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(54) Electrical contact element between a first and a second contact part

(57) The invention concerns to an electrical contact element between a first and a second contact part. In order to optimize the electrial contact, the contact element is a spring in form of a meander, by which the meander follows in its parallel sections a v-formed path in a plane A, and a further v-shape in the plane B which is at least approximately orthogonal to plane A.

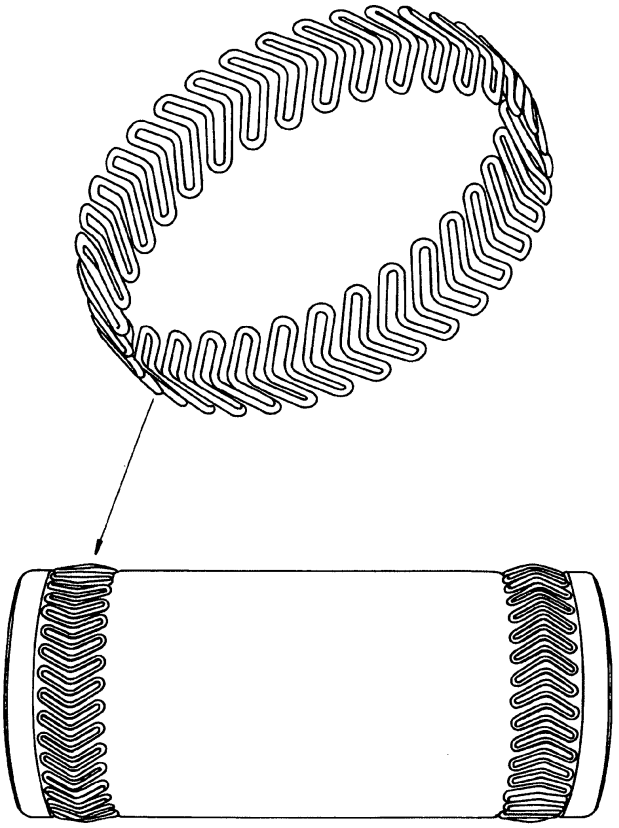

Fig.2

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Description

[0001] The invention concerns to an electrical contact element between a first and a second contact part.

[0002] For contacting especially busbars in medium voltage switchgears, contacting springs are known in form of spiral rings,or a belt of current carrying copper contact elements in combination with a steel spring.

[0003] The disadvantages are different, depending on the solutions above.

a) The groove for the spiral contact is quite complex in shape and requires thick material as it is comparable deep. The connection requires more space and material.

b) As the belt is not a closed ring and therefore has no spring force, it needs a special groove to be fixed. It requires high accuracy in manufacturing. The costs for the contacts are high, as it is an assembly of the steel spring as a belt and single contacts for each contact point.

c) The mechanical tolerance of a contact system using the belt system is limited.

[0004] It is the object of the invention, to optimize electrical contact by the use of an elastic contact element, so that also an easy an effective electrical interconnection at least in the use in medium and high voltage switchgears is given.

[0005] The basical idea of this invention is, that the contact element is a spring in form of a meander, by which the meander follows in its parallel sections a v-formed path in a plane A, and a further v-shape in the plane B which is at least approximately orthogonal to plane A. This causes in result, that the resilience of the spring is generated by a three-dimensional torsion. This is highly different to a resilience which is caused or effected by only a one- or two-dimensional elongation.

[0006] To form an electrical contacting element in the way of the invention, it is possible to introduce high reset forces into the spring which generates a very close and effective electric contacting between the aforesaid two contact parts.

[0007] Further advantages are that a spring is a flat construction, because of its second v-shape in the third cartesial dimension. Its important advantage is given by the use for busbar-connection, because its possible to arrange the contact element between the two tubeformed parts without a necessity of the arrangement of groove in at least one of the these contacting parts, or it is only need a very flat groove.

[0008] A further advantageous feature is, that the first and second contact part are the inner and outer part of a disconnecter-, grounding- or threeposition-switch in medium or high voltage switchgears.

[0009] Furthermore is described, that the first and second contact part are the inner and outer part of a moveable contact of vacuum circuitbreaker in medium or high voltage switchgears. For this this spring construction is advantageous too.

[0010] The spring meander of the contact element is following or formed as a closed ring spring arrangement.

[0011] Furthermore the contact element is made of copper-zirconium, or of copper-beryllium.

[0012] The spring meander of the contact element can be made out of a round profile.

[0013] Alternatively the spring meander of the contact element can also be made of a flat cutted or stamped profile which is mechanically transformed into a round profile by milling. This is easy to manufacture, but has the same technical feature of the resulting spring.

[0014] An advantageous embodiment of the invention is shown in figure 1

[0015] Out of a spring wire a spring with a meander shape (see figure 1), which is bend in an angle in the center line, is formed, e.g. as endless belt. At the cutted ends C and D it can be welded to a ring to be used in cylindrical contacts.

[0016] The groove to take the spring is of simple rectangular shape and therefore easy to produce. The depth is a little deeper then the thickness of the wire of the spring. This saves material and machining time. Due to the spring force in the direction A, the spring can be placed on the inner or the outer cylinder.

[0017] The bending in the center line is defining the height of the spring and the contact force. The flexibility of this contact spring is given by the fact, that the spring follows a 3-dimensional meander structure. So the forces which are introduced from Part 2 to Part 3 causes a resulting torsion of the spring material itself.

[0018] By this a good electrical contact is given in the special mentioned application.

[0019] Figur 2 shows several perspective views of the contact element, as well as its position on a busbar for a Medium Voltage Switchgear.

[0020] The contact spring is located at the ends on this busbar, which will be pushed into tube-formed contacts on both sides of the busbar.

Claims

1. Electrical contact element between a first and a second contact part, **characterized in that** the contact element is a spring in form of a meander, by which the meander follows in its parallel sections a v-formed path in a plane A, and a further v-shape in the plane B which is at least approximately orthogonal to plane A.

2. Electrical contact element according to claim 1, **characterized in that** the first and second contact part are the inner and outer part of a busbar connection in high or medium voltage switchgears.

3. Electrical contact element according to claim 1, **characterized in that** that the first and second contact part are the inner and outer part of a disconnecter-, grounding- or threeposition-switch in medium or high voltage switchgears.

4. Electrical contact element according to claim 1, **characterized in that** that the first and second contact part are the inner and outer part of a moveable contact of vacuum circuitbreaker in medium or high voltage switchgears.

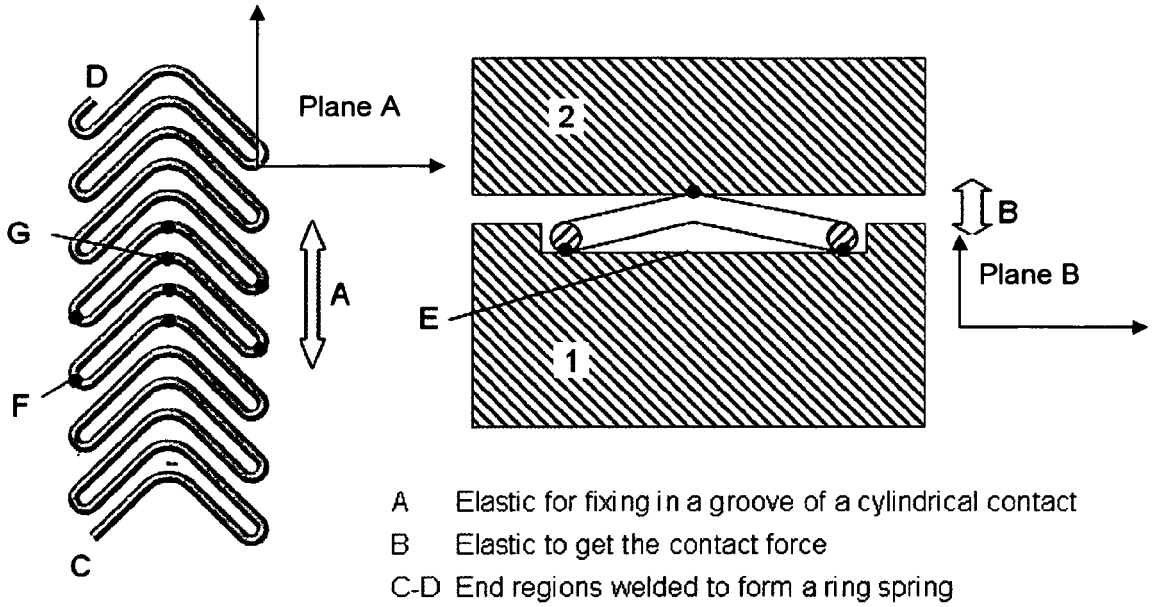
5. Electrical contact element according to claim 1 or 2, **characterized in that** the spring meander of the contact element is following or formed as a closed ring spring arrangement.

6. Electrical contact element according to claim 1, 2 or 3,
characterized in that the contact element is made of copper-zirconium,

7. Electrical contact element according to claim 1, 2 or 3,
characterized in that the contact element is made of copper-beryllium

8. Electrical contact element according to claim 4 or 5, **characterized in that** the spring meander of the contact element is made of a round profile.

9. Electrical contact element according to claim 4 or 5, **characterized in that** the spring meander of the contact element is made of a flat cutted or stamped profile which is mechanically transformed into a round profile by milling.



A Elastic for fixing in a groove of a cylindrical contact
B Elastic to get the contact force
C-D End regions welded to form a ring spring
E Simple rectangular groove
F Contact points for contact element 1
G Contact points for contact element 2

Fig.1

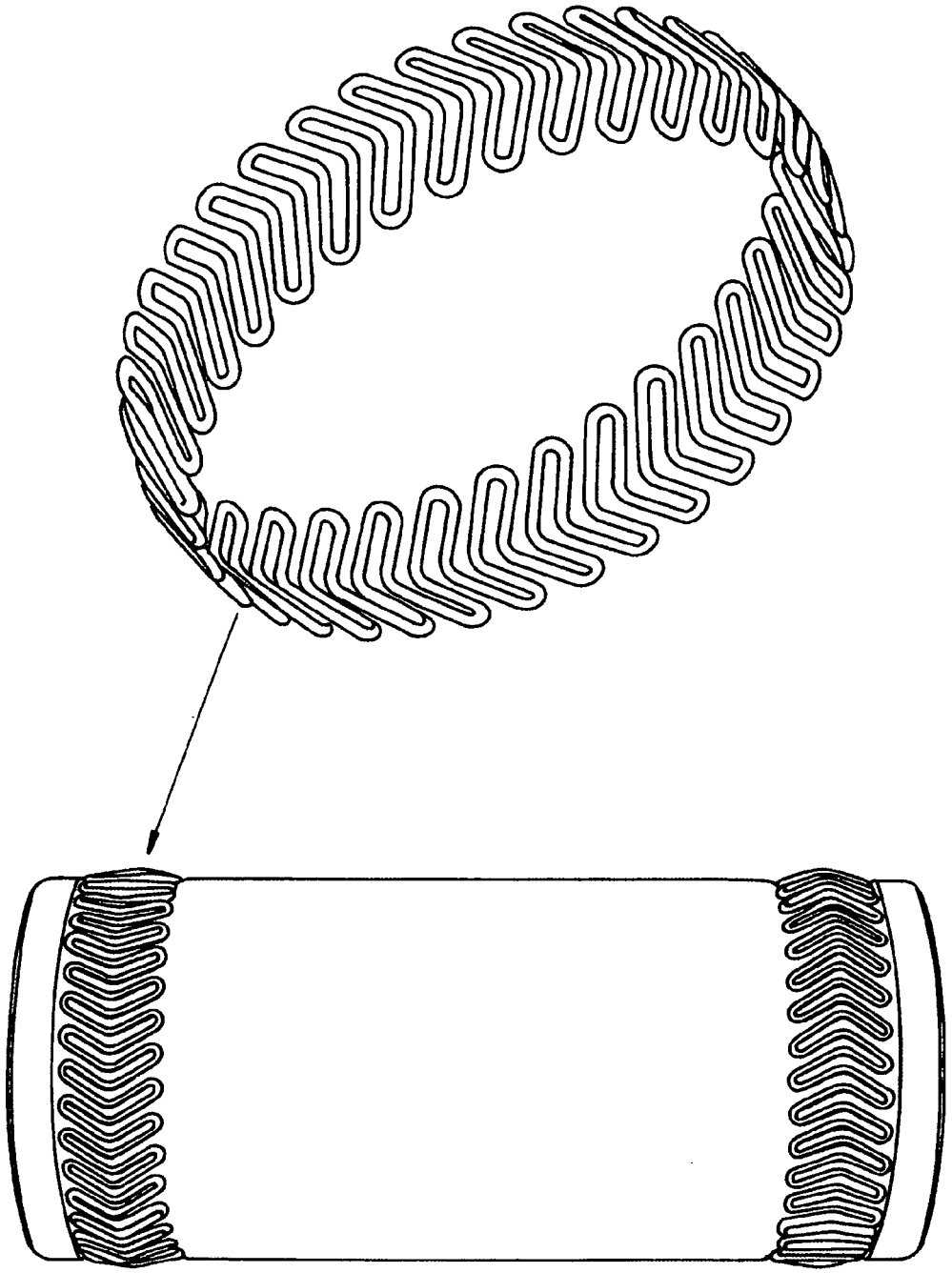


Fig.2

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EUROPEAN SEARCH REPORT

Application Number
EP 10 01 4523

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	EP 0 716 474 A1 (MULTI CONTACT AG [CH]) 12 June 1996 (1996-06-12) * column 11, line 17 - line 34; figures 7a, 7b * * column 13, line 20 - line 25 * * column 1, line 25 - line 52 *	1-9	INV. H01R4/48 H01H1/38 H01H1/44
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A	EP 1 164 658 A2 (ALSTOM [FR]) 19 December 2001 (2001-12-19) * paragraph [0009] - paragraph [0018]; figures 1-3 *	1-9	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 March 2011	Dobbs, Harvey

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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E : earlier patent document, but published on, or after the filing date
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 01 4523

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82