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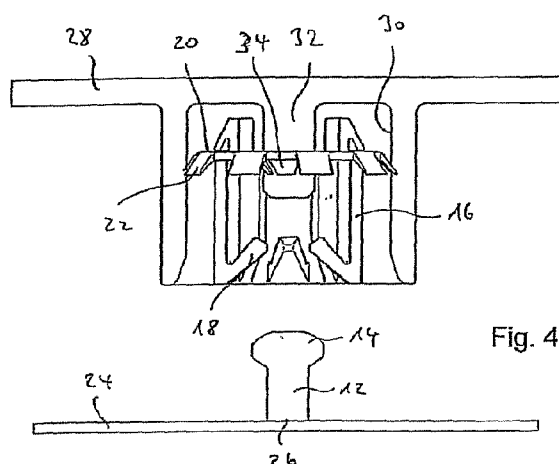
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(54) Title: METHOD AND DEVICE FOR FASTENING A FIRST COMPONENT ON A SECOND COMPONENT



(57) Abstract: Method for fastening a first component (28) on a second component (24), comprising the following steps: - a first fastening element (10) with at least one fastening section and a second fastening element (12) are releasably connected with one another, - the second fastening element (12) is fastened to the second component (24) while it is releasably connected with the first fastening element (10), - for fastening the first component (28), the first fastening element is connected with its at least one fastening section (32) with at least one corresponding fastening section of the first component (28), wherein the holding force between the first (10) and second (12) fastening element is smaller than the holding force between the first component (28) and the first fastening element (10) on the one hand side, and than the holding force between the second fastening element (12) and the second component (24) on the other hand side.

Method and device for fastening a first component on a second component

The invention relates to a method for fastening a first component on a second component. In addition, the invention relates to a device for fastening a first component on a second component. Components are fastened on each other using these types of methods and devices, for example in automobile construction. The second component, for example, can be a bodywork part of an automobile, in particular an automobile door. The first component, for example, can be a trim part for the bodywork part. There are devices known which comprise one or more fastening bolts which are welded on the surface of the second component. A fastening device with a reception for the fastening bolt is fastened, for example, to an opening or corresponding reception of the first component. The first component is then pressed or screwed onto the fastening bolt together with the fastening device in order to fasten the first component on the second component in this way. Using such devices and methods, high holding forces are achieved in operation between the components. However, the assembly and the development of the fastening device are comparatively expensive.

Proceeding from the illustrated prior art, the object underlying the invention is to provide a device and a method of the aforementioned type, with which the assembly and structural development are able to be simplified.

This object is achieved in accordance with the invention by the objects of independent claims 1 and 7. Advantageous developments can be found in the dependent claims, the description and the figures.

The invention achieves the object, on the one hand, by means of a method for fastening a first component on a second component, comprising the following steps:

- a first fastening element with at least one fastening section and a second fastening element are releasably connected with one another,

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- the second fastening element is fastened to the second component while it is releasably connected with the first fastening element,
- for fastening the first component, the first fastening element is connected with its at least one fastening section with at least one corresponding fastening section of the first component,
- wherein the holding force between the first and second fastening element is smaller than the holding force between the first component and the first fastening element on the one hand, and smaller than the holding force between the second fastening element and the second component on the other hand.

The invention achieves the object, on the other hand, by means of a device for fastening a first component on a second component, comprising

- a first fastening element with at least one fastening section, which engages with at least one corresponding fastening section of the first component for fastening the first component on the first fastening element, and
- a second fastening element, wherein fastening means are provided with which the second fastening element can be fastened to the second component and wherein releasable connection means are provided, with which the first and second fastening element can be releasably connected with one another,

wherein the holding force between the first and second fastening element exerted by the releasable connection means is smaller than the holding force between the first component and the first fastening element, exerted by the fastening sections, on the one hand, and smaller than the holding force between the second fastening element and the second component, exerted by the fastening means, on the other hand.

The second component can be a carrier part, for example a bodywork part of an automobile, in particular an automobile door. In a corresponding manner, the first component can be a trim part of an automobile, for example for an automobile door.

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The fastening means and the releasable connection means are, in particular, part of the device in accordance with the invention. The first and/or second component can also be part of the device in accordance with the invention. The first and second fastening elements are releasably connected with each other by means of the releasable connection means. The fastening of the first component on the first fastening element brought about by the fastening sections can also be releasable.

In accordance with the invention, the respective holding forces between the components and the fastening elements, on the one side, and the holding force between the fastening elements, on the other side, are selected so as to be different. In particular, the holding force between the fastening elements which are releasably connected with one another is smaller than the holding forces of the respective connection of the fastening elements with the first or second component. This can be effected by developing the connection means in a suitable manner. By selecting the holding forces in accordance with the invention, the first component can be pulled off the second component in a particularly simple manner, for example for the purposes of maintenance or repair, the connection between the first and second fastening element being automatically released. The first fastening element can then be pulled off together with the first component. The second fastening element remains on the second component. New assembly is then possible in a particularly simple manner after the maintenance or the repair by the first fastening element, together with the first component fastened thereon, once again being releasably connected with the second fastening element and consequently with the second component carrying said second fastening element.

At the same time, in accordance with the invention, a particularly simple (first) assembly is possible by the fastening elements being pre-assembled releasably connected with one another and then, when thus releasably connected with one another, being fastened on the second component by means of the second fastening element. The first component can then be immediately fastened on the first fastening

element and consequently on the second component. Therefore, on site, only one assembly step, namely the fastening of the second fastening element on the second component, is necessary before the first component can be finally assembled. In the prior art, in contrast, two assembly steps are necessary before the final assembly, on the one hand, for example, welding a bolt to a bodywork part and, on the other hand, the assembly of a fastening element on a trim part. The final assembly of the trim part on the bodywork cannot be effected until this has been done. Therefore, a time and cost saving is achieved in accordance with the invention compared to the prior art. In addition, the production is simplified as fewer demands can be made on the first component. For example, no specific measures are necessary for fastening a fastening element on the first component in a temporary manner before the final assembly. In accordance with the invention, this also leads to a cost saving.

The at least one fastening section of the first component and the at least one fastening section of the first fastening element can be locked with one another according to one development. To this end, the fastening section of the first component can comprise at least one locking reception or at least one locking projection. In a corresponding manner, the fastening section of the first fastening element can comprise at least one locking projection or at least one locking reception. The at least one fastening section of the first fastening element can comprise a locking element from a metal material. Metal locking elements are capable of providing, in a reliable manner, the necessary high holding forces between the first component and the first fastening element in accordance with the invention. A metal locking element can be a metal ring, for example. The rest of the first fastening element can consist, for example, of plastics material. In a plastics material injection molding method, the metal locking element can then be injected into the plastics material section of the first fastening element, the rest of which, for example, has been molded in an integral manner.

According to a further development, the fastening means, with which the second

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fastening element can be fastened to the second component, can comprise a welding connection, a gluing connection or a mechanical connection. The necessary high holding force between the second fastening element and the second component in accordance with the invention is achieved in this way. The second fastening element can consist of a plastics material or a metal. According to a development which is particularly appropriate in practice, the second fastening element can comprise a fastening bolt, for example a metal bolt. The releasable connection means, with which the first and second fastening element can be releasably connected with one another, can also comprise a locking connection. To this end, the first fastening element can comprise at least one locking reception or at least one locking projection. In a corresponding manner, the second fastening element can comprise at least one locking projection or at least one locking reception. If the second fastening element, for example, is a fastening bolt, a head with a widened cross section can form such a locking projection. The first fastening element can then, for example, have resiliently elastic locking arms which engage behind the bolt head while the first and second fastening element are connected with one another and thus provide a locking means.

According to a further development, for demounting the first component from the second component, the first component can be pulled off the second component together with the first fastening element, wherein the second fastening element remains fastened on the second component while the connection between the first and second fastening element is released.

One exemplary embodiment of the invention is explained in more detail below by way of figures, in which, in a schematic manner:

figure 1 shows a sectional view of a first and second fastening element of a device in accordance with the invention, said fastening elements being connected with one another,

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- figure 2 shows a sectional view of the fastening elements from figure 1 in a first assembly state,
- figure 3 shows a sectional view of the fastening elements from figure 1 in a second assembly state and
- figure 4 shows a sectional view of the fastening elements from figure 1 in a third assembly state.

In so far as nothing to the contrary is specified, identical references in the figures designate identical objects. Figure 1 shows a first and second fastening element 10, 12 of a device in accordance with the invention, said first and second fastening elements being releasably connected with one another. The second fastening element 12, in the example shown, is formed by a fastening bolt from metal. The fastening bolt has a bolt head 14 with a widened cross section. For the rest, the form of the fastening bolt can be cylindrical for example. The first fastening element 10 has a main section 16 which consists in an integral manner of a plastics material. The main section 16 has on its lower end several radially inwardly directed resilient locking arms 18, two of which can be seen in figure 1. As can also be seen in figure 1, the locking arms 18, with the first and second fastening element 10, 12 releasably locked with one another, lock underneath the bolt head 14. To achieve this locked-together state, the first fastening element 10 has been placed onto the second fastening element 12. In the region of its end remote from the locking arms 18, the first fastening element 10, over and above this, has a fastening section for a first component, which, in the example shown, comprises a locking element in the form of a metal ring 20. The metal ring 20 has several locking projections 22 which are directed downward in figure 1 for locking on a corresponding fastening section of the first component, as will be explained in more detail again below. In the example shown, the metal ring 20 has been injected into the main section 16 from plastics material in an injection molding method.

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Figure 2 shows the device shown in figure 1 in a first assembly state. To this end, while the first and second fastening elements 10, 12 are releasably connected with one another, the second fastening element 12, in particular the fastening bolt, is welded onto a second component 24 by means of a welding connection 26. The second component 24, in this present case, is a component of an automobile, in particular a bodywork section of a vehicle door. Figure 3 shows a first component 28 fastened to the second component 24 by means of the device in accordance with the invention. The first component 28, in this present case, is a trim part of an automobile, in particular for a vehicle door. The first component 28 has a fastening section which comprises a substantially cylindrical reception 30. From the top surface of the first component 28, a fastening section 32, which is cylindrical in the example shown, extends in the center into the cylindrical reception 30. The diameter of the cylindrical reception 30, in this case, is somewhat smaller than the largest diameter of the metal ring 20. This means that when the first component 28 is placed onto the metal ring 20, the locking projections 22 of the metal ring 20 are resiliently deformed and consequently the cylindrical section 30 and consequently the first component 28 are held on the metal ring 20 and consequently on the second component 24. Over and above this, several resilient locking projections 34 are also arranged distributed over the circumference of the central ring opening of the metal ring 20. The diameter of the central ring opening of the metal ring 20, which is defined by said locking projections 34, is somewhat smaller than the diameter of the cylindrical holding section 32 of the first component 28. This means that in this region also, the locking projections 34 abut against the outer surface of the cylindrical section 32 and consequently against the fastening elements 10, 12 and the second component 24 in a locking manner. In the state shown in figure 3, the first component 28 is fastened finally on the second component 24.

A state of the device in accordance with the invention for maintenance or repair is shown in figure 4. To this end, the first component 28 has been pulled off the second component by means of exerting a pulling force, in the figures upward. The holding

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force between the first fastening element 10 and the second fastening element 12, in this case, is smaller than the holding force between the first fastening element 10 and the first component 28 on the one hand and smaller than the holding force between the second fastening element 12 and the second component 24 on the other hand. As a result of these ratios between the holding forces, the second fastening element 12 remains on the second component 24, the connection between the first fastening element 10 and the second fastening element 12 being released, such that the first fastening element 10 is pulled off together with the first component 28, as can be seen in figure 4. In this state, for example, the second component 24 and the first component 28 are accessible for maintenance or repair. Once the maintenance or repair has been concluded, the first component 28 can be fastened on the second component 24 in a simple manner by means of a new connection between the first fastening element 10 and the second fastening element 12. Consequently, only one assembly step is necessary in each case for demounting and for the subsequent new assembly. Using the device in accordance with the invention or the method in accordance with the invention, the assembly is simplified in relation to the prior art. At the same time, the structural development of the device in accordance with the invention is also simplified in relation to known devices.

Claims:

1. Method for fastening a first component (28) on a second component (24), comprising the following steps:
 - a first fastening element (10) with at least one fastening section and a second fastening element (12) are releasably connected with one another,
 - the second fastening element (12) is fastened to the second component (24) while it is releasably connected with the first fastening element (10),
 - for fastening the first component (28), the first fastening element (10) is connected with its at least one fastening section with at least one corresponding fastening section of the first component (28),
 - wherein the holding force between the first and second fastening element (10, 12) is smaller than the holding force between the first component (28) and the first fastening element (10) on the one hand side, and than the holding force between the second fastening element (12) and the second component (24) on the other hand side.
2. Method according to claim 1, characterized in that the at least one fastening section of the first component (28) and the at least one fastening section of the first fastening element (10) are locked with one another for fastening the first component (28) on the first fastening element (10).
3. Method according to one of claims 1 or 2, characterized in that the second fastening element (12) is connected with the second component (24) by welding, gluing or mechanical connection.
4. Method according to one of claims 1 to 3, characterized in that the second fastening element (12) comprises a fastening bolt.
5. Method according to one of claims 1 to 4, characterized in that the first and second fastening element (10, 12) are releasably locked with one another.
6. Method according to one of claims 1 to 5, characterized in that for demounting

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the first component (28) from the second component (24), the first component (28) is pulled off the second component (24) together with the first fastening element (10), wherein the second fastening element (12) remains fastened on the second component (24) while the connection between the first and second fastening element (10, 12) is released.

7. Device for fastening a first component (28) on a second component (24) comprising
 - a first fastening element (10) with at least one fastening section, which engages with at least one corresponding fastening section of the first component (28) for fastening the first component (28) on the first fastening element (10), and
 - a second fastening element (12), wherein fastening means are provided with which the second fastening element (12) can be fastened to the second component (24) and wherein releasable connection means are provided, with which the first and second fastening element (10, 12) can be releasably connected with one another,

wherein the holding force between the first and second fastening element (10, 12) exerted by the releasable connection means is smaller than the holding force between the first component (28) and the first fastening element (10), exerted by the fastening sections, on the one hand side, and than the holding force between the second fastening element (12) and the second component (24), exerted by the fastening means, on the other hand side.

8. Device according to claim 7, characterized in that the at least one fastening section of the first component (28) and the at least one fastening section of the first fastening element (10) for fastening the first component (28) on the first fastening element (10) lock with one another.
9. Device according to claim 8, characterized in that the at least one fastening section of the first fastening element (10) comprises a locking element from a

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metal material.

10. Device according to one of claims 7 to 9, characterized in that the fastening means, with which the second fastening element (12) can be fastened to the second component (24) comprises a welding connection (26), a gluing connection or a mechanical connection.
11. Device according to one of claims 7 to 10, characterized in that the second fastening element (12) comprises a fastening bolt.
12. Device according to one of claims 7 to 11, characterized in that the releasable connection means, with which the first and second fastening element (10, 12) can be releasably connected with one another, comprise a locking connection.

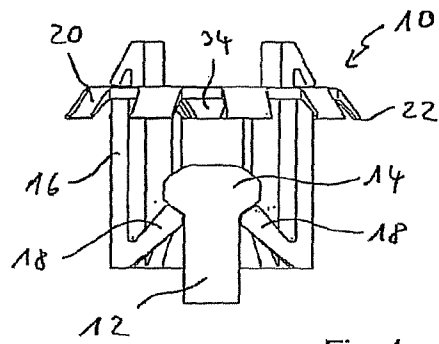


Fig. 1

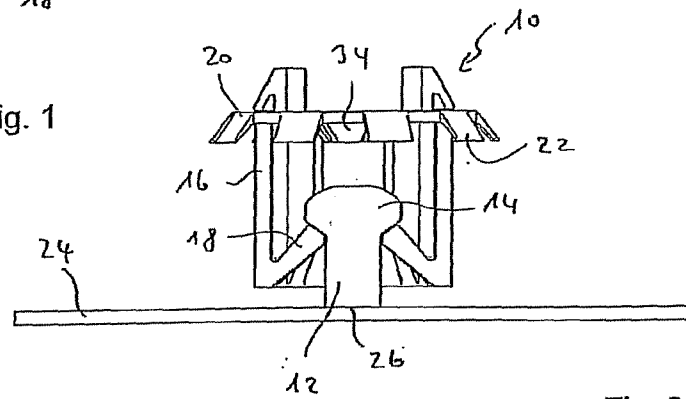


Fig. 2

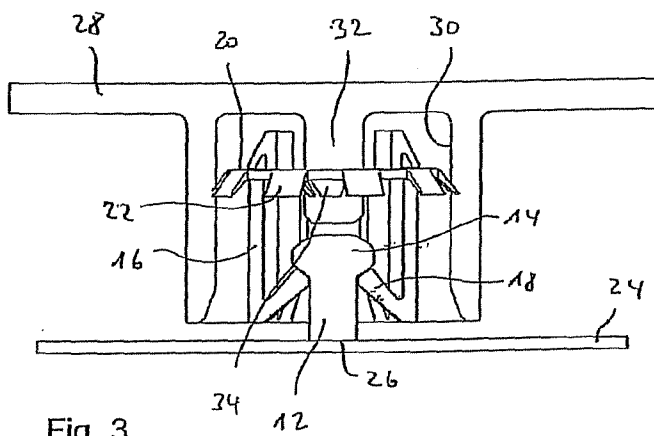


Fig. 3

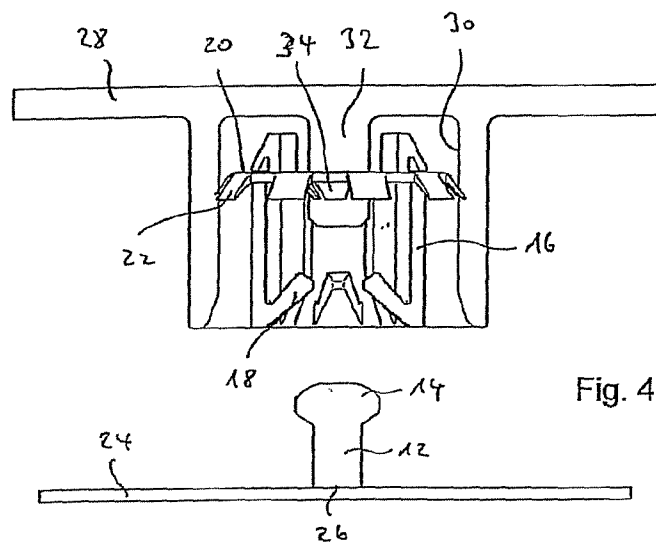


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. B60R13/02 F16B5/06
ADD.

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)
F16B B60R

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)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 20 2009 015837 U1 (NEWFREY LLC [US]) 18 February 2010 (2010-02-18) paragraphs [0004], [0007], [0012], [0017] figure 4	1,3-7, 9-12
A	----- EP 2 145 795 A2 (NEWFREY LLC [US]) 20 January 2010 (2010-01-20) paragraphs [0006], [0008], [0013], [0015] - [0023] figure 2	1-12
A	----- US 2010/047011 A1 (EBERLE DIEGO [CH] ET AL) 25 February 2010 (2010-02-25) abstract figures 1,3 paragraph [0004] - paragraph [0009] ----- -/-	1-12



Further documents are listed in the continuation of Box C.



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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/033456

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

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