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- (71) Applicant: ILLINOIS TOOL WORKS INC. [US/US];  
155 Harlem Avenue, Glenview, Illinois 60025 (US).
- (72) Inventor: KLUGE, Martin; Untere Siedlerstr. 7, 97285  
Roettingen (DE).
- (74) Agent: HAUPTMAN, Benjamin J.; Lowe Hauptman &  
Ham, LLP, 2318 Mill Road, Suite 1400, Alexandria, Vir-  
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(54) Title: FASTENING CLIP AND METHOD FOR PRODUCING A FASTENING CLIP

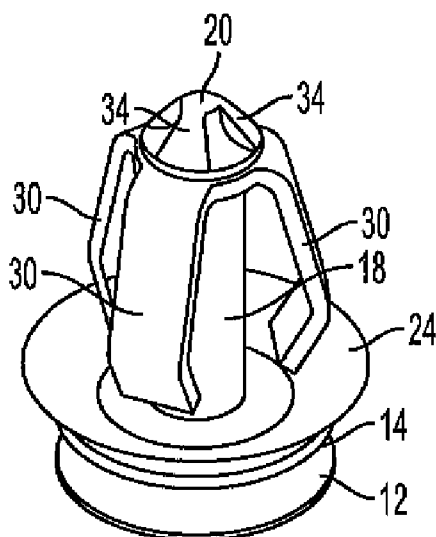


FIG. 14

(57) Abstract: The invention relates to a fastening clip for fastening a component to a support component of a car, comprising a plastics body made from a thermoplastic with a head section (10) which is fastenable at an opening in the component, and a pin section (18) extending from the head section, furthermore comprising a metal clamp with a clamp head (26) having a passage opening (28), wherein the pin section of the plastics body is guided through the passage opening in the clamp head, and wherein the free end (20) of the pin section, said free end projecting through the passage opening in the clamp head, has a cross section which is enlarged in a plastics melting process in relation to the passage opening in the clamp head such that the clamp head is held on the pin section. In addition, the invention relates to a method for producing such a fastening clip.



SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,  
GW, KM, ML, MR, NE, SN, TD, TG).

— *as to the applicant's entitlement to claim the priority of  
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— *as to applicant's entitlement to apply for and be granted  
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- 1 -

### FASTENING CLIP AND METHOD FOR PRODUCING A FASTENING CLIP

The invention relates to a fastening clip for fastening a component to a support component of a car, and to a method for producing such a fastening clip. Fastening clips of this type are used, for example, to fasten trim panels to car bodies. The fastening clips are intended to provide a defined retaining force and to be repeatedly removable and re-fittable.

Fastening clips which are completely composed of plastic are known. In this case, over the course of repeated removal and re-fitting, wear or damage to the plastic may occur, and therefore the retaining force decreases. Hybrid fastening clips which have a plastics body and a metal part clipped onto the plastics body are also known. The metal part ensures a constant retaining force even after repeated removal and re-fitting. However, due to the clip connection between the metal part and the plastics part, the geometry of the fastening clip, in particular of the metal part, is predetermined within narrow limits. In particular, known hybrid fastening clips are not insertable into circular passage bores in support components.

Starting from the explained prior art, the invention is based on the object of providing a fastening clip for fastening a component to a support component of a car, and a method for producing such a fastening clip, wherein the fastening clip provides a constant retaining force even after repeated removal and re-fitting, and wherein the geometry of the fastening clip is substantially freely selectable.

The invention achieves the object by the subject matter of claims 1 and 12. Advantageous refinements are found in the dependent claims, the description and the figures.

The invention firstly achieves the object by a fastening clip for fastening a component to a support component of a car, comprising a plastics body made from a thermoplastic with a head section which is fastenable at an opening in the component, and a pin section

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extending from the head section, furthermore comprising a metal clamp with a clamp head having a passage opening, wherein the pin section of the plastics body is guided through the passage opening in the clamp head, and wherein the free end of the pin section, said free end projecting through the passage opening in the clamp head, has a cross section which is enlarged in a plastics melting process in relation to the passage opening in the clamp head such that the clamp head is held on the pin section.

In addition, the invention achieves the object by a method for producing a fastening clip according to the invention, in which the pin section of the plastics body is guided through the passage opening in the clamp head and the free end of the pin section, which free end projects through the passage opening in the clamp head, is provided in a plastics melting process with a cross section which is enlarged in relation to the passage opening in the clamp head such that the clamp head is held on the pin section.

The fastening clip may be what is referred to as a trim clip. In particular, the component to be fastened to the support component may be a trim panel and the support component may be a car body part. The fastening clip has suitable retaining means in order to be held at an opening in the component. Said retaining means can be provided on the plastics body. Furthermore, the fastening clip may be latched at a passage bore in the support component. The fastening clip is repeatedly removable from the support component and re-fittable on the support component. The component may also be repeatedly detached from the fastening clip and fastened again to the fastening clip. The metal clamp of the fastening clip according to the invention ensures that a constant retaining force is provided even when the fastening clip is repeatedly removed from and re-fitted on the support component.

In addition, a substantially free selection of the geometry of the fastening clip, in particular of the metal clamp and of the plastics body, is made possible by the fastening according to the invention of the metal clamp to the plastics body. For this purpose, in a plastics melting process, the shape of the free end of the pin section of the plastics body is widened

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in cross section, after insertion into the passage opening in the clamp head, in such a manner that the cross-sectionally enlarged free end of the pin section no longer fits through the passage opening in the clamp head. The metal clamp is therefore caught by the clamp head thereof on the pin section, and therefore on the plastics body, in particular between the cross-sectionally enlarged free end of the pin section and a suitable stop on the other side of the clamp head. The plastics melting process comprises melting the thermoplastic by introducing thermal energy, reshaping the plastic in the melted state and subsequently cooling said plastic in the cross-sectionally enlarged shape. The thermal energy can be introduced as in the case of a plastics welding process. In this respect, the plastics melting process according to the invention substantially corresponds to plastics welding, but wherein an integrally bonded connection between the plastics body and the metal clamp does not necessarily take place. On the contrary, the metal clamp can be held, for example, in a form-fitting manner on the plastics body, in particular on the pin section. The metal clamp can also be held movably on the pin section with slight play. This makes fitting easier. However, it is also possible for the metal clamp to be held on the plastics body essentially without play. According to the invention, production of a hybrid fastening clip from a plastics body and a metal clamp is possible in a simple manner with the geometry being able to be designed substantially freely.

The possibility of freely designing the clamp geometry means that the fastening clip according to the invention is also suitable for arrangement in round holes of support components. The cap or point geometry of the free end of the pin section can also be freely designed. By this means, both the fitting on the support component can be made easier and a centering effect during the insertion into the passage bore in the support component achieved. The connection produced by the plastics melting process is of great stability and can be provided economically and with high process reliability. During the production process, the production of a fluid-tight variant, in particular waterproof variant, is also possible. It is possible here for a foam seal to be automatically applied, for example in the same process which is used for producing the fastening clip, in particular the connection of the metal clamp to the plastics body.

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The pin section of the plastics body can furthermore have a step-shaped cross-sectional enlargement, wherein the clamp head of the metal clamp is held between the step-shaped cross-sectional enlargement and the cross-sectionally enlarged free end of the pin section. Just like the free end of the pin section, which free end is remelted during the plastics melting process, the step-shaped cross-sectional enlargement has a larger cross section than the passage hole in the clamp head of the metal clamp. As already mentioned, the clamp head can be held in particular substantially without play between the cross-sectionally enlarged free end and the step-shaped cross-sectional enlargement of the pin section.

The metal clamp can comprise a plurality of elastic clamp arms which extend from the clamp head in the direction of the head section of the plastics body. The clamp arms can form a cross section which widens at least in sections from the clamp head. The fastening clip can be clipped into a passage bore in the support component by the elastic clamp arms. During the insertion into the passage bore, first of all the clamp arms are elastically deformed inward and, after passing through the passage bore, the clamp arms move back in the direction of the rest state thereof and therefore the fastening clip is latched at the passage bore.

The head section of the plastics body can have two fastening flanges between which the component can be held, as is known per se. Furthermore, the fastening flange facing the free ends of the clamp arms of the metal clamp can have an elastic retaining lip facing the free ends of the clamp arms. In the fitted state, the retaining lip bears against that side of the support component which faces it and, in particular together with the elastic clamp arms, results in improved support on the support component.

As already mentioned, the fastening clip can be configured in such a manner that it can be inserted into a round, in particular circular, passage bore in the support component. Circular passage bores are frequently provided on support components and make fitting

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easier. In this respect, the plastics melting process used according to the invention provides sufficient freedom with regard to the designing of the geometry.

The fastening clip can furthermore be rotationally symmetrical. A body is rotationally symmetrical (also radially symmetrical) if the rotation of the body by a certain angle about the axis of symmetry thereof brings the body into alignment with itself again. The fastening clip can be in particular rotationally symmetrical n-fold, wherein n is the number of clamp arms. If the fastening clip has, for example, three clamp arms, it is correspondingly rotationally symmetrical three-fold. This means that the fastening clip, in the event of rotation by  $120^\circ$  ( $360^\circ/3$ ) about the axis of symmetry thereof, is brought into alignment with itself again. The axis of symmetry of the fastening clip can be defined in particular by the longitudinal axis of the, for example, cylindrical pin section. In particular, the plastics body of the fastening clip can also be rotationally symmetrical. Said plastics body, in the event of rotation about the axis of symmetry thereof by any angle, is therefore then reproduced on itself again.

According to a further refinement, the cross-sectionally enlarged free end of the pin section can have mounting ribs. The cross-sectional enlargement of the free end during the plastics melting process also permits substantially any geometries with regard to the point of the free end of the pin section. Mounting ribs introduced into the point of the pin section make it easier to insert the fastening clip into the passage bore in the support component, in particular in the event of blind fitting.

The passage opening in the clamp head can have a circular cross section. According to a further refinement, it can also be provided that the passage opening of the clamp head has a cross section which is not rotationally symmetrical, preferably a four-cornered cross section, wherein, after the plastics melting process, at least that part of the pin section which is located in the passage opening has a cross section which is matched to the cross section, which is not rotationally symmetrical, of the passage opening and is likewise not rotationally symmetrical. In this refinement, the pin section is matched in the region of its

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passage through the passage opening in the clamp head to the cross section of the passage opening in the clamp head during the plastics melting process. The pin section can have in particular a circular cross section before the melting during the plastics melting process. After the plastics melting process and the matching to the cross section of the passage opening in the clamp head, there is then a form-fitting connection between the pin section and the clamp head, said form-fitting connection preventing the pin section from rotating in the clamp head.

The plastics melting process used according to the invention can be an ultrasonic melting process or a hot stamping process or a hot riveting process. The plastic can be melted thermally in a simple manner by ultrasound, as is known from ultrasonic plastics welding. Furthermore, the pin section can be provided in a simple manner with a predetermined geometry, for example with mounting ribs or the like, in the region of the free end thereof.

In the method according to the invention, the plastics body can be provided in a two-component injection-molding process with a section made of softer plastic, for example a sealing section. The plastics melting process can then be carried out in a particularly simple manner in terms of production in the casting mold for the two-component injection-molding process. In the casting mold, the plastics body and the metal clamp are in a defined position for the plastics melting process. Furthermore, a hot stamping core or hot riveting core used for the plastics melting process can then bound part of the mold cavity of the casting mold. The hot stamping core or hot riveting core therefore then itself forms part of the mold cavity.

An exemplary embodiment of the invention is explained in more detail below with reference to figures, in which, schematically:

Fig. 1 shows a plastics body of a fastening clip according to the invention in a side view,

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Fig. 2 shows the plastics body from fig. 1 in a sectional view,

Fig. 3 shows the plastics body from fig. 1 in a perspective view,

Fig. 4 shows the plastics body from fig. 1 in a top view,

Fig. 5 shows a metal clamp of a fastening clip according to the invention in a side view,

Fig. 6 shows the metal clamp from fig. 5 in a top view,

Fig. 7 shows the metal clamp from fig. 5 in a perspective view,

Fig. 8 shows the plastics body from fig. 1 and the metal clamp from fig. 5 in a temporarily fitted position in a side view,

Fig. 9 shows the illustration from fig. 8 in a sectional view,

Fig. 10 shows the illustration from fig. 8 in a perspective view,

Fig. 11 shows the illustration from fig. 8 in a top view,

Fig. 12 shows the plastics body from fig. 1 and the metal clamp from fig. 5 in the ready fitted state to form a fastening clip according to the invention in a side view,

Fig. 13 shows the illustration from fig. 12 in a sectional view,

Fig. 14 shows the illustration from fig. 12 in a perspective view, and

Fig. 15 shows the illustration from fig. 12 in a top view.

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Unless stated otherwise, the same reference numbers in the figures refer to the same objects. The plastics body, which is shown in figures 1 to 4, of the fastening clip according to the invention is formed as a single piece from a thermoplastic. It has a head section 10 with a first fastening flange 12 and a second fastening flange 14. A clearance 16 in which a component, for example a trim panel, which is to be fastened to a support component in a car, for example to a car body, can be held in a manner known per se is formed between the fastening flanges 12, 14. A cross-sectionally circular pin section 18 with a free end 20 extends from the head section 10. At the reference number 22, a step-shaped cross-sectional enlargement from the free end 20 to the remaining part of the pin section 18 can be seen. In addition, it can be seen that the second fastening flange 12 has a plate-like elastic retaining lip 24 facing the free end 20 of the pin section 18.

Figures 5 to 7 show a metal clamp of the fastening clip according to the invention. The metal clamp has a clamp head 26 with a passage opening 28 which is square in the example illustrated. In the example shown, three elastic clamp arms 30 extend from the clamp head 26. Starting from the clamp head 26, the clamp arms 30 first of all form a widening cross section as far as a bend 32, from which the cross section formed by the clamp arms 30 is reduced again.

The production of the fastening clip according to the invention will be explained with reference to figures 8 to 15. First of all, the pin section 18 of the plastics body is inserted by the free end 20 thereof through the passage opening 28 in the clamp head 26 of the metal clamp in order to reach the pre-fitting state shown in figures 8 to 11. After the step-shaped cross-sectional enlargement 22, the cross section of the pin section 18 is larger than the cross section of the passage opening 28 in the clamp head 26, and therefore the clamp head 26 rests on the step-shaped cross-sectional enlargement 22, as can be seen in particular in the sectional view in figure 9.

From said pre-fitting state, the free end 20 of the pin section 18 is then remelted in a plastics melting process and thus enlarged in cross section, as can be seen in figures 12 to

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15. In the example illustrated, a plastics hot riveting process is used. With such a plastics hot riveting process, the free end 20 can be formed with substantially any shape. As can be seen in figures 12 to 15, the free end 20 of the pin section 18 in the present case has been formed in a cap-like manner, wherein three mounting ribs 34 have been introduced into the cap-like free end 20. The mounting ribs 34 serve for simpler insertion into the support component, in particular in the event of blind fitting.

As can be seen in particular in the sectional view of figure 13, the cross section of the free end 20 has been widened within the scope of the plastics hot riveting process in such a manner that the metal clamp is held by the clamp head 26 thereof between the step-shaped cross-sectional enlargement 22 and the cross-sectionally enlarged free end 20 of the pin section 18 substantially without play. It is also possible, by sufficient heating of the free end 20 of the pin section 18, for the plastic in the region of the passage opening 28 in the clamp head 26 to be matched to the cross section of the passage opening 28, i.e. to likewise have a square cross section after the plastics hot riveting process. This prevents the metal clamp from rotating on the pin section 18.

In the ready fitted state shown in figures 12 to 15, the fastening clip can be clipped into a passage bore in a support component. For this purpose, the clamp arms 30, during the passage through the cross-sectionally smaller passage bore and the largest cross section of the clamp arms 30, are first of all elastically compressed and, after passing through the passage bore, latch behind the passage bore. The elastic retaining lip 24 bears here on one side of the support component and the clamp arms 30, by the free ends thereof, which can be seen at the bottom in figure 12, bear here on the other side of the support component. As mentioned, the component to be fastened to the support component can be held in the clearance 16 between the first and second fastening flange 12, 14 of the plastics body and can therefore be fastened to the support component.

The fastening clip according to the invention ensures constant retaining forces even in the event of repeated removal and re-fitting. Furthermore, a substantially free selection of the

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geometry of the fastening clip is possible by means of the production according to the invention. In the example shown, the fastening clip according to the invention can be inserted because of the geometry thereof into a circular passage bore in the support component.

Claims

1. A fastening clip for fastening a component to a support component of a car, comprising a plastics body made from a thermoplastic with a head section (10) which is fastenable at an opening in the component, and a pin section (18) extending from the head section (10), furthermore comprising a metal clamp with a clamp head (26) having a passage opening (28), wherein the pin section (18) of the plastics body is guided through the passage opening (28) in the clamp head (26), and wherein the free end (20) of the pin section (18), said free end projecting through the passage opening (28) in the clamp head (26), has a cross section which is enlarged in a plastics melting process in relation to the passage opening (28) in the clamp head (26) such that the clamp head (26) is held on the pin section (18).
2. The fastening clip as claimed in claim 1, characterized in that the pin section (18) of the plastics body furthermore has a step-shaped cross-sectional enlargement (22), wherein the clamp head (26) is held between the step-shaped cross-sectional enlargement (22) and the cross-sectionally enlarged free end (20) of the pin section (18).
3. The fastening clip as claimed in either of the preceding claims, characterized in that the metal clamp comprises a plurality of elastic clamp arms (30) which extend from the clamp head (26) in the direction of the head section (10) of the plastics body.
4. The fastening clip as claimed in one of the preceding claims, characterized in that the head section (10) of the plastics body has two fastening flanges (12, 14) between which the component can be held.
5. The fastening clip as claimed in claims 3 and 4, characterized in that the fastening flange (12) facing the free ends of the clamp arms (30) has an elastic retaining lip (24) facing the free ends of the clamp arms (30).

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6. The fastening clip as claimed in one of claims 3 to 5, characterized in that the clamp arms (30) form a cross section which widens at least in sections from the clamp head (26).
7. The fastening clip as claimed in one of the preceding claims, characterized in that said the fastening clip can be inserted into a round, in particular circular, passage bore in the support component.
8. The fastening clip as claimed in one of claims 3 to 7, characterized in that said the fastening clip is rotationally symmetrical, in particular rotationally symmetrical n-fold, wherein n is the number of clamp arms (30).
9. The fastening clip as claimed in one of the preceding claims, characterized in that the cross-sectionally enlarged free end (20) of the pin section (18) has mounting ribs (34).
10. The fastening clip as claimed in one of the preceding claims, characterized in that the passage opening (28) of the clamp head (26) has a cross section which is not rotationally symmetrical, preferably a four-cornered cross section, wherein, after the plastics melting process, at least that part of the pin section (18) which is located in the passage opening (28) has a cross section which is matched to the cross section, which is not rotationally symmetrical, of the passage opening (28) and is likewise not rotationally symmetrical.
11. The fastening clip as claimed in one of the preceding claims, characterized in that the plastics melting process is an ultrasonic melting process or a hot stamping process or a hot riveting process.
12. A method for producing a the fastening clip as claimed in one of the preceding claims, in which the pin section (18) of the plastics body is guided through the passage opening (28) in the clamp head (26) and the free end (20) of the pin section (18), which

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free end projects through the passage opening (28) in the clamp head (26), is provided in a plastics melting process with a cross section which is enlarged in relation to the passage opening (28) in the clamp head (26) such that the clamp head (26) is held on the pin section (18).

13. The method as claimed in claim 12, characterized in that the plastics body is provided in a two-component injection-molding process with a section made of softer plastic, wherein the plastics melting process is carried out in the casting mould for the two-component injection-molding process.

14. The method as claimed in claim 13, characterized in that a hot stamping core or hot riveting core used for the plastics melting process bounds part of the cavity of the casting mould.

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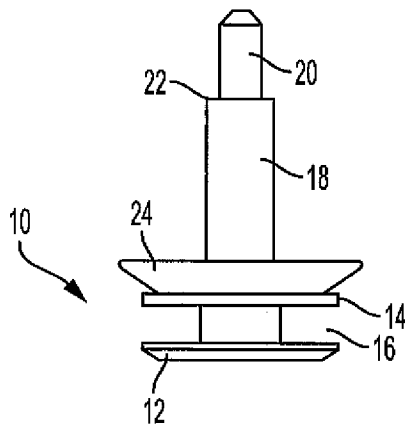


FIG. 1

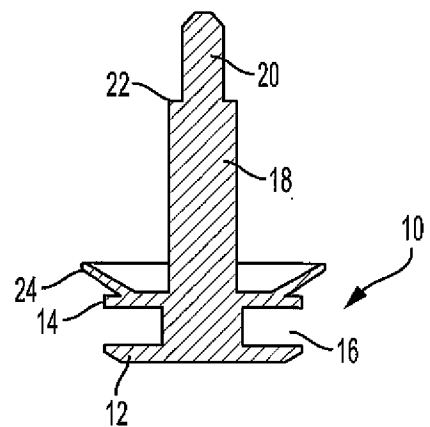


FIG. 2

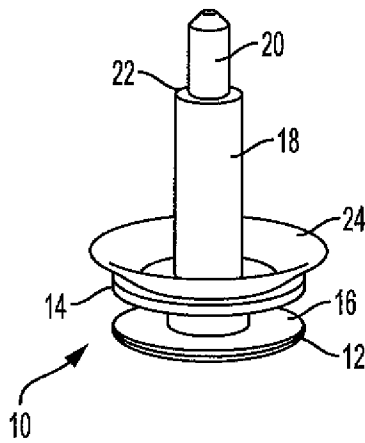


FIG. 3

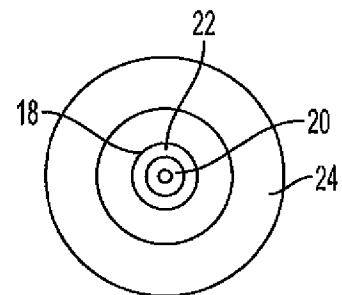


FIG. 4

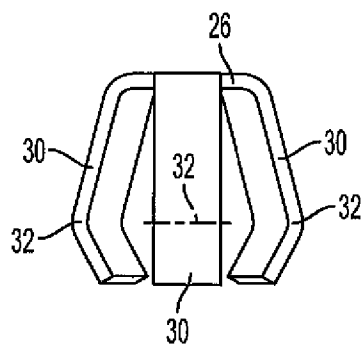


FIG. 5

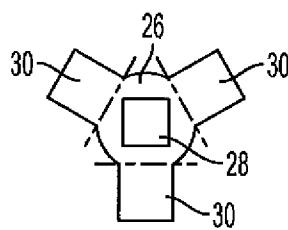


FIG. 6

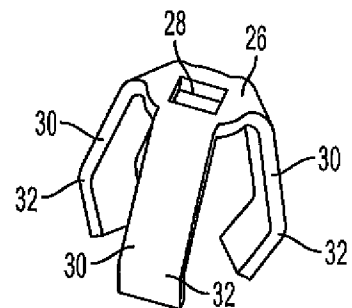


FIG. 7

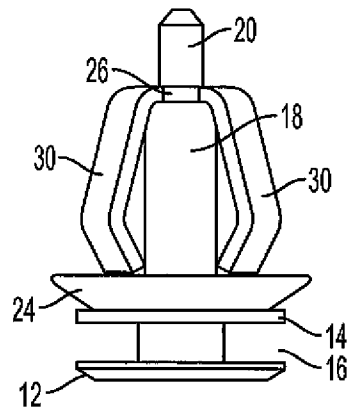


FIG. 8

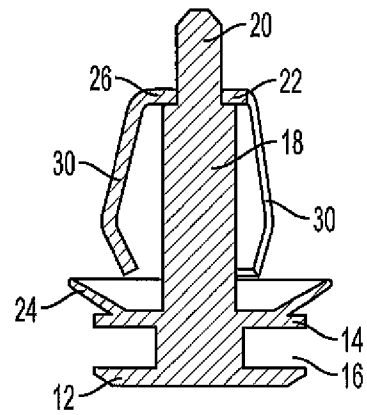


FIG. 9

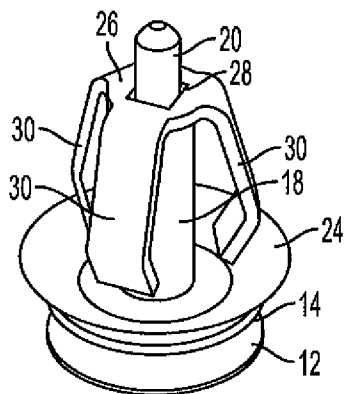


FIG. 10

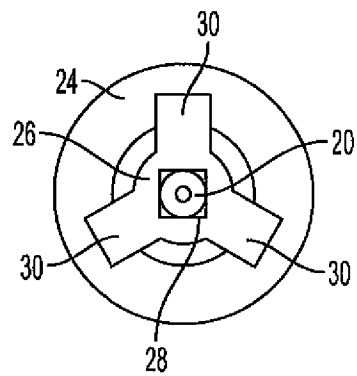


FIG. 11

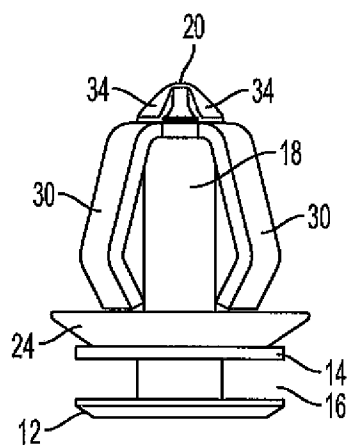


FIG. 12

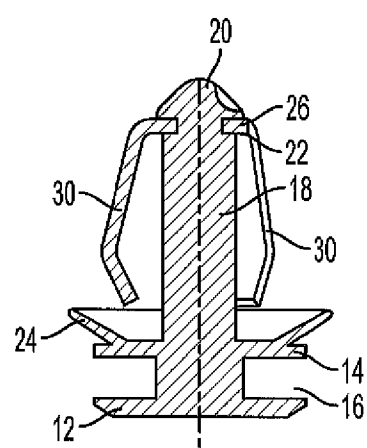


FIG. 13

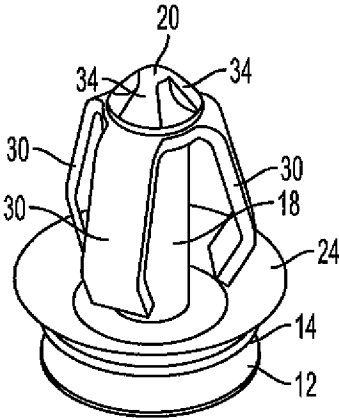


FIG. 14

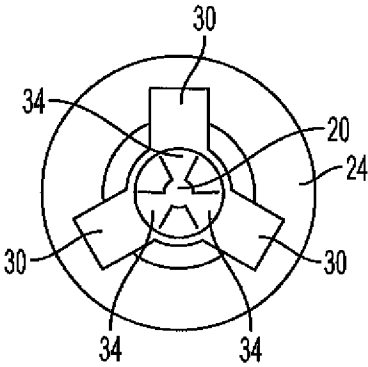


FIG. 15

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2015/014381

A. CLASSIFICATION OF SUBJECT MATTER  
INV. F16B21/08 F16B5/06 B60R13/02  
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         | EP 0 889 247 A2 (MIKALOR SA [ES])<br>7 January 1999 (1999-01-07)                                                         | 1-3,6-14              |
| Y         | column 2, line 9 - line 17<br>column 3, line 27 - line 45; figure 4<br>-----                                             | 4,5                   |
| Y         | WO 98/33679 A2 (MECANO RAPID GMBH [DE];<br>FRIEDRICH ELVIRA [DE]; DEMEL OTTO [DE];<br>SENFTL) 6 August 1998 (1998-08-06) | 4,5                   |
| A         | page 4, last paragraph - page 5, paragraph<br>1; figures 2,3<br>-----                                                    | 1,3,6,<br>10,12       |



Further documents are listed in the continuation of Box C.



See patent family annex.

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Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040,  
Fax: (+31-70) 340-3016

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Heinzler, Markus

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Information on patent family members

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