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(54) **INTERLOCKING APPARATUS OF TRANSFER SWITCH**

(57) The present invention discloses an interlocking apparatus of transfer switch. The transfer switch comprises a primary side operation mechanism and a backup side operation mechanism. The interlocking apparatus comprises a primary side driving rod, a primary side driven rod, a primary side executing rod, a backup side driving rod, a backup side driven rod, and a backup side executing rod. The primary side driving rod moves following a movement of a main shaft of the primary side operation mechanism. The primary side driven rod is connected to the primary side driving rod. The primary side executing rod is connected to the primary side driven rod and is installed on a side plate of the backup side operation mechanism. The primary side executing rod rotates around a second fulcrum on the side plate of the backup side operation mechanism. The backup side driving rod moves following a movement of a main shaft of the backup side operation mechanism. The backup side driven rod is connected to the backup side driving rod. The backup side executing rod is connected to the backup side driven rod and is installed on a side plate of the primary side operation mechanism. The backup side executing rod rotates around a first fulcrum on the side plate of the primary side operation mechanism.

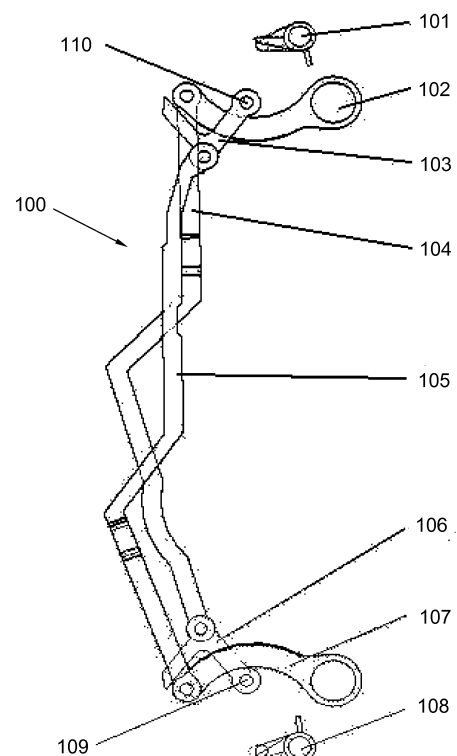


FIG 2

Description

Background of the invention

1. Field of the Invention

[0001] The present invention relates to the field of low voltage electrical apparatus, more particularly, to an interlocking apparatus of a transfer switch equipment (TSE).

2. The Related Art

[0002] Transfer switch equipments (TSE, here after "transfer switches") are used to transfer between two power supplies. When one of the power supplies is malfunctioned, such as loss of power, interruption or frequency shift, the transfer switch transfers a load circuit from the malfunctioned power supply to the other power supply, for example, from a primary side power supply to a backup side power supply, so that the power supply for important load circuits are ensured. The transfer switch may also be used to transfer between two load circuits. During a transfer procedure of the transfer switch, two groups of contacts within the transfer switch shall not close simultaneously.

[0003] In existing transfer switches, shifting forks are used to implement interlock between two power supplies. When one of the power supply is closed, a shifting fork (also called a retainer) holds a closing main shaft so that the other power supply is not able to close. Such a structure is adapted to small capacity transfer switches. For large capacity transfer switches, due to the large operation force and large impact force acted on the components, the shifting forks will bear a large force when it holds the closing main shaft or is driven by the closing main shaft. Therefore, the interlocking apparatus using shifting forks have the following disadvantages: low reliability, short service life and large volume.

[0004] The Chinese patent application with the application number 201110161233.6 and entitled "Interlocking Device of Transfer Switch" discloses an interlocking device of a transfer switch. The interlocking device comprises an upper part and a lower part with symmetrical structures, wherein the upper part and the lower part of the interlocking device are mounted symmetrically at an interval of an operation mechanism of the transfer switch. Each of the upper part and the lower part comprises an interlocking rod, a locking lever mounted on a side plate of a mechanism, an unlocking lever, a reset spring fixed between a lock catch and the unlocking lever, a stop pin positioned on the side plate, and a reset spring with one end fixed on the interlocking rod. A closing half shaft of either the upper part or the lower part of the operation mechanism rotates to push the interlocking rod to make a vertically translational motion during the rotation, and the other end of the interlocking rod leans against and locks the closing half shaft of the other part of the oper-

ation mechanism so as to fix the closing half shaft. When the closing half shafts of the upper and the lower parts of the operation mechanism move at the same time, the closing half shafts are leaned against by the interlocking rod of the other part respectively, thereby realizing interlock between a primary side power supply and a backup side power supply. The solution disclosed in this application is directed to large capacity transfer switches, the interlock function is realized by the locking lever, the unlocking lever and the reset springs. This solution has high difficulties in installation and commissioning, high accuracy is required.

[0005] The Chinese patent application with the application number 201110308801.0 and entitled "Interlocking Device of Transfer Switch" discloses an interlocking device of a transfer switch. The interlocking device comprises an upper part and a lower part with symmetrical structures, the interlocking device is mounted at an interval of an operation mechanism of the transfer switch, each of the upper part and the lower part comprises an interlocking rod, a stop pin located at an end of the interlocking rod, a reset spring with one end fixed on the interlocking rod, and an idler wheel located between the stop pin and the reset spring. An end of the interlocking rod extends out to form an arched upper protruding part. A main shaft of the upper part or the lower part of the operation mechanism drives a cantilever to rotate and push the interlocking rod to rotate around a rotation point. The protruding part on the interlocking rod presses a tripping rod on the other part of the operation mechanism so as to prevent the tripping rod from moving. Therefore, transfer between a primary side power supply and a backup side power supply is realized. The solution disclosed in this application is also directed to large capacity transfer switches. A closing main shaft directly drives a breaking shaft so as to realize the interlock function. The components shall bear a large force in this solution, the breaking shaft is easily to be damaged so the reliability of the device is low.

Summary

[0006] The present invention provides an interlocking apparatus of transfer switch with low difficulties in installation and commissioning, and the components of the interlocking apparatus are acted with a relatively small force.

[0007] According to an embodiment of the present invention, an interlocking apparatus of transfer switch is provided. The transfer switch comprises a primary side operation mechanism and a backup side operation mechanism. The interlocking apparatus comprises a primary side driving rod, a primary side driven rod, a primary side executing rod, a backup side driving rod, a backup side driven rod and a backup side executing rod. The primary side driving rod is connected to a main shaft of the primary side operation mechanism and moves following a movement of the main shaft. The primary side

driven rod is connected to the primary side driving rod. The primary side executing rod is connected to the primary side driven rod, the primary side executing rod is installed on a side plate of the backup side operation mechanism, the primary side executing rod rotates around a second fulcrum on the side plate of the backup side operation mechanism. The backup side driving rod is connected to a main shaft of the backup side operation mechanism and moves following a movement of the main shaft. The backup side driven rod is connected to the backup side driving rod. The backup side executing rod is connected to the backup side driven rod, the backup side executing rod is installed on a side plate of the primary side operation mechanism, the backup side executing rod rotates around a first fulcrum on the side plate of the primary side operation mechanism.

[0008] According to an embodiment, when the primary side operation mechanism is closed, the primary side driving rod moves following the movement of the main shaft of primary side operation mechanism and drives the primary side driven rod to move, the primary side driven rod drives the primary side executing rod to rotate around the second fulcrum on the side plate of the backup side operation mechanism and press a backup side breaking half shaft of the backup side operation mechanism so as to prevent the backup side operation mechanism from closing. When the primary side operation mechanism is open, the primary side driving rod moves following the movement of the main shaft of the primary side operation mechanism and resets, the primary side driving rod drives the primary side executing rod to reset via the primary side driven rod, the backup side breaking half shaft of the backup side operation mechanism is released and the backup side operation mechanism is able to close.

[0009] According to an embodiment, the primary side driving rod is curved, the primary side driven rod is bent, the primary side executing rod is forked; the primary side driving rod, the primary side driven rod and the primary side executing rod are connected in sequence to constitute a multi linkage mechanism. The primary side driving rod, the primary side driven rod and the primary side executing rod are disposed in sequence from upper to lower.

[0010] According to an embodiment, when the backup side operation mechanism is closed, the backup side driving rod moves following the movement of main shaft of the backup side operation mechanism and drives the backup side driven rod to move, the backup side driven rod drives the backup side executing rod to rotate around the first fulcrum on the side plate of the primary side operation mechanism and press a primary side breaking half shaft of the primary side operation mechanism so as to prevent the primary side operation mechanism from closing. When the backup side operation mechanism is open, the backup side driving rod moves following the movement of the main shaft of the backup side operation mechanism and resets, the backup side driving rod drives

the backup side executing rod to reset via the backup side driven rod, the primary side breaking half shaft of the primary side operation mechanism is released and the primary side operation mechanism is able to close.

[0011] According to an embodiment, the backup side driving rod is curved, the backup side driven rod is bent, the backup side executing rod is forked; the backup side driving rod, the backup side driven rod and the backup side executing rod are connected in sequence to constitute a multi linkage mechanism. The backup side driving rod, the backup side driven rod and the backup side executing rod are disposed in sequence from lower to upper.

[0012] According to an embodiment, the interlocking apparatus is installed at an interval of the primary side operation mechanism and the backup side operation mechanism.

[0013] The interlocking apparatus of transfer switch according to the present invention has advantages of simple structure, high reliability and small volume. The interlocking apparatus prevents the primary side power supply and the backup side power supply from simultaneous closing via interlocking rods driven by the rotation of the main shaft of the operation mechanism. The interlocking apparatus of the present invention is easy to implement, the interlocking apparatus is able to provide a reliable mechanical interlock between two mechanisms without increasing the volume of the product.

Brief description of the drawings

[0014] The above and other features, natures, and advantages of the invention will be apparent by the following description of the embodiments incorporating the drawings, wherein,

Fig. 1a and Fig. 1b disclose the structure where an interlocking apparatus of a transfer switch according to one embodiment of the present invention is installed between two operation mechanisms.

Fig. 2 discloses the structure of an interlocking apparatus of a transfer switch according to one embodiment of the present invention under an initial status, wherein the transfer switch is located at a middle position under the initial status.

Fig. 3 discloses the structure of an interlocking apparatus of a transfer switch according to one embodiment of the present invention under a status where the primary side operation mechanism is closed.

Fig. 4 discloses the structure of an interlocking apparatus of a transfer switch according to one embodiment of the present invention under a status where the backup side operation mechanism is closed.

Detailed description of embodiments

[0015] The interlocking apparatus provided in prior art have some disadvantages, for example, the solution dis-

closed in CN201110161233.6 has high difficulties in installation and commissioning and requires high accuracy during assembling. The solution disclosed in CN201110308801.0 acts a large force to the components and breaking shaft is easily to be damaged. The present invention provides an interlocking apparatus adapted for large capacity transfer switches. The interlocking apparatus has low difficulties in installation and commissioning, and the components of the interlocking apparatus bear a relatively small force. The interlocking apparatus of a transfer switch according to the present invention is adapted to large capacity transfer switches.

[0016] The present invention is designed as follows: an interlocking apparatus of a transfer switch adapted for two operation mechanisms that are disposed in an upper and lower arrangement. The interlocking apparatus has two linkage mechanisms disposed in a symmetrical upper and lower arrangement, each linkage mechanism has a driving rod, a driven rod and an executing rod. The interlocking apparatus is installed between two operation mechanisms of the transfer switch.

[0017] When the upper operation mechanism is closed, the driving rod of the upper linkage mechanism moves following a movement of a main shaft of the upper operation mechanism. The driving rod drives the driven rod to move and the driven rod drives the executing rod to move. The executing rod presses a breaking half shaft of the lower operation mechanism so that the lower operation mechanism is not able to close. When the upper operation mechanism is open, the driving rod of the upper operation mechanism drives the driven rod to move and the driven rod drives the executing rod to move. The executing rod releases the breaking half shaft of the lower operation mechanism and the lower operation mechanism is able to close. Similarly, when the lower operation mechanism is closed, the driving rod of the lower linkage mechanism moves following a movement of a main shaft of the lower operation mechanism. The driving rod drives the driven rod to move and the driven rod drives the executing rod to move. The executing rod presses a breaking half shaft of the upper operation mechanism so that the upper operation mechanism is not able to close. When the lower operation mechanism is open, the driving rod of the lower operation mechanism drives the driven rod to move and the driven rod drives the executing rod to move. The executing rod releases the breaking half shaft of the upper operation mechanism and the upper operation mechanism is able to close.

[0018] As required, the upper operation mechanism and the lower operation mechanism may be one of a primary side operation mechanism and a backup side operation mechanism respectively. Generally, the upper operation mechanism is the primary side operation mechanism and the lower operation mechanism is the backup side operation mechanism. The interlocking apparatus may implement a mechanical interlock between a primary side power supply and a backup side power supply.

[0019] Referring to Fig. 1 to Fig. 4, the present invention discloses an interlocking apparatus of a transfer switch. The transfer switch comprises a primary side operation mechanism 111 and a backup side operation mechanism 112. The interlocking apparatus 100 comprises: a primary side driving rod 102, a primary side driven rod 104, a primary side executing rod 106, a backup side driving rod 107, a backup side driven rod 105 and a backup side executing rod 103. The primary side driving rod 102 is connected to a main shaft of the primary side operation mechanism 111 and moves following a movement of the main shaft. The primary side driven rod 104 is connected to the primary side driving rod 102. The primary side executing rod 106 is connected to the primary side driven rod 104. The primary side executing rod 106 is installed on a side plate of the backup side operation mechanism 112. The primary side executing rod 106 rotates around a second fulcrum 109 on the side plate of the backup side operation mechanism 112. The backup side driving rod 107 is connected to a main shaft of the backup side operation mechanism 112 and moves following a movement of the main shaft. The backup side driven rod 105 is connected to the backup side driving rod 107. The backup side executing rod 103 is connected to the backup side driven rod 105. The backup side executing rod 103 is installed on a side plate of the primary side operation mechanism 111. The backup side executing rod 103 rotates around a first fulcrum 110 on the side plate of the primary side operation mechanism 111.

[0020] In one embodiment, when the primary side operation mechanism 111 is closed, the primary side driving rod 102 moves following the movement of the main shaft of the primary side operation mechanism 111 and drives the primary side driven rod 104 to move. The primary side driven rod 104 drives the primary side executing rod 106 to rotate around the second fulcrum 109 on the side plate of the backup side operation mechanism 112 and press a backup side breaking half shaft 108 of the backup side operation mechanism 112 so as to prevent the backup side operation mechanism 112 from closing. When the primary side operation mechanism 111 is open, the primary side driving rod 102 moves following the movement of main shaft of the primary side operation mechanism 111 and resets. The primary side driving rod 102 drives the primary side executing rod 106 to reset via the primary side driven rod 104. The backup side breaking half shaft 108 of the backup side operation mechanism 112 is released and the backup side operation mechanism 112 is able to close.

[0021] The primary side driving rod 102 is curved, the primary side driven rod 104 is bent, the primary side executing rod 106 is forked. The primary side driving rod 102, the primary side driven rod 104 and the primary side executing rod 106 are connected in sequence to constitute a multi linkage mechanism. Generally, the primary side operation mechanism 111 is disposed as an upper operation mechanism, thus the primary side driving rod 102, the primary side driven rod 104 and the primary side

executing rod 106 are disposed in sequence from upper to lower.

[0022] In one embodiment, when the backup side operation mechanism 112 is closed, the backup side driving rod 107 moves following the movement of a main shaft of the backup side operation mechanism 112 and drives the backup side driven rod 105 to move. The backup side driven rod 105 drives the backup side executing rod 103 to rotate around the first fulcrum 110 on the side plate of the primary side operation mechanism 111 and press a primary side breaking half shaft 101 of the primary side operation mechanism 111 so as to prevent the primary side operation mechanism 111 from closing. When the backup side operation mechanism 112 is open, the backup side driving rod 107 moves following the movement of the main shaft of the backup side operation mechanism 112 and resets. The backup side driving rod 107 drives the backup side executing rod 103 to reset via the backup side driven rod 105. The primary side breaking half shaft 101 of the primary side operation mechanism 111 is released and the primary side operation mechanism 111 is able to close.

[0023] The backup side driving rod 107 is curved, the backup side driven rod 105 is bent, the backup side executing rod 103 is forked. The backup side driving rod 107, the backup side driven rod 105 and the backup side executing rod 103 are connected in sequence to constitute a multi linkage mechanism. Generally, the backup side operation mechanism 112 is disposed as a lower operation mechanism, thus backup side driving rod 107, the backup side driven rod 105 and the backup side executing rod 103 are disposed in sequence from lower to upper.

[0024] The interlocking apparatus 100 is installed at an interval of the primary side operation mechanism 11 and the backup side operation mechanism 12.

[0025] Continue with Fig. 1 to Fig. 4, Fig. 1 to Fig. 4 disclose an interlocking apparatus of a transfer switch according to an embodiment of the present invention. Fig. 1a and Fig. 1b disclose the structure where an interlocking apparatus of a transfer switch according to one embodiment of the present invention is installed between two operation mechanisms. Fig. 2 to Fig. 4 disclose the conditions where the transfer switch is located at different positions and the interlocking apparatus is under different working status. Fig. 2 discloses the structure of the interlocking apparatus under an initial status, where the transfer switch is located at a middle position under the initial status. Fig. 3 discloses the structure of an interlocking apparatus under a status where the primary side operation mechanism is closed. Fig. 4 discloses the structure of an interlocking apparatus under a status where the backup side operation mechanism is closed.

[0026] The interlocking apparatus 100 of a transfer switch comprise an upper part and a lower part with symmetrical structures. The interlocking apparatus 100 is installed at an interval between the two operation mechanisms of the transfer switch, for example, at an interval

between the primary side operation mechanism 111 and the backup side operation mechanism 112. As shown in Fig. 1a and Fig. 1b, the interlocking apparatus 110 is installed symmetrically and crosswise at the interval between the operation mechanisms of the transfer switch. The primary side operation mechanism 111 acts as an upper operation mechanism and the backup side operation mechanism acts as a lower operation mechanism.

[0027] As to the upper rod linkage mechanism, that is, the primary side rod linkage mechanism, the primary side driving rod 102 is welded on a main shaft of the primary side operation mechanism 111, the primary side driving rod 102 is curved. The primary side driven rod 104 is designed with a special shape, such as bent, the primary side driven rod 104 is connected to the primary side driving rod 102. The primary side executing rod 106 is connected to the primary side driven rod 104. The primary side driving rod, the primary side driven rod and the primary side executing rod are disposed and connected in sequence from upper to lower so as to constitute a multi linkage mechanism.

[0028] When the upper operation mechanism, that is, the primary side operation mechanism 111 is closed, the primary side driving rod 102 moves following the movement of the main shaft of the primary side operation mechanism 111 and drives the primary side driven rod 104 to move. The primary side driven rod 104 drives the primary side executing rod 106 to rotate around the second fulcrum 109 on the side plate of the lower operation mechanism, that is, the backup side operation mechanism 112. The primary side executing rod 106 presses a backup side breaking half shaft 108 of the backup side operation mechanism 112, so that the backup side operation mechanism 112 is not able to close, as shown in Fig. 3. When the upper operation mechanism, that is, the primary side operation mechanism 111 is open, the primary side driving rod 102 moves following the movement of main shaft of the primary side operation mechanism 111 and resets. The primary side executing rod 106 resets through a linkage of the multi linkage mechanism. The backup side breaking half shaft 108 of the backup side operation mechanism 112 is released and the backup side operation mechanism 112 is able to close.

[0029] As to the lower rod linkage mechanism, that is, the backup side rod linkage mechanism, the backup side driving rod 107 is welded on a main shaft of the backup side operation mechanism 112, the backup side driving rod 107 is curved. The backup side driven rod 105 is designed with a special shape, such as bent, the backup side driven rod 105 is connected to the backup side driving rod 107. The backup side executing rod 103 is connected to the backup side driven rod 105. The backup side driving rod, the backup side driven rod and the backup side executing rod are disposed and connected in sequence from lower to upper so as to constitute a multi linkage mechanism.

[0030] When the lower operation mechanism, that is, the backup side operation mechanism 112 is closed, the

backup side driving rod 107 moves following the movement of a main shaft of the backup side operation mechanism 112. The backup side driving rod 107 drives the backup side driven rod 105 to move. The backup side driven rod 105 drives the backup side executing rod 103 to rotate around the first fulcrum 110 on the side plate of the upper operation mechanism, that is, the primary side operation mechanism 111. The backup side executing rod 103 presses a primary side breaking half shaft 101 of the primary side operation mechanism 111, so that the primary side operation mechanism 111 is not able to close, as shown in Fig. 4. When the lower operation mechanism, that is, the backup side operation mechanism 112 is open, the backup side executing rod 103 resets through a linkage of the multi linkage mechanism. The primary side breaking half shaft 101 of the primary side operation mechanism 111 is released and the primary side operation mechanism 111 is able to close.

[0031] When the primary side operation mechanism and the backup side primary side operation mechanism are both open, the transfer switch is located at a middle position and the interlocking apparatus is located at an initial position, as shown in Fig. 2. When the power supply of either side closes, the power supply of the other side is not able to close because its breaking half shaft is pressed.

[0032] The interlocking apparatus of a transfer switch according to the present invention has advantages of simple structure, high reliability and small volume. The interlocking apparatus prevents the primary side power supply and the backup side power supply from simultaneous closing via interlocking rods driven by the rotation of the main shaft of the operation mechanism. The interlocking apparatus of the present invention is easy to implement, the interlocking apparatus is able to provide a reliable mechanical interlock between two mechanisms without increasing the volume of the product.

[0033] The above embodiments are provided to those skilled in the art to realize or use the invention, under the condition that various modifications or changes being made by those skilled in the art without departing the spirit and principle of the invention, the above embodiments may be modified and changed variously, therefore the protection scope of the invention is not limited by the above embodiments, rather, it should conform to the maximum scope of the innovative features mentioned in the Claims.

Claims

1. An interlocking apparatus of a transfer switch, wherein the transfer switch comprises a primary side operation mechanism and a backup side operation mechanism, the interlocking apparatus comprising:

a primary side driving rod connected to a main shaft of the primary side operation mechanism,

wherein the primary side driving rod moves following a movement of the main shaft;

a primary side driven rod connected to the primary side driving rod;

a primary side executing rod connected to the primary side driven rod, wherein the primary side executing rod is installed on a side plate of the backup side operation mechanism, the primary side executing rod rotates around a second fulcrum on the side plate of the backup side operation mechanism;

a backup side driving rod connected to a main shaft of the backup side operation mechanism, wherein the backup side driving rod moves following a movement of the main shaft;

a backup side driven rod connected to the backup side driving rod;

a backup side executing rod connected to the backup side driven rod, wherein the backup side executing rod is installed on a side plate of the primary side operation mechanism, the backup side executing rod rotates around a first fulcrum on the side plate of the primary side operation mechanism.

2. The interlocking apparatus of a transfer switch according to claim 1, wherein when the primary side operation mechanism is closed, the primary side driving rod moves following the movement of the main shaft of the primary side operation mechanism and drives the primary side driven rod to move, the primary side driven rod drives the primary side executing rod to rotate around the second fulcrum on the side plate of the backup side operation mechanism and press a backup side breaking half shaft of the backup side operation mechanism so as to prevent the backup side operation mechanism from closing.
3. The interlocking apparatus of a transfer switch according to claim 2, wherein when the primary side operation mechanism is open, the primary side driving rod moves following the movement of the main shaft of the primary side operation mechanism and resets, the primary side driving rod drives the primary side executing rod to reset via the primary side driven rod, the backup side breaking half shaft of the backup side operation mechanism is released and the backup side operation mechanism is able to close.
4. The interlocking apparatus of a transfer switch according to claim 3, wherein the primary side driving rod is curved, the primary side driven rod is bent, the primary side executing rod is forked; the primary side driving rod, the primary side driven rod and the primary side executing rod are connected in sequence to constitute a multi linkage mechanism.

5. The interlocking apparatus of a transfer switch according to claim 4, wherein the primary side driving rod, the primary side driven rod and the primary side executing rod are disposed in sequence from upper to lower. 5

6. The interlocking apparatus of a transfer switch according to claim 1, wherein when the backup side operation mechanism is closed, the backup side driving rod moves following the movement of the main shaft of the backup side operation mechanism and drives the backup side driven rod to move, the backup side driven rod drives the backup side executing rod to rotate around the first fulcrum on the side plate of the primary side operation mechanism and press a primary side breaking half shaft of the primary side operation mechanism so as to prevent the primary side operation mechanism from closing. 10 15

7. The interlocking apparatus of a transfer switch according to claim 6, wherein when the backup side operation mechanism is open, the backup side driving rod moves following the movement of the main shaft of the backup side operation mechanism and resets, the backup side driving rod drives the backup side executing rod to reset via the backup side driven rod, the primary side breaking half shaft of the primary side operation mechanism is released and the primary side operation mechanism is able to close. 20 25 30

8. The interlocking apparatus of a transfer switch according to claim 7, wherein the backup side driving rod is curved, the backup side driven rod is bent, the backup side executing rod is forked; the backup side driving rod, the backup side driven rod and the backup side executing rod are connected in sequence to constitute a multi linkage mechanism. 35

9. The interlocking apparatus of a transfer switch according to claim 7, wherein the backup side driving rod, the backup side driven rod and the backup side executing rod are disposed in sequence from lower to upper. 40

10. The interlocking apparatus of a transfer switch according to claim 1, wherein the interlocking apparatus is installed at an interval of the primary side operation mechanism and the backup side operation mechanism. 45 50

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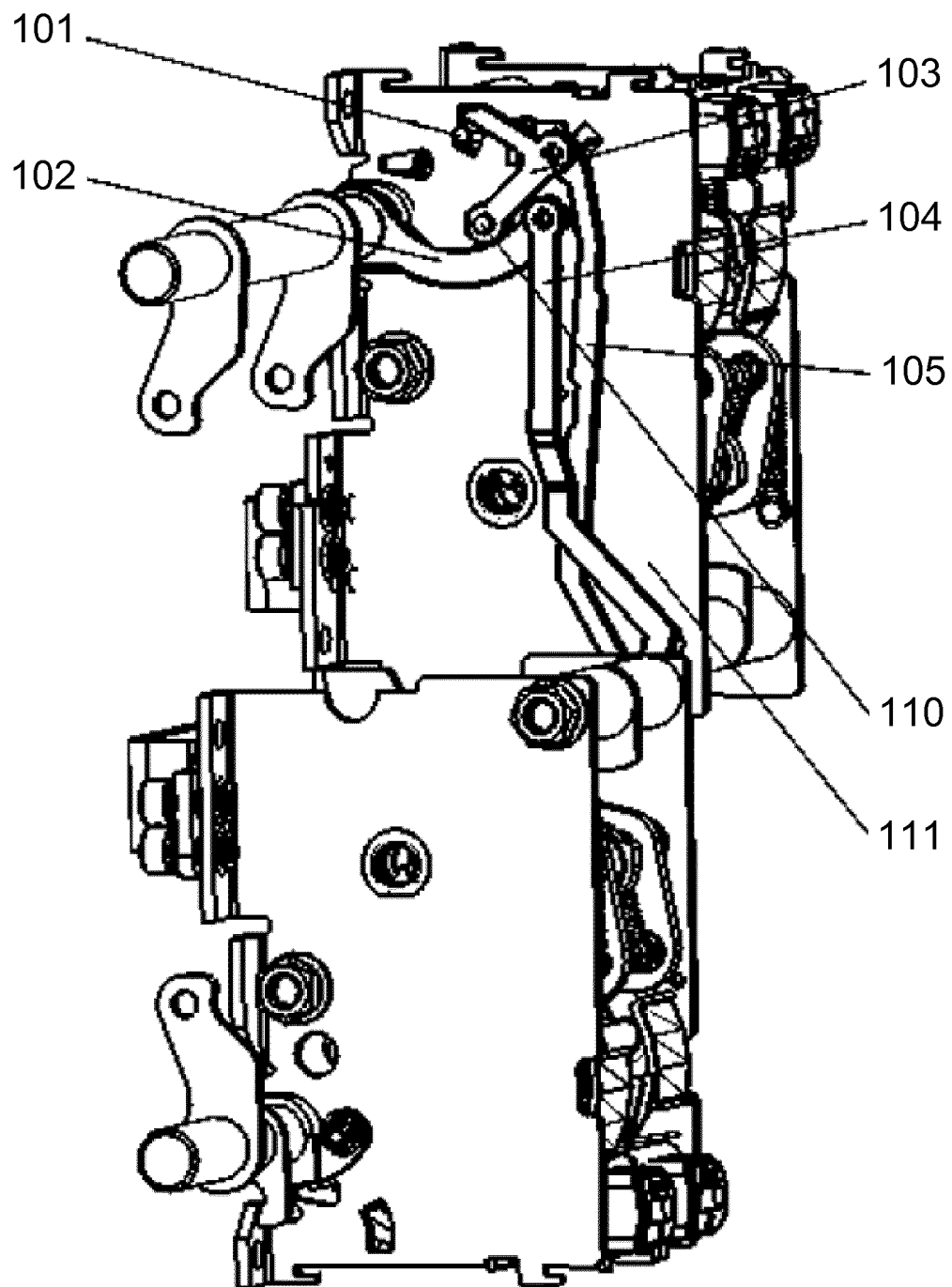


FIG 1a

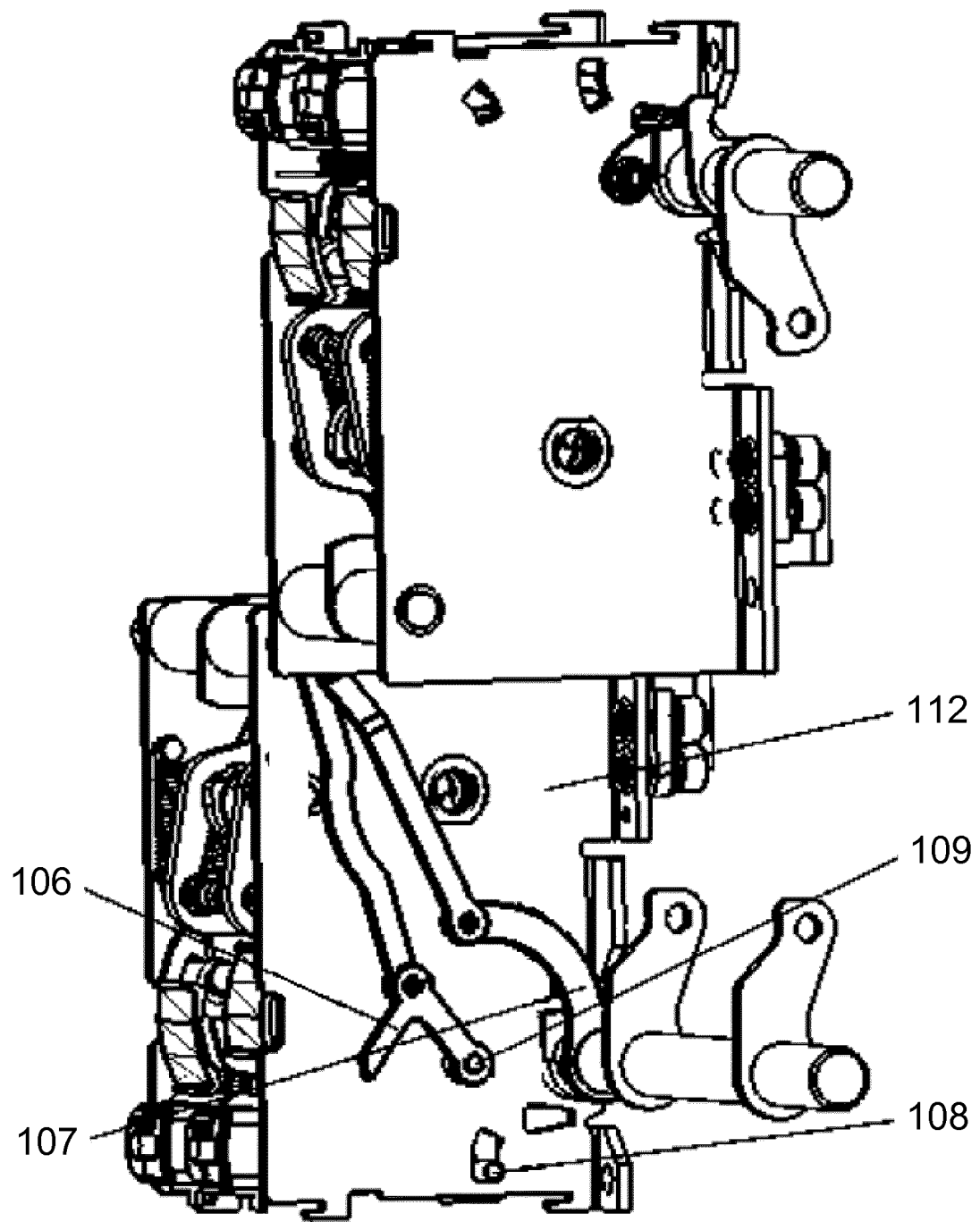


FIG 1b

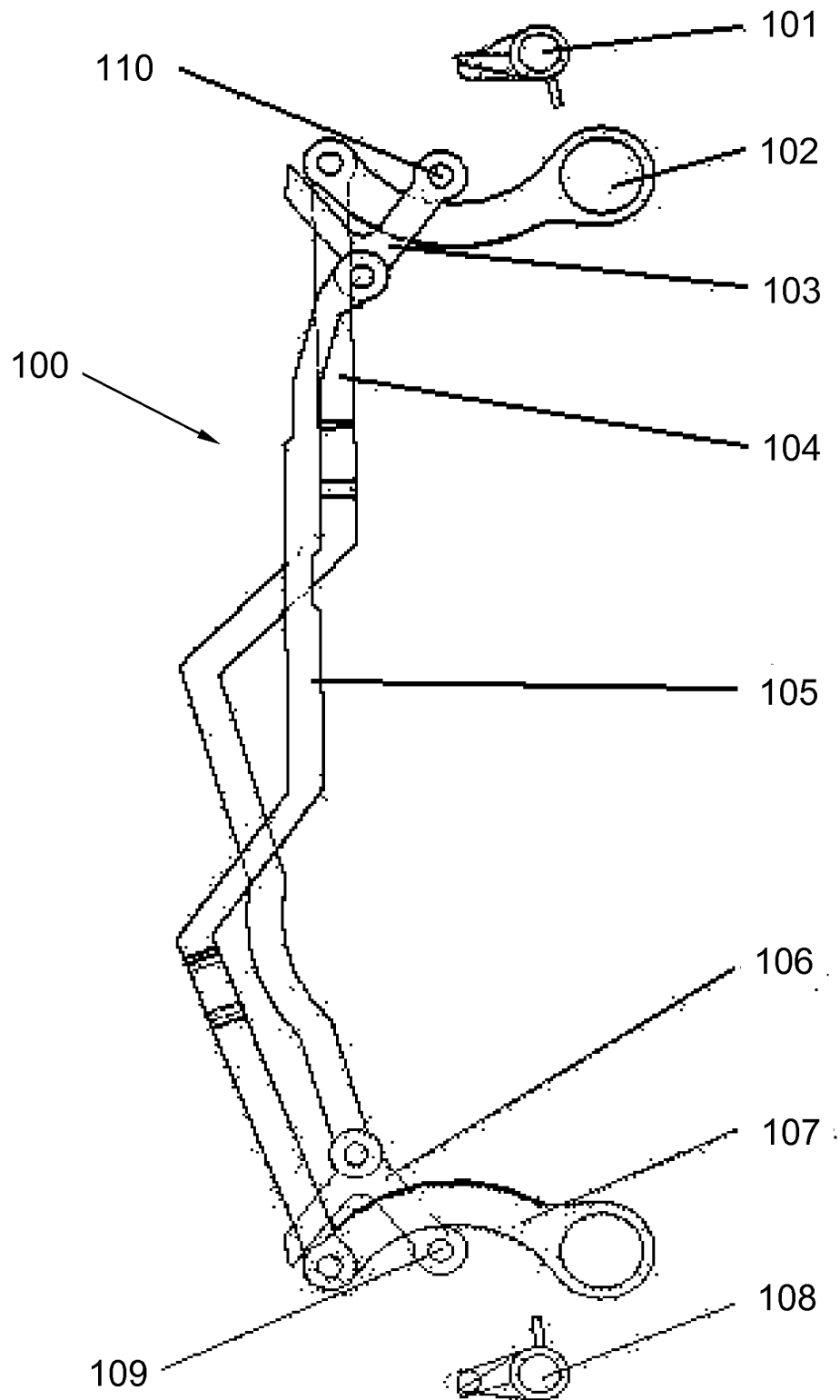


FIG 2

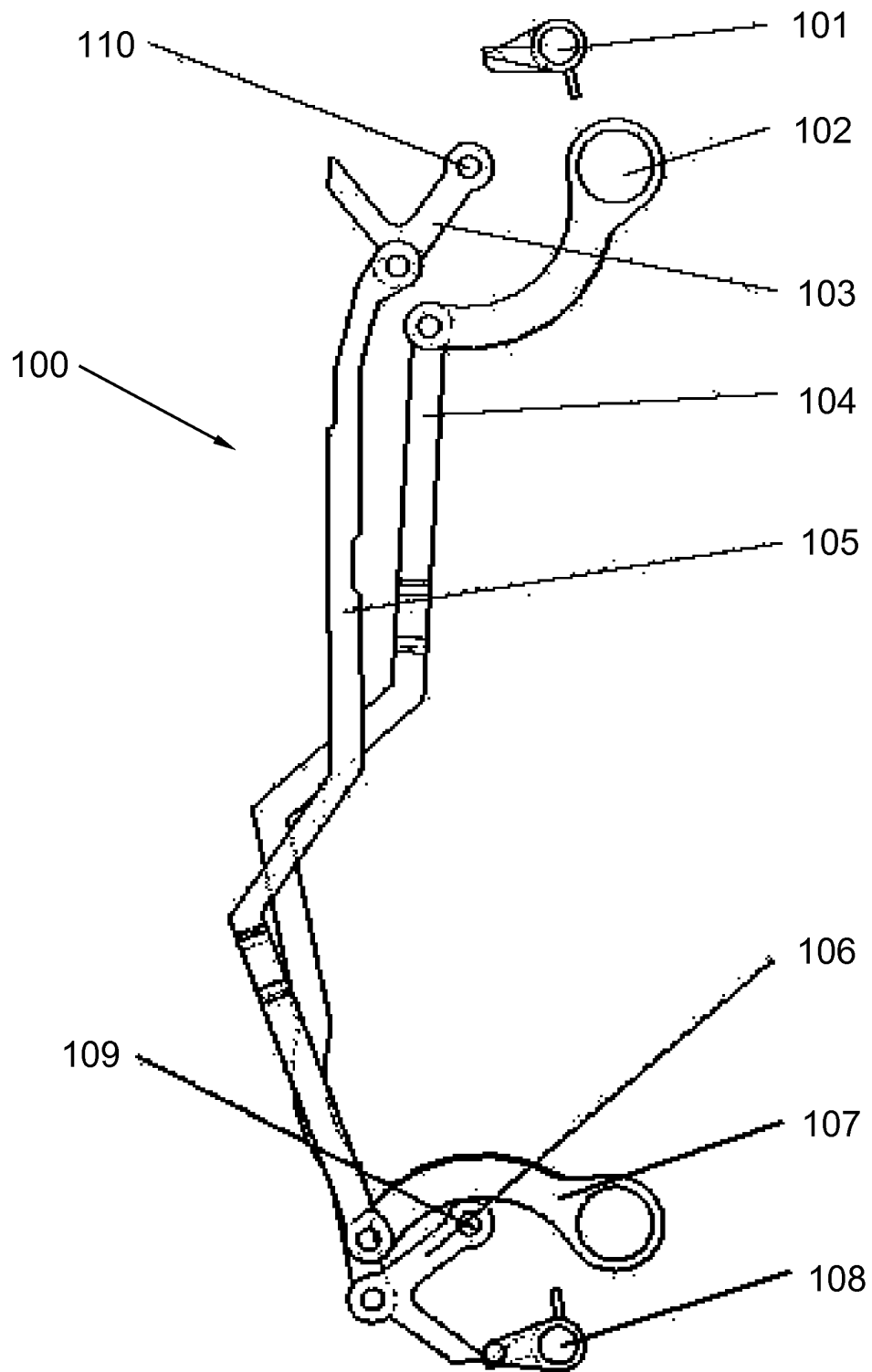


FIG 3

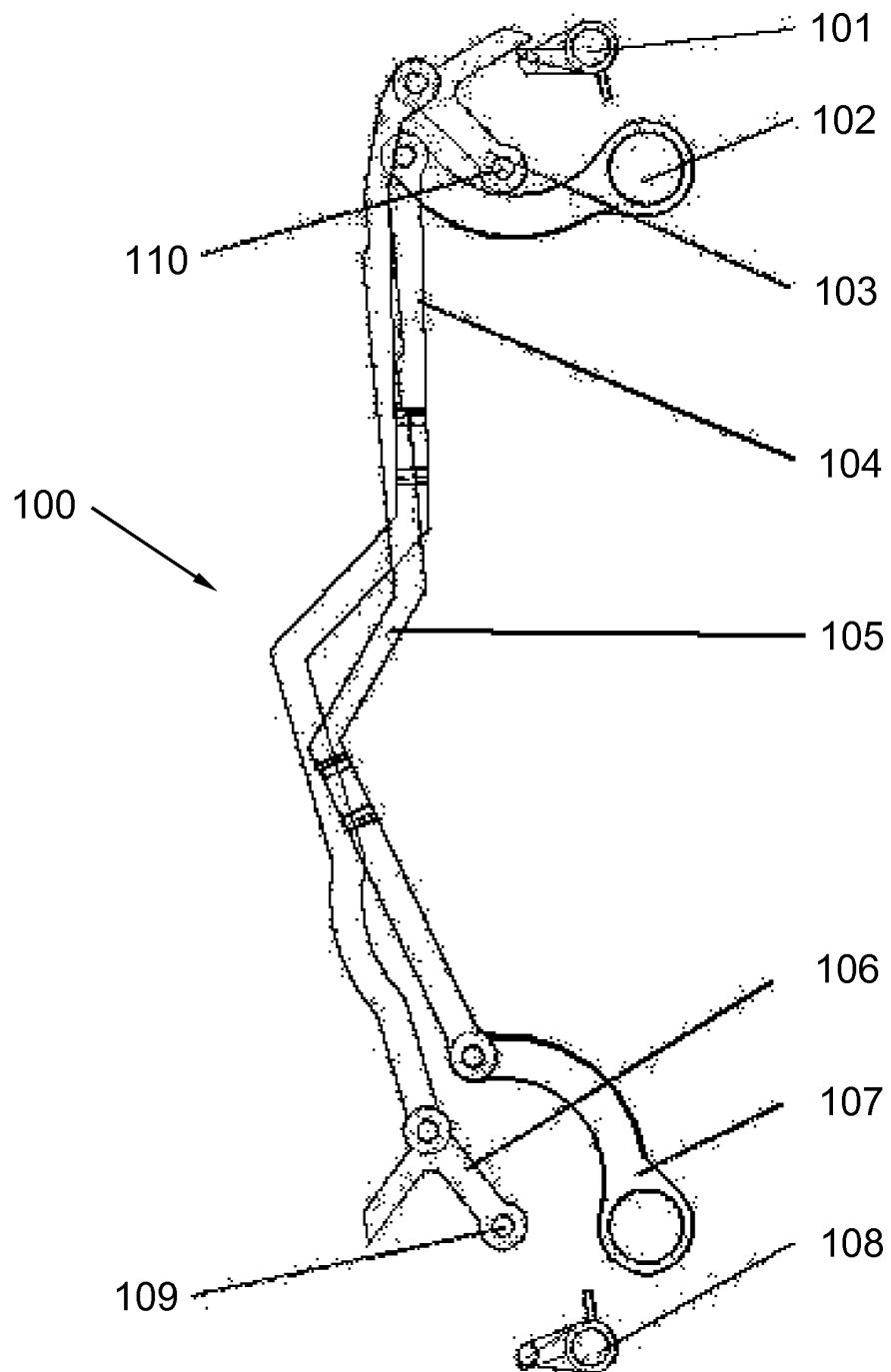


FIG 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/082439

A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, CNPAT, CNKI: power, double, standby, bypass, spare, interlock, latch, transfer, switch

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 102543518 A (HUANYU GROUP CO LTD) 04 July 2012 (04.07.2012) the whole document	1-10
A	KR 100840384 B1 (O-SUNG ELECTRIC MACHINERY CO LTD) 23 June 2008 (23.06.2008) the whole document	1-10
A	KR 100787905 B1 (O-SUNG ELECTRIC MACHINERY CO LTD) 27 December 2007 (27.12.2007) the whole document	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search
18 November 2013 (18.11.2013)

Date of mailing of the international search report
12 December 2013 (12.12.2013)

Name and mailing address of the ISA
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Haidian District, Beijing 100088, China
Facsimile No. (86-10) 62019451

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RAN, Chunyan
Telephone No. (86-10) 62411745

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2013/082439

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 102543518 A	04.07.2012	None	
KR 100840384 B1	23.06.2008	KR 20070018742 A	14.02.2007
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/082439

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A. CLASSIFICATION OF SUBJECT MATTER

H01H 9/24 (2006.01) i
H01H 9/26 (2006.01) i

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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