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(54) Vehicle jack.

(57) The jack has an elongate leg (11) with a base (12) and an arm (16) pivoted to the leg. A screw 19 between the arm and the leg can be turned by means of a handle (25) to move the arm relatively towards the leg to effect lift. The arm is of channel form with sides (26,27) provided with rebates (31) which receive a track element (32) bridging the channel sides. The track element has a concave surface (33) on which is slidable a load-support element (30) having a convex surface at one end, engaged with the concave surface, and provided with a groove at the opposite end, for engaging a seam of a vehicle body. The load-support element is a moulded block. the track element and load-support element have captivating means (40) captivating the block on the track element.

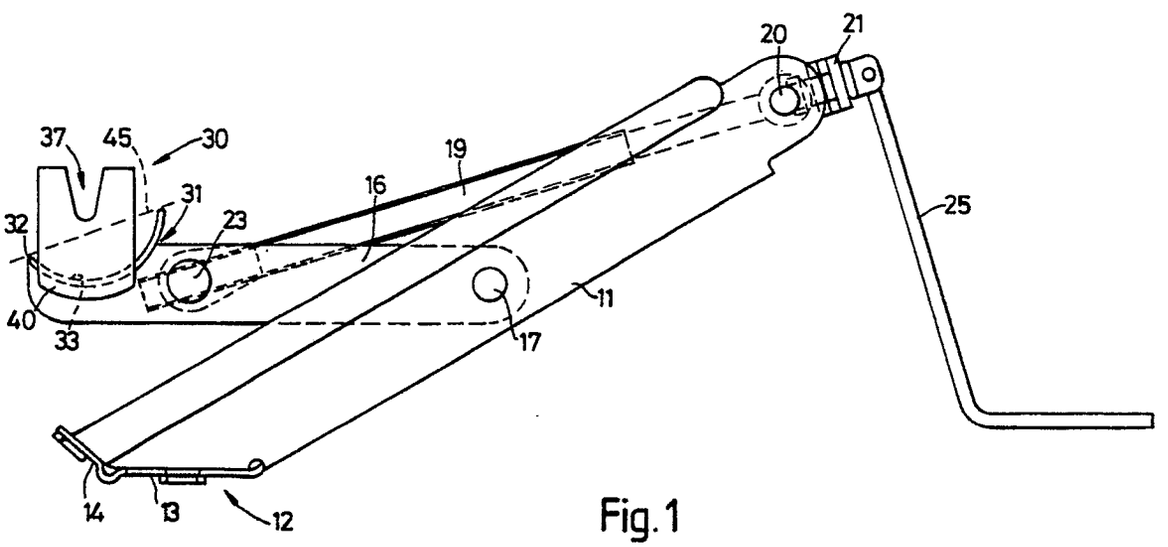

Fig.1

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VEHICLE JACK

The present invention relates to vehicle jacks.

Jacks are well known of the type having first and second pivotally interconnected elongate members, with a base element at a lower end of the first member and a load-support element at an upper end of the second member, and with a rotatable adjustment screw between the members. Old examples are described in GB-A-1454847, whose load-support element is fixed to the second member, and GB-A-1011933, whose load-support element is pivoted to the second member.

During lift of a vehicle, the vehicle tilts, so that there is a tendency for the jacking point to move relative to the jack. Allowance for such movement is necessary for stability of the jack. The jacking point is often a welded seam on the body.

In GB-A-1454847, the load-support element is designed to permit the seam to slide relative to the element. This has the disadvantages of frictional resistance to such movement as well as surface damage to both the seam and the load-support element, so that both may be liable to rust. In GB-A-1011933, this problem is avoided, because the load-support element can be fixed relative to a jacking point on the vehicle. As the vehicle tilts, in a jacking operation, the load-support element pivots to compensate.

It is now common-place for a welded body seam to be used as jacking point, the seam being received in a recess in the load-support element, the recess extending parallel to the pivot axis of the element. In this case, the load-support element is not fixed to a jacking point and the element can move angularly relative to a seam engaged in the recess. The jack shown in GB-A-1011933 would, therefore, be unstable, if adapted to engage a seam.

Numerous proposals have been made over the years for controlling pivoting motion of the load-support element to avoid this instability problem. Examples are DE-A-2902579, which discloses provision of an additional link between the load-support element and the first member, or leg, DE-A-2430033, in which the load-support element is held against motion relative to the screw, GB-A-2182308, which mounts the load-support element on a resilient block and DE-U-8706754 which provides a spring between the load-support element and the second member or arm. All of these proposals have disadvantages in requiring additional support elements and/or being either too flexible to cure the instability problem, or too inflexible to avoid high lateral forces being placed on the jack.

In DE-C-2954496 a metal load-support element is provided. A hollow, generally cylindrical element is formed having an axial mouth. In a modification, the mouth is bounded by opposed lips. The element is received in recesses in the sides of a metal, channel-shaped arm and can swivel in the recesses. Relative movement between the seam and the arm is provided partly by movement of the seam in the interior of the cylindrical element and partly by swivelling of the element in the recesses. The body seats on the element so that scuffing of the body of the vehicle occurs as the seam moves relatively in the element.

A further disadvantage is that the seam is received within the arm, so that there is a very short radial distance between the axis of the element and the vehicle body adjacent the seam. As a consequence, as the vehicle body tilts away from the jack, the jack is drawn with it, causing instability of the jack.

In DE-C-2936002, in Figures 1 to 4, the load-support element is a plastics moulding having trunnions pivoted in the arm, and a recess, for receiving the seam, spaced from the axis of rotation of the trunnions. This means that the vehicle body is spaced further from the axis, so that it should be possible for the tilting of the body to be partly accommodated by the recess moving with the seam relative to the arm. The arrangement is such, however, that the old problem of instability of the jack would be met due to the free pivotal movement of the load-support element in the arm, and this is prevented by securing the element to the screw, as in DE-A-2430033.

DE-C-2936002 overcomes the inflexibility problem, so introduced, by providing a wide recess for the seam, as in DE-C-2954496. Scuffing of the body will occur, although this is mitigated by use of a plastics element. In the raised state of the jack, there is a levering action of the seam against a side of the recess, putting this side in shear. There is, therefore, risk of the element breaking with consequent collapse of the vehicle.

GB-A-2176458 discloses a jack in which a track element is mounted on the arm and has a convex bearing surface. The load support element is formed with an arcuate rotary portion defining a concave surface which engages the convex bearing surface. This arrangement does not provide sufficiently free movement of the load support element, which tends to be frictionally held relative to the arm. For effective operation, very low frictional forces are necessary and it is not practically possible to reduce friction sufficiently by choice of materials which can be used in a jack. This arrangement is also expensive to manufacture.

The present invention seeks to overcome these problems and provides an improvement over GB-A-2176458, the jack of the invention being capable of cheap manufacture with the load-support element being sufficiently movable to be effective with sufficient pivotal control to avoid instability, as in DE-C-2936002, without the disadvantage of securing the element to the screw, and without the problem of scuffing of the body of the vehicle, as in DE-C-2954496.

The present invention provides a jack having an elongate leg with a base element at one end, an elongate arm supported by the leg and pivotally movable relative thereto under the control of adjustable means including a member pivotally connected to the arm, an arcuate track element provided on the arm at a location spaced along the arm from the pivotal connection of said member to the arm, the element defining a bearing surface, a load-support element having a rotary portion complementary to the bearing surface and angularly movable in engagement with the bearing surface, and an engagement portion having an end surface provided with a recess for receiving a seam of a vehicle, said end surface being opposite to said rotary portion, with an intervening part between the rotary portion and the engagement portion, and means to captivate the load-support element on the track element, characterised in that the bearing surface is concave, the complementary rotary portion is convex, and the recess is substantially located outside the concave surface and beyond the centre thereof, so as, in use, to locate the seam at a position spaced from the centre.

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

Fig.1 is a side elevation of a first embodiment of a jack according to the invention;

Fig.2 is a perspective view of a part of the jack of Fig.1, showing its load-support element;

Fig.3 is an exploded perspective view corresponding to Fig.2;

Fig.4 is a perspective view similar to Fig.2 of a second embodiment;

Fig.5 is an exploded perspective view corresponding to Fig.4.

Fig.6 is a view similar to Fig 2 of a third embodiment of the invention;

Fig.7 is an exploded perspective view corresponding to Fig.6; and

Fig.8 is a perspective view of a part of a modification of the second embodiment of Figs. 4 and 5.

Referring initially to Figs. 1 to 3, the jack shown comprises an elongate leg 11 secured to, or formed in one piece with a base element 12. The jack shown is of the type in which the base has a setting-up surface 13 and a main support surface 14 and in which, in use, the jack rolls from a position supported by the setting-up surface to a position supported by the main support surface. As an alternative, the leg 11 may be pivoted to a base. Both types of jack are well known.

An arm 16 is pivoted to the leg 11 by a pivot pin 17. Both the arm and the leg are made of channel-shaped metal pressings, with the arm received between the channel sides of the leg. A screw 19 extends between the arm and the leg and is pivotally mounted on both. In the jack shown, the screw extends through a pivot device 20, pivotally mounted between the channel sides of the leg, near its end remote from the base. The screw is captivated on the pivot device with a ball-race bearing 21 provided on the screw and bearing against the device. The screw extends through and is screw-engaged with a nut 23, pivotally mounted on the arm. The positions of the pivot device 20 and the nut 23 may be reversed. A handle 25 is secured to the screw. A load-support element 30 is mounted on the arm at the end remote from the pivot 17, and is spaced from the pivot connection of the nut 23 to the arm.

In operation, the jack is initially arranged, as shown in Fig.1 supported on its setting-up surface 13, with the load-support element 30 engaged with a seam of a vehicle body. The handle is turned to rotate the screw, so that the leg 11 is drawn towards the arm 16 with accompanying lift of the load-support surface. The jack rolls onto the main support surface 14, during such operation.

Jacks of this type are well known, as is shown in the documentation previously referred to, e.g. as in DE-A-2430033 and further detail of construction is, therefore, unnecessary.

The arm 16, is provided with part-circular rebates 31 in its channel sides, 26,27 (Fig.2).

A track element 32, which is a metal pressing of arcuate form, has an external convex surface complementary to the rebates and is secured (e.g. welded) therein, with the track element bridging the channel sides 26,27. The track element has a concave bearing surface 33 with marginal edges 34, which overhang the channel sides 26,27.

The load-support element 30 is a plastics moulding, e.g. of low friction material such as a polyamide. The element comprises a block having an engagement portion 35 provided with a recess, or groove 37, in an upper end surface 38, for receiving the seam of a vehicle body. The groove 37 tapers slightly and is broader at the mouth than at the bottom of the groove.

The load-support element has a rotary portion at its lower end, opposite to the upper end surface 38, formed with a convex surface 39, complementary to and seated on the concave bearing surface 33. The element overhangs the edges of the bear-

ing surface 33 and has extensions defining inturned flanges 40. The flanges have concave surfaces which engage with the convex surfaces of the marginal edges 34 of the track element 32, so as to captivate the load-support element on the track element.

Formations on the ends of the track element 32, or the channel sides 26,27 of the arm, serve as stops to prevent the load support element from being detached from the track element. These formations are not illustrated, but are preferably defined by deformations of the metal parts.

An intermediate part 41 is provided between the groove 37 and the lower end 39, so that the groove is located outside the area bounded by the concave surface and an imaginary chord 45 (Fig.1) drawn through the ends of the concave surface, as viewed in cross-section.

In use, the load-support element slides on the concave bearing surface during lift, so as to compensate for tilt of the vehicle and rotation of the lift arm 16 relative to the vehicle. The sliding arrangement provides control of the angular movement so that stability of the jack is maintained and the location of the groove 37, spaced substantially from the concave bearing surface, assists in maintaining such stability.

Referring now to Figs. 4 and 5, a second embodiment is shown. The arm 16 is again formed with rebates 31 in its channel sides 26,27 and a track element 132 is secured in the rebates, so as to bridge the channel sides. The track element has a concave bearing surface 133 and overhangs the channel sides. The opposite edges of the track element are formed with side walls and inturned flanges 140, which overlie the marginal edges of the concave bearing surface.

The load-support element 130 is again a moulded plastics block with an engagement portion 135 having an upper surface 138 and a groove 137. An intermediate portion 141 and a convex lower end surface 139, which engages the concave bearing surface are also provided. In this embodiment, the lower end of the element is formed with arcuate marginal edge formations 150 which engage beneath the flanges 140 of the track element, so that the load-support element is captivated on the track element. The intermediate portion 141 is reduced in width to define the marginal edge formations 150.

As in the previous embodiment, the track element will also have formations (not shown) to prevent the load-support element from being detached from the track element.

Referring now to Figs 6 and 7, an embodiment is shown in which the track element 32 or 132 is replaced by a pair of elements 33a,33b integrally formed, as arcuate flanges, with the channel sides 26,27 of the arm 16. The flanges project inwardly of the sides 26,27 and adjoin respective rebates 31. This arrangement is particularly easy to manufacture and strong, in use.

The load support element 230 is a moulded plastics block, similar to that of Fig.3 with an engagement portion 235 having an upper surface 238, a groove 237, an intermediate portion 241 and a convex lower end portion 239, which engages the concave bearing flanges 33a,33b. The block has an inverted-T section portion 250 having a portion 253 between the flanges and a cross-piece 254 defining grooves 251,252 with the end portion 239. The grooves receive the flanges 33a,33b, whereby the support element 230 is captivated on the flanges by the cross-portion 251.

In a modification, the flanges 33a,33b, may be outwardly turned to engage a load support element 30, as shown in Fig.3.

Referring to Fig. 8, a modification of the embodiment of Figs. 4 and 5 is shown. The load support element 30 is the same as that in Figs. 4 and 5. The track element 132 is, however, replaced by a pair of elements 133a,133b, each integral with a respective channel side 26,27 of the arm 16. Each track element is channel-shaped with the mouths of the elements facing each other. Each track element is arcuate and adjoins a corresponding rebate 31.

It is envisaged that the concave track surface in any of the embodiments may be part-spherical so as to permit limited movement laterally of the arm 16.

Claims

1. A jack having an elongate leg (11) with a base element (12) at one end, an elongate arm (16) supported by the leg and pivotally movable relative thereto under the control of adjustable means (19) including a member (23) pivotally connected to the arm (16), an arcuate track element (32,132,33a,33b,133A,133b) provided on the arm (16) defining a bearing surface (33), a load-support element (30,130) having a rotary portion (39,139) complementary to the bearing surface (33) and angularly movable in engagement with the bearing surface, and an engagement portion (35,135) having an end surface (38,138) provided with a recess (37,137) for receiving a seam of a vehicle, said end surface being opposite to said rotary portion (39,139), with an intervening part (41,141) between the rotary portion and the engagement portion, and means (40,140) to captivate the load-support element (30,130) on the track element (32,132,33a,33b,133a,133b) characterised in that the bearing surface (33) is con-

cave, the complementary rotary portion (39,139) is convex, and the recess (37,137) is substantially located outside the concave surface and beyond the centre thereof, so as, in use, to locate the seam at a position spaced from the centre.

2. A jack according to Claim 1, wherein the arm (16) is a channel-shaped member having channel sides (26,27) each formed with an arcuate rebate (31) and the rotary portion (39,139) is located within the rebates.

3. A jack according to Claim 2, wherein a pair of said track elements (132) is provided, each element being integrally formed with a respective one of said channel sides (26,27) and adjoining a respective one of said rebates (31).

4. A jack according to Claim 3, wherein the track elements (33a,33b) extend towards each other and the load support element (230) has a portion (253) projecting between the track elements and captivating portions (254) projecting beneath the track elements within the channel-shaped arm (16).

5. A jack according to Claim 2, wherein the track element (32) is and arcuate element seated in the rebates (31) and bridging the channel.

6. A jack according to Claim 5, wherein the track element (32) is defined by a metal pressing of arcuate form seated in said rebates (31).

7. A jack according to any preceding claim, wherein the track element (132), or pair of track elements (133a,133b), defines a part-cylindrical concave track surface and the track element, or pair of track elements, has edge formations which captivate the load-support element (130) on the trace element, or pair of track elements.

8. A jack according to Claim 1, 2, 5, 6 or 7, wherein the track element (32), or pair of track elements (33a,33b) defines a part-cylindrical concave track surface and the load support element (30) has formations (40) which captivate edges of the track element, or pair of track elements.

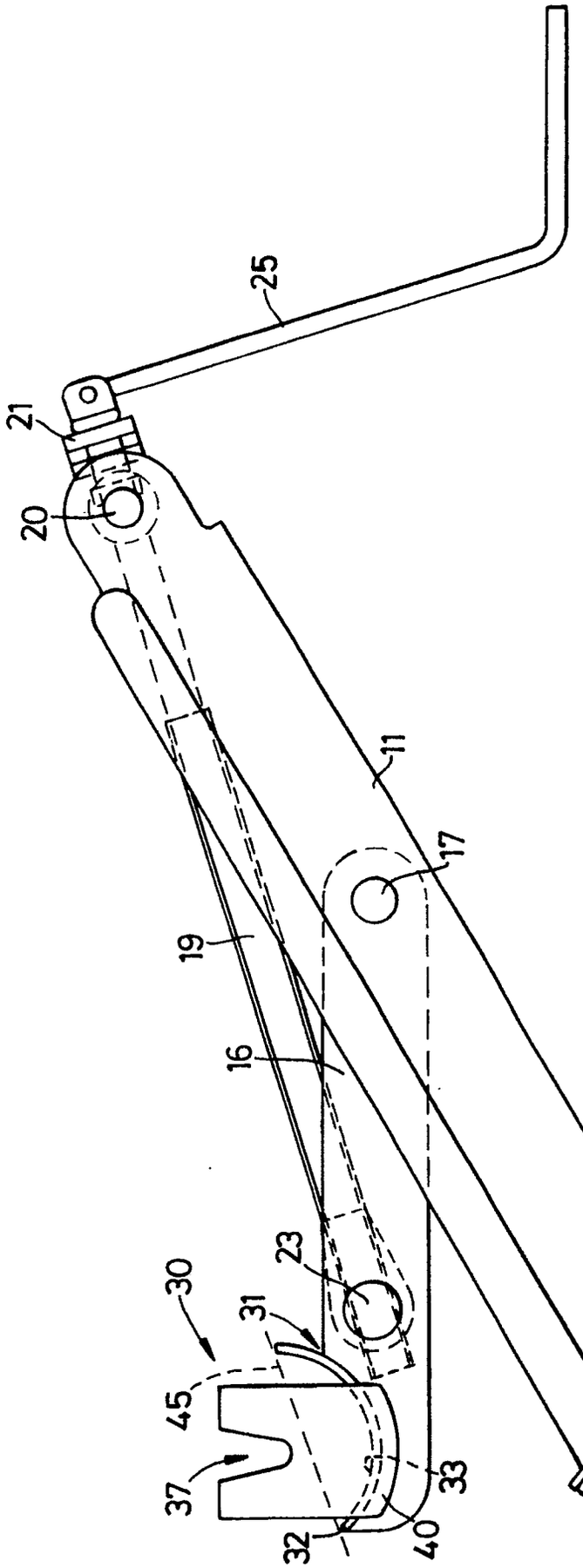
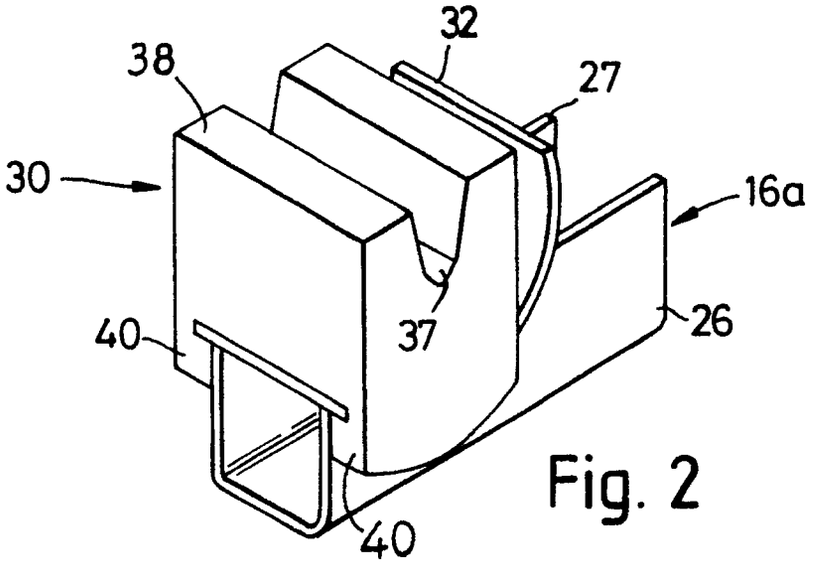


Fig.1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16a
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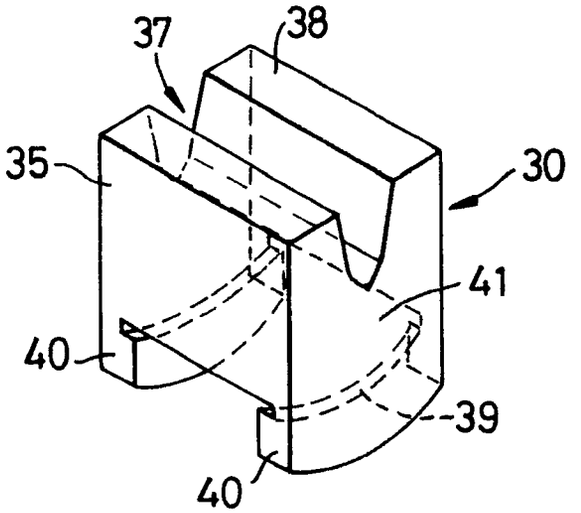
Fig. 2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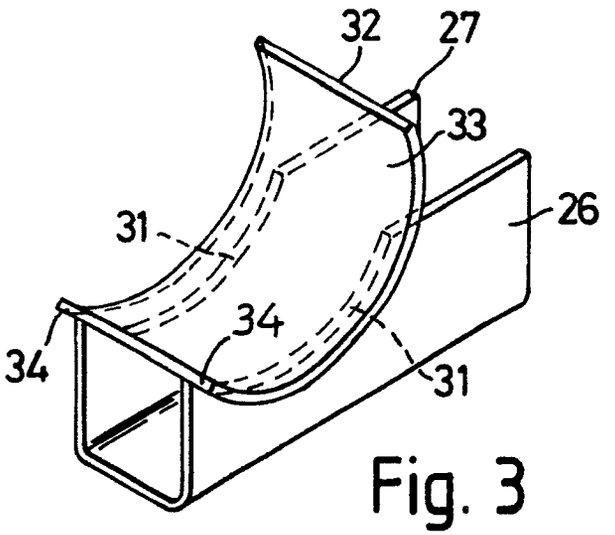
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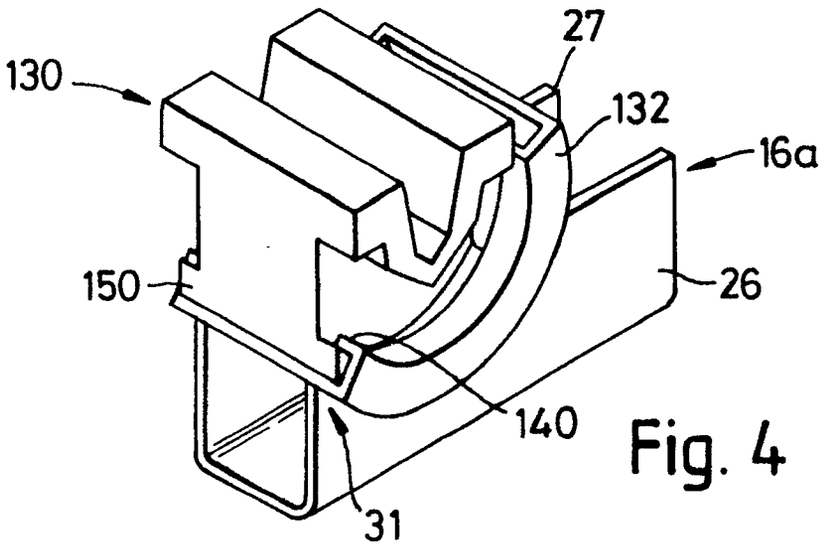
Fig. 3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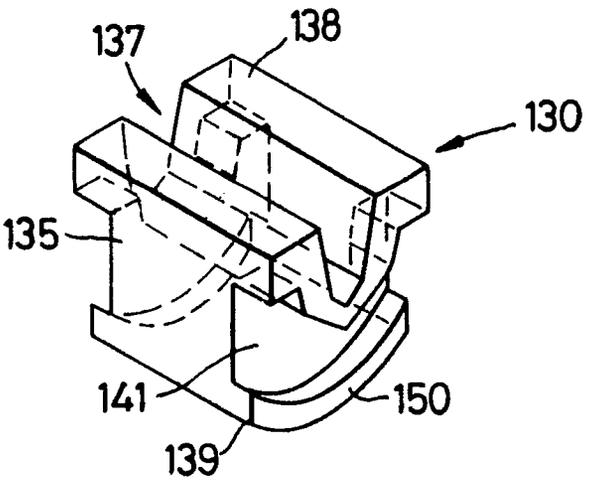
26
140
31

Fig. 4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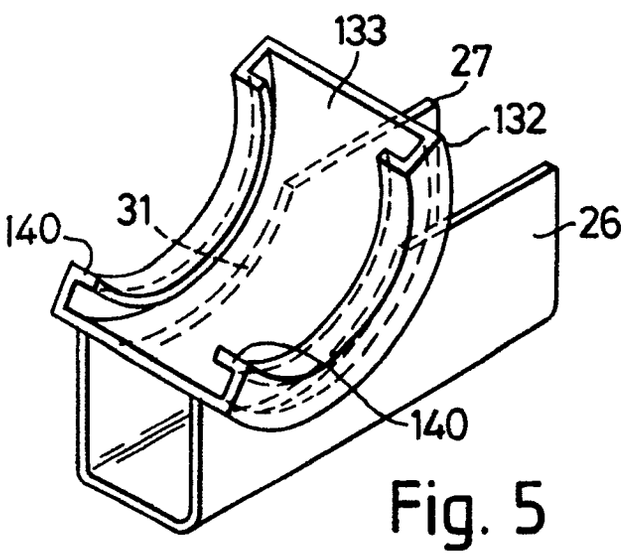
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Fig. 5

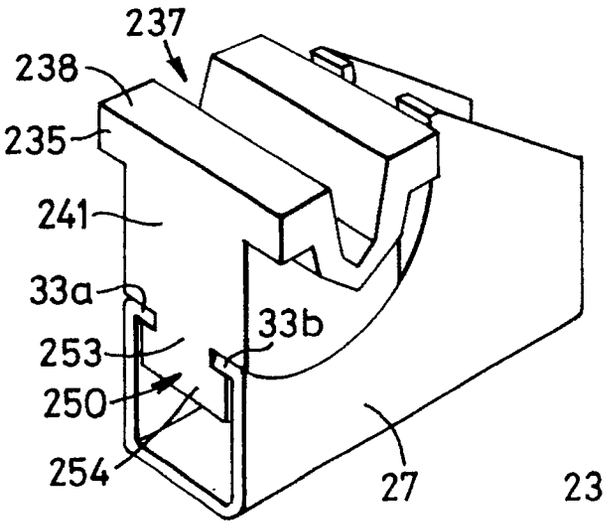


Fig. 6

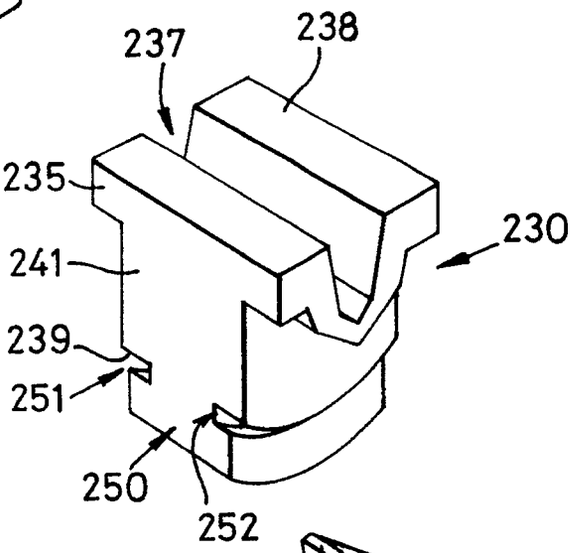
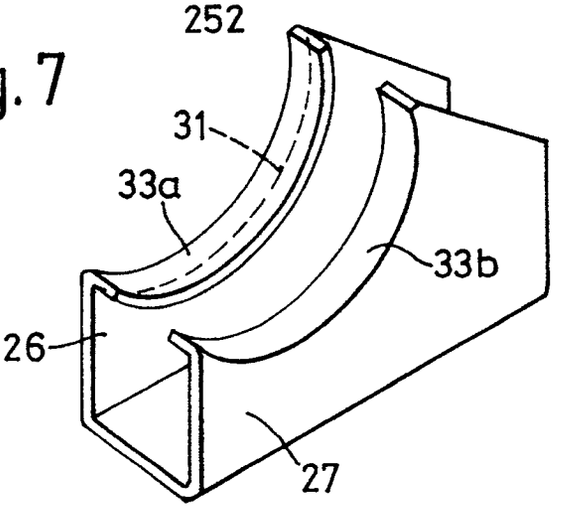


Fig. 7



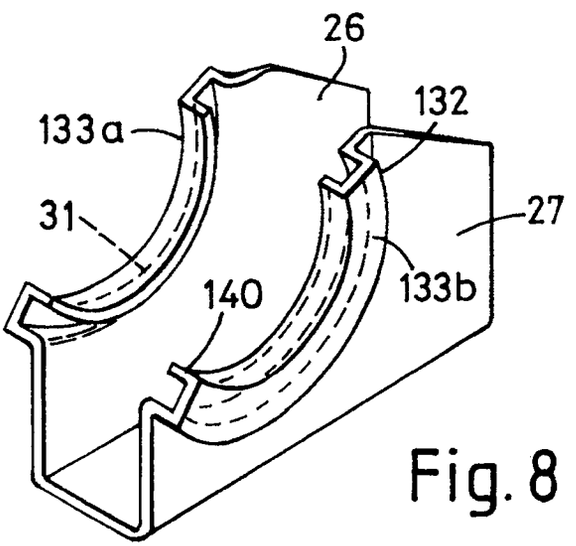


Fig. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 30 0278

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)
P,X	DE-U-9 002 560 (LAHNWERK GmbH & CO. KG VERFORMUNGSTECHNIK) * Page 6, 3rd last paragraph; page 7, complete *	1	B 66 F 3/12
A	GB-A-2 176 458 (METALLIFACTURE)		
A,D	DE-C-2 954 496 (E.A. STORZ)		
A	EP-A-0 327 484 (BATZ)		
A	DE-A-3 033 956 (AUGUST BILSTEIN)		
A	US-A-2 618 464 (SINTZ)		
A	US-A-4 146 208 (CICCARELLI)		
A	FR-A-7 605 46 (DELPHY)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
B 66 F

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	28 March 91	VAN DEN BERGHE E.J.J

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same catagory
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T: theory or principle underlying the invention

E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document