



(43) International Publication Date
24 December 2014 (24.12.2014)

- (51) International Patent Classification:
F16B 5/02 (2006.01) *F16B 37/04* (2006.01)
- (21) International Application Number:
PCT/US2014/035320
- (22) International Filing Date:
24 April 2014 (24.04.2014)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
20 2013 005 582.0 21 June 2013 (21.06.2013) DE
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- (81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,

HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ,
LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,
SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

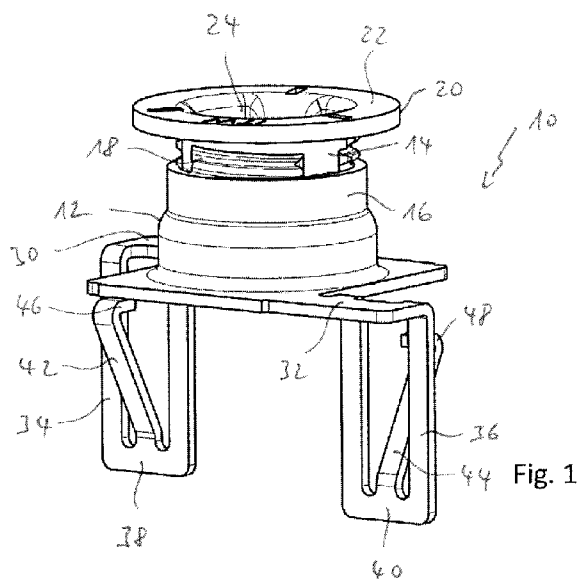
Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

- with international search report (Art. 21(3))

(54) Title: SYSTEM COMPRISING A CARRIER COMPONENT



(57) Abstract: System comprising a carrier component (28), in particular a carrier component (28) of an automobile, and a multi-part fastening device (10) for fastening a component on the carrier component (28), wherein the fastening device (10) comprises a first part (12) with holding means with which the fastening device (10) is held on at least one opening (50, 52) of the carrier component (28), and wherein the fastening device (10) comprises a second part (14) with an abutting surface (22) for the component and with a fastening reception (24), which is designed to receive fastening means for fastening the component on the fastening device (10) in a state contacting the abutting surface (22) of the second part (14), wherein the first part (12) and the second part (14) are relatively moveable with regard to each other along a first direction, wherein the holding means of the first part (12) comprise at least two holding legs with which the fastening device (10) is held on the at least one opening (50, 52) of the carrier component (28), wherein the holding legs are moveable in the at least one opening (50, 52) along a second direction being orthogonal to the first direction and along a third direction being orthogonal to the first and the second direction.

SYSTEM COMPRISING A CARRIER COMPONENT

The invention relates to a system comprising a carrier component, in particular a carrier component of an automobile, and a multi-part fastening device for fastening a component on the carrier component, wherein the fastening device comprises a first part with holding means with which the fastening device is held on at least one opening of the carrier component, and wherein the fastening device comprises a second part with an abutting surface for the component and with a fastening reception, which is designed to receive fastening means for fastening the component on the fastening device in a state contacting the abutting surface of the second part, wherein the first part and the second part are relatively moveable with regard to each other along a first direction.

For example, trim parts are fastened to carrier components of automobiles by way of fastening devices of this type. To this end, the fastening device is inserted with its holding means into one or more openings of the carrier component, with the result that the fastening device is held on the carrier component. The component to be fastened which likewise has, for example, one opening is placed onto the abutting surface of the fastening device in such a way that the component opening is aligned with the fastening reception of the fastening device. Subsequently, for example, a fastening bolt can be inserted through the opening of the component into the fastening reception, with the result that the component is held reliably on the carrier component via the fastening device.

A multi-part fastening device under the name “ITW Advanced Compensation Nut (ACN)” is known from practice. A first part of said fastening device has holding means for holding on a carrier component and a reception which is provided with an inner thread for a second part of the fastening device, which second part is provided with a corresponding outer thread. The second part has an abutting surface for a component to be fastened on the carrier component and forms a fastening reception for a fastening bolt or the like. By the second part being screwed into or out of the first part, the first and the

second part can be moved relative to one another in the axial direction. It is possible in this way to compensate for component tolerances in the direction of movement.

Proceeding from this prior art, the invention is based on the object of further increasing the flexibility of fastening devices of this type, in particular with regard to tolerances of the carrier components and/or the components which are to be fastened thereon.

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

The invention achieves the object by way of a system comprising a carrier component, in particular a carrier component of an automobile, and a multi-part fastening device for fastening a component on the carrier component, wherein the fastening device comprises a first part with holding means with which the fastening device is held on at least one opening of the carrier component, and wherein the fastening device comprises a second part with an abutting surface for the component and with a fastening reception, which is designed to receive fastening means for fastening the component on the fastening device in a state contacting the abutting surface of the second part, wherein the first part and the second part are relatively moveable with regard to each other along a first direction, and wherein the holding means of the first part comprises at least two holding legs with which the fastening device is held on the at least one opening of the carrier component, wherein the holding legs are moveable in the at least one opening along a second direction being orthogonal to the first direction and along a third direction being orthogonal to the first and the second direction.

By way of the system according to the invention, a component, for example a trim part for an automobile, can be fastened on a carrier component, for example a carrier component of an automobile. To this end, first of all the fastening device is arranged with its holding means on the at least one opening of the carrier component, with the result that the fastening device is held on the carrier component. Subsequently, a component to be fastened on the carrier component, which component likewise can have at least one opening for this purpose, can be placed onto the abutting surface of the

fastening device in such a way that the opening of the component is aligned with the opening of the fastening reception, which opening is delimited by the abutting surface. Subsequently, fastening means, such as a fastening bolt, can be inserted through the opening of the component into the fastening reception. The fastening means are then held in the fastening reception, as a result of which in turn the component is fastened on the carrier component.

The system can have a plurality of fastening devices of this type, with the result that the component to be fastened which can then correspondingly be provided with a plurality of openings can be fastened via a plurality of fastening points on the carrier component which likewise has a plurality of openings for this purpose. The fastening device of the system according to the invention is of multi-part, in particular two-part configuration. Here, the holding means for holding on the at least one opening of the carrier component are provided on a first part and the abutting surface and the fastening reception are provided on a second part of the fastening device. By virtue of the fact that the first part and the second part are relatively moveable with regard to each other along a first direction, for example in an axial direction of the fastening reception, first of all component tolerances can be compensated for in this direction, that is to say, in particular, an axial direction of the fastening reception.

According to the invention, the holding means of the first part have at least two holding legs with which the fastening device is held on the at least one opening of the carrier component. The holding legs are moveable in the at least one opening along a second direction being orthogonal to the direction of movement between first and second part (the first direction) and along a third direction being orthogonal to the first and the second direction. If, therefore, a moveability along the z-direction, for example, is made possible by way of the two-part nature of the fastening device, the arrangement of the holding legs in the at least one opening of the carrier component, moreover, makes a movement along the x-direction and y-direction possible. In addition to tolerance compensation in the z-direction, for example an insertion direction of a fastening means into the fastening reception, tolerance compensation in the x-direction and y-direction is therefore also made possible. Here, the holding forces in the mounted state are

configured, in particular, in such a way that a movement in the second and third direction is still possible in the mounted state.

The system according to the invention can be used, in particular, for fastening cover components on an interior carrier component of an automobile. An extremely accurate alignment of the covers even in the case of component tolerances is desired precisely in the interior of an automobile for visual reasons.

The first part of the fastening device can be of single-part configuration. The second part of the fastening device can correspondingly also be of single-part configuration. The first part and the second part can be composed of a metal material or of a plastic. However, any desired material combinations are also conceivable. The fastening reception can be formed by a substantially hollow cylindrical section of the first part. It is also conceivable that the fastening reception is additionally configured in the second part of the fastening device. The fastening reception can, in particular, have a circular cross section.

According to one refinement, the fastening reception can have at least one locking element or an inner thread for receiving a fastening bolt. The fastening device can be formed by a fastening nut. Here, the first part can be formed by a first or lower nut and the second part can be formed by a second or upper nut. The fastening bolt can be a threaded bolt or a locking bolt.

According to a further refinement, the carrier component can have at least two openings, wherein the at least two holding legs are held in each case on one of the openings. Separate openings are therefore provided for the holding legs of the fastening device. Tolerance compensation which is defined in a further improved manner is achieved as a result.

According to a further refinement, the at least two holding legs can each comprise at least one elastic locking arm, wherein the elastic locking arms engage in a locking manner behind the at least one opening when held on the at least one opening of the

carrier component. The elastic locking arms are moved out of their rest position by way of elastic bending when inserted into the openings of the carrier component. After passing through the openings, the locking arms move back into their rest position, wherein engagement behind the openings and therefore reliable holding of the fastening device on the carrier component occur.

According to a further refinement, the at least two holding legs can each comprise at least one flat carrying section abutting on the surface of the carrier component in the mounted state, wherein starting from the carrying sections in each case at least one holding section extends, which holding sections extend through the respective opening. Here, the surface of the carrier component is that side of the carrier component which faces the component to be fastened in the mounted state. The carrying sections therefore extend in a plane which lies perpendicularly with respect to the insertion direction of the fastening means, for example a fastening bolt, into the fastening reception. The carrying sections can in each case be rectangular, in particular they can form a non-equilateral rectangle. The holding sections can have a length which is greater by a multiple than the thickness of the carrier component and/or the component to be fastened thereon. For example, in the insertion direction of a fastening bolt into the fastening reception, that is to say, in particular, in the axial direction of the fastening reception, the holding sections can have a greater extent than the fastening reception. This applies correspondingly to the locking arms. The required pressing-in forces for mounting are advantageously reduced by way of long holding sections and long locking arms.

Furthermore, the holding sections can each be flat holding sections which each extend starting from the carrying sections in a direction being essentially perpendicular to the carrying sections. For example, the holding sections can likewise have a rectangular outline. The locking arms can have been formed in each case by being punched out of the holding sections. Correspondingly, the holding sections can be, for example, of U-shaped configuration, wherein the ends of the legs are connected to the carrying sections. In particular, the legs of a U-shaped holding section of this type can extend in each case perpendicularly with respect to the plane, in which the carrying sections lie, and therefore also perpendicularly with respect to the surface of the carrier component. The

locking arms can then extend in each case starting from the base section which connects the legs of the U-shaped holding sections. In particular, the elastic locking arms can extend with an angle, preferably an acute angle, with respect to the holding sections.

According to a further refinement, the holding sections, when held on the respective opening of the carrier component, can each be received in the respective opening with play along the second direction and along the third direction. The openings are therefore in each case larger than the cross section received therein of the holding sections, with the result that said holding sections are moveable, in particular displaceable in the second and the third direction. According to a further refinement, starting from a hollow cylindrical section of the first part, the carrying sections can extend away from one another along parallelly distant directions. Furthermore, the fastening reception of the first part of the fastening device can be formed by a hollow cylindrical section, wherein the carrying sections, starting from the hollow cylindrical section of the first part, each extend away in tangential direction. Here, in particular, the longitudinal axes of the carrying sections extend away from one another and run along lines which are spaced apart in parallel. The carrying sections are therefore arranged asymmetrically in relation to the longitudinal axis of the fastening reception. The holding legs and the holding sections are then also correspondingly arranged asymmetrically in relation to the longitudinal axis of the fastening reception. This ensures reliable anti-rotation protection of the device in the mounted state. Furthermore, it can be provided that the at least two openings of the carrier component, on which the holding legs are held, are each rectangular openings. Once again, they are, in particular, non-equilateral rectangles, that is to say elongate rectangles, which therefore form slots.

According to a further refinement, the carrier component can have at least one third opening, preferably a circular-shaped third opening, which is aligned with the fastening reception of the first part of the fastening device. If required, the fastening means for fastening the component can then extend through the circular-shaped opening of the carrier component.

According to a further refinement, it can be provided that the second part of the fastening device has an outer thread, and that the first part of the fastening device has an inner thread, wherein the second part is rotatably received with its outer thread in the inner thread of the first part and is thus moveable along the first direction relative to the first part. In this way, the moveability and therefore the tolerance compensation in the first direction, for example the axial direction of the fastening reception, is achieved in a particularly simple way. Here, the required forces for rotating the second part in the first part of the fastening device are selected to be higher than the required forces for screwing, for example, the fastening bolt into the fastening reception which is formed by the second part, for example an inner thread of the fastening reception. This ensures that first of all the fastening bolt is screwed into the fastening reception of the second part until the component which is to be fastened on the carrier component is pressed onto the abutting surface of the second part by the fastening bolt. Only then is sufficient torque exerted on the second part of the fastening device during further screwing in of the fastening bolt, with the result that the fastening bolt then rotates the second part of the fastening device, with the result that said second part is screwed further into the first part, in order thus to ensure tolerance compensation in the insertion direction.

In the following text, one exemplary embodiment of the invention will be explained in greater detail using figures, in which, diagrammatically:

- figure 1 shows a fastening device of a system according to the invention in a perspective view,
- figure 2 shows the fastening device from figure 1 in a side view,
- figure 3 shows the fastening device from figure 1 in a plan view,
- figure 4 shows the fastening device from figure 1 in a partially transparent side view, and
- figure 5 shows a carrier component of a system according to the invention in a plan view.

If nothing else is specified, identical designations denote identical objects in the figures. Figures 1 to 4 show a fastening device 10 of a system according to the invention in

accordance with an exemplary embodiment. The fastening device 10 is of two-part configuration and has a first, lower (in figure 1) part 12 and a second, upper (in figure 1) part 14. The first part 12 has a substantially hollow cylindrical section 16. The hollow cylindrical section 16 has an inner thread (not shown in the figures). The second part 14 is of substantially hollow cylindrical configuration and, on its outer circumference, has an outer thread 18 which comes into engagement with the inner thread of the hollow cylindrical section 16 of the first part 12. At its upper end in figure 1, the second part 14 has a flange 20, the upper side of which forms an abutting surface 22 for a component which is to be fastened on a carrier component by way of the fastening device 10. The flange 20 with its abutting surface 22 delimits the opening of a fastening reception 24 of the second part 14. A plurality of locking elements 26 are arranged in the fastening reception 24. Said locking elements 26 are configured to come into engagement with a fastening bolt, for example a threaded bolt, and thus to hold the fastening bolt in the fastening reception 24. This serves in a manner known per se to fasten a component on the fastening device 10 and, via the latter, on a carrier component, by the fastening bolt being inserted through a suitable opening of the component into the fastening reception 24.

As holding means, in the present case the first part 12 of the fastening device 10 has two holding legs with which the fastening device 10 is held on a carrier component 28 (shown diagrammatically and in detail in figure 5) of an automobile, as will be explained in greater detail further below. The two holding legs of the first part 12 comprise in each case one flat carrying section 30, 32 which lies on the surface of the carrier component 28 in the mounted state. The carrying sections 30, 32 in each case have a substantially rectangular shape. Starting from the carrying sections 30, 32, in each case one holding section 34, 36 extends. The holding sections 34, 36 are in each case of U-shaped configuration, wherein the ends of their legs are connected to the carrying sections 30, 32. It can be seen, for example, in figure 2 that the flat holding sections 34, 36, starting from the likewise flat carrying sections 30, 32, extend away from the latter in a direction which is perpendicular with respect to the plane of the carrying sections 30, 32. As viewed in the insertion direction of a fastening bolt into the fastening reception 24, that is to say in a direction from top to bottom in figures 1 and 2, the holding sections 34, 36

have a greater extent than the fastening reception 24. Starting from the base section 38, 40 which in each case connects the two legs of the U-shaped holding sections 34, 36, in each case one elastic locking arm 42, 44 extends. In the example which is shown, the elastic locking arms 42, 44 extend in each case at an acute angle with respect to the holding sections 34, 36. The acute angles are illustrated with the designations α and β for illustrative purposes in figure 2. At their free ends, the elastic locking arms 42, 44 have in each case one angled-away abutting section 46, 48. Moreover, it can be seen, for example, in the plan view of figure 3 that the carrying sections 30, 32, starting from the hollow cylindrical section 16 of the first part 12, extend away from one another along directions which are spaced apart in parallel, to be precise in tangential direction in relation to the hollow cylindrical section 16.

It can be seen in figure 5 that the carrier component 28 has two elongate rectangular openings 50, 52. Moreover, the carrier component has a circular-shaped opening 54 which is arranged between the rectangular openings 50, 52. A center point of the circular-shaped opening 54 is shown at the designation 56 in figure 5. It can be seen that the rectangular openings 50, 52 are arranged asymmetrically in relation to said circle center point 56. Anti-rotation protection is achieved as a result.

For mounting, the fastening device 10 which is shown in figures 1 to 4 is inserted with the holding sections 34, 36 into the rectangular openings 50, 52 of the carrier component 28. Here, first of all elastic bending of the locking arms 42, 44 occurs in the direction of the holding section 34, 36 which holds them in each case. After the locking arms 42, 44 have passed through the rectangular openings 50, 52, they move back into their starting position again and engage behind the rectangular openings 50, 52 of the carrier component 28, wherein their angled-away sections 46, 48 bear against the underside of the carrier component 28. The fastening device 10 is then held on the carrier component 28.

Subsequently, a second component (not shown in the figures) is placed onto the abutting surface 22 of the second part 14 of the fastening device 10 in such a way that a component opening is aligned with the fastening reception 24. A fastening bolt is then

inserted through the component opening into the fastening reception 24, wherein locking of the locking elements 26 on the fastening bolt occurs. In particular, the fastening bolt can be screwed into the fastening reception 24. Here, the required torque for rotating the second part 14 in the first part 12 of the fastening device 10 is sufficiently high, with the result that first of all the fastening bolt is screwed into the fastening reception 24 until the component to be fastened is clamped between a head of the fastening bolt and the abutting surface 22. Only subsequently, upon further rotation of the fastening bolt, is sufficiently great torque exerted, in order to screw the second part 14 into the first part 12 and thus to move the second part 14 with respect to the first part 12 in the insertion direction of the fastening bolt, that is to say from top to bottom in figure 2, in order in this way to ensure tolerance compensation in the z-direction, that is to say from top to bottom in figure 2. At the same time, the rectangular openings 50, 52 are sufficiently large, with the result that the holding sections 34, 36 are held with play in an x-direction which is orthogonal with respect to the insertion direction of the fastening bolt (z-direction) and in a y-direction which is likewise orthogonal with respect to said x-direction, that is to say in figure 5 firstly from left to right and vice versa and secondly from top to bottom and vice versa. As a result, in addition to the tolerance compensation in the z-direction, tolerance compensation in the x-direction and y-direction can also be ensured.

Claims

1. System comprising a carrier component (28), in particular a carrier component (28) of an automobile, and a multi-part fastening device (10) for fastening a component on the carrier component (28), wherein the fastening device (10) comprises a first part (12) with holding means with which the fastening device (10) is held on at least one opening (50, 52) of the carrier component (28), and wherein the fastening device (10) comprises a second part (14) with an abutting surface (22) for the component and with a fastening reception (24), which is designed to receive fastening means for fastening the component on the fastening device (10) in a state contacting the abutting surface (22) of the second part (14), wherein the first part (12) and the second part (14) are relatively moveable with regard to each other along a first direction,
characterized in that the holding means of the first part (12) comprise at least two holding legs with which the fastening device (10) is held on the at least one opening (50, 52) of the carrier component (28), wherein the holding legs are moveable in the at least one opening (50, 52) along a second direction being orthogonal to the first direction and along a third direction being orthogonal to the first and the second direction.
2. System according to claim 1, characterized in that the fastening reception (24) comprises at least one locking element (26) or an inner thread for receiving a fastening bolt.
3. System according to one of the preceding claims, characterized in that the carrier component (28) comprises at least two openings (50, 52), wherein the at least two holding legs are held in each case on one of the openings (50, 52).
4. System according to one of the preceding claims, characterized in that the at least two holding legs each comprise at least one elastic locking arm (42, 44), wherein the elastic locking arms (42, 44) engage in a locking manner behind the at least one opening (50, 52) when held on the at least one opening (50, 52) of the carrier component (28).

5. System according to one of claims 3 or 4, characterized in that the at least two holding legs each comprise at least one flat carrying section (30, 32) abutting on the surface of the carrier component (28), wherein starting from the carrying sections (30, 32) in each case at least one holding section (34, 36) extends, which holding sections extend through the respective opening (50, 52).
6. System according to claim 5, characterized in that the holding sections (34, 36) are each flat holding sections (34, 36) which each extend starting from the carrying sections (30, 32) in a direction being essentially perpendicular to the carrying sections (30, 32).
7. System according to one of claims 5 or 6, characterized in that the elastic locking arms (42, 44) extend with an angle, preferably an acute angle, with regard to the holding sections (34, 36).
8. System according to one of claims 5 to 7, characterized in that the holding sections (34, 36), when held on the respective opening (50, 52) of the carrier component (28), are each received in the respective opening (50, 52) with play along the second direction and along the third direction.
9. System according to one of claims 5 to 8, characterized in that, starting from a hollow cylindrical section (16) of the first part (12), the carrying sections (30, 32) extend away from one another along parallelly distanced directions.
10. System according to one of claims 5 to 9, characterized in that the fastening reception (24) of the first part (12) of the fastening device (10) is formed by a hollow cylindrical section (16), wherein the carrying sections (30, 32), starting from the hollow cylindrical section (16) of the first part (12), each extend away in tangential direction.
11. System according to one of claims 3 to 10, characterized in that the at least two

openings (50, 52) of the carrier component (28), on which the holding legs are held, are each rectangular openings (50, 52).

12. System according to one of claims 3 to 11, characterized in that the carrier component (28) comprises at least one third opening (54), preferably a circular-shaped opening (54), which is aligned with the fastening reception (24) of the first part (12) of the fastening device (10).
13. System according to one of the preceding claims, characterized in that the second part (14) of the fastening device (10) comprises an outer thread (18), and in that the first part (12) of the fastening device (10) comprises an inner thread, wherein the second part (14) is rotatably received with its outer thread (18) in the inner thread of the first part (12) and is thus moveable along the first direction relative to the first part (12).

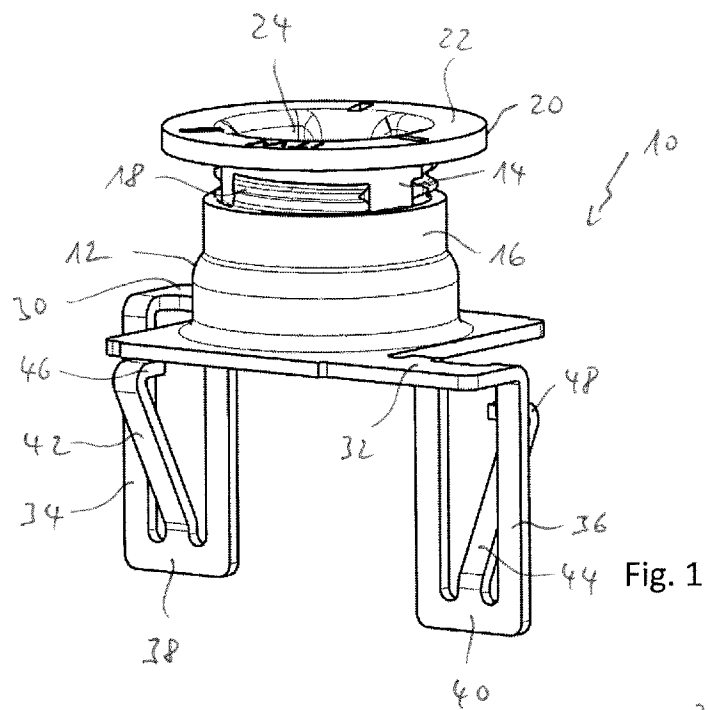


Fig. 1

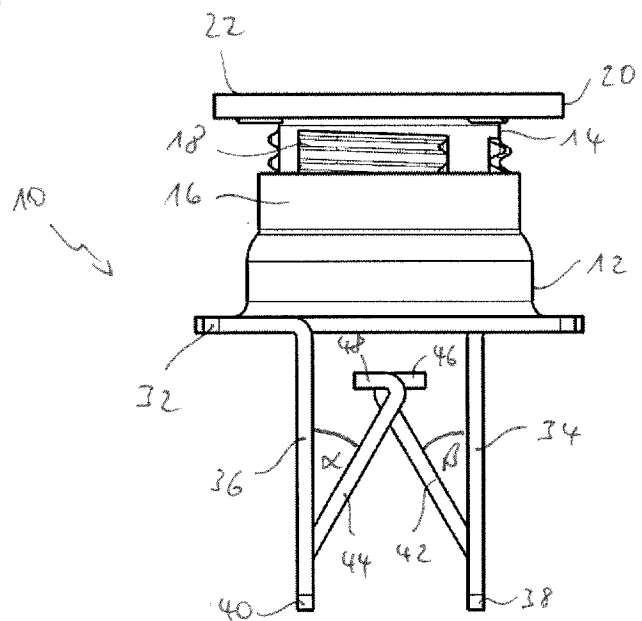


Fig. 2

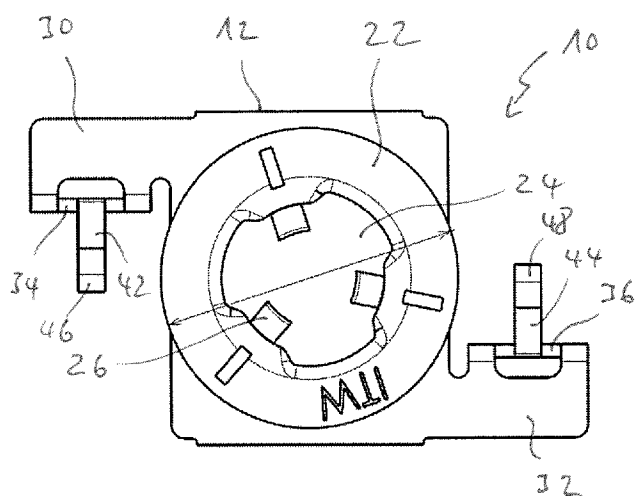
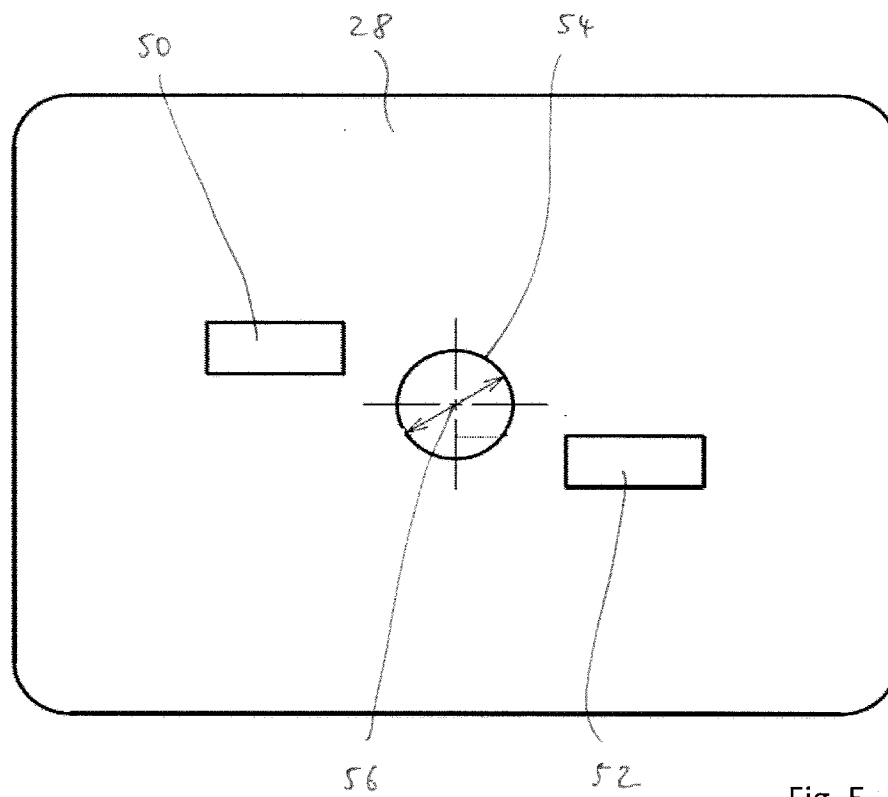
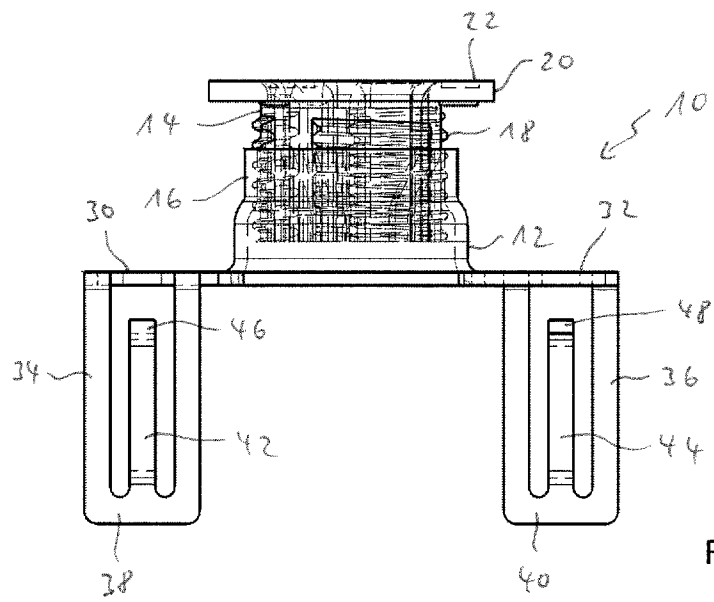


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/035320

A. CLASSIFICATION OF SUBJECT MATTER
INV. F16B5/02 F16B37/04
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 44 12 431 C1 (BENTELER WERKE AG [DE]) 19 October 1995 (1995-10-19) column 3, line 36 - column 5, line 5; figures 1-5	1-13
X	DE 20 2007 008154 U1 (BOELLHOFF VERBINDUNGSTECHNIK [DE]) 6 September 2007 (2007-09-06) paragraph [0019] - paragraph [0032]; figures 1-7	1-13
A	WO 2008/129854 A1 (AOYAMA SEISAKUSHO [JP]; KONAGAYA SATOSHI [JP]; SHIBUYA KAZUOKI [JP]; H) 30 October 2008 (2008-10-30) abstract; figures	1-13

☐

Further documents are listed in the continuation of Box C.

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See patent family annex.

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Date of the actual completion of the international search

11 September 2014

Date of mailing of the international search report

18/09/2014

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Information on patent family members

International application No

PCT/US2014/035320

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