assembly is connected to the first rotating plate 50 of the auxiliary switch 100.

[0025] Inside the housing 10, a pair of wiring terminals T1 and T4 away from the operating handle 101 are respectively electrically connected to the movable contact carrier 84a on the second rotating plate 60 and the movable contact carrier 84b on the first rotating plate 50 via flexible wires S7, S8, and respectively remain in a normally closed state. The remaining two pairs of wiring terminals T2, T3, T5, T6 are respectively provided with two pairs of stationary contact pieces S2, S3, S5, S6. As the first rotating plate 50 rotates, same can drive the movable contact 85b to come into contact with the first stationary contact S5 or the second stationary contact S6 on the same side of the first rotating plate so that switching between a first electrical circuit and a second electrical circuit can be achieved. As the second rotating plate 60 rotates, same can drive the movable contact 85a to come into contact with the first stationary contact S2 or the second stationary contact S3 on the same side of the second rotating plate so that switching between a third electrical circuit and a fourth electrical circuit can be achieved.

[0026] As a second preferred embodiment, only one change-over contact piece assembly may be provided inside the housing 10 of the auxiliary switch 100. Specifically, the movable contact carrier may be selectively connected to one of the rotating plates of the auxiliary switch 100, for example, same is connectable to the first rotating plate 50 or the second rotating plate 60. As the first rotating plate 50 or the second rotating plate 60 rotates, the movable contact 85b or 85a on the corresponding side thereof can be driven into contact with the first stationary contact S2; S5 or the second stationary contact S3; S6 so as to achieve switching between at least two electrical circuits.

[0027] The structure and operation process of the change-over contact piece assembly of the present invention will be described in detail below with the first preferred embodiment as an example and in conjunction with Figs. 1 to 4.

[0028] According to a preferred embodiment, the movable contact carrier 84a has a plate-like structure and has a thickness, and the movable contact carrier 84a is provided with at least two clamping portions 841a, 848a so as to be separately fitted with and clamped onto the second rotating plate 60. Similarly, the movable contact carrier 84b has a plate-like structure and has a thickness, and the movable contact carrier 84b is provided with at least two clamping portions 841b, 848b so as to be separately fitted with and clamped onto the first rotating plate 50. With the above design, the movable contact carrier has a large current-carrying section, which can not only improve a current-carrying capacity, but also effectively reduce an increase in temperature and power consumption.

[0029] Furthermore, the movable contact carrier 84a comprises a first extension 843a and a second extension 842a. Preferably, the first extension 843a and the second extension 842a form an L-shaped structure, the movable contact 85a being located at an end of the first extension 843a. A bent portion 844a bent toward the first extension 843a is further provided at an end of the second extension 842a. The second rotating plate 60 is provided with an accommodation groove 601 for accommodating the bent portion 844a, such that the bent portion 844a can be clamped in the accommodation groove 601. Similarly, the movable contact carrier 84b comprises a first extension 843b and a second extension 842b. Preferably, the first extension 843b and the second extension 842b form an L-shaped structure, the movable contact 85b being located at an end of the first extension 843b. A bent portion 844b bent toward the first extension 843b is further provided at an end of the second extension 842b. The first rotating plate 50 is provided with an accommodation groove 501 for accommodating the bent portion 844b, such that the bent portion 844b can be clamped in the accommodation groove 501. With the above design, the connection relationship between the movable contact carrier and the first rotating plate or the second rotating plate is made more stable and reliable.

[0030] Further preferably, the first extension 843a is also provided with a first mounting groove 845a, the second rotating plate 60 is also provided with a clamping hook 602, and the first mounting groove 845a and the clamping hook 602 can be fitted and clamped together. Similarly, the first extension 843b is also provided with a first mounting groove 845b, the first rotating plate 50 is also provided with a clamping hook 502, and the first mounting groove 845b and the clamping hook 502 can be fitted and clamped together. With the above design, the connection stability between the movable contact carrier and the first rotating plate or the second rotating plate can be further improved.

[0031] In order to make the reset member have better connection stability, the first extension 843a is also provided with a second mounting groove 846a, and the second rotating plate 60 is also provided with a mounting post 603, one end of the reset member 86a being hooked in the second mounting groove 846a, and the other end of the reset member

86a being sleeved over the mounting post 603. Similarly, the first extension 843b is also provided with a second mounting groove 846b, and the first rotating plate 50 is also provided with a mounting post 503, one end of the reset member 86b being hooked in the second mounting groove 846b, and the other end of the reset member 86b being sleeved over the mounting post 503.

[0032] It should be noted that, as a further preferred embodiment, the second rotating plate 60 is also provided with two locating protrusions 604, 605, and the first extension 843a can selectively abut against either one of the locating protrusions so that, when the second rotating plate 60 drives the movable contact carrier 84a to rotate in a first direction, the movable contact carrier 84a takes the first locating protrusion 604 as a rotation fulcrum, and when the second rotating plate 60 drives the movable contact carrier 84a to rotate in a second direction, the movable contact carrier 84a takes the second locating protrusion 605 as the rotation fulcrum. Similarly, the first rotating plate 50 is also provided with two locating protrusions 504, 505, and the first extension 843b can selectively abut against either one of the locating protrusions so that, when the first rotating plate 50 drives the movable contact carrier 84b to rotate in the first direction, the movable contact carrier 84b takes the first locating protrusion 504 as a rotation fulcrum, and when the rotary member 50 drives the movable contact carrier 84b to rotate in the second direction, the movable contact carrier 84b takes the second locating protrusion 505 as the rotation fulcrum. With the change of the two rotation fulcrums, contact pressure reverses, so that when the movable contact is brought into contact with different stationary contacts, contact pressure is provided by the reset member, and the stability of the contact pressure is ensured.

[0033] As shown in Fig. 4, taking the change-over contact piece assembly on one side of the housing 10 as an example, since one end of the reset member 86a is sleeved over the mounting post 603 on the second rotating plate 60 and the other end of the reset member 86a is hooked in the second mounting groove 846a on the movable contact carrier 84a, as the second rotating plate 60 rotates, the movable contact carrier 84a is driven to move so that, when the second rotating plate 60 rotates by a certain angle, the movable contact carrier 84a comes into contact with the first stationary contact piece 81a, the second rotating plate 60 continues to rotate, the movable contact carrier 84a is separated from the first locating protrusion 604, and at this time, the reset member 86a generates a contact pressure on a contact; and when the second rotating plate 60 rotates in a reverse manner and by a certain angle, the movable contact carrier 84a comes into contact with the second stationary contact piece 82a, the second rotating plate 60 continues to rotate, the movable contact carrier 84a is separated from the second locating protrusion 605, and at this time, the reset member 86a generates a contact pressure on the contact.

[0034] In summary, regarding the change-over contact piece assembly with the above-mentioned structure and features of the present invention, the contact pressure of the contact thereof is provided by the reset member, a tension action point is located on the movable contact piece close to a fulcrum, and the influence of the accumulated tolerance of parts on a reset force is reduced by a lever, therefore, the influence of the dimensional tolerance of the mechanical parts on the contact pressure of the contact can be effectively reduced. Since the reset member has a more stable pull force, the stability of the contact pressure can be ensured. With the change of the two fulcrums, the contact pressure reverses, so that when the movable contact is brought into contact with different stationary contacts, contact pressure is provided by the reset member, and a stable contact pressure is provided.

[0035] Since the movable contact carrier of the present invention has a large current-carrying section, the current-carrying capacity can be increased, and an increase in temperature and power consumption can be reduced. Compared with the prior art, the movable contact carrier has a short length, which can meet the requirements for the spatial compactness of a product. Since the movable contact carrier has a high degree of rigidity, plastic deformation cannot occur.

[0036] It should be understood that, although the description is given according to each of the embodiments, each embodiment does not only comprise an independent technical solution, and this narrative manner of the description is only for clarity. For a person skilled in the art, the description shall be regarded as a whole, and the technical solution in each of the embodiments can also be suitably combined to form other implementations that can be understood by a person skilled in the art.

Claims

1. A contact piece assembly for achieving switching between different electrical circuits, the contact piece assembly comprising
 - a first stationary contact piece (81a; 81b) with a first stationary contact (S2; S5) provided thereon;
 - a second stationary contact piece (82a; 82b) with a second stationary contact (S3; S6) provided thereon; and
 - a movable contact piece assembly (83a; 83b) comprising:
 - a movable contact carrier (84a; 84b) connectable to a rotary member (60; 50);
 - a movable contact (85a; 85b) fixed on the movable contact carrier (84a; 84b); and

a reset member (86a; 86b), with one end thereof being connected to the movable contact carrier (84a; 84b), and the other end thereof being connected to the rotary member (60; 50), the reset member (86a; 86b) being suitable to generate a contact pressure,

wherein as the rotary member (60; 50) rotates, the movable contact (85a; 85b) can be driven into contact with the first stationary contact (S2; S5) or the second stationary contact (S3; S6);

characterized in that

the contact piece assembly is a change-over contact piece assembly,

wherein the rotary member (60; 50) is provided with two locating protrusions (604, 605; 504, 505) for bearing the movable contact carrier (84a; 84b), when the rotary member (60; 50) drives the movable contact carrier (84a; 84b) to rotate in a first direction and into place, the movable contact carrier (84a; 84b) takes a first locating protrusion (604; 504) as a rotation fulcrum, and when the rotary member (60; 50) drives the movable contact carrier (84a; 84b) to rotate in a second direction and into place, the movable contact carrier (84a; 84b) takes a second locating protrusion (605; 505) as the rotation fulcrum, wherein with the change of the two rotation fulcrums contact pressure reverses, so that when the movable contact (85a; 85b) is brought into contact with the first stationary contact (S2; S5) or the second stationary contact (S3; S6), contact pressure is provided by the reset member (86a; 86b).

2. The change-over contact piece assembly as claimed in claim 1, wherein the movable contact carrier (84a; 84b) has a plate-like structure and has a thickness, and the movable contact carrier (84a; 84b) is provided with at least two clamping portions (841a, 848a; 841b, 848b) so as to be separately fitted with and clamped onto the rotary member (60; 50).

3. The change-over contact piece assembly as claimed in claim 2, wherein the movable contact carrier (84a; 84b) comprises a first extension (843a; 843b) and a second extension (842a; 842b), and the first extension (843a; 843b) and the second extension (842a; 842b) form an L-shaped structure, the movable contact (85a; 85b) being located at an end of the first extension (843a; 843b).

4. The change-over contact piece assembly as claimed in claim 3, wherein a bent portion (844a, 844b) bent toward the first extension (843a; 843b) is further provided at an end of the second extension (842a; 842b), and the rotary member (60; 50) is provided with an accommodation groove (601; 501) for accommodating the bent portion (844a; 844b), such that the bent portion (844a; 844b) can be clamped in the accommodation groove (601; 501).

5. The change-over contact piece assembly as claimed in claim 3 or 4, wherein the first extension (843a; 843b) is also provided with a first mounting groove (845a; 845b), the rotary member (60; 50) is also provided with a clamping hook (602; 502), and the first mounting groove (845a; 845b) and the clamping hook (602; 502) can be fitted and clamped together.

6. The change-over contact piece assembly as claimed in claim 5, wherein the first extension (843a; 843b) is also provided with a second mounting groove (846a; 846b), and the rotary member (60; 50) is also provided with a mounting post (603; 503), one end of the reset member (86a; 86b) being hooked in the second mounting groove (846a; 846b), and the other end of the reset member (86a; 86b) being sleeved over the mounting post (603; 503).

7. An auxiliary switch (100), a housing (10) of which is internally provided with at least one change-over contact piece assembly as claimed in any one of claims 1-6, wherein the change-over contact piece assembly is located on at least one side of the housing (10), and the movable contact carrier (84a; 84b) of the change-over contact piece assembly is selectively connected to a rotating plate (60; 50) of the auxiliary switch (100); the first stationary contact piece (81a; 81b) and the second stationary contact piece (82a; 82b) are each connected to two wiring terminals (T2, T3; T5, T6) located on one side of the housing (10); and as the rotating plate (60; 50) rotates, the movable contact (85a; 85b) can be driven into contact with the first stationary contact (S2; S5) or the second stationary contact (S3; S6) so as to achieve switching between at least two electrical circuits.

8. An auxiliary switch (100), a housing (10) of which is internally provided with two change-over contact piece assemblies as claimed in any one of claims 1-6, and a first rotating plate (60) and a second rotating plate (50) which are arranged concentrically, wherein a first change-over contact piece assembly and a second change-over contact piece assembly are respectively located on two sides of the housing (10), the movable contact carrier (84a) of the first change-over contact piece assembly is connected to the first rotating plate (60) of the auxiliary switch (100), and the movable contact carrier (84b) of the second change-over contact piece assembly is connected to the second rotating plate (50) of the auxiliary switch (100), as the first rotating plate (60) rotates, the movable contact (85a) can

be driven into contact with the first stationary contact (S2) or the second stationary contact (S3), and as the second rotating plate (50) rotates, the movable contact (85b) can be driven into contact with the first stationary contact (S5) or the second stationary contact (S6) so as to achieve switching between four electrical circuits.

Patentansprüche

1. Kontaktstückanordnung zum Erzielen eines Schaltens zwischen unterschiedlichen elektrischen Stromkreisen, wobei die Kontaktstückanordnung Folgendes umfasst:

ein erstes feststehendes Kontaktstück (81a; 81b) mit einem daran vorgesehenen ersten feststehenden Kontakt (S2; S5);
 ein zweites feststehendes Kontaktstück (82a; 82b) mit einem daran vorgesehenen zweiten feststehenden Kontakt (S3; S6); und

eine bewegliche Kontaktstückanordnung (83a; 83b), die Folgendes umfasst:

einen Träger (84a; 84b) eines beweglichen Kontakts, der mit einem Drehelement (60; 50) verbunden werden kann;

einen beweglichen Kontakt (85a; 85b), der an dem Träger (84a; 84b) eines beweglichen Kontakts befestigt ist; und

ein Rückstellelement (86a; 86b), das an einem Ende mit dem Träger (84a; 84b) eines beweglichen Kontakts verbunden ist und das am anderen Ende mit dem Drehelement (60; 50) verbunden ist, wobei das Rückstellelement (86a; 86b) dafür geeignet ist, einen Kontaktdruck zu erzeugen,

wobei der bewegliche Kontakt (85a; 85b) in Kontakt mit dem ersten feststehenden Kontakt (S2; S5) oder mit dem zweiten feststehenden Kontakt (S3; S6) angetrieben werden kann, während sich das Drehelement (60; 50) dreht;

dadurch gekennzeichnet, dass

die Kontaktstückanordnung eine Wechselkontaktstück-Anordnung ist,

wobei das Drehelement (60; 50) mit zwei Befestigungsvorsprüngen (604, 605; 504, 505) versehen ist, um den Träger (84a; 84b) eines beweglichen Kontakts zu tragen, wobei der Träger (84a; 84b) eines beweglichen Kontakts einen ersten Befestigungsvorsprung (604; 504) als einen Drehpunkt nimmt, wenn das Drehelement (60; 50) den Träger (84a; 84b) eines beweglichen Kontakts antreibt, um ihn in einer ersten Richtung und in die richtige Stellung zu drehen, und wobei der Träger (84a; 84b) eines beweglichen Kontakts einen zweiten Befestigungsvorsprung (605; 505) als den Drehpunkt nimmt, wenn das Drehelement (60; 50) den Träger (84a; 84b) eines beweglichen Kontakts antreibt, um ihn in einer zweiten Richtung und in die richtige Stellung zu drehen, wobei sich der Kontaktdruck mit dem Wechsel der zwei Drehpunkte umkehrt, sodass der Kontaktdruck durch das Rückstellelement (86a; 86b) bereitgestellt wird, wenn der bewegliche Kontakt (85a; 85b) mit dem ersten feststehenden Kontakt (S2; S5) oder mit dem zweiten feststehenden Kontakt (S3; S6) in Kontakt gebracht wird.

2. Wechselkontaktstück-Anordnung nach Anspruch 1, wobei der Träger (84a; 84b) eines beweglichen Kontakts eine plattenförmige Struktur aufweist und eine Dicke aufweist und wobei der Träger (84a; 84b) eines beweglichen Kontakts mit wenigstens zwei Klemmabschnitten (841a, 848a; 841b, 848b) versehen ist, um getrennt mit dem Drehelement (60; 50) zusammengepasst und an es geklemmt zu werden.

3. Wechselkontaktstück-Anordnung nach Anspruch 2, wobei der Träger (84a; 84b) eines beweglichen Kontakts einen ersten Fortsatz (843a; 843b) und einen zweiten Fortsatz (842a; 842b) umfasst und wobei der erste Fortsatz (843a; 843b) und der zweite Fortsatz (842a; 842b) eine L-förmige Struktur bilden, wobei sich der bewegliche Kontakt (85a; 85b) an einem Ende des ersten Fortsatzes (843a; 843b) befindet.

4. Wechselkontaktstück-Anordnung nach Anspruch 3, wobei ferner an einem Ende des zweiten Fortsatzes (842a; 842b) ein gebogener Abschnitt (844a, 844b) vorgesehen ist, der in Richtung des ersten Fortsatzes (843a; 843b) gebogen ist, und wobei das Drehelement (60; 50) mit einer Aufnahmenut (601; 501) zum Aufnehmen des gebogenen Abschnitts (844a; 844b) versehen ist, sodass der gebogene Abschnitt (844a; 844b) in die Aufnahmenut (601; 501) geklemmt werden kann.

5. Wechselkontaktstück-Anordnung nach Anspruch 3 oder 4, wobei der erste Fortsatz (843a; 843b) außerdem mit

einer ersten Befestigungsnut (845a; 845b) versehen ist, wobei das Drehelement (60; 50) außerdem mit einem Klemmhaken (602; 502) versehen ist, und wobei die erste Befestigungsnut (845a; 845b) und der Klemmhaken (602; 502) zusammengepasst und zusammengeklemt werden können.

6. Wechselkontaktstück-Anordnung nach Anspruch 5, wobei der erste Fortsatz (843a; 843b) außerdem mit einer zweiten Befestigungsnut (846a; 846b) versehen ist und wobei das Drehelement (60; 50) außerdem mit einem Befestigungspfosten (603; 503) versehen ist, wobei ein Ende des Rückstellelements (86a; 86b) in die zweite Befestigungsnut (846a; 846b) eingehakt ist und wobei das andere Ende des Rückstellelements (86a; 86b) über den Befestigungspfosten (603; 503) gezogen ist.

7. Hilfsschalter (100), von dem ein Gehäuse (10) innen mit wenigstens einer Wechselkontaktstück-Anordnung nach einem der Ansprüche 1-6 versehen ist, wobei sich die Wechselkontaktstück-Anordnung auf wenigstens einer Seite des Gehäuses (10) befindet und wobei der Träger (84a; 84b) eines beweglichen Kontakts der Wechselkontaktstück-Anordnung wahlweise mit einer Drehplatte (60; 50) des Hilfsschalters (100) verbunden ist; wobei das erste feststehende Kontaktstück (81a; 81b) und das zweite feststehende Kontaktstück (82a; 82b) jeweils mit zwei Verdrahtungsanschlüssen (T2, T3; T5, T6) verbunden sind, die sich auf einer Seite des Gehäuses (10) befinden; und wobei der bewegliche Kontakt (85a; 85b) in Kontakt mit dem ersten feststehenden Kontakt (S2; S5) oder mit dem zweiten feststehenden Kontakt (S3; S6) angetrieben werden kann, während sich die Drehplatte (60; 50) dreht, um ein Schalten zwischen wenigstens zwei elektrischen Stromkreisen zu erzielen.

8. Hilfsschalter (100), von dem ein Gehäuse (10) innen mit zwei Wechselkontaktstück-Anordnungen nach einem der Ansprüche 1-6 und mit einer ersten Drehplatte (60) und mit einer zweiten Drehplatte (50), die konzentrisch angeordnet sind, versehen ist, wobei sich eine erste Wechselkontaktstück-Anordnung und eine zweite Wechselkontaktstück-Anordnung jeweils auf zwei Seiten des Gehäuses (10) befinden, wobei der Träger (84a) eines beweglichen Kontakts der ersten Wechselkontaktstück-Anordnung mit der ersten Drehplatte (60) des Hilfsschalters (100) verbunden ist, und wobei der Träger (84b) eines beweglichen Kontakts der zweiten Wechselkontaktstück-Anordnung mit der zweiten Drehplatte (50) des Hilfsschalters (100) verbunden ist, wobei der bewegliche Kontakt (85a) in Kontakt mit dem ersten feststehenden Kontakt (S2) oder mit dem zweiten feststehenden Kontakt (S3) angetrieben werden kann, während sich die erste Drehplatte (60) dreht, und wobei der bewegliche Kontakt (85b) in Kontakt mit dem ersten feststehenden Kontakt (S5) oder mit dem zweiten feststehenden Kontakt (S6) angetrieben werden kann, während sich die zweite Drehplatte (50) dreht, um ein Schalten zwischen vier elektrischen Stromkreisen zu erzielen.

Revendications

1. Ensemble de pièces de contact pour réaliser une communication entre différents circuits électriques, l'ensemble de pièces de contact comprenant
une première pièce de contact fixe (81a ; 81b) dotée d'un premier contact fixe (S2 ; S5) ;
une seconde pièce de contact fixe (82a ; 82b) dotée d'un second contact fixe (S3 ; S6) ; et
un ensemble de pièces de contact mobile (83a ; 83b) comprenant :

un porte-contact mobile (84a ; 84b) pouvant être connecté à un élément rotatif (60 ; 50) ;
un contact mobile (85a ; 85b) fixé sur le porte-contact mobile (84a ; 84b) ; et
un élément de réinitialisation (86a ; 86b), dont une extrémité est connectée au porte-contact mobile (84a ; 84b),
et l'autre extrémité est connectée à l'élément rotatif (60 ; 50), l'élément de réinitialisation (86a ; 86b) convenant pour générer une pression de contact,

dans lequel quand l'élément rotatif (60 ; 50) tourne, le contact mobile (85a ; 85b) peut être amené en contact avec le premier contact fixe (S2 ; S5) ou le second contact fixe (S3 ; S6) ;

caractérisé en ce que

l'ensemble de pièces de contact est un ensemble de pièces de contact de commutation, dans lequel l'élément rotatif (60 ; 50) est doté de deux protubérances de positionnement (604, 605 ; 504, 505) pour porter le porte-contact mobile (84a ; 84b), quand l'élément rotatif (60 ; 50) entraîne le porte-contact mobile (84a ; 84b) pour qu'il tourne dans un premier sens et se mette en place, le porte-contact mobile (84a ; 84b) utilise une première protubérance de positionnement (604 ; 504) comme appui de rotation, et quand l'élément rotatif (60 ; 50) entraîne le porte-contact mobile (84a ; 84b) pour qu'il tourne dans un second sens et se mette en place, le porte-contact mobile (84a ; 84b) utilise une seconde protubérance de positionnement (605 ; 505) comme appui de rotation, dans lequel avec le changement des deux appuis de rotation la pression de contact s'inverse, de telle sorte que

quand le contact mobile (85a ; 85b) est amené en contact avec le premier contact fixe (S2 ; S5) ou le second contact fixe (S3 ; S6), la pression de contact est fournie par l'élément de réinitialisation (86a ; 86b) .

2. Ensemble de pièces de contact de commutation selon la revendication 1, dans lequel le porte-contact mobile (84a ; 84b) a une structure en forme de plaque et une épaisseur, et le porte-contact mobile (84a ; 84b) est doté d'au moins deux parties de serrage (841a, 848a ; 841b, 848b) de manière à être ajusté séparément et serré sur l'élément rotatif (60 ; 50).
3. Ensemble de pièces de contact de commutation selon la revendication 2, dans lequel le porte-contact mobile (84a ; 84b) comprend un premier prolongement (843a ; 843b) et un second prolongement (842a ; 842b), et le premier prolongement (843a ; 843b) et le second prolongement (842a ; 842b) forment une structure en forme de L, le contact mobile (85a ; 85b) étant placé à une extrémité du premier prolongement (843a ; 843b).
4. Ensemble de pièces de contact de commutation selon la revendication 3, dans lequel une partie coudée (844a, 844b) coudée vers le premier prolongement (843a ; 843b) est fournie en outre à une extrémité du second prolongement (842a ; 842b), et l'élément rotatif (60 ; 50) est doté d'une rainure de réception (601 ; 501) destinée à recevoir la partie coudée (844a ; 844b), de telle sorte que la partie coudée (844a ; 844b) puisse être serrée dans la réunion de réception (601 ; 501).
5. Ensemble de pièces de contact de commutation selon la revendication 3 ou 4, dans lequel le premier prolongement (843a ; 843b) est également doté d'une première réunion de montage (845a ; 845b), l'élément rotatif (60 ; 50) est également doté d'un crochet de serrage (602 ; 502), et la première rainure de montage (845a ; 845b) et le crochet de serrage (602 ; 502) peuvent être montés et serrés ensemble.
6. Ensemble de pièces de contact de commutation selon la revendication 5, dans lequel le premier prolongement (843a ; 843b) est également doté d'une seconde rainure de montage (846a ; 846b), et l'élément rotatif (60 ; 50) est également doté d'un montant (603 ; 503), une extrémité de l'élément de réinitialisation (86a ; 86b) étant accrochée dans la seconde rainure de montage (846a ; 846b), et l'autre extrémité de l'élément de réinitialisation (86a ; 86b) étant emmanchée par-dessus le montant (603 ; 503).
7. Commutateur auxiliaire (100), dont un boîtier (10) est doté intérieurement d'au moins un ensemble de pièces de contact de commutation selon l'une quelconque des revendications 1 à 6, dans lequel l'ensemble de pièces de contact de commutation est placé sur au moins un côté du boîtier (10), et le porte-contact mobile (84a ; 84b) de l'ensemble de pièces de contact de commutation est connecté sélectivement à une plaque de rotation (60 ; 50) du commutateur auxiliaire (100) ; la première pièce de contact fixe (81a ; 81b) et la seconde pièce de contact fixe (82a ; 82b) sont chacune connectées à deux bornes de câblage (T2, T3 ; T5, T6) situées sur un côté du boîtier (10) ; et quand la plaque de rotation (60 ; 50) tourne, le contact mobile (85a ; 85b) peut être amené en contact avec le premier contact fixe (S2 ; S5) ou le second contact fixe (S3 ; S6) de manière à réaliser une commutation entre au moins deux circuits électrique.
8. Commutateur auxiliaire (100), dont un boîtier (10) est doté intérieurement de deux ensembles de pièces de contact de commutation selon l'une quelconque des revendications 1 à 6, et d'une première plaque de rotation (60) et d'une seconde plaque de rotation (50) qui sont agencées concentriquement, dans lequel un premier ensemble de pièces de contact de commutation et un second ensemble de pièces de contact de commutation sont respectivement placés sur deux côtés du boîtier (10), le porte-contact mobile (84a) du premier ensemble de pièces de contact de commutation est connecté à la première plaque de rotation (60) du commutateur auxiliaire (100), et le porte-contact mobile (84b) du second ensemble de pièces de contact de commutation est connecté à la seconde plaque de rotation (50) du commutateur auxiliaire (100), au fur et à mesure que la première plaque de rotation (60) tourne, le contact mobile (85a) peut être amené en contact avec le premier contact fixe (S2) ou le second contact fixe (S3), et au fur et à mesure que la seconde plaque de rotation (50) tourne, le contact mobile (85b) peut être amené en contact avec le premier contact fixe (S5) ou le second contact fixe (S6) de manière à réaliser une commutation entre quatre circuits électriques.

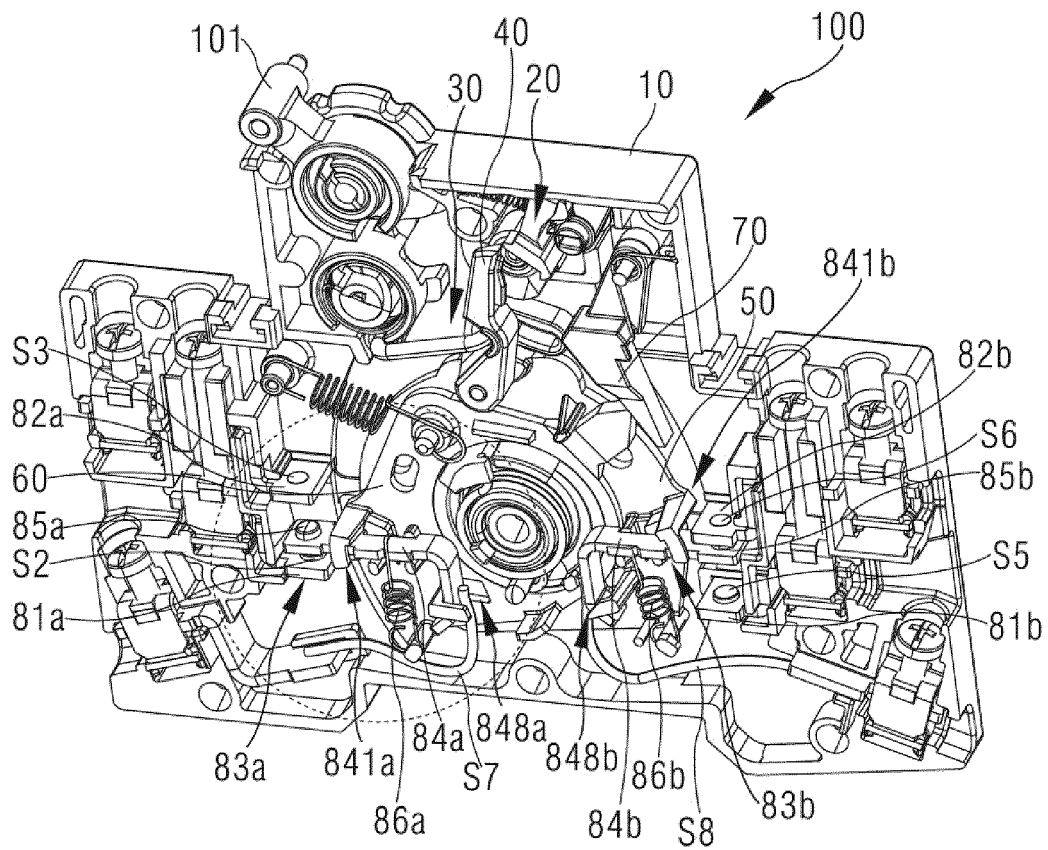


Fig. 1

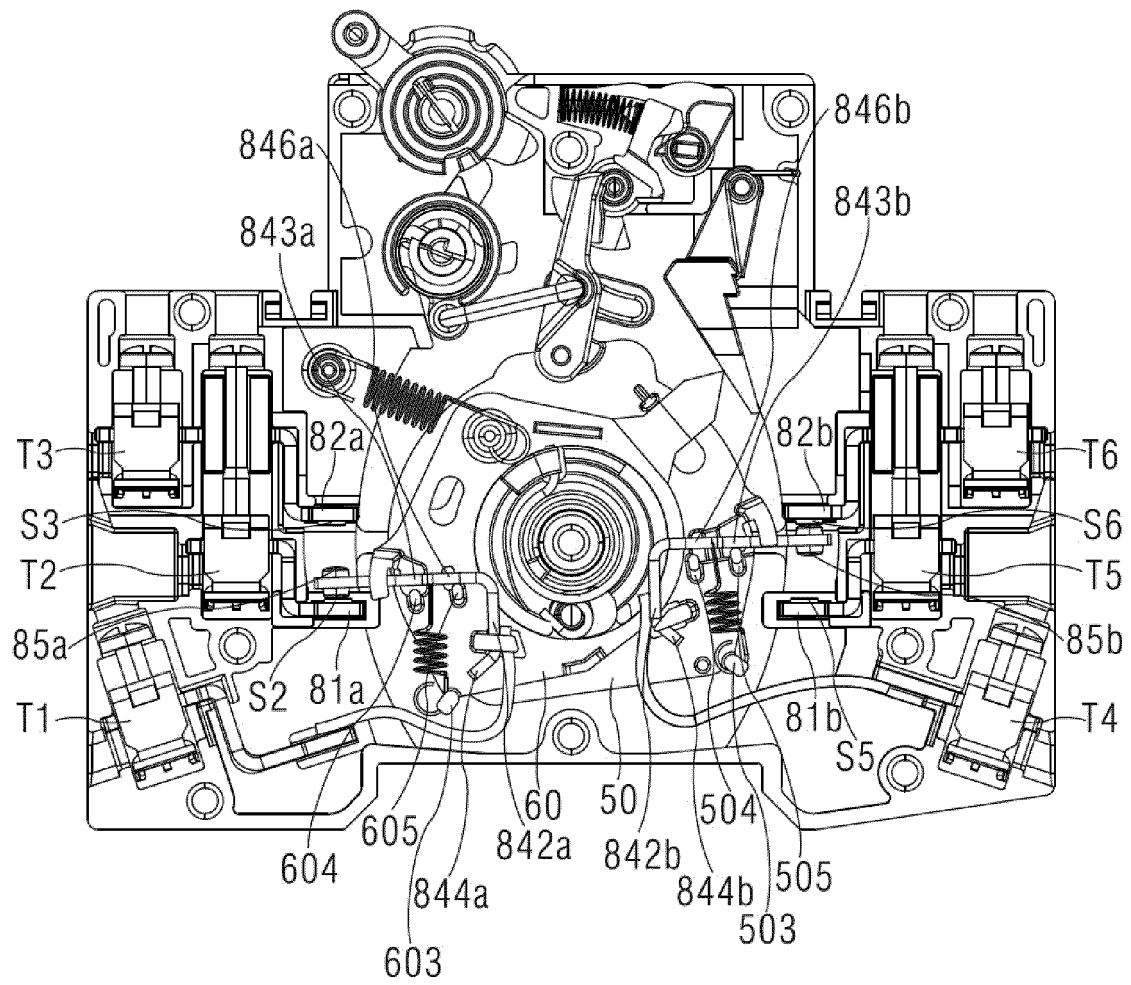


Fig. 2

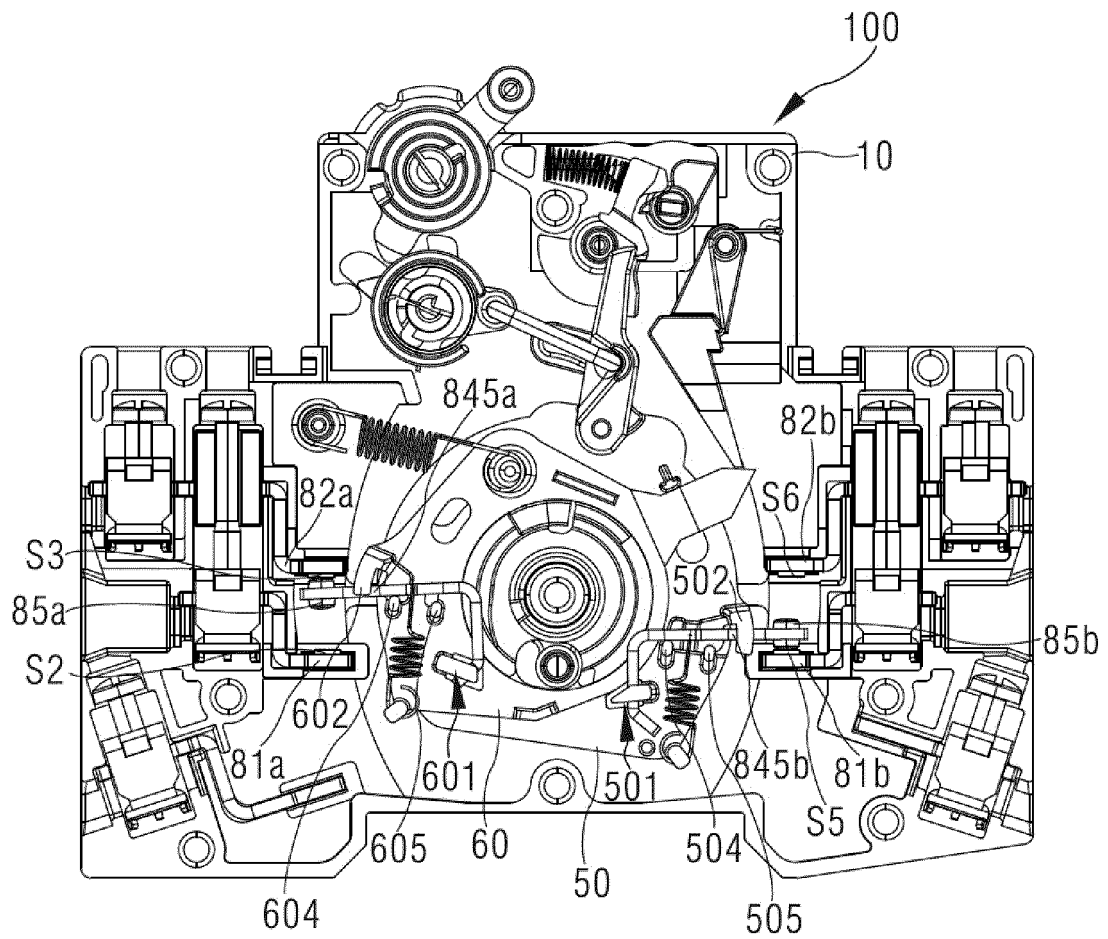


Fig. 3

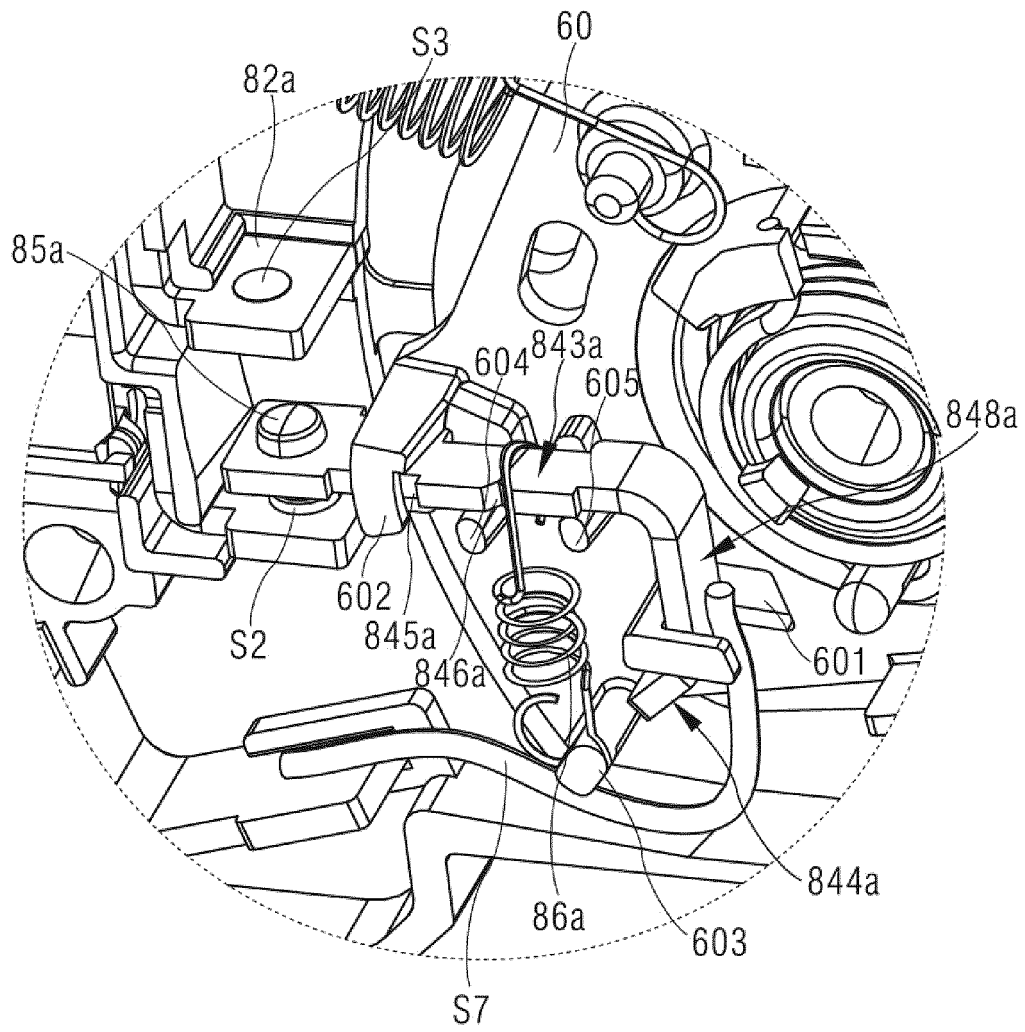


Fig. 4

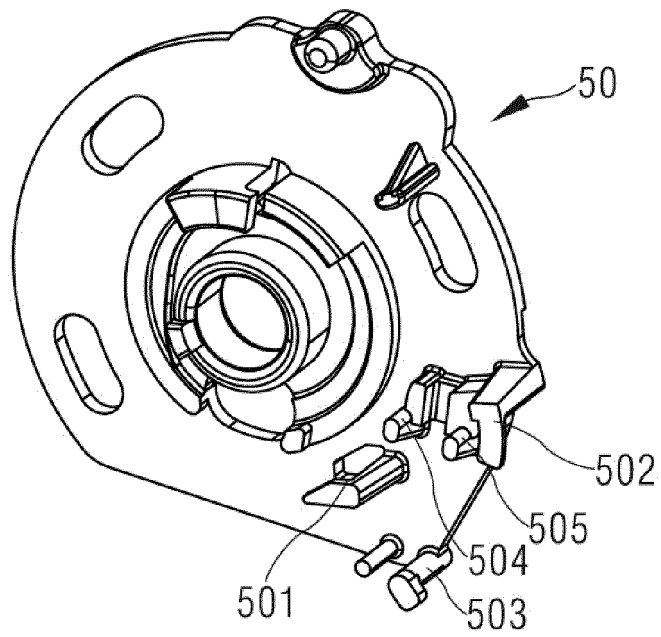


Fig. 5

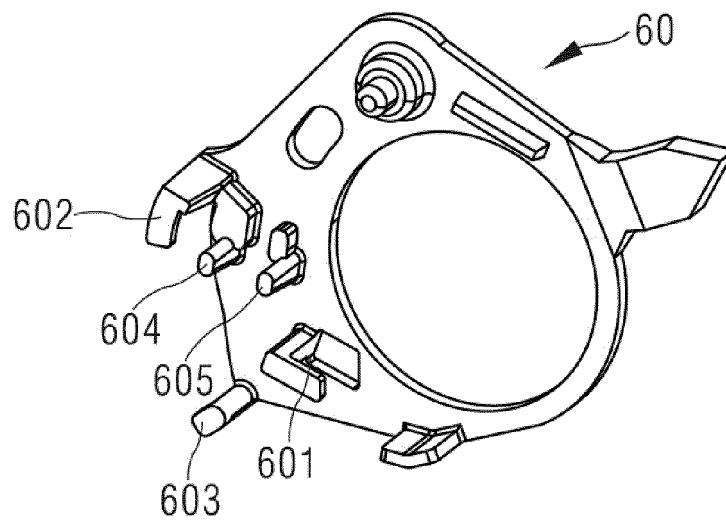


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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