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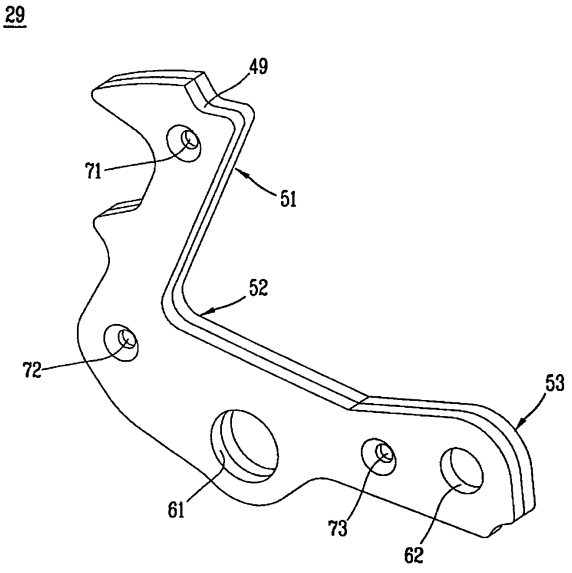
(54) Air circuit breaker and link thereof

(57) An air circuit breaker comprising: a cam (22) connected to a rotational shaft (21) to be rotated; a driving lever (24) connected to the cam to be rotated; a closing spring (25) connected to the driving lever to be compressed by the rotation of the driving lever; and a plurality of links (29,34,35) for transferring a tensile force generated when the closing spring is tensioned to a switching shaft connected to a movable contact, wherein at least one (29) of the plurality of links has a structure that a plurality of members are coupled to one another, whereby operation reliability of the air circuit breaker can be enhanced and a lifetime thereof can be elongated by preventing abrasion or damage from being occurred on the links during the operation of the air circuit breaker.

FIG. 8



EP 1 914 777 A1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an air circuit breaker, and particularly, to an air circuit breaker capable of improving operation reliability thereof by employing an intensity-enhanced link, and a link used in the air circuit breaker.

2. Background of the Invention

[0002] In general, an air circuit breaker is a device for breaking a circuit when occurring an on/off state of a load, overload, short circuit, power leakage, electric shock, and the like.

[0003] As shown in Figs. 1 to 3, a related art air circuit breaker may comprise a switching mechanism 102 for switching on and/or off a circuit by moving a movable contact 138 toward a terminal 139. The switching mechanism 102 may comprise: a cam 122 connected to a rotational shaft 121 to be rotated automatically or manually; a driving lever 124 rotatably disposed at a frame 109 which supports both sides of the switching mechanism 102 and having a lever roller 123 so as to be rotated when the lever roller 123 is rotated along a curved surface of the cam 122 by the rotation of the cam 122; a closing spring 125 having one end connected to a lower end portion of the driving lever 124 and the other end supported at the frame 109 to accumulate elastic energy generated by being compressed when the driving lever 124 is rotated by the rotation of the cam 122; a first latch 127 extending longitudinally to be elastically disposed at the frame 109 and having a particular recess at its lower side surface so as to be restrained when a pin 126 installed at the cam 122 is locked by the recess; a closing switch 128 disposed at an upper side of the first latch 127 to release the restraint of the first latch 127; a first link 129 rotatably installed at the rotational shaft 121 to extend longitudinally, having a lower end portion connected to an upper end portion of the driving lever 124 so as to be rotated by the rotation of the driving lever 124, and having a particular recess 149 at its upper side; a second latch 131 disposed at an upper side of the first link 129, having a latch roller 130 contacted with an upper surface of the first link 129, rotated by the rotation of the first link 129, and restrained when the latch roller 130 is locked by the recess 149 of the first link 129; an opening switch 132 disposed at an upper side of the second latch 131 so as to release the restraint of the second latch 131; a second link 134 having a lower end portion connected to the driving lever 124 together with the first link 129, and disposed to come in contact with a pin 133 formed at the driving lever 124; a third link 135 connected to an upper end of the second link 134 by a connection pin 141 to be rotated according to a displacement of the second link 134; a switching shaft 103 rotatably disposed at the frame 109, and connected to the third link 135 to be rotated by the movement of the third link 135; a connection shaft 136 for allowing the third link 135 to be connected to the switching shaft 103; an opening spring 137 having one end fixed to the connection shaft 136 and the other end supported at the frame 109; and a leg 140 fixed to the switching shaft 103 so as to allow the movable contact 138 to be moved toward the terminal 139 when the switching shaft 103 is rotated.

[0004] Here, the first link 129, as shown in Fig. 4, comprises: a first portion 151 coming in contact with the latch roller 130 of the second latch 131 and having the recess 149 by which the latch roller 130 is restrained; a second portion 152 extending from the first portion in a curved state and having an insertion hole 161 in which the rotational shaft 121 is inserted so as to be supported at the rotational shaft 121; and a third portion 153 extending downwardly from the second portion 152 and having a connection hole 162 to be connected to the driving lever 124.

[0005] On the other hand, a stopper 142 disposed below the third portion 153 of the first link 129 for preventing the first link 129 from being rotated over a particular displacement when the air circuit breaker performs its breakage operation is supported at the frame 109.

[0006] The related art air circuit breaker having such configuration may perform a charging operation of accumulating elastic energy in the closing spring 125, a closing operation of connecting the movable contact 138 onto the terminal 139 by an elastic restoring force of the closing spring 125, and a breakage operation of disconnecting the movable contact 138 from the terminal 139.

[0007] First, in the charging operation of the air circuit breaker, as shown in Fig. 2, when the movable contact 138 in a state of being separated (disconnected) from the terminal 139 is rotated automatically or manually, the cam 122 is rotated and accordingly the driving lever 124 is rotated, thereby compressing the closing spring 125.

[0008] In the closing operation of the air circuit breaker, as shown in Fig. 3, an elastic force of the closing spring 125 is transferred to each link element of the switching mechanism 102, such that the switching shaft 103 connected to the third link 135 is rotated. Accordingly, the movable contact 138 is connected to the terminal 139 so as to be conducted. During this operation, the opening spring 137 is tensioned by the movement of the connection shaft 136.

[0009] Also, in the breakage operation of the air circuit breaker, when breaking a circuit, the movable contact 138 is separated from the terminal 139 by an elastic restoring force of the opening spring 137, so as to be returned to its original state as shown in Fig. 1.

[0010] Among the operations of the related art air circuit breaker performed as described above, during the charging operation, the first link 129 rotated centering around the rotational shaft 121 according to the rotation of the driving lever 124, and the second latch 131 is re-

strained as the latch roller 130 of the second latch 131 is locked by the recess 149 of the first link 129. Here, a contact force of the latch roller 130 and a load of the second latch 131 are applied to the first portion 151 of the first link 129.

[0011] During the closing operation of the air circuit breaker, the connection pin 141 for connecting the second link 134 to the third link 135 is collided at the second portion 152 of the first link 129. Accordingly, part of a tensile force generated when the closing spring 125 is drastically tensioned and loads of the second and third links 134 and 135 are applied to the second portion 152 of the first link 129.

[0012] During the breakage operation of the air circuit breaker, the collision of the first link 129 onto the stopper 142 prevents the rotation of the first link 129 over a particular displacement. Here, a force generated when the first link 129 is collided onto the stopper 142 is applied to the third portion 153 of the first link 129.

[0013] As such, during the charging operation, the closing operation and the breakage operation of the air circuit breaker, great loads and impacts are applied to each portion of the first link 129, which may cause the first link 129 to be abraded and damaged, resulting in the generation of great deviation for the operation of the air circuit breaker. Also, upon opening/closing the air circuit breaker, power unbalance of a load is aggravated to cause damage on a load end. In addition, a lifetime of the air circuit breaker is drastically shortened.

[0014] Furthermore, a method for thickening the first link 129 may be employed in order to bear up against loads or impacts applied onto the first link 129. However, in case of increasing the thickness of the first link 129, it is difficult to fabricate the first link 129 having high intensity in a manner of a press forming. Alternatively, in case of performing cutting by using a laser or the like without the press forming, it increases cost of products.

SUMMARY OF THE INVENTION

[0015] Therefore, in order to solve the disadvantages and problems of the related art, an object of the present invention is to provide an air circuit breaker in which a link, to which great loads are applied during charging operation, closing operation and breakage operation of the air circuit breaker, is configured in a structure that plural members (plates) are coupled to one another so as to prevent abrasion and damage from being occurred on the link the link, whereby operation reliability of the air circuit break can be enhanced, a lifetime thereof can be elongated, and fabrication thereof can be facilitated with low cost.

[0016] To achieve this object in accordance with the purpose of the present invention, as embodied and broadly described herein, there is provided an air circuit breaker comprising: a cam connected to a rotational shaft to be rotated; a driving lever connected to the cam to be rotated; a closing spring connected to the driving lever to be compressed by the rotation of the driving lever; and a plurality of links for transferring a tensile force generated when the closing spring is tensioned to a switching shaft which is connected to a movable contact, wherein at least one of the plurality of links has a structure that plural members are coupled to one another.

[0017] The object can be achieved by the link of the air circuit breaker which is formed for a plurality of members to be layered with one another, and has a first portion, a second portion extending from the first portion in a curved state and having an insertion hole, and a third portion extending downwardly from the second portion and having a connection hole.

[0018] Preferably, any one of coupled points at which the plurality of members implementing the link are coupled to one another is located at the first portion, in order to improve intensity of the link when performing a charging operation of the air circuit breaker.

[0019] Preferably, any one of coupled points at which the plurality of members implementing the link are coupled to one another is located at the second portion, in order to improve intensity of the link when performing a closing operation of the air circuit breaker.

[0020] Preferably, any one of coupled points at which the plurality of members implementing the link are coupled to one another is located at the third portion, in order to improve intensity of the link when performing a breakage operation of the air circuit breaker.

[0021] The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

[0023] In the drawings:

Fig. 1 is a sectional view showing a related art air circuit breaker;

Fig. 2 is a sectional view of a sate where a closing spring of the related art air circuit breaker is compressed;

Fig. 3 is sectional view of a connected state of the related art air circuit breaker;

Fig. 4 is a front view of a link of the related art air circuit breaker;

Fig. 5 is a sectional view of an air circuit breaker according to the present invention;

Fig. 6 is a sectional view of a sate where a closing spring of the air circuit breaker according to the present invention is compressed;

Fig. 7 is a sectional view of a connected state of the air circuit breaker according to the present invention;
Fig. 8 is a perspective view of a link of the air circuit breaker according to the present invention; and
Fig. 9 is a lateral view of the link of the air circuit breaker according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0024] Description will now be given in detail of an air circuit breaker according to the present invention, with reference to the accompanying drawings.

[0025] As shown in Figs. 5 to 7, an air circuit breaker according to the present invention may comprise a switching mechanism 2 for opening/closing a circuit by moving a movable contact 38 toward a terminal 39. The switching mechanism 2 may comprise: a cam 22 connected to a rotational shaft 21 to be rotated automatically or manually; a driving lever 23 rotatably disposed at a frame 9 which supports both sides of the switching mechanism 2 and having a lever roller 23 so as to be rotated when the lever roller 23 is operated along a curved surface of the cam 22 by the rotation of the cam 22; a closing spring 25 having one end connected to a lower end portion of the driving lever 24 and the other end supported at the frame 9 so as to accumulate elastic energy generated when being compressed by the rotation of the driving lever 24 in conjunction with the rotation of the cam 22; a first latch 27 extending longitudinally to be elastically installed at the frame 9, and having a particular recess at its lower side surface such that it is restrained when a pin 26 disposed at the cam 22 is locked by the recess; a closing switch 28 disposed at an upper side of the first latch 27 to release the restraint of the first latch 27; a first link 29 rotatably disposed at the rotational shaft 21 to extend longitudinally, having a lower end portion of the first link 29 connected to an upper end portion of the driving lever 24 so as to be rotated by the rotation of the driving lever 24, and having a particular recess 49 at its upper side; a second latch 31 disposed at an upper side of the first link 29, and having a latch roller 30 in contact with an upper surface of the first link 29 to be rotated by the rotation of the first link 29, wherein the second latch 31 is restrained when the latch roller 30 is locked by the recess 49 of the first link 29; an opening switch 32 disposed at an upper side of the second latch 31 to release the restraint of the second latch 31; a stopper 42 disposed at a lower side of the frame 9 to prevent the rotation of the first link 29 over a certain displacement when the air circuit breaker performs a breakage operation; a second link 34 having a lower end portion connected to the driving lever 24 together with the first link 29, and disposed to come in contact with a pin 33 formed at the driving lever 24; a third link 35 connected to an upper end of the second link 34 by a connection pin 41 to be rotated according to a displacement of the second link 34; a switching shaft 3 rotatably disposed at the frame 9 and connected to the third link 35 to be rotated by the movement of the third link 35; a connection shaft 36 for allowing the third link 35 to be connected to the switching shaft 3; an opening spring 37 having one end fixed to the connection shaft 36 and the other end supported at the frame 9; and a leg 40 fixed to the switching shaft 3 to move the movable contact 38 toward the terminal 39 when the switching shaft 3 is rotated.

[0026] Here, during a closing operation of the air circuit breaker, loads or impacts may be applied to a plurality of links for transferring a tensile force generated when the closing spring 25 is tensioned. The plurality of links have a structure that plural members are coupled to one another in order to improve intensity against the loads or impacts.

[0027] Hereinafter, links having enhanced intensity will be described with reference to the first link 29.

[0028] As shown in Fig. 8, the first link 29 has a structure that a plurality of members are, for example, layered with each other. The first link 29 may comprise a first portion 51 with which the latch roller 30 of the second latch 31 comes in contact and having the recess 49 by which the latch roller 30 is restrained; a second portion 52 extending from the first portion 51 in a curved state and having an insertion hole 61 in which the rotational shaft 21 is inserted so as to be rotatably supported at the rotational shaft 21; and a third portion 53 extending downwardly from the second portion 52 and having a connection hole 62 such that the third portion 53 is connected to the driving lever 24.

[0029] As shown in Fig. 9, the first link 29 is configured such that a plurality of members are coupled to each other at plural coupling points 71, 72 and 73 by coupling members 81, 82 and 83, such as rivets or screws. However, the first link 29 of the present invention may not be limited to this configuration. A plurality of members may be coupled to each other in a manner of a spot welding.

[0030] Meanwhile, during a charging operation of the air circuit breaker, when the second latch 31 is restrained as the latch roller 30 of the second latch 31 is locked by the recess 49 of the first link 29, a contact force of the latch roller 30 and a load of the second latch 31 are applied to the first portion 51 of the first link 29. Accordingly, in order to enhance the intensity of the first link 29, one (e.g., 71) of the coupling points 71, 72 and 73 at which a plurality of members configuring the first link 29 are coupled to each other is preferably located at the first portion 51.

[0031] Also, during a closing operation of the air circuit breaker, when the connection pin 41 for connecting the second link 34 to the third link 35 is collided on the second portion 52 of the first link 29, part of a tensile force generated when the closing spring 25 is drastically tensioned and loads of the second and third links 34 and 35 are applied to the second portion 52 of the first link 29. Accordingly, in order to enhance the intensity of the first link 29, one (e.g., 72) of the coupling points 71, 72 and 73 at which a plurality of members configuring the first link 29 are coupled to each other is preferably located at the

second portion 52.

[0032] During a breakage operation of the air circuit breaker, when the first link 29 is collided on the stopper 42, a tensile force is generated, which is then applied to the third portion 53 of the first link 29. Accordingly, in order to enhance the intensity of the first link 29, one (e.g., 73) of the coupling points 71, 72 and 73 at which a plurality of members configuring the first link 29 are coupled to each other is preferably located at the third portion 53.

[0033] The air circuit breaker according to the present invention having such configuration may perform a charging operation of accumulating elastic energy in the closing spring 25, a closing operation of connecting the movable contact 38 to the terminal 39 by an elastic restoring force of the closing spring 25, and a breakage operation of disconnecting the movable contact 38 from the terminal 39.

[0034] First, in the charging operation of the air circuit breaker, as shown in Fig. 6, when the rotational shaft 21 is rotated automatically or manually in a state where the movable contact 38 is disconnected from the terminal 39, the cam 22 is rotated. Accordingly, the driving lever 24 is rotated so as to compress the closing spring 25.

[0035] In the closing operation of the air circuit breaker, as shown in Fig. 7, the elastic energy of the closing spring 25 is transferred to each link of the switching mechanism 2 to allow the switching shaft 3 connected to the third link 35 to be rotated. Accordingly, the movable contact 38 is connected to the terminal 39 to be conducted. In this operation, the opening spring 37 is tensioned by the movement of the connection shaft 36.

[0036] In the breakage operation of the air circuit breaker, an elastic restoring force of the opening spring 37 tensioned when a circuit is broken separates (disconnects) the movable contact 38 from the terminal 39. Accordingly, the movable contact 38 is returned to its original state as shown in Fig. 5.

[0037] In the air circuit breaker according to the present invention, the first link 29 is configured such that the plurality of members are coupled to one another, and thereby the intensity of the first link 29 can be enhanced without thickening the first link 29. Therefore, it is possible to prevent an occurrence of abrasion or damage of the first link 29 caused by loads or impacts applied to each portion of the first link 29 during the charging operation, the closing operation and the breakage operation of the air circuit breaker. Accordingly, it is effective to improve operation reliability of the air circuit breaker and to elongate the lifetime thereof.

[0038] Also, in the air circuit breaker according to the present invention, the coupling points 71, 72 and 73 at which the plurality of members configuring the first link 29 are located at portions to which the loads are applied during the charging operation, the closing operation and the breakage operation of the air circuit breaker. Accordingly, it is effective to appropriately deal with the loads or impacts applied to each portion of the first link 29.

[0039] The foregoing embodiments and advantages are merely exemplary and are not to be construed as limiting the present disclosure. The present teachings can be readily applied to other types of apparatuses. This description is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art. The features, structures, methods, and other characteristics of the exemplary embodiments described herein may be combined in various ways to obtain additional and/or alternative exemplary embodiments.

[0040] As the present features may be embodied in several forms without departing from the characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalents of such metes and bounds are therefore intended to be embraced by the appended claims.

Claims

1. A link of an air circuit breaker disposed in the air circuit breaker which comprises a switching mechanism for converting a rotation motion of a rotational shaft to compress a closing spring such that a movable contact is moved by an elastic restoring force of the closing spring, so as to open/close a circuit,
   wherein the link of the air circuit breaker is configured such that a plurality of members are coupled to one another.

2. The link of claim 1, wherein the link is configured such that a plurality of members are layered with one another.

3. The link of claim 1, wherein the plurality of members configuring the link are coupled to one another by at least one coupling member.

4. The link of claim 3, wherein the coupling member is located at a portion to which a load is applied.

5. A link of an air circuit breaker, which is formed for a plurality of members to be layered with one another, the link comprising:

   a first portion;
   a second portion extending from the first portion in a curved state and having an insertion hole; and
   a third portion extending downwardly from the second portion and having a connection hole.

6. The link of claim 5, wherein any one of coupled points at which the plurality of members implementing the link are coupled to one another is located at the first portion, in order to improve intensity of the link when performing a charging operation of the air circuit breaker.

7. The link of claim 5, wherein any one of coupled points at which the plurality of members implementing the link are coupled to one another is located at the second portion, in order to improve intensity of the link when performing a closing operation of the air circuit breaker.

8. The link of claim 5, wherein any one of coupled points at which the plurality of members implementing the link are coupled to one another is located at the third portion, in order to improve intensity of the link when performing a breakage operation of the air circuit breaker.

9. An air circuit breaker comprising:

a cam connected to a rotational shaft to be rotated;
a driving lever connected to the cam to be rotated;
a closing spring connected to the driving lever to be compressed by the rotation of the driving lever; and
a plurality of links for transferring a tensile force generated when the closing spring is tensioned to a switching shaft connected to a movable contact,

wherein at least one of the plurality of links has a structure that a plurality of members are coupled to one another.

FIG. 1

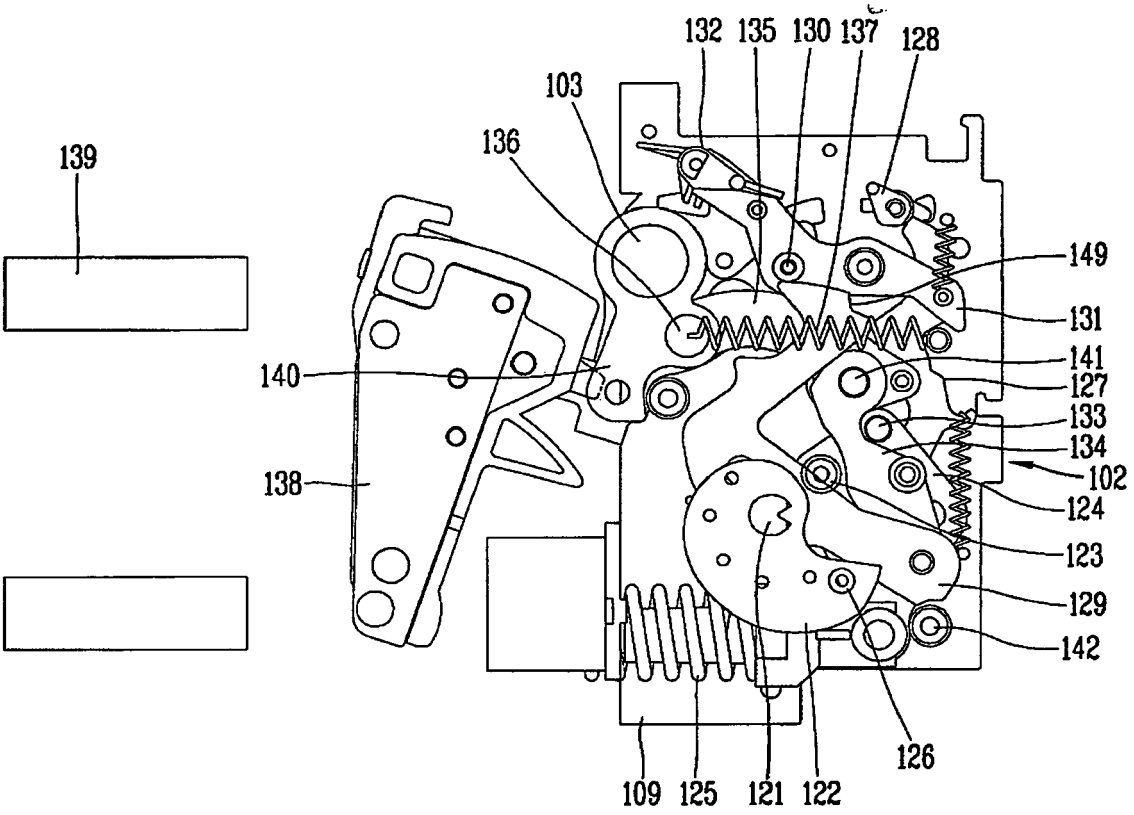

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FIG. 2

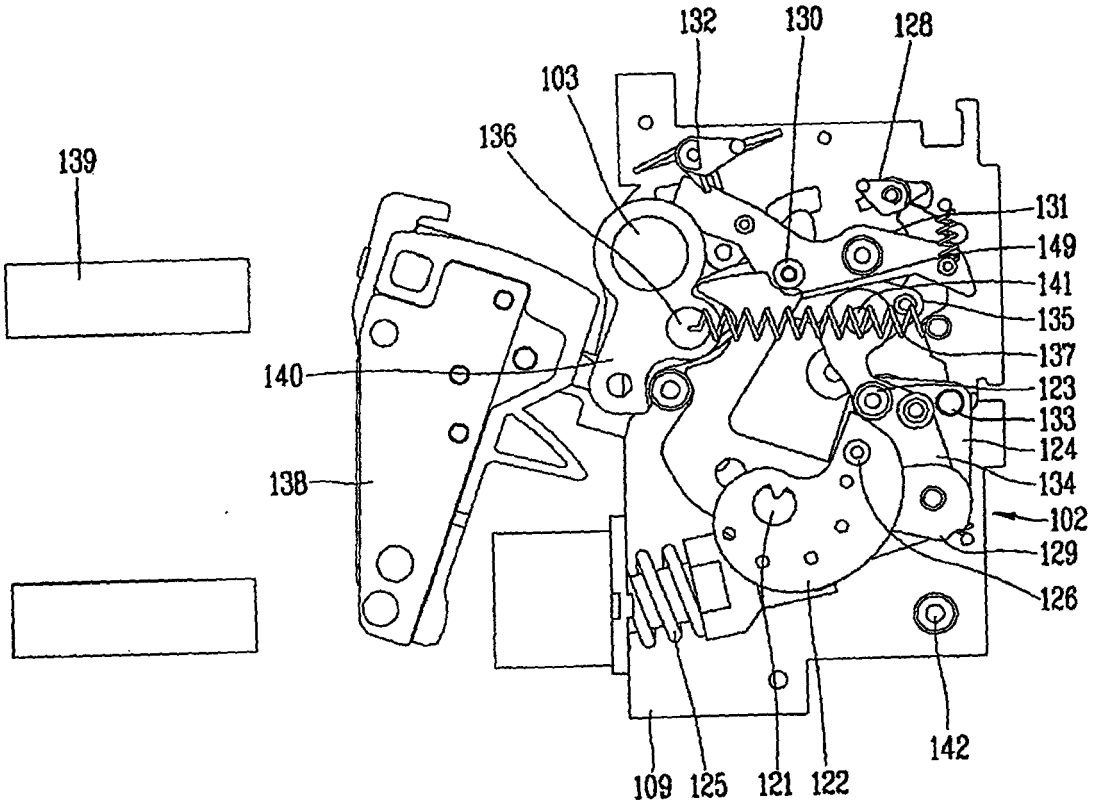
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FIG. 3

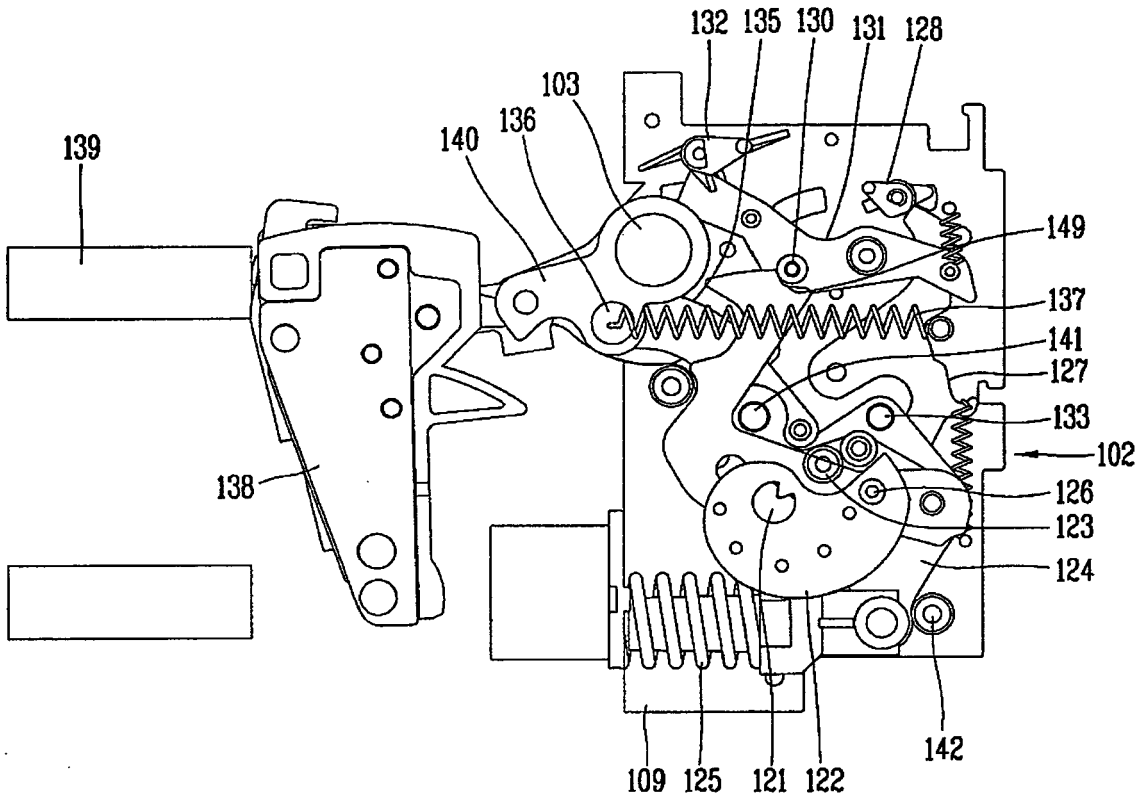
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FIG. 4

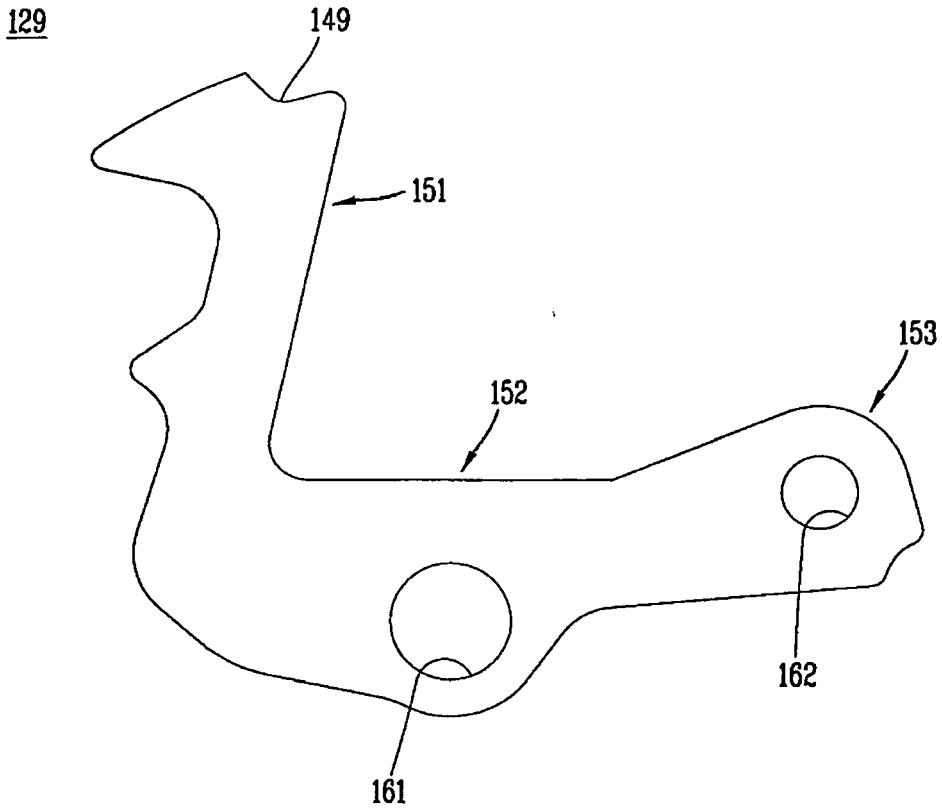


FIG. 5

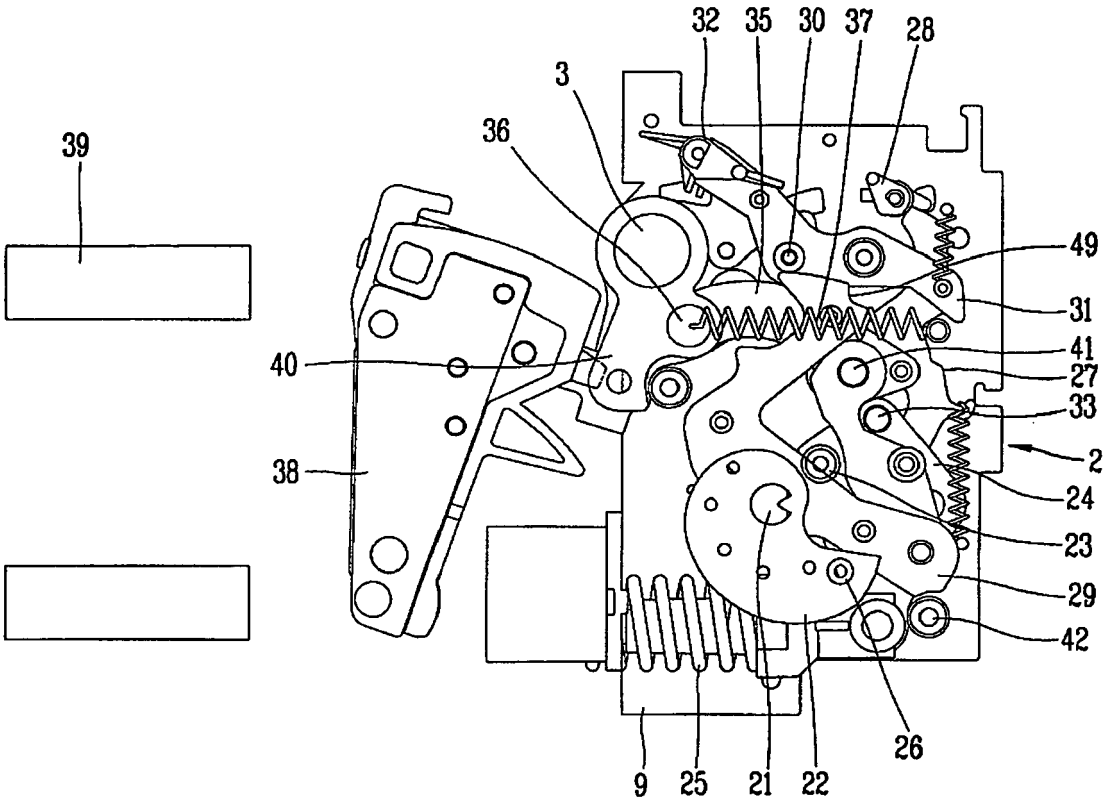


FIG. 6

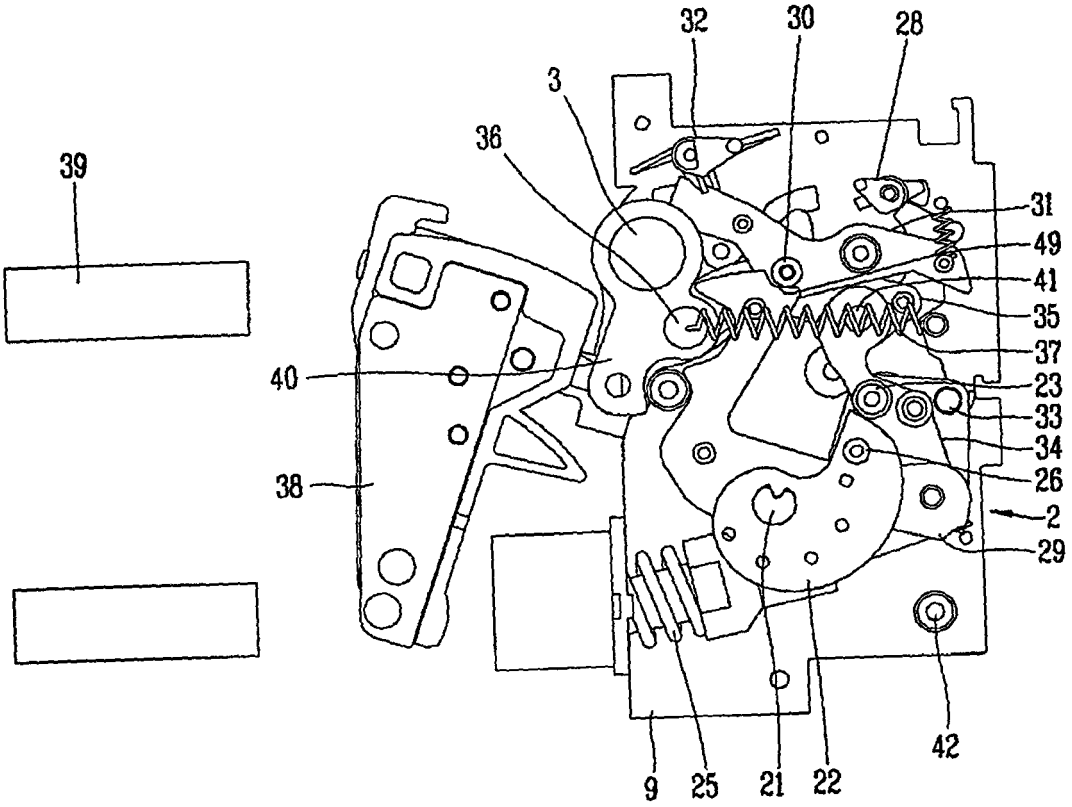


FIG. 7

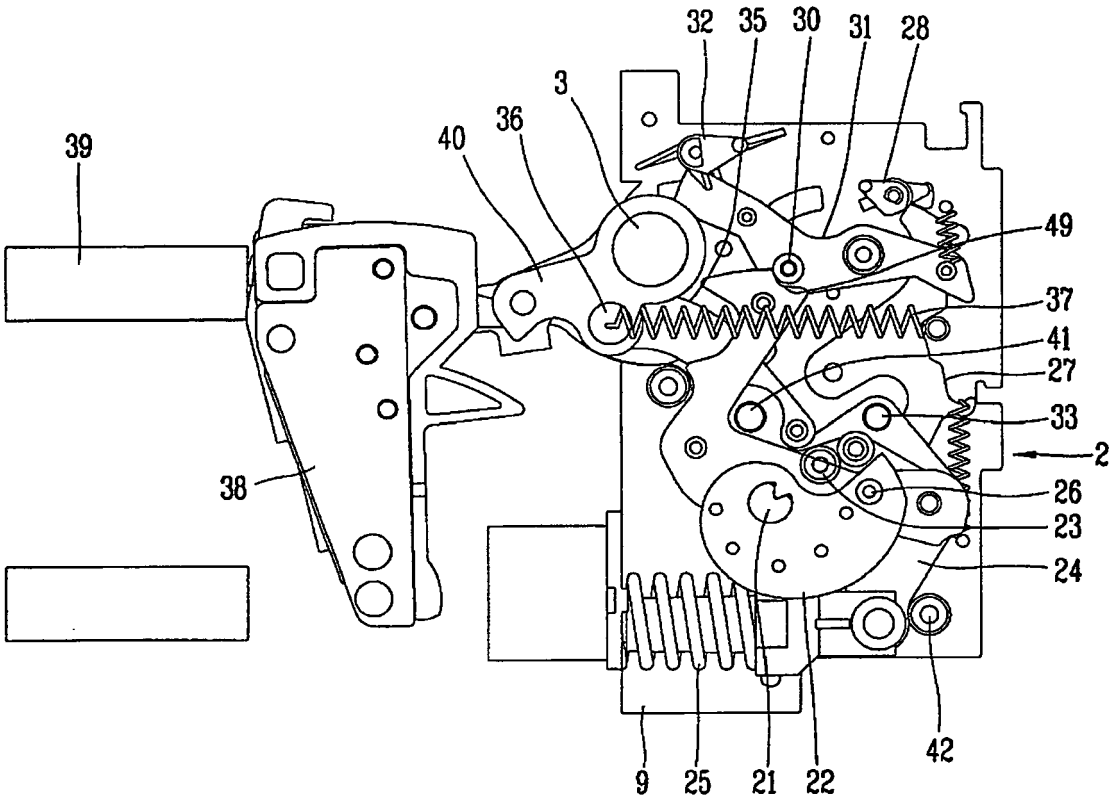


FIG. 8

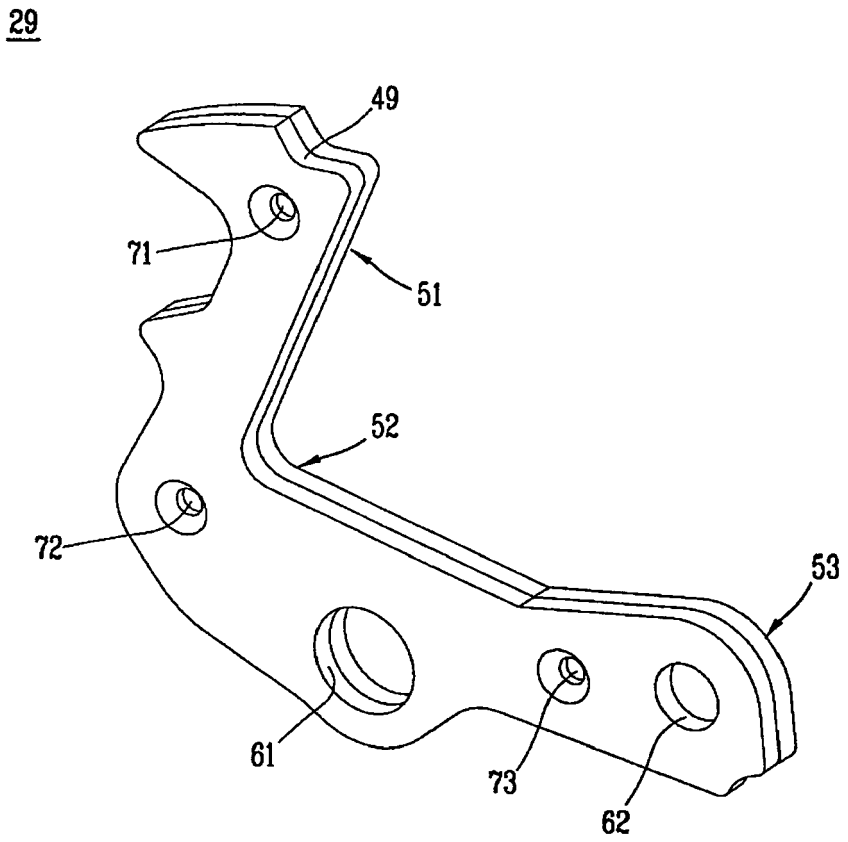
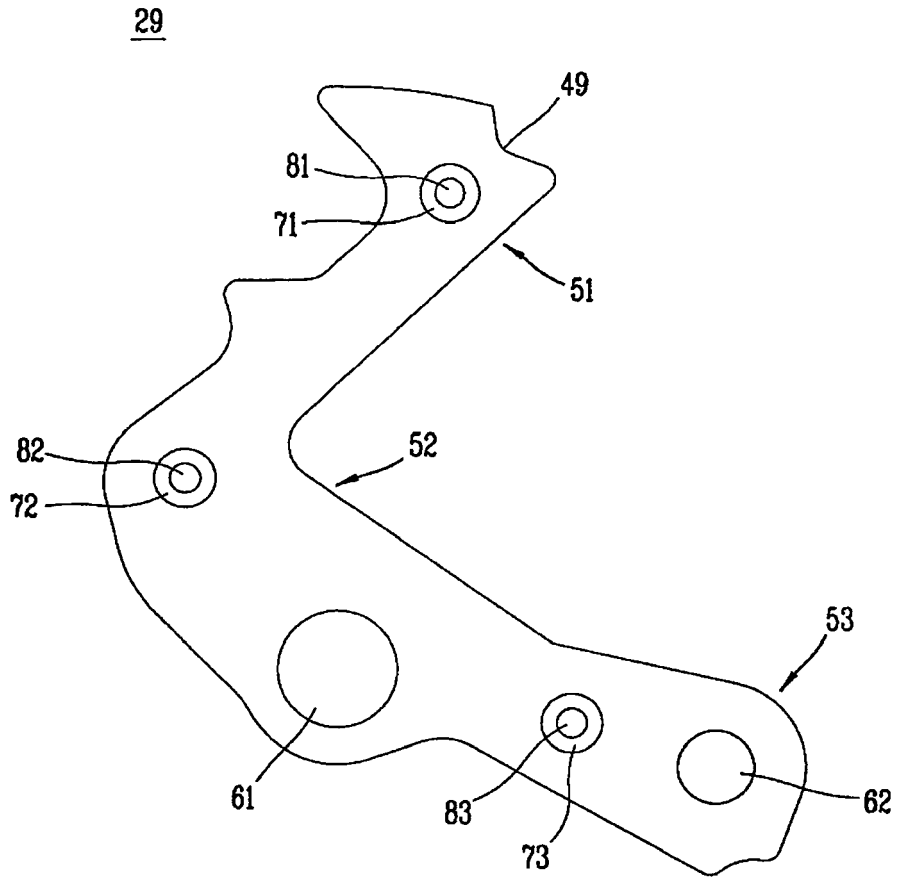


FIG. 9



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EUROPEAN SEARCH REPORT

Application Number
EP 07 01 9932

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 004 875 A (MOODY G LAWRENCE [US] ET AL) 2 April 1991 (1991-04-02) * column 2, line 46 - column 6, line 24; figures 1-5 * -----	1-8	INV. H01H3/46 ADD. H01H3/30
X	US 5 224 590 A (MILIANOWICZ STANISLAW A [US] ET AL) 6 July 1993 (1993-07-06) * column 11, line 34 - column 17, line 37; figures 1-4,12,20 * -----	1-4	
X	FR 2 449 329 A (TOKYO SHIBAURA ELECTRIC CO [JP]) 12 September 1980 (1980-09-12) * page 10, line 33 - page 11, line 16; figures 5-8 * * page 4, line 1 - page 6, line 38 * -----	1-4	
Y	EP 0 997 919 A (SCHNEIDER ELECTRIC IND SA [FR] SCHNEIDER ELECTRIC IND SAS [FR]) 3 May 2000 (2000-05-03) * paragraphs [0016], [0017]; figure 4 * -----	1-9	
Y	GB 384 604 A (ENGLISH ELECTRIC CO LTD; ARTHUR ALEXANDER HEATH) 8 December 1932 (1932-12-08) * page 3, lines 121-125; figure 6 * -----	1-9	TECHNICAL FIELDS SEARCHED (IPC) H01H
X	EP 1 130 615 A (SIEMENS AG [DE]) 5 September 2001 (2001-09-05) * abstract; figures 1,3 * -----	5	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 January 2008	MAEKI-MANTILA, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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18-01-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5004875 A	02-04-1991	NONE	
US 5224590 A	06-07-1993	NONE	
FR 2449329 A	12-09-1980	JP 1396525 C	24-08-1987
		JP 55108118 A	19-08-1980
		JP 61061213 B	24-12-1986
		US 4409449 A	11-10-1983
EP 0997919 A	03-05-2000	AU 754416 B2	14-11-2002
		AU 5714199 A	04-05-2000
		BR 9904986 A	05-09-2000
		CA 2283991 A1	30-04-2000
		CN 1253366 A	17-05-2000
		CZ 9903822 A3	12-07-2000
		DE 69929873 T2	07-09-2006
		EA 1841 B1	27-08-2001
		ES 2258320 T3	16-08-2006
		FR 2785444 A1	05-05-2000
		HU 9903981 A2	28-08-2000
		ID 25949 A	16-11-2000
		JP 2000149726 A	30-05-2000
		KR 20000029413 A	25-05-2000
		PL 336036 A1	08-05-2000
		TR 9902695 A2	21-07-2000
		TW 434623 B	16-05-2001
		US 6144002 A	07-11-2000
		ZA 9906752 A	02-05-2000
GB 384604 A	08-12-1932	NONE	
EP 1130615 A	05-09-2001	DE 10010727 A1	06-09-2001

EPO FORM P0459

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