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(54) **Connector equipped with clamp contacts on a pair of bus bars**

(57) The present invention concerns a connector (1) equipped with clamp contacts (2) arranged on a pair of bus bars (3a, 3b) in which the clamping contacts (2) each have two contact springs (4a, 4b) pressed against one another and the contact springs, placed one next to

the other and with the same orientation all being interconnected by means of a shared bus bar, the bus bars (3a, 3b) equipped with mutually opposed contact springs (4a, 4b) being interconnected to form one assembly.

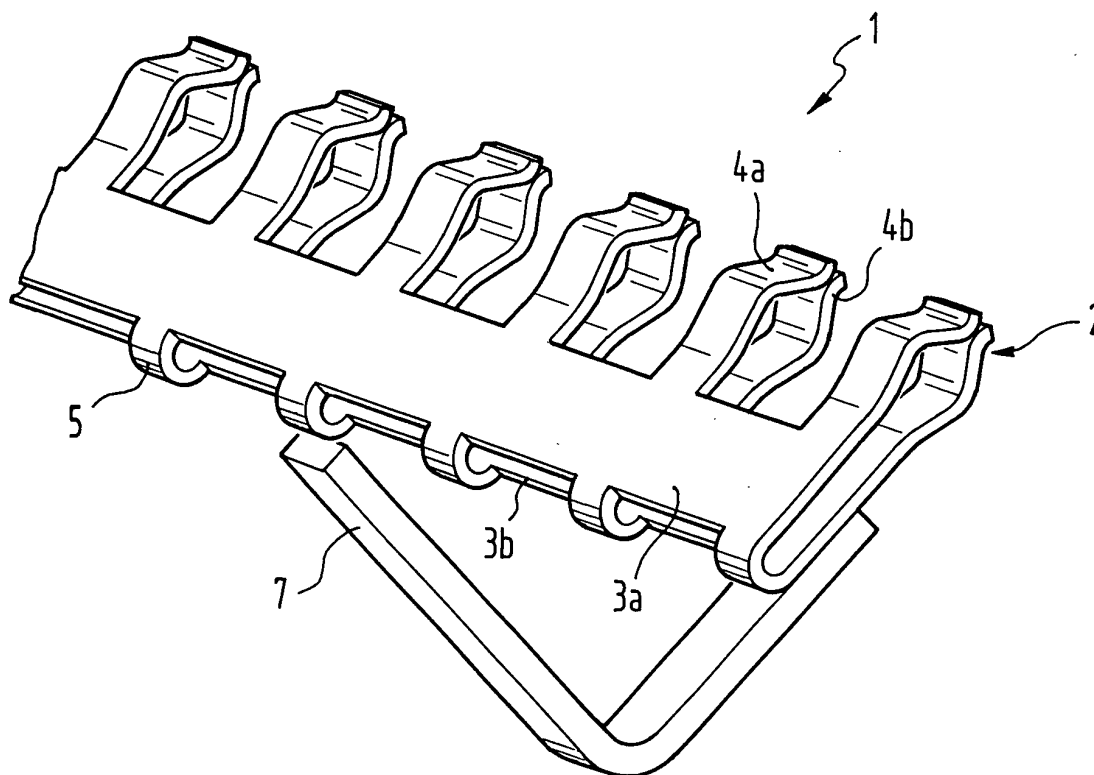


FIG.1

Description

[0001] The invention concerns a connector equipped with clamp contacts arranged on a pair of bus bars, in which the clamp contacts each have two contact springs pressed one against the other, the contact springs, placed one against the other, and of the same orientation, being interconnected by means of a shared bus bar.

[0002] Such connection devices are familiar from, for example, DE 26 39 642 A1. In that document, two bus bars from which issue bars equipped with contact springs are interconnected in a conducting manner and are anchored in a housing. The manufacture of such a device proves to be costly, by reason of the need to interconnect such bus bars and it is impossible to manufacture in that way a row of contact springs in alignment, which have different phases or signals. Moreover, the arrangement of bus bars in a base zone calls for a lot of space and it is not possible to secure a compact arrangement of several rows of contact springs.

[0003] The present invention has purpose to improve a connector of the type described in the preamble in such a way as to be able to achieve a compact arrangement of several bus bars with different equipment and at a low cost of manufacture.

[0004] This problem is solved according to the invention by means of a connector equipped with clamp contacts arranged on a pair of bus bars, in which the clamp contacts each have two contact springs pressed against one another, the contact springs being placed one next to the other and having the same orientation, being all interconnected by a shared bus bar and in which mutually opposed contact spring bus bars are interconnected to form one whole.

[0005] According to a preferred form of embodiment of the present invention, the mutually opposed contact spring bus bars are connected together by bars bent back in such a way that the bus bars are placed one opposite the other and that the ends of the contact springs are in frictional contact under prestressed effect.

[0006] According to another preferred form of embodiment, several pairs of bus bars connected together and equipped with contact springs in different positions along the bus bar axis, are bent back one above the other, being separated by insulating foils in such a way that their contact springs are in alignment with respect to one another.

[0007] According to another form of embodiment, the pairs of bus bars placed in layers one above the other are simultaneously bent back to form a pack, the intermediate insulating foil furnishing slight adhesion-related friction.

[0008] According to another form of embodiment, the different pairs have different lengths in the pack, the pair of bus bars located outside being the shortest and the pair of bus bars located inside being the longest.

[0009] According to another preferred form of embodiment,

a contact leg is conductively connected to each pair of bus bars.

[0010] Furthermore, according to a form of embodiment, a supplementary pair of bus bars is arranged next to at least one pack of bus bars in such a way that all the contact springs are placed on the same level in at least two rows.

[0011] The invention will be explained in greater detail hereinafter with the help of the description of an example of embodiment, referring to drawings. In the drawing:

Fig. 1 shows a perspective view of a form of embodiment of a connector according to the invention;

Fig. 2 shows another perspective part-view of the connector from Fig 1;

Fig. 3 shows yet another perspective part-view of the connector from Fig 2.

[0012] In Fig. 1 can be seen a connector 1 equipped with clamp contacts 2, each with two contact springs 4a, 4b whose the ends are placed in frictional contact under prestressed effect. The contact springs 2 are made and arranged in one piece on a pair of bus bars 3a, 3b, being spaced parallel one to another at the same distance. The two bus bars 3a, 3b are interconnected via bars 5 which are also made in one piece. From the point of view of manufacturing technique, this arrangement has the great advantage that it is possible to manufacture by die stamping from a sheet in one operation, the bus bars 3a, 3b, the bars 5 and the contact springs 4a and 4b and that it is possible to impart to the contact springs their final shape. The two bus bars 3a, 3b are then given their final shape by bending back the semi-finished product at 180° round a folding ridge on the level of the bars 5. Lastly, a contact lug 7 serving for the supply of the pair of bus bars is conductively connected by electricity to one end of the pair of bus bars. According to another form of embodiment, the contact lug 7 could be directly cut on the bus bar.

[0013] Fig. 2 and 3 show an integrated assembly of pairs of bus bars, which are all manufactured on the principle of the previously described connector. In the embodiment example shown in Fig. 2 and 3, there are three pairs of bus bars 13a, 13b, 14a, 14b as well as 15a, 15b, located one on the other, being separated by insulating foils prior to the process of bending back and then bent back together. The insulating foils have a low degree of adhesion and are not glued, in order to avoid their becoming extended, or their breaking during the bending back operation.

[0014] The contact springs of each pair of bus bars are arranged in a spaced and different manner, according to the pairs of bus bars, so as to form an aligned assembly of clamp contacts and connected to different supplies (e.g. the 3 phases of a three-phase current)

[0015] In order that an aligned row of contact springs should be the end-product, the arms of the contact springs must be dimensioned and shaped differently, from bus bar to bus bar, so as to compensate for the difference of position in the pack of bus bars formed for that reason.

[0016] It can be seen that the contact springs, which are connected to different pairs of bus bars can be arranged in alignment next to one another.

[0017] As can be seen in Fig. 2 and 3, next to an assembly of pairs of bus bars can be arranged a pair of bus bars according to Fig. 1 in the neighbourhood of the previously formed assembly with a supply connected to neutral.

[0018] The assembly so formed provides a very compact connector, in which the density of contact springs is very high. The connector according to the invention can withstand currents of the order of 60 A. A large field of applications therefore opens for the connector in the area of industrial strong current technology.

5. A connector according to one of the Claims from 3 to 4, **characterised in that** the different pairs of bus bars (13a, 13b, 14a, 14b, 15a, 15b) are of different lengths in the pack, the pair of bus bars (15a, 15b) placed outside being the shortest and the pair of bus bars (13a, 13b) placed inside, being the longest.

6. A connector according to Claim 5, **characterised in that** the contact lug (7, 8, 9) is conductively connected to the pair of bus bars (13a, 13b, 14a, 14b, 15a, 15b)

7. A connector according to one of the Claims from 3 to 6, **characterised in that** a supplementary pair of bus bars (16a, 16b) is arranged next to at least one pair of bus bars in such a way that all the contact springs (4a, 4b) are placed on the same level in at least two rows.

Claims

1. A connector (1) equipped with clamp contacts (2) arranged on a pair of bus bars (3a, 3b) in which the clamp contacts (2) each have two contact springs (4a, 4b) pressed against one another, the contact springs being placed one next to the other and having the same orientation, all being interconnected by a shared bus bar, **characterised in that** the bus bars (3a, 3b), equipped with mutually opposed contact springs (4a, 4b) are interconnected to form one assembly.
2. A connector according to Claim 1, **characterised in that** the bus bars (3a, 3b) equipped with mutually opposed contact springs (4a, 4b) are interconnected by the bars (5) bent back in such a way that the bus bars (3a, 3b) are placed one opposite the other and that the ends of the contact springs are in frictional contact under prestressed effect.
3. A connector according to Claim 1 or 2, **characterised in that** several pairs of bus bars (13a, 13b, 14a, 14b, 15a, 15b), interconnected together and equipped with contact springs (4a, 4b) in different positions along the axis (6) of the bus bars, are bent back, one above the other, being separated by insulating foils in such a way that their contact springs (4a, 4b) are aligned with respect to the others.
4. A connector according to Claim 3, **characterised in that** that the pairs of bus bars (13a, 13b, 14a, 14b, 15a, 15b) placed in layers one above the other are simultaneously bent back into a pack, the insulating foil providing slight friction by adhesion.

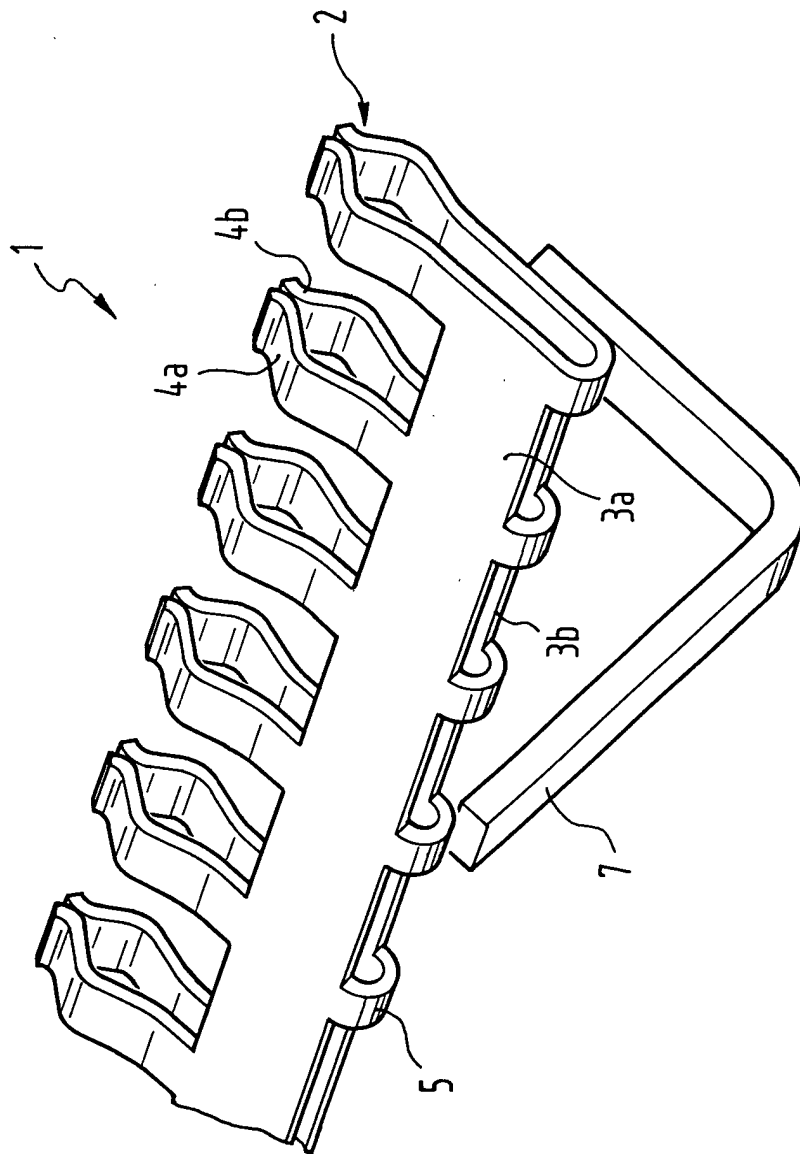


FIG.1

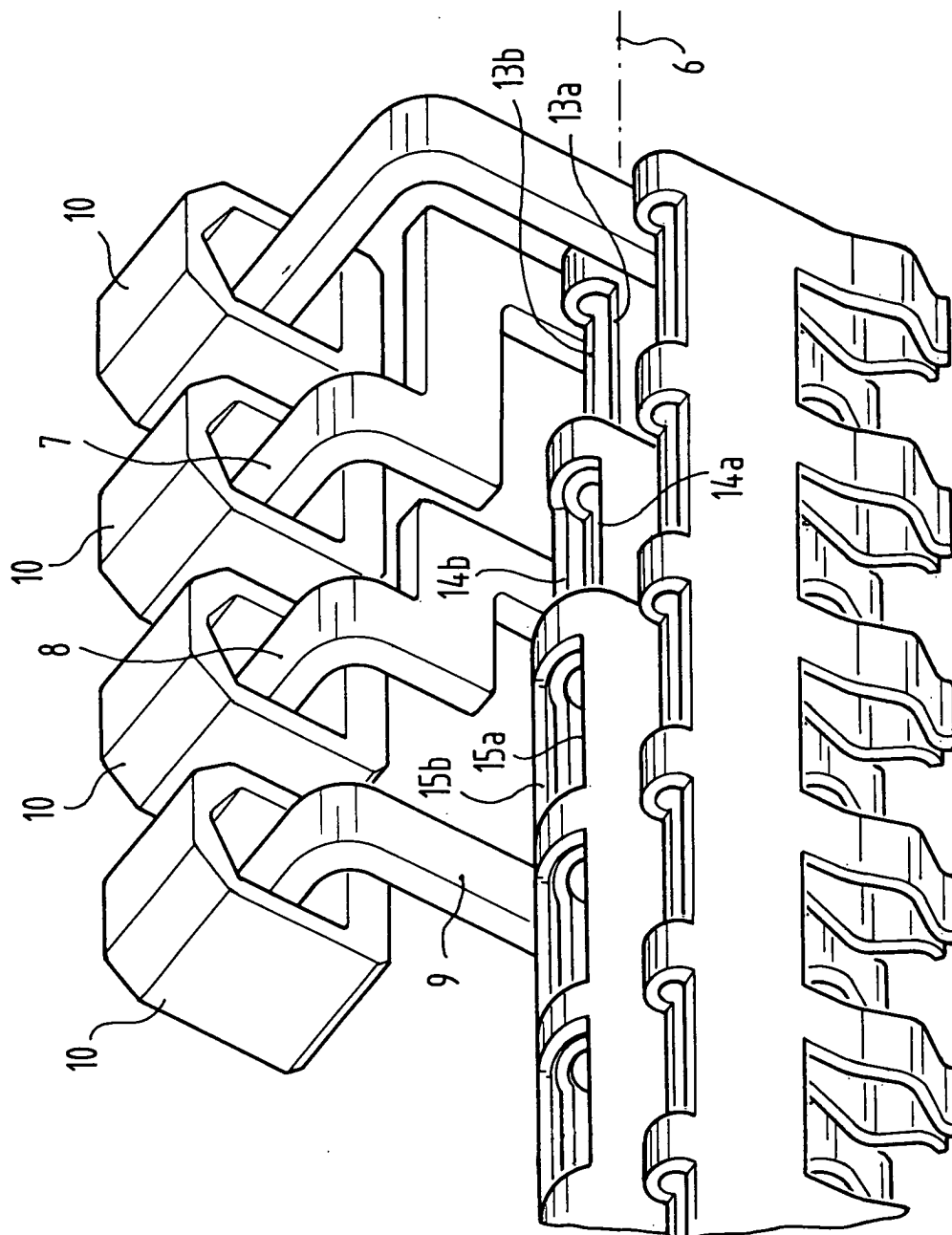


FIG.2

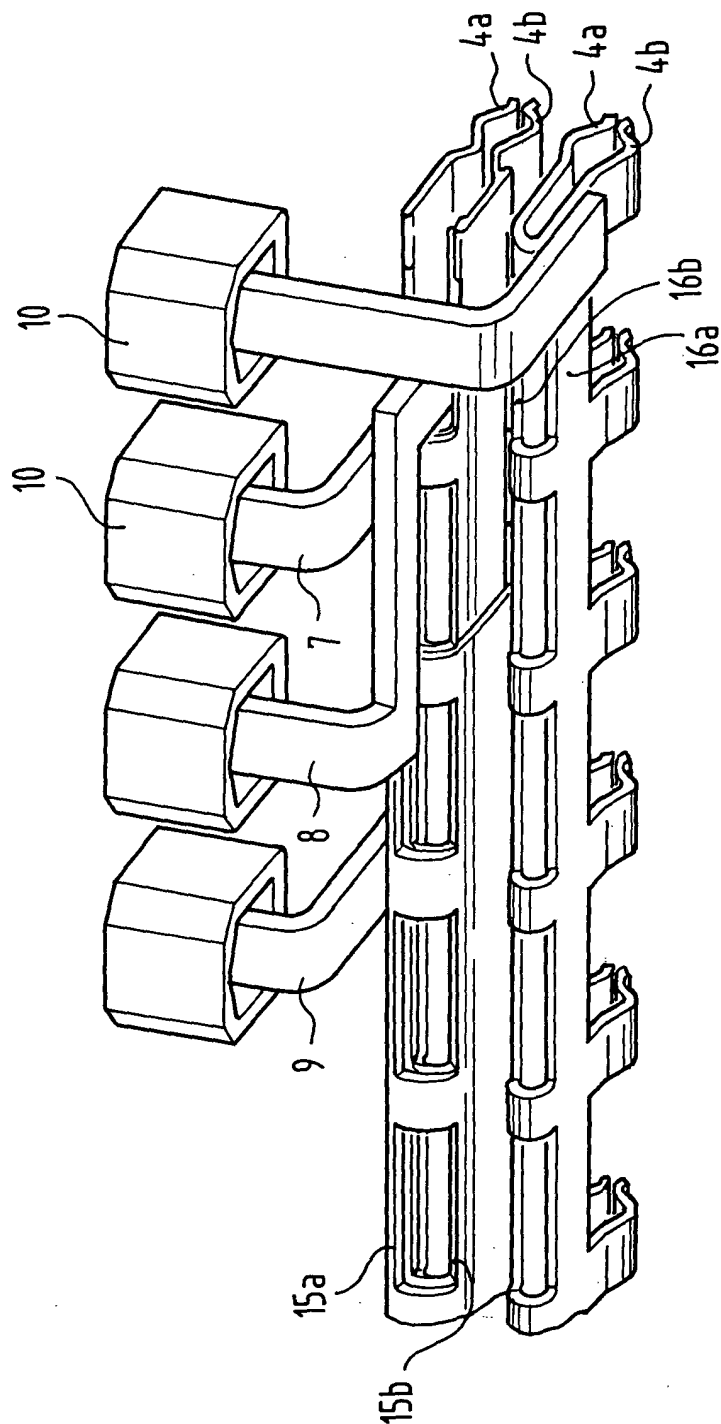


FIG.3



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EUROPEAN SEARCH REPORT

Application Number
EP 02 01 7640

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
Y	EP 1 009 080 A (FRAMATOME CONNECTORS INT) 14 June 2000 (2000-06-14) * abstract; figures 1,2 *	1-7	H02G5/00 H02B1/20 H01R13/115
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Y	DE 195 24 123 C (PHOENIX CONTACT GMBH & CO) 13 February 1997 (1997-02-13) * column 3, line 21 - line 51; figure 4 *	1-7	
			TECHNICAL FIELDS SEARCHED (Int.CI.7)
			H02G H02B H01R
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 September 2002	Examiner Criqui, J-J
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 P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 01 7640

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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24-09-2002

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82