(12) UK Patent Application (19) GB (11) 2 024 975 A

(21) Application No 7905501
(22) Date of filing 16 Feb 1979
(23) Claims filed 16 Feb 1979
(30) Priority data
(31) 53/017731U
(32) 16 Feb 1978
(33) Japan (JP)
(43) Application published 16 Jan 1980
(51) INT CL³ F16B 37/04 35/04
(52) Domestic classification F2H 17A4
(56) Documents cited
GB 1246777
GB 1074754
GB 936418
GB 684740
GB 613974
GB 556544
(58) Field of search F2H
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Marks & Clerk

(54) **Anchoring Nuts or Bolts Using a Clip**

(57) A clip (20) for fastening two members or structures (100, 102) together, comprising a base portion (44), a plurality of resilient limbs (46) projecting in one axial direction from the base portion and arranged generally in flower bud or corolla form about the center axis of the clip, and a threaded member or portion (56) fast on the base portion, each of the limb portions being formed with an indent (50) recessed toward the center axis of the clip and extending in a circumferential direction about the center axis for being engaged by one of the members or structures (102). The threaded member (56) may be a nut, as shown, or a bolt or stud, and may be integral with or secured to the base portion (44).

Fig. 11

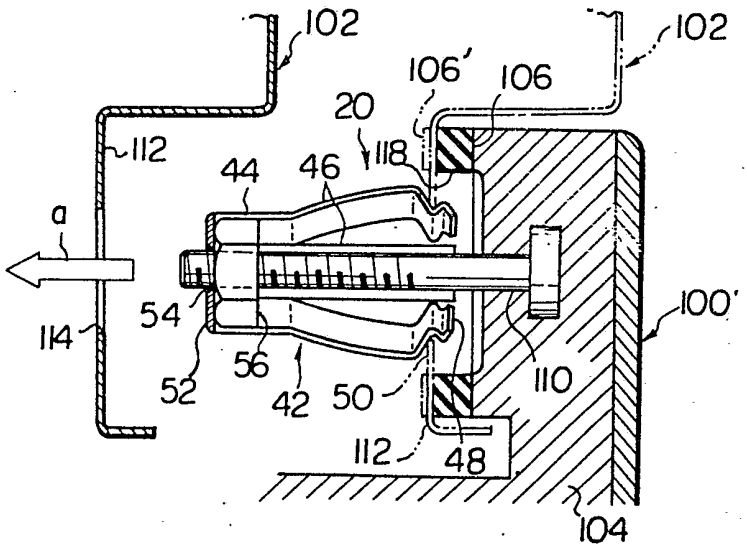

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Fig. 1

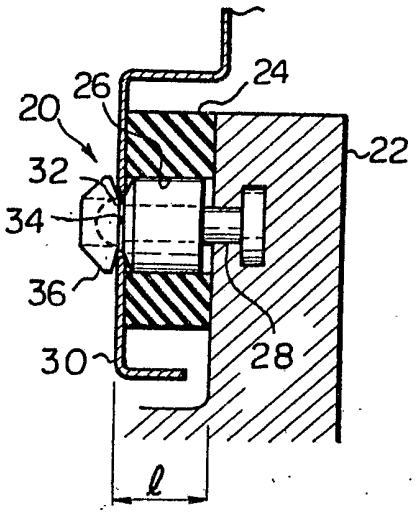

Fig. 2

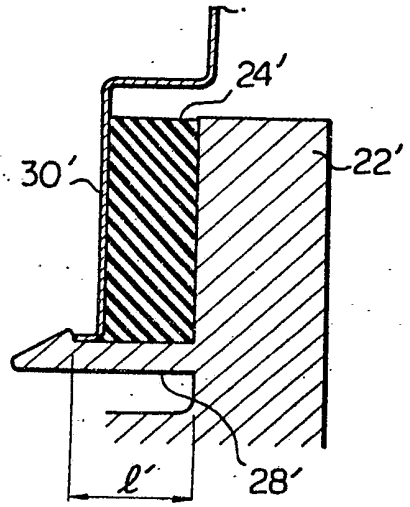

Fig. 3

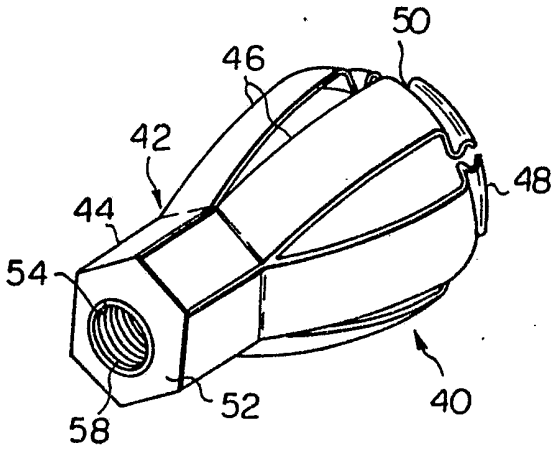

Fig. 4

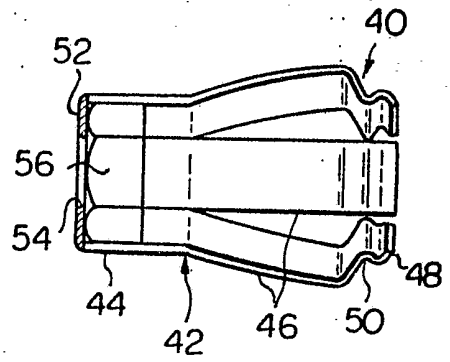

Fig. 5

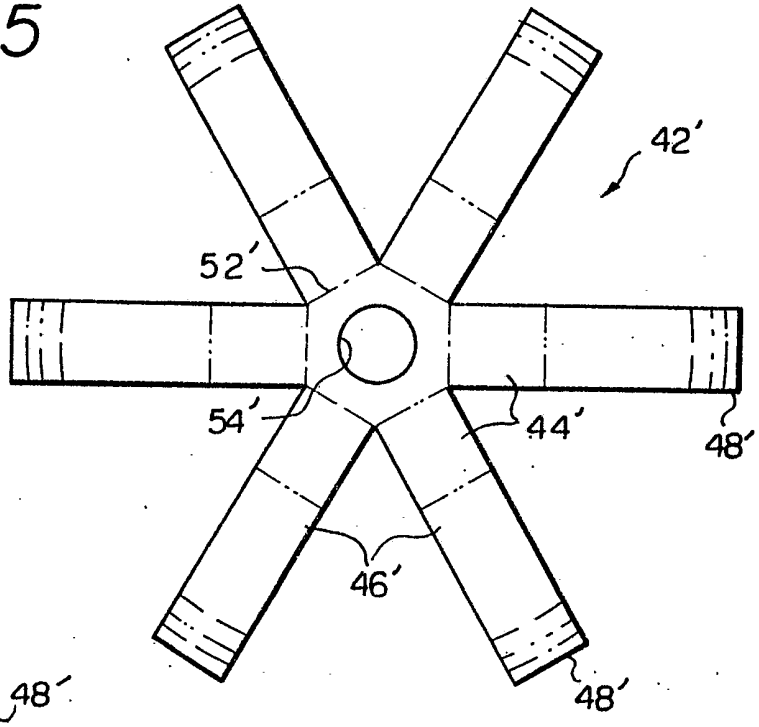

Fig. 6

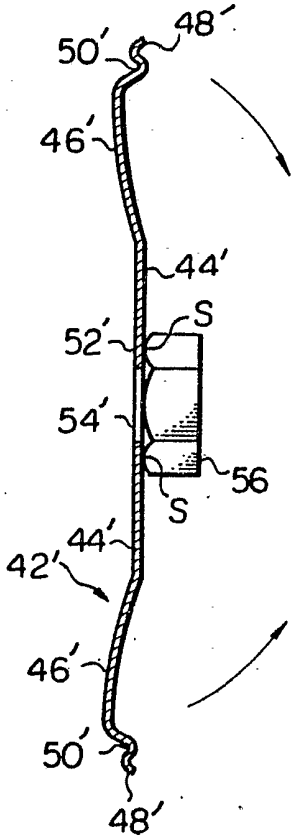

Fig. 7

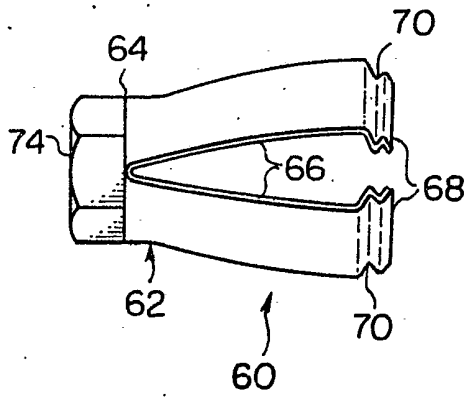

Fig. 8

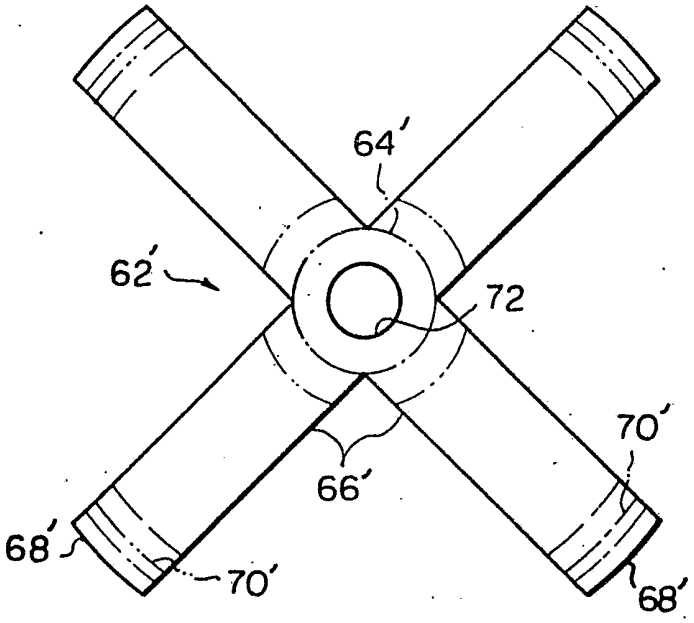

Fig. 9

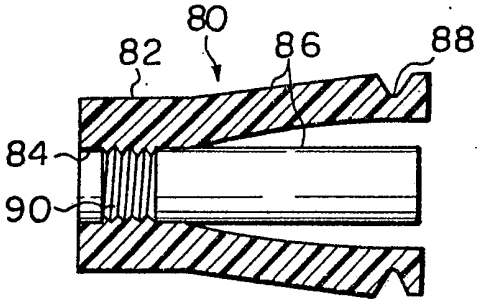

Fig. 10

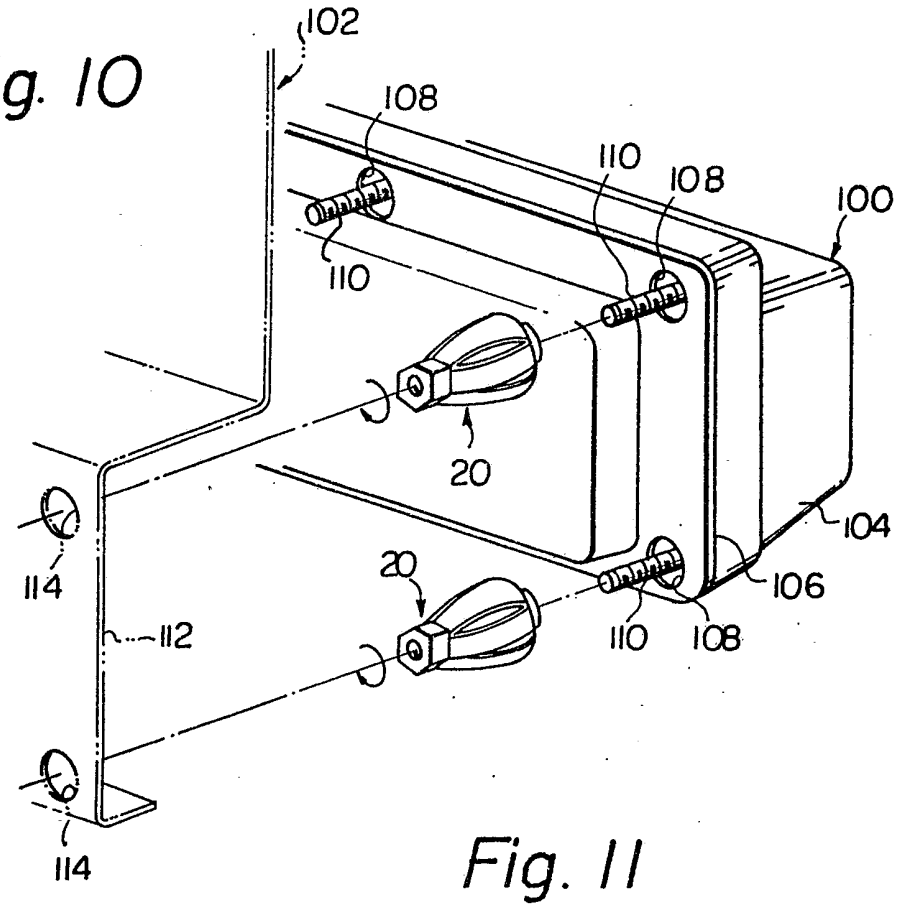
102
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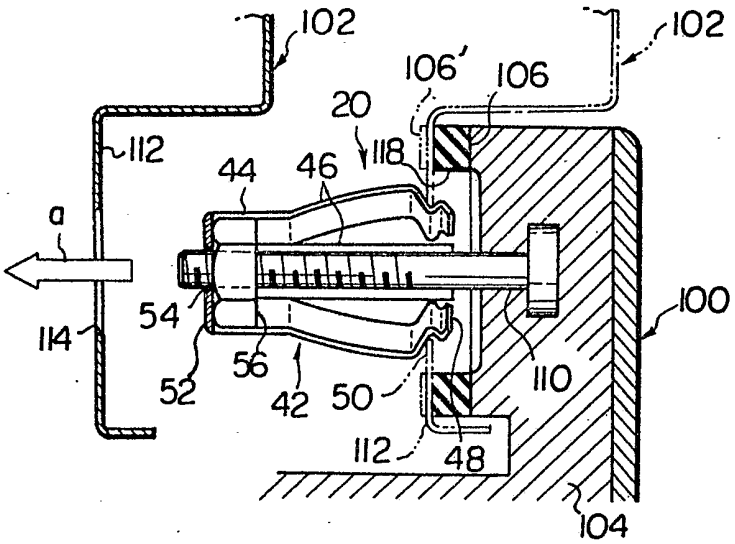
Fig. 11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SPECIFICATION

Anchoring Nuts or Bolts with a "Clip"

The present invention relates to a clip for joining two members or structures together and, more particularly, to a clip for mounting a member or structure on another member or structure in such a manner that the positions of the two members or structures held together by means of the clip are readily adjustable relative to each other during and/or after the mounting of one of the members or structures on the other.

In accordance with the present invention, there is provided a clip for joining two members together, having a center axis therethrough and comprising a base portion axially open at both axial ends thereof, a plurality of limbs projecting in one axial direction from the base portion and arranged about the center axis of the clip, each of the limbs having a free end portion formed with an indent recessed toward the center axis of the clip and extending in a circumferential direction about the center axis for providing engagement between the clip and one of the aforesaid two members, and fastening means fast on the base portion and adapted to be engaged by the other of the two members.

While a clip provided by the present invention is useful for the fastening or joining of any members or structures together, the present invention will be hereinafter described as being applied, by way of example, to a clip to be used for the mounting of a rear combination lamp unit of an automotive vehicle on the body structure of the vehicle.

The drawings illustrate representative examples of the prior art clips of the nature to which the present invention appertains and some preferred embodiments of a clip proposed by the present invention to overcome some intrinsic drawbacks of such prior art articles, wherein

Fig. 1 is a sectional view showing, partly in side elevation, an arrangement in which a rear combination lamp unit of an automotive vehicle is mounted on the body structure of the vehicle by means of a prior-art clip;

Fig. 2 is a view similar to Fig. 1 but showing an arrangement in which a rear combination lamp unit of an automotive vehicle is mounted on the body structure of the vehicle by means of another type of prior-art clip;

Fig. 3 is a perspective view showing a preferred embodiment of a clip according to the present invention;

Fig. 4 is a longitudinal sectional view of the clip illustrated in Fig. 3;

Fig. 5 is a plan view showing a flat blank from which the bracket forming part of the clip illustrated in Figs. 3 and 4 are to be produced;

Fig. 6 is a cross sectional view of the blank partially deformed before being finally shaped into the clip illustrated in Figs. 3 and 4;

Fig. 7 is a side elevational view of another embodiment of a clip according to the present invention;

Fig. 8 is a plan view showing a flat blank from which the bracket forming part of the clip illustrated in Fig. 7 is to be produced;

Fig. 9 is a longitudinal sectional view showing, partly in side elevation, still another embodiment of a clip according to the present invention;

Fig. 10 is a fragmentary perspective view showing an arrangement in which a rear combination lamp unit of an automotive vehicle is being mounted on the body structure of the vehicle by the use of clips each constituted by the embodiment illustrated in Figs. 3 and 4; and

Fig. 11 is a sectional view showing part of the arrangement in which one of the clips shown in Fig. 10 is being handled to fasten the lamp unit on the vehicle body structure.

Referring to the drawings, a known clip 20 is shown used for the mounting of a rear combination lamp unit of an automotive vehicle on the body structure of the vehicle. The combination lamp unit includes a rigid mounting flange 22 having a resilient sealing strip 24 of, for example, rubber attached to the front end face of a portion of the flange 22 and formed with a slot 26. The flange 22 of the lamp unit has mounted thereon a pin 28 having a flanged rear end portion securely embedded in the flange 22 and a headed front end portion perpendicularly projecting from the flange 22 through the slot 26 in the sealing strip 24, the headed end portion projecting in part out of the slot 26. On the other hand, the vehicle body structure to be provided with the lamp unit has a rigid, rear end panel 30 formed with an opening 32 which is shaped conformingly to the cross section of the slot 26 in the sealing strip 24. The opening 32 in the rear end panel 30 is slightly smaller than the cross sectional area of the slot 26 in the sealing strip 24 so that the edge which the rear end panel 30 has along the perimeter of the opening 30 protrudes slightly over the slot 26 in the sealing strip 24 which is interposed between the panel 30 and the flange 22 of the lamp unit. The clip 20 to have the lamp unit and the vehicle body structure thus arranged has a generally cylindrical configuration having a bore open at both axial ends of the clip and is secured to the pin 28 through the bore. The clip 20 is further formed with a circumferential groove 34 and is fastened to the rear end panel 30 of the vehicle body structure in such a manner that the edge which the rear end panel 30 has along its opening 32 closely fits in the circumferential groove 34 as shown. To facilitate insertion of the clip 20 through the opening 32 in the rear end panel 30, the clip 20 is usually tapered toward its foremost end so as to have a frusto-conical front end portion 36 projecting beyond the opening 32 in the panel 30.

One of the drawbacks encountered in the connection provided between the lamp unit and the vehicle body structure by means of the clip 20 thus arranged is the difficulty in forcefully pressing the rear end panel 30 against the front end face of the sealing strip 24 by the clip 20 and thereby maintaining adequate sealing between

the panel 30 and the sealing strip 24 and accordingly between the vehicle body structure and the combination lamp attached to the body structure. Such a drawback results principally from an error in the measurement between the circumferential groove 34 in the clip 20 and the front end face of the flange 22 to which the sealing strip 24 is attached and a misalignment between the clip 20 and the opening 32 in the rear end panel 30 due to a dimensional error which tends to be involved in the manufacture of the vehicle body structure. If the clip 20 is designed so that the rear end panel 30 can be pressed against the sealing strip 24 by an increased force, the clip 20 is subjected to an increased load along its area engaged by the rear end panel 30 so that the frusto-conical end portion 36 of the clip 20 becomes liable to break during mounting of the lamp unit on the vehicle body structure and/or even after the lamp unit has been mounted on the vehicle body structure.

Fig. 2 shows another prior-art arrangement in which a rear combination lamp is mounted on the body structure of an automotive vehicle. In the arrangement herein shown, the rear combination lamp unit has a flange 22′ formed with a forward projection 28′ having a sagittate tip portion and is secured to a rear end panel 30′ of a vehicle body structure with a sealing strip 24′ interposed between the panel 30′ and the front face of a portion of the flange 22′ of the lamp unit. The rear end panel 30′ of the vehicle body structure has a bent edge portion abutting the rear end face of the sagittate tip portion of the projection 28′ of the flange 22′ having the projection 28′ forced through an opening formed in the rear end panel 30′ and defined in part by the above mentioned bent edge portion of the panel 30′. The arrangement thus supporting the rear combination lamp on the vehicle body structure has a drawback similar to that encountered in the arrangement of Fig. 1 in that a sufficient sealing effect cannot be achieved between the rear end panel 30′ and the sealing strip 24′ because of the reduced force with which the rear end panel 30′ is pressed against the sealing strip 24′ by the sagittal tip portion of the projection 28′ of the flange 22′. As in the arrangement of Fig. 1, such a drawback results from an error in the measurement l′ between the rear end face of the sagittal tip portion of the projection 28′ and the front end face of the flange 22′ to which the sealing strip 24′ is attached and an error in the dimensional relationship between the bent eege portion of the rear end panel 30′ and the projection 28′ of the flange 22′, particularly, the sagittal tip portion of the projection 28′. When compared with the arrangement of Fig. 1, the arrangement illustrated in Fig. 2 has another drawback in that, where a lamp unit having a plurality of projections each similar to the above described projection 28′ is to be attached to a vehicle body structure, the lamp unit as a whole must be exchanged with a new one when one of the projections is found unsuitable for being fitted to the vehicle body structure or is damaged during or even upon completion of the mounting of the lamp unit on the vehicle body structure.

The present invention contemplates provision of an improved and useful clip adapted to eliminate all these drawbacks encountered in mounting a rear combination lamp unit on the body structure of an automotive vehicle or, more basically, connecting any member or structure to another member or structure.

Referring to Figs. 3 and 4, a clip 40 embodying the present invention consists of a bracket 42 consisting of a hollow base portion 44 of hexagonal cross section and having six limbs 46 extending respectively from the individual flat parts or sections of the base portion 44 and arranged substantially symmetrically about the center axis of the bracket 42. The individual limbs 46 of the bracket 42 slightly bulge in flower bud or corolla form about the center axis of the bracket and have free end portions 48 each of which is formed with an indent 50 recessed toward the center axis of the bracket 42, the respective indents 50 in the limbs 46 extending, as a whole, circumferentially around the center axis of the bracket. The base portion 44 has at its end opposite to the limbs 46 an end wall 52 formed with an opening 54 having a center axis substantially in line with the center axis of the bracket 42. The clip 40 further includes an internally threaded fastening member or nut 56 fixedly attached to the inner face of the end wall 52 of the base portion 44 by, for example, soldering. The fastening member or nut 56 has a tapped hole 58 having an axially outer end open through the opening 54 in the end wall 52 of the bracket 42. The bracket 42 is constructed of a resilient material such as a spring steel or plastic so that the limbs 46 are resiliently contractible about the center axis of the bracket 42.

The bracket 42 thus forming part of the clip 40 embodying he present invention may be produced from a unitary flat blank 42′ of, for example, a spring steel shown in Fig. 5. The flat blank 42′ consists of a hexagonal center portion 52′ formed with a circular opening 54′ and having an area slightly larger than and similar in shape to the cross sectional area of the nut 56 (Fig. 4) to be used, and six inner branch portions 44′ projecting respectively from the individual sides of the center portion 52′ and outer branch portions 46′ merging respectively out of the inner branch portions 44′. The flat blank 42′ thus configured is deformed in such a manner as to have its outer branch portions 46′ slightly warped in one direction parallel with the center axis of the blank 42′ and formed with an indent 50′ recessed in the other direction and located adjacent the free outer end of each of the outer branch portions 46′, as shown in Fig. 6. The nut 56 is thereafter fixed by soldering as at S to one face of the center portion 52′ of the blank 42′, whereupon the inner branch portions 44′ are bent substantially at right angles along the outer perimeter of the nut 56 in such a manner that the outer branch portions 44′ have

the nut 56 enclosed therewithin and the outer branch portions 46' are warped radially outwardly about the center axis of the generally bud or corolla shaped structure thus obtained.

If desired, the nut 56 which has been assumed to be attached to the inner face of the end wall 52 of the bracket 42 in the construction shown in Figs. 3 and 4 may be attached to the outer end face of the end wall 52. In this instance, the end wall 52 of the bracket 42 may have any cross sectional configuration other than a hexagonal cross sectional configuration and, as a corollary, the number of limbs 46 projecting from the base portion 44 may be selected depending upon the cross sectional configuration of the base portion 44. An example of such a clip is illustrated in Fig. 7.

In Fig. 7, the clip generally indicated at 60 is shown comprising a bracket 62 consisting of a substantially flat, circular base portion 64 and four limbs 66 projecting substantially perpendicularly from the base portion and arranged substantially symmetrically about the center axis of the bracket 62. Each of the limbs 66 has a free end portion 68 formed with an indent 70 recessed toward the center axis of the bracket 62 and extending or curved in a circumferential direction of the bracket 62. The base portion 64 of the bracket 62 is formed with a circular opening 72 (Fig. 8) having a center axis substantially in line with the center axis of the bracket 62 as a whole and has fixedly attached to its outer face an internally threaded fastening member or nut 74 having a tapped hole (not shown) which is open to the opening 72 in the base portion 64 of the bracket 62. Fig. 8 shows a unitary flat blank 62' from which the bracket 62 thus configured is to be produced. The flat blank 62' consists of a circular center portion formed with a circular opening 72 and four branch portions 66' projecting radially from the center portion 64' and substantially equiangularly spaced from each other about the center axis of the blank 62'. For producing the bracket 62 shown in Fig. 7, the blank 62' thus shaped initially is deformed so that the branch portions 66' are slightly warped in one direction parallel with the center axis of the blank 62' and formed with an indent 70' in a free end portion 68' of each of the branch portions 66'. The blank 62' is thereafter further deformed so that the branch portions 66' are bent substantially perpendicularly from the center portion 64' so as to form the bracket 62 having the base portion 64 resulting from the center portion 64 and the limbs 66 resulting from the branch portions 66'.

Fig. 9 shows another embodiment of the clip according to the present invention. The clip, designated in its entirety by reference numeral 80, has a unitary construction comprising a cylindrical base portion 82 formed with an opening 84 at one axial end and a plurality of limbs 86 projecting axially from the base portion 82 and arranged substantially symmetrically about the center axis of the clip 80. The limbs 86 are slightly curved radially outwardly away from the center axis of the clip 80 and are substantially equiangularly spaced from each other generally in flower bud or corolla form about the center axis of the clip 80. Each of the limbs 86 has formed in its free end portion a notch or indent 88 which is recessed toward the center axis of the clip 80 and which extends in a circumferential direction of the clip 80. The base portion 82 of the clip 80 is further formed with a tapped bore 90 adjacent the opening 84 in the base portion 82. The clip 80 thus configured is constructed preferably of a molded plastics.

Description will be hereinafter made regarding an example of the arrangement in which clips provided by the present invention are utilized for the mounting of a rear combination lamp unit of an automotive vehicle on the body structure of the vehicle. In Figs. 10 and 11, each of such clips is assumed to be constituted by the embodiment illustrated in Figs. 3 and 4 by way of example and is shown to be used for mounting a rear combination lamp unit 100 on the body structure 102 of an automotive vehicle.

In Figs. 10 and 11, the rear combination lamp unit 100 is shown comprising a flange 104 having a sealing strip 106 of, for example, rubber fixedly attached to the end face of a front wall portion of the flange 104 and formed with openings 108. The flange 104 has fixedly embedded therein a plurality of stud bolts 110 projecting forwardly from the flange and outwardly through the openings 108, respectively, in the sealing strip 106. The vehicle body structure 102 on which the lamp unit 100 thus constructed is to be mounted has a rear end panel 112 formed with circular openings 114 having a predetermined diameter, the locations of the openings 108 in the sealing strip 106 and the stud bolts 110 on the flange 104 being determined depending upon the locations of the openings 114 in the rear end panel 112. Each of the clips 40 is first fitted to each of the stud bolts 110 by turning the clip 40 on the threaded shank portion of the bolt 110 so that the nut 56 forming part of the clip 40 is axially moved on the bolt 110 in a direction in which the indented free end portions 48 of the limbs 46 of the bracket 42 advance toward the flange 104 of the lamp unit 100 and accordingly the stud bolt 110 forwardly projects through the opening 54 in the end wall 52 of the bracket 42, as will be seen from Fig. 11. When the clips 40 are set in predetermined axial positions on the individual stud bolts 110, respectively, the lamp unit 100 as a whole is fitted to the rear end panel 112 of the vehicle body structure 102 by forcibly inserting the clips 40 respectively through the openings 114 in the rear end panel 112 of the vehicle body structure 102 as indicated by arrow *a* in Fig. 11. While the clips 40 are being thus forced through the openings 114 in the rear end panel 112 of the vehicle body structure 102, the limbs 46 of the bracket 42 of each clip 40 are resiliently deformed to radially contract about the center

axis of the bracket 42. When each of the clips 40 is thus moved to a position having the indents 50 in the free end portions 48 of the limbs 46 located in proximity to each of the openings 114 in the rear end panel 112, the limbs 46 of the bracket 42 of each clip 40 are allowed to expand by a snap action about the center axis of the bracket 42 so that the circular edge which the rear end panel 112 has formed along each of the openings 114 is closely received in the inde ts 50 in the limbs 46 as indicated by phantom lines in Fig. 11. If, in this instance, the sealing strip 106 on the lamp unit 100 thus mounted on the rear end panel 112 of the vehicle body structure 102 is compressed throughout its area by the rear end panel 112 as indicated by full lines in Fig. 11, the lamp unit 100 is satisfactorily sealed onto the rear end panel 112 of the vehicle body structure 102. If, however, the sealing strip 106 fails to be sufficiently compressed throughout the area thereof by the rear end panel 112 having the clips 40 secured thereto as indicated at 106' in Fig. 11, the sealing strip 106 can be more tightened against the rear end panel 112 by further turning one or more of the clips 40 on the associated stud bolt or bolts 110 so that the particular clip 40 or each of the particular clips 40 is moved closer to the flange 104 of the lamp unit 100. Thus, a dimensional error existing, if any, between the rear combination lamp unit 100 and the vehicle body structure 102 can be readily taken up by adjusting the axial position of each of the clips 40 on the associated one of the stud bolts 110 during assemblage of the lamp unit 100 on the vehicle body structure 102. If, furthermore, one of the clips 40 to be used for the fastening of two members or structures is found unsuitable for the fastening members or structures, the particular clip may be exchanged with a new one compatible with the members or structure.

While it has been assumed in the foregoing description that the fastening means forming part of the clip provided by the present invention is constituted by an internally threaded member attached to the bracket of the clip or an internally threaded portion of the bracket, the fastening means in a clip according to the present invention may be constituted by an externally threaded member, such as a bolt, stud or screw securely connected to the base portion of the clip though not shown in the drawings.

Claims

1. A clip for joining two members together, having a center axis therethrough and comprising a base portion axially open at both axial ends thereof, a plurality of limbs projecting in one axial direction from said base portion and arranged about said center axis, each of the limbs having a free end portion formed with an indent recessed toward said center axis and extending in a circumferential direction about the center axis for providing engagement between the clip and one of said two members, and fastening means fast on said base portion and adapted to be engaged by the other of said two members.

2. A clip as set forth in claim 1, in which the fastening means comprises an internally threaded fastening member secured to said base portion.

3. A clip as set forth in claim 2, in which said fastening member has a tapped axial bore having a center axis substantially aligned with the center axis of the clip.

4. A clip as set forth in claim 3, in which said base portion has at its axial end opposite to said limbs an end wall formed with an opening, said fastening member being secured to said end wall and having said tapped axial bore open to said opening in the end wall.

5. A clip as set forth in claim 4, in which said fastening member is securely attached to the inner face of said end wall.

6. A clip as set forth in claim 1, in which said fastening member is securely attached to the outer face of said end wall.

7. A clip as set forth in claim 1, in which said base portion is internally threaded to form said fastening means.

8. A clip as set forth in claim 1, in which said fastening means comprises an externally threaded member securely connected to said base portion.

9. A clip as set forth in any one of claims 1 to 8, in which said limbs are resiliently deformable radially about the center axis of the clip.

10. A clip as set forth in claim 9, in which said limbs bulge radially outwardly about the center axis of the clip.

11. A clip as set forth in claim 10, in which said limbs are substantially equiangularly spaced from each other about the center axis of the clip.

12. A clip as set forth in any one of claims 1 to 8, in which each of said limbs is radially bent to form said indent.

13. A clip as set forth in any one of claims 1 to 8, in which said indent in each of said limbs is constituted by a notch formed in each of the limbs.

14. A clip constructed and arranged substantially as described herein with reference to Figs. 3 to 6, or Figs. 7 and 8, or Fig. 9 of the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1980. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.