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(54) Vehicle jack.

(57) The vehicle jack is of the pantograph or other linkage type having channel-form arms. A cylindrical nut (14) having a constant external diameter is journalled in the walls of the arm at one pivot point (7). A spacer (100) in the form of a clip is provided, the spacer (100) being engaged on the screw (9) of the jack and located on the nut (14) between the walls of the arm. In this way, the spacer (100) positively locates the screw (9) between the walls, thereby limiting radial movement of the screw (9).

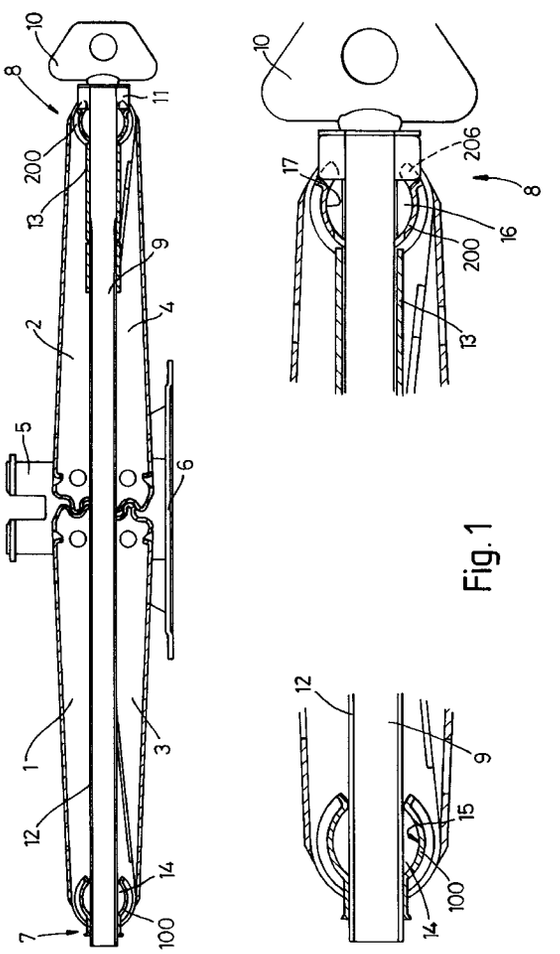

Fig. 1

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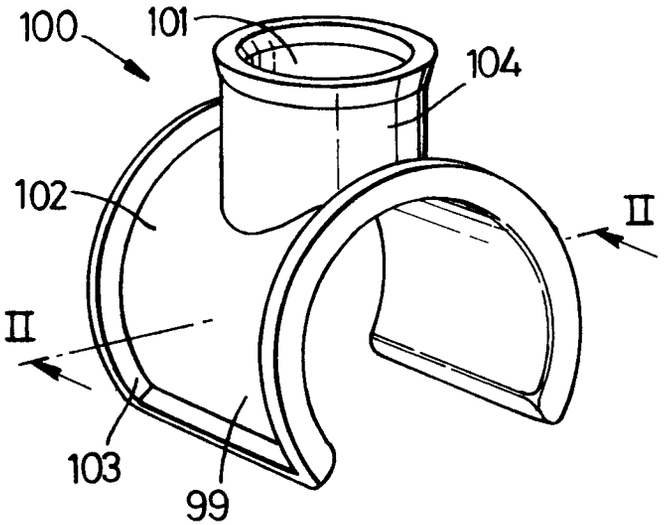

Fig. 2

The present invention relates to a vehicle jack.

The invention is particularly applicable to the type of jack having a parallelogrammic linkage, hereafter called a pantograph jack, but is also applicable to other types of jack.

A pantograph jack has a pair of upper arms and a pair of lower arms, each lower arm being pivotally connected to a respective upper arm by a pivot pin and nut respectively.

A vehicle support member is pivotally attached to the upper arms and a base member is pivotally attached to the lower arms. A screw has at one end a head including a ball-race bearing, the screw extending radially through the pivot pin and screw-engaging radially with the nut, with the head bearing on the pivot pin. The screw is rotatable by a handle to raise or lower the support member relative to the base.

In existing pantograph jacks each of the upper and lower arms is of channel form, including two spaced walls. The spaced walls of the lower arms receive an upper arm therebetween, whereas the spaced walls of the upper arms receive the nut or pivot pin therebetween. The nut and the pivot pin are shaped to provide reduced ends which are journalled in both walls of the respective upper and lower arms.

In existing methods of pantograph jack assembly, it is necessary to deform ends of the nut and pivot pin to inhibit their axial movement, so as to maintain the central position of the screw and ensure stability.

These methods involve assembly around the pivot and the nut in separate steps, each step being followed by a deformation operation. Hence, such manual assembly methods are inherently time-consuming. Consequently, semi-automation of the assembly is highly desirable to reduce the time of jack manufacture, making the jack cheaper to produce.

FR-A-2300039 discloses a pantograph jack having a linkage with a rotatable nut of constant cross-section which is journalled in holes in the four arms of the jack at a pivot point of the linkage. A sleeve is provided around the nut between the interior faces of the inner arms, the sleeve having a length equal to the space between the interior faces. Both the nut and the sleeve have threaded bores which engage the screw of the jack. In order to assemble the jack disclosed in FR-A2300039, the sleeve must be correctly located at the pivot point between the interior faces of the inner arms so that the sleeve is aligned with the holes in the arms. Next, the nut is inserted inside the sleeve and the holes in the arms. Finally, the bores of the nut and the sleeve must be aligned before the screw is threaded therethrough. DE-A-2430033 discloses a jack having a pivot point arrangement which is similar to that of FR-A-2300039.

The present invention enables the jack to be assembled quickly on a jig, using fewer operations than in the assembly of existing pantograph jacks. Hence, the assembly of the vehicle jack of the present invention is quicker and cheaper than that of existing pantograph jacks.

According to the present invention there is provided a vehicle jack comprising a base, a vehicle support member and a linkage therebetween, the linkage including a rotatable nut of constant cross-section at one pivot point of the linkage, a rotatable actuating member extending radially through a rotatable pivot member of the linkage and screw-engaged radially in the nut, whereby rotation of the actuating member operates the linkage to raise or lower the vehicle support member relative to the base, the linkage including a link with two spaced walls having parallel facing surfaces provided with apertures journalling respective end parts of the nut, and a spacer engaged on the actuating member and located on the nut between the walls, the spacer comprising a body having opposite end faces which abut respective said parallel facing surfaces so as to limit radial movement of the actuating member relative to the walls, wherein the body is in the form of a clip resiliently snap-fitted on the nut.

The use of spacer clips is well known in several fields, as shown, for example, in FR-A-2450971. No-one has, however, considered the use of a spacer clip in a jack in order to achieve the object of the present invention.

Reference is now made to the accompanying drawings, wherein:-

Figure 1 is a cross-sectional view of a jack provided, in accordance with the invention, with spacers on a nut and a pivot member of the jack;

Figure 2 is a perspective view of a first spacer for location on the nut;

Figure 3 is a sectional view of the first spacer taken along the line II-II shown in Figure 2;

Figure 4 is a perspective view of a second spacer, which is for location on the pivot member;

Figure 5 is a sectional view of the second spacer taken along the line III-III shown in Figure 4;

Figure 6 is a perspective view of an alternative construction for the first spacer for location on the nut;

Figure 7 is a sectional view of the alternative construction taken along the line IV-IV shown in Figure 6.

Referring to Figure 1, there is shown a pantograph jack, having relatively pivoted first and second upper arms 1 and 2 and relatively pivoted first and second lower arms 3 and 4 arranged in a parallelogram configuration. The arm is in channel form and has two parallel walls, each wall having an aligned hole. The upper arms 1 and 2 are received in respective lower arms 3 and 4 so that the holes in the walls of each upper arm are in alignment with those in each respective lower arm. The upper arms 1 and 2 are pivotally attached to a vehicle support member 5, while the lower arms are pivotally attached to a base 6.

The jack has a cylindrical nut 14 of constant diameter journalled in the aligned holes 15 in the walls of the first upper and lower arms at the pivot point 7 of the two arms.

A rotatable pivot member 16 of constant cross-section is journalled in the aligned holes 17 in the walls of the second upper and lower arms 2 and 4 at their pivot point 8 in order to pivotally attach second upper and lower arms arms together. Pivot member 16 has a hole extending radially therethrough. The pivot member 16 is cylindrical except for an axial flat surface, as known in the art.

An actuating member 9 extends radially through the hole in the pivot member 16 and screw-engages radially with the nut 14. Actuating member 9 is rotatable in the nut by a handle 10. Rotation of the actuating member 9 in the nut actuates the first upper and lower arms, thereby raising or lowering the vehicle support member 5 with respect to the base 6. The actuating member 9 is a screw having sufficient screw thread 12 along its length to screw-engage the nut 14 during use of the jack. The screw 9 has a head 11 including a ball-race bearing, which bears on the flat surface of the pivot member 16. A sleeve 13 is secured on the screw in abutment with the pivot member 16 to captivate the pivot member between the head and the collar and prevent over-screwing of the jack.

A spacer 10 is engaged on the screw 9 and has a body 99, in the form of a clip, resiliently snap-fitted on the nut 14 at pivot point 7. The spacer 100 is shown in detail in Figures 2 and 3, the body 99 has a part-cylindrical portion 102, defining the clip which engages with the nut 14, and being formed with an aperture 101 which receives the screw 9. The body is also provided with marginal reinforcing flanges 103 at its ends. The spacer 100 additionally has a collar 104 which extends from the aperture 101 and acts as a barrier to a lubricant which is in the area of contact between the screw 9 and the nut 14. In order to act as a barrier to the lubricant, the collar 104 is located at the side of the nut 14 remote from the pivot member 16. In other embodiments the collar 104 need not be provided.

The spacer 100, by positively locating the actuating member between the walls of the upper arm 1, prevents radial movement of the screw 9 and, as a consequence, prevents axial movement of the nut 14 through the aligned holes 15 of the first upper and lower arms 1 and 3.

A second spacer 200 is engaged on the screw 9 and resiliently snap-fitted on the pivot member 16 at pivot point 8.

The second spacer 200 is shown in Figures 4 and 5, and has a part-cylindrical body 202 provided with an aperture 201 which receives the sleeve 13. Reinforcing flanges 203 are provided on the body. The body 202 snap-engages on the pivot member 16. The head 11 is received in two recesses 205 in the free, exially extending ends of the part-cylindrical portion 202, which define, as shown in phantom in Figure 1, projections 206 lying between the head 11 and inner surfaces of the second upper arm 2, to centralise the head.

The second spacer 200 positively locates screw 9 between the walls of the second upper arm 2, thereby preventing radial movement of the screw 9 and axial movement of the pivot member 16 through the aligned holes 17 of the second upper and lower arms 2 and 4.

Figures 6 and 7 show an alternative spacer which is provided for engagement of the screw 9 at the pivot point 7 for the nut 14. In this embodiment, the spacer 300 also has a collar 304 located at the side of the nut 14 remote from the pivot member 16, but an annular chamber 305 is provided between the collar and the body 301 of the spacer. The chamber surrounds the screw 9 adjacent to the nut 14. The chamber 305 acts as a reservoir for lubricant for lubcricating the area of contact between the screw 9 and the nut 14. Access to the interior of the chamber 305 for filling the chamber with lubricant is provided by a hole 307 in the chamber wall. The collar 304, as before, provides a barrier to the lubricant. in this embodiment, the collar 304 has a number of circumferentially spaced, flexible lobes 306 projecting radially from the interior thereof and into the thread of the screw 9. The lobes 306 present an additional barrier to the movement of the lubricant out of the chamber 305.

In another embodiment (not shown) the additional barrier is in the form of a single, flexible ring-like projection extending radially from the interior surface of the collar 304 and having a single radial cut formed therein, so that the projection is deformable into engagement in the helical threads.

Although the jack described has two spacers, other arrangements are possible, e.g. only the spacer engaging the actuating member 9 located on the nut 14 being provided, since the head 11 may serve to locate the actuating member 9 between the walls of the second upper arm 2 at the end of the actuating member 9 nearest the pivot member.

The most suitable materials for the manufacture of the spacer are those such as polyamides that allow the spacer to be resiliently snap-fitted onto the nut during assembly, and which will rigidify when the assembled jack is heated as it subsequently passes through the painting plant. Materials sold under the Registered Trade Mark "Zytel" are particularly useful for the manufacture of the spacer.

The use of a nut 14 with a constant cross-section and a spacer allows the jack to be assembled in a semi-automated method. In this method, the base 6 is held in a first jig with the lower arms 3 and 4 pivotally attached thereto. The upper arms 1 and 2 and the vehicle support member 5 are assembled using

a second jig. The upper and lower arms, still held by their respective jigs, are then brought into alignment. The nut 14 is inserted through aligned holes 15 in the first upper and lower arms 1 and 3 at their pivot point 7, insertion being possible because the nut is of a constant external diameter. The second upper and lower arms 2 and 4 are connected by the pivot member 16 at their pivot point 8. When the second spacer is used connection is made by inserting a pivot member 16 with a constant cross-section through the aligned holes 17 in the walls of the second upper and lower arms 2 and 4. In the next step, the actuating member 9 is engaged with the nut and the pivot member 6, the second spacer (if used) also being engaged with the actuating member 9.

Finally, the spacer is engaged with actuating member 9 and resiliently snap-fitted to the nut 14, thereby completing assembly.

It is evident, therefore, that the presence of the spacer on the nut avoids the need to deform the ends of the nut 24, allowing assembly of the jack of the invention to be semi-automated. In addition, manufacture of the nut 14 is simpler because the nut does not have to be shaped to have reduced ends as in the prior art.

Claims

1. A vehicle jack comprising a base (6), a vehicle support member (5) and a linkage therebetween, the linkage including a rotatable nut (14) of constant cross-section at one pivot point (7) of the linkage, a rotatable actuating member (9) extending radially through a rotatable pivot member (16) of the linkage and screw-engaged radially in the nut (14), whereby rotation of the actuating member (9) operates the linkage to raise or lower the vehicle support member (5) relative to the base (6), the linkage including a link with two spaced walls having parallel facing surfaces provided with apertures (15) journalling respective end parts of the nut (14), and a spacer (100,300) engaged on the actuating member (9) and located on the nut (14) between the walls, the spacer (100,300) comprising a body (99,301) having opposite end faces which abut respective said parallel facing surfaces of the walls so as to limit radial movement of the actuating member (9) relative to the walls, characterised in that the body is in the form of a clip resiliently snap-fitted on the nut (14).

2. A vehicle jack according to Claim 2 wherein the spacer (100,300) has been rigidified after fitting on the nut (14), whereby removal of the spacer (100,300) from the nut (14) is resisted.

3. A vehicle jack according to any preceding claim, wherein the spacer (100,300) is made of a material which rigidifies after being heated.

4. A vehicle jack according to Claim 3, wherein the spacer (100,300) is made of a polyamide.

5. A vehicle jack according to any preceding claim, wherein the clip is defined by a part-cylindrical portion (102,302) of the body (99,301) provided with marginal flanges (103) defining said end faces.

6. A vehicle jack according to any preceding claim wherein there is a lubricant in the area of contact between the screw (9) and the nut (14), and the spacer (100,300) has a collar (104,304) which receives the actuating member (9) and acts as a barrier to the lubricant, the collar (104,304) being located at the side of the nut (14) remote from the pivot member (16).

7. A vehicle jack according to Claim 6 comprising a chamber (305) between the collar (104,304) and the part-cylindrical portion (102,302) to define a reservoir for the lubricant.

8. A vehicle jack according to Claim 7 wherein the chamber (305) has at least one hole (307) formed therein, the hole (307) providing access to the chamber interior for introducing the lubricant.

9. A vehicle jack according to any one of Claims 6, 7 or 8, wherein the collar (104,304) has a plurality of lobes (306) projecting radially from the interior thereof and engaging in the thread of the screw (9).

10. A vehicle jack according to any one of Claims 6, 7 or 8, wherein the collar (104,304) has a flexible ring-like projection extending radially from the interior surface thereof, the projection having a radial cut formed therein to facilitate engagement of the flexible projection into the thread of the screw (9).

11. A vehicle jack according to any preceding claim wherein a further spacer (200) is engaged on the actuating member (9) and located on the pivot member (16).

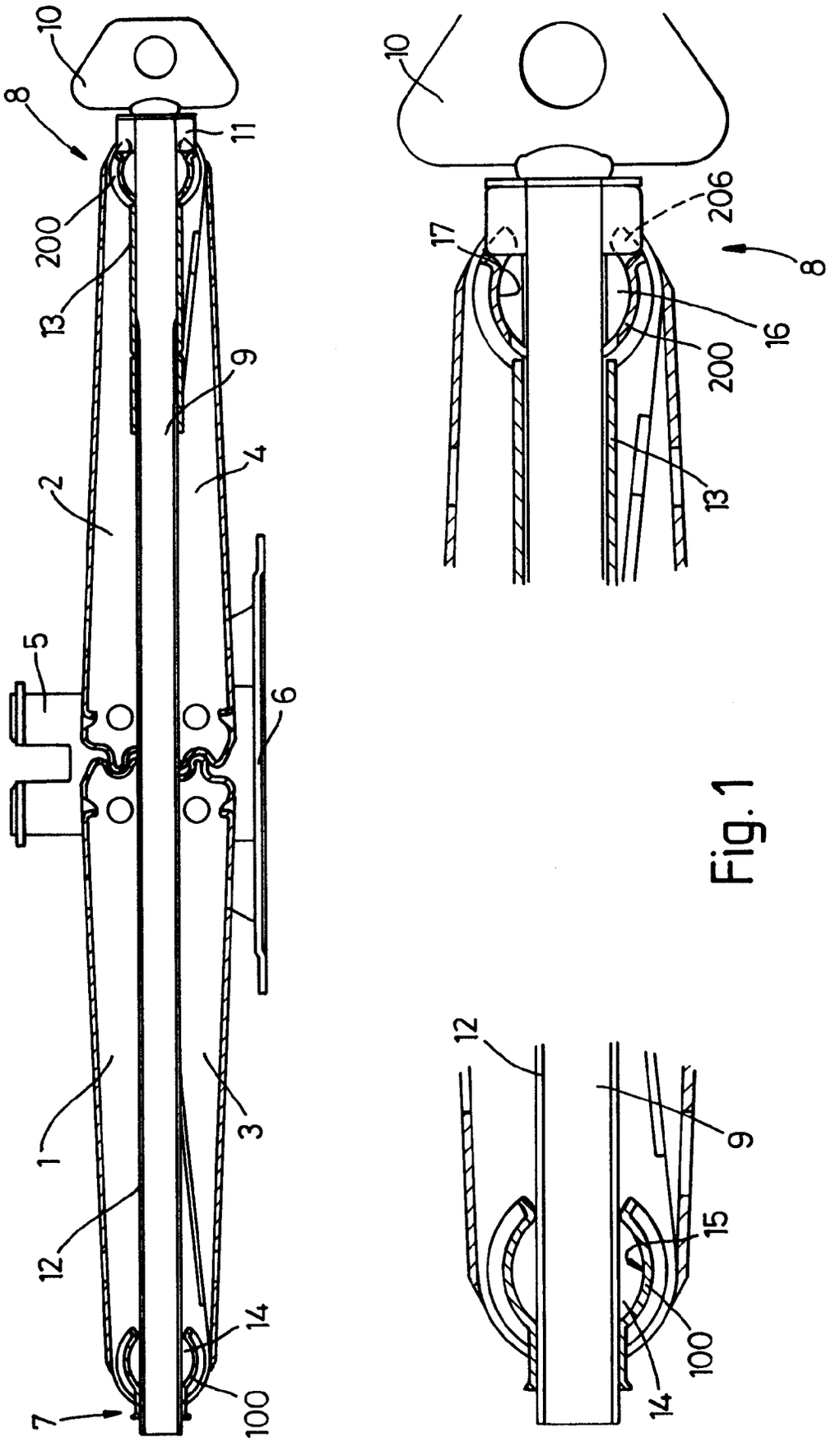
10
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Fig. 1

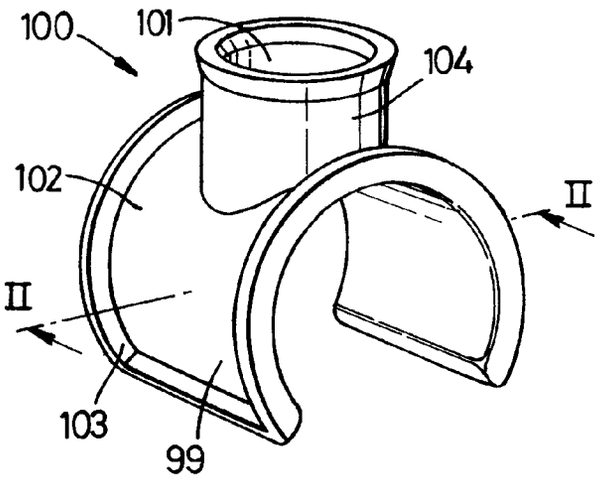

Fig. 2

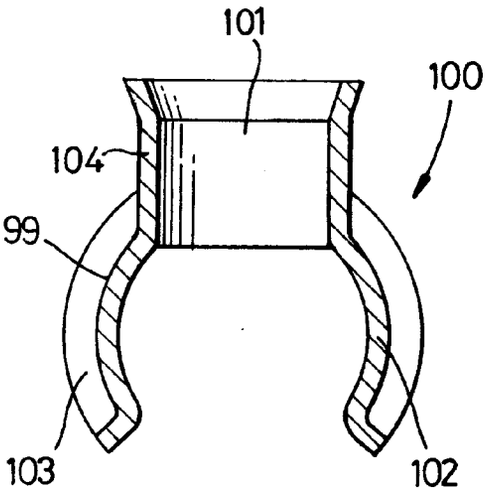

Fig. 3

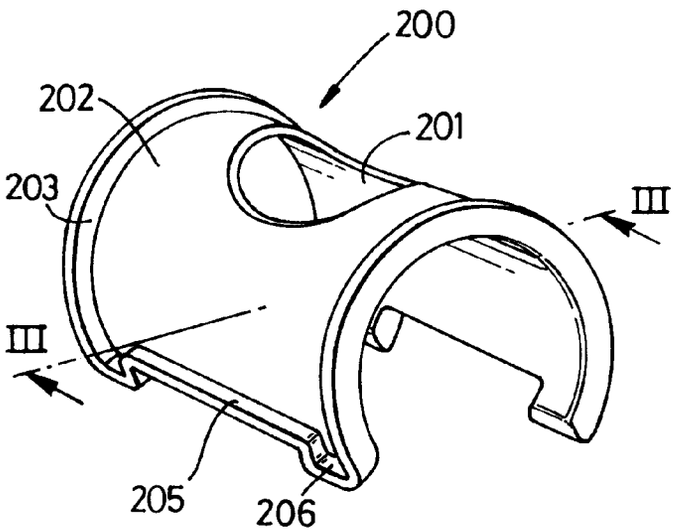

Fig. 4

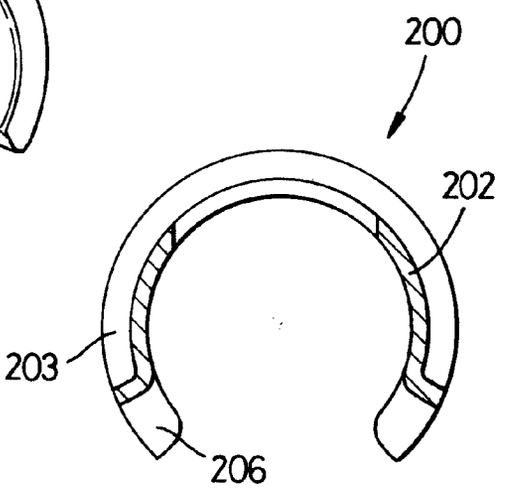

Fig. 5

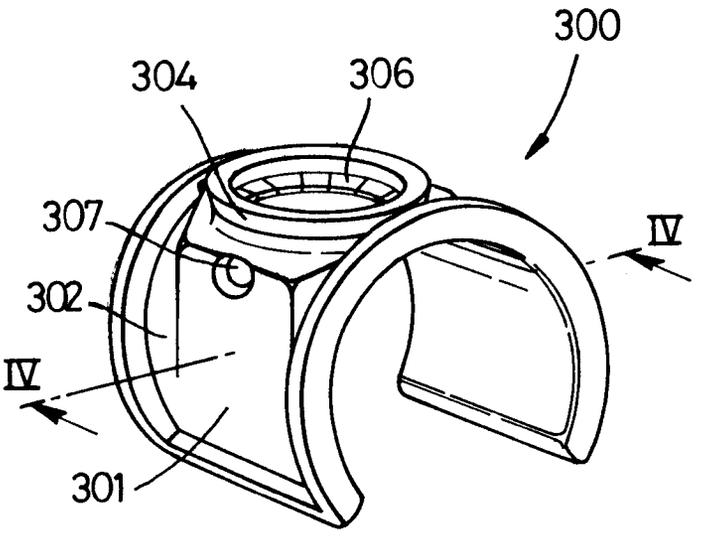

Fig. 6

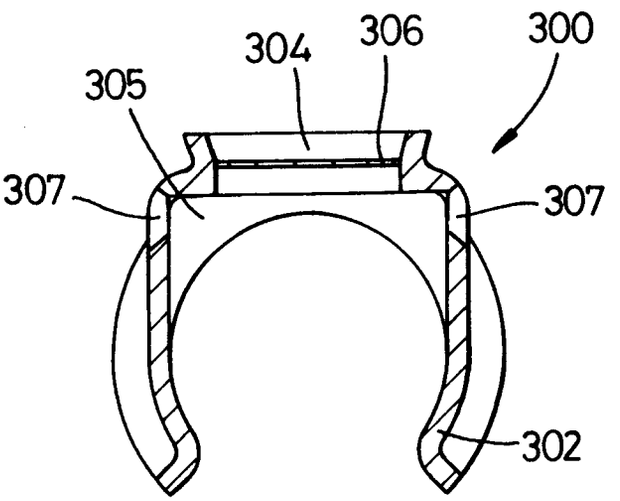

Fig. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 30 1238

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y,D	FR-A-2 300 039 (ROUSSEAU) * page 2, line 18 - page 3, line 11 * * page 5, line 32 - page 6, line 13 *	1,4,5,11	B66F3/12
Y,D	FR-A-2 450 971 (MOULAGES PLASTIQUES DU MIDI) * page 8, line 1 - line 33 *	1,4,5,11	
A,D	DE-A-2 430 033 (E. A. STORZ) * page 6, paragraph 2 - page 7, paragraph 1 *	1	
A	EP-A-0 380 890 (ÈTABL. LANGLOIS) * column 2, line 40 - line 44 *	6	
A	US-A-1 376 507 (BILLINGSLEY)		
A	US-A-2 467 657 (BROWN)		
A	US-A-4 771 986 (NASU)		
A	FR-A-2 655 968 (RENAULT)		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	EP-A-0 340 551 (E. A. STORZ)		B66F B60S F16B
A	FR-A-2 482 937 (ÈTABL.J. FLORIMOND ET H. CHABARDES)		
A	GB-A-2 223 735 (METALLIFACTURE)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 MAY 1993	VAN DEN BERGHE E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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