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(54) **A device for detachably coupling an implement to a vehicle**

(57) The present invention relates to a device (1) for detachably coupling an implement to a vehicle and in particular to a lightweight wedge device (1). The device (1) has a means for coupling the device (1) to the vehicle and a means for releasably engaging an implement to the device (1). The coupling means and the engaging means are moveable relative to one another by a wedge

(11) mounted there between. The wedge (11) is a two part wedge (11) having a first part (12) normally fixed between the coupling means and the engaging means. A second part (14) is slidably insertable into and removable from the device (1) by an operator wherein the second part (14) is formed for cooperation with the first part (12).

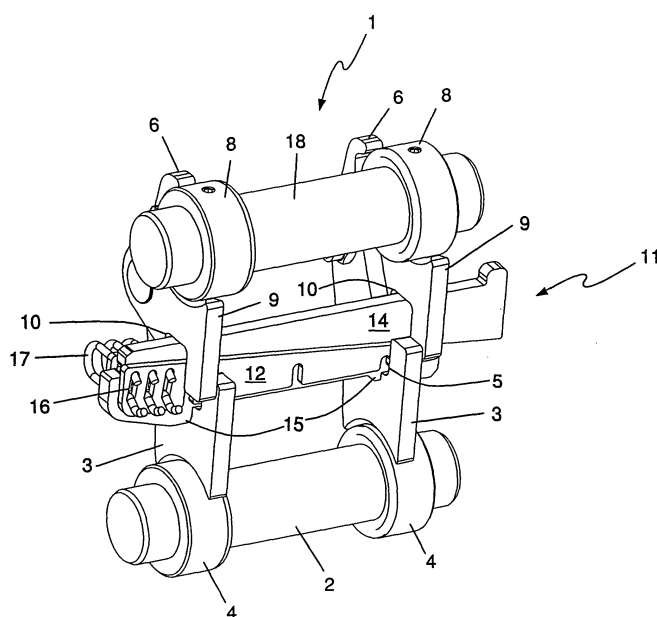


FIG.1

## Description

**[0001]** The present invention relates to a device for detachably coupling an implement to a vehicle and in particular to a lightweight wedge device.

**[0002]** The inventor of the present invention has previously devised a number of devices for detachably coupling an implement to a vehicle. In particular, International Publication No. WO 90/08234 discloses a device having a first coupling part carried by the implement presenting substantially u-shaped mutually opening recesses and a second coupling part which is carried by a machine and includes mutually parallel pins and permits parallel movement between the pins. In one embodiment of this device a wedge is used in combination with toggle arms and carrier arms to separate the pins from one another to engage the first and second coupling parts. The apparatus is complex consisting of a large number of interdependently moving parts and also adds substantial weight to the implement. Additionally, it is easy to damage the apparatus, especially when the apparatus is old, by applying too much force to the wedge part. There is no way for a machine operator to tell when a sufficient amount of force has been applied to the wedge to secure the first and second coupling parts together and it is often the case that excess force is used resulting in damage to the device.

**[0003]** It is an object of the present invention to overcome the problems associated with the prior art in order to reduce the complexity and thereby reduce the manufacturing costs associated with the apparatus. It is also an object of the invention to reduce the weight of the device and to reduce the risk of damage to the device during coupling and decoupling.

**[0004]** Accordingly, the present invention provides a device for detachably coupling an implement to a vehicle such as an excavation bucket onto the backhoe of an excavator, the device comprising a means for coupling the device to the vehicle and a means for releasably engaging an implement to the device wherein the means for coupling the device to the vehicle and the means for releasably engaging an implement to the device are moveable relative to one another by a wedge mountable there between characterised in that the wedge is a two part wedge having a first part normally fixed between the coupling means and the engaging means and a second part slidably insertable into and removable from the device by an operator wherein the second part is formed for cooperation with the first part in order to move the coupling means and the engaging means relative to one another so as to detachably engage the implement with the device.

**[0005]** Ideally, the direction of travel of the removable part of the wedge is substantially perpendicular to the direction of relative travel between the coupling means and the engaging means.

**[0006]** Preferably, the coupling means is provided by a pair of spaced apart coaxially aligned parallel rings

each being carried on a support-plate.

**[0007]** Ideally, the support plates are substantially parallel to one another.

**[0008]** Ideally, the engaging means is provided by a cylinder carrying a pair of panels which are axially spaced about the longitudinal axis of the cylinder and extend substantially perpendicular therefrom in the same direction.

**[0009]** Preferably, the panels are parallel to one another.

**[0010]** Ideally, the panels are provided with hooking means at their ends distal from the cylinder. These hooks are formed for engagement with the rings providing structural support for the device.

**[0011]** Preferably, the panels provide recesses distal from the cylinder for carrying the wedge.

**[0012]** Ideally, the support plates define recesses distal from the rings for resting on the wedge.

**[0013]** Preferably, each support plate carrying a ring is adjustably mounted on a panel of the engaging means.

**[0014]** Ideally, each support plate is adjustably mounted on an outer main surface of each panel.

**[0015]** Preferably, the adjustable mounting is provided by a block and slot arrangement, wherein the block is connected to a plate and is formed for slidable engagement with a partially enclosed slot opening along the outer main surface of a panel.

**[0016]** Preferably, the removable part and the fixed part of the wedge are substantially triangular sections which form a rectangular section when the removable part is fully inserted into the device.

**[0017]** Ideally, the fixed part of the wedge defines a number of stops which are formed for engagement with the panels of the cylinder restricting lateral movement of the fixed part of the wedge.

**[0018]** Preferably, one end of the fixed part of the wedge is formed for engagement with the corresponding end of the removable part in order to releasably engage the removable part in position in the device once the removable part has been inserted by a predetermined distance. This mechanism prevents an operator from exerting excess force on the wedge and reduces the risk of damage to wedges during insertion.

**[0019]** In one embodiment, both parts of the wedge define holes on a corresponding end for receiving a locking bolt or any other retaining means for locking the wedge in position.

**[0020]** In a particularly preferred embodiment, the fixed part of the wedge defines a number of springs at one end traversing the longitudinal axis of the wedge and the corresponding end of the removable part of the wedge defines a rib and groove formation formed for engagement with the springs.

**[0021]** Preferably, the surface of the fixed part of the wedge which supports the removable part of the wedge defines a longitudinally extending slot which is formed for receiving the removable part of the wedge and the

upright side walls of the slot act as a guide means for guiding the removable part into and out of the device.

**[0022]** The present invention will now be described with reference to the accompanying drawings, which are given by way of example only, and show two embodiments of a device for detachably coupling an implement to a vehicle. In the drawings: -

Figure 1 is a perspective view of the device in accordance with the invention;

Figure 2 is an exploded view of the wedge of Figure 1.

Figure 3 is a perspective view of the wedge of Figures 1 and 2;

Figure 4 is a partial cut-away perspective view of the wedge of Figures 1, 2 and 3;

Figure 5 is a partial cut-away perspective view of the bottom half of the wedge of Figures 1 to 4; and

Figure 6 is a perspective view of a second embodiment of wedge in accordance with the invention.

**[0023]** Referring to the drawings and initially to Figure 1 there is shown a device indicated generally by the reference numeral 1. The device 1 has a cylinder 2 carrying a pair of spaced apart panels 3. The panels 3 are each carried on a larger diameter cylinder part 4 of the cylinder 2. The panels 3 both define a u-shaped recess 5 and have hooks 6 at their ends distal from the cylinders 2 and 4. The device 1 also includes a pair of rings 8 each of which is carried on a support plate 9. A shaft 18 for mounting the rings 8 to a machine extends between and beyond the rings 8. The support plates 9 both define inverted u-shaped recesses 10 and have sliding blocks (not shown) for engagement with partially enclosed slot guides (not shown) formed in the panels 3. A wedge 11 is shown in the assembled position having a normally fixed part 12 and a removable part 14. The fixed part 12 defines a number of stops 15 and apertures 16. The apertures 16 are formed for receiving springs 17 which extend through the fixed part 12.

**[0024]** Referring now to Figure 2, there is shown an exploded view of the wedge 11 of device 1. One end of the fixed part 12 of the wedge 11 defines three apertures 16 for receiving three springs 17. A corresponding end of the removable part 14 of the wedge 11 has a rib and groove formation 13. Figure 3 shows the wedge 11 having fixed part 12 and removable part 14. The fixed part 12 of the wedge 11 houses a number of springs 17 at one end traversing the longitudinal axis of the wedge 11 in one direction through a number of apertures 16 defined in the fixed part 12, the springs 17 traversing back again in the opposite direction through the apertures 16. The corresponding end of the removable part 14 of the

wedge 11 has a rib and groove formation (see Figures 2 and 4) formed for engagement with the upper portion of the traversing springs 17. The removable part 14 of the wedge 11 has a stop 28 preventing the removable part 14 from passing too far into the device 1. The fixed part 12 includes stops 15 preventing lateral movement of the part 12 when mounted in the device 1.

**[0025]** Referring to Figure 4, one end of the surface of the removable part 14 of the wedge 11, which surface is supported on the fixed part 12 and has a rib and groove formation 13 for engagement with the upper portion of traversing springs 17. Figure 5 shows the top surface 44 of the fixed part 12 of the wedge 11 having a longitudinally extending slot 45 formed for receiving the removable part (not shown) of the wedge 11 and acts as a guide for guiding the removable part into and out of the device 1. Referring now to Figure 6, a second embodiment of a wedge is indicated generally by the reference numeral 61. The wedge 61 comprises a fixed part 62 and a removable part 64. Both parts 62, 64 of the wedge 61 define holes 66 on a corresponding end for receiving a locking bolt 67 or any other suitable retainer for locking the wedge 61 together.

**[0026]** In use, a user inserts springs 17 into the apertures 16 formed in the fixed part 12 of the wedge 11, which is normally housed in the device 1. The end of the removable part 14 of the wedge 11 carrying the rib and groove formation 13 is inserted manually into the slot 45 on the top surface 44 of the fixed part 12 of the wedge 11 by an operator. The removable part 14 of the wedge 11 is then tapped with a hammer or some similar tool into the device 1 in order to move the rings 8 and cylinders 2, 4 away from one another, thereby releasably engaging an implement to the device 1. Once the operator feels the rib and groove formation 13 of the removable part 14 engaging with the springs 17, the operator stops tapping the removable part 14 as the wedge 11 is securely in place. Alternatively, an operator taps the removable part 64 of the wedge 61 with a hammer or some similar tool into the device 1 in order to move the rings 8 and cylinders 2, 4 away from one another. Once the holes 66 of both parts 62, 64 have aligned the operator can insert the locking pin 67 through the aligned holes 66, thereby securely locking the wedge 61.

**[0027]** It will of course be appreciated that the details of the specific embodiments are given by way of example only and in no way limit the invention and that various alterations and modifications may be made to the embodiments without departing from the scope of the invention as defined in the appended claims.

## Claims

1. A device (1) for detachably coupling an implement to a vehicle such as an excavation bucket onto the backhoe of an excavator, the device (1) comprising a means for coupling the device to the vehicle and

a means for releasably engaging an implement to the device wherein the means for coupling the device to the vehicle and the means for releasably engaging an implement to the device are moveable relative to one another by a wedge (11) mountable there between **characterised in that** the wedge (11) is a two part wedge (11) having a first part (12) normally fixed between the coupling means and the engaging means and a second part (14) slidably insertable into and removable from the device (1) by an operator wherein the second part (14) is formed for cooperation with the first part (12) in order to move the coupling means and the engaging means relative to one another so as to detachably engage the implement with the device.

2. A device (1) as claimed in claim 1 wherein the direction of travel of the removable part (14) of the wedge (11) is substantially perpendicular to the direction of relative travel between the coupling means and the engaging means.
3. A device (1) as claimed in any preceding claim wherein the coupling means is provided by a pair of spaced apart coaxially aligned parallel rings (8) each being carried on a support-plate (9).
4. A device (1) as claimed in any preceding claim wherein the engaging means is provided by a cylinder (2) carrying a pair of panels (3) which are axially spaced about the longitudinal axis of the cylinder (2) and extend substantially perpendicular therefrom in the same direction.
5. A device (1) as claimed in claim 4 wherein the panels (3) provide recesses (5) distal from the cylinder (2) for carrying the wedge (11).
6. A device (1) as claimed in any of claim 3 to 5 wherein the support plates (9) define recesses (10) distal from the rings (8) for resting on the wedge (11).
7. A device (1) as claimed in any of claims 3 to 6 wherein each support plates (9) is adjustably mounted on a panel (3).
8. A device (1) as claimed in any preceding claim wherein the fixed part (12) of the wedge defines a number of stops (15) which are formed for engagement with the panels (3) of the cylinder (2) restricting lateral movement of the fixed part (12) of the wedge (11).
9. A device (1) as claimed in any preceding claim wherein one end of the fixed part (12) of the wedge (11) is formed for releasable engagement with a correspondingly formed end of the removable part (14).

10. A device (1) as claimed in claim 9 wherein the end of the fixed part (12) of the wedge (11) houses a number of transversely extending members (17) formed for positive engagement with a rib and groove formation (13) located on the corresponding end of the removable part (14) whereby engagement of said members (17) and formation (13) locks the removable part (14) of the wedge (11) in position in the device (1).

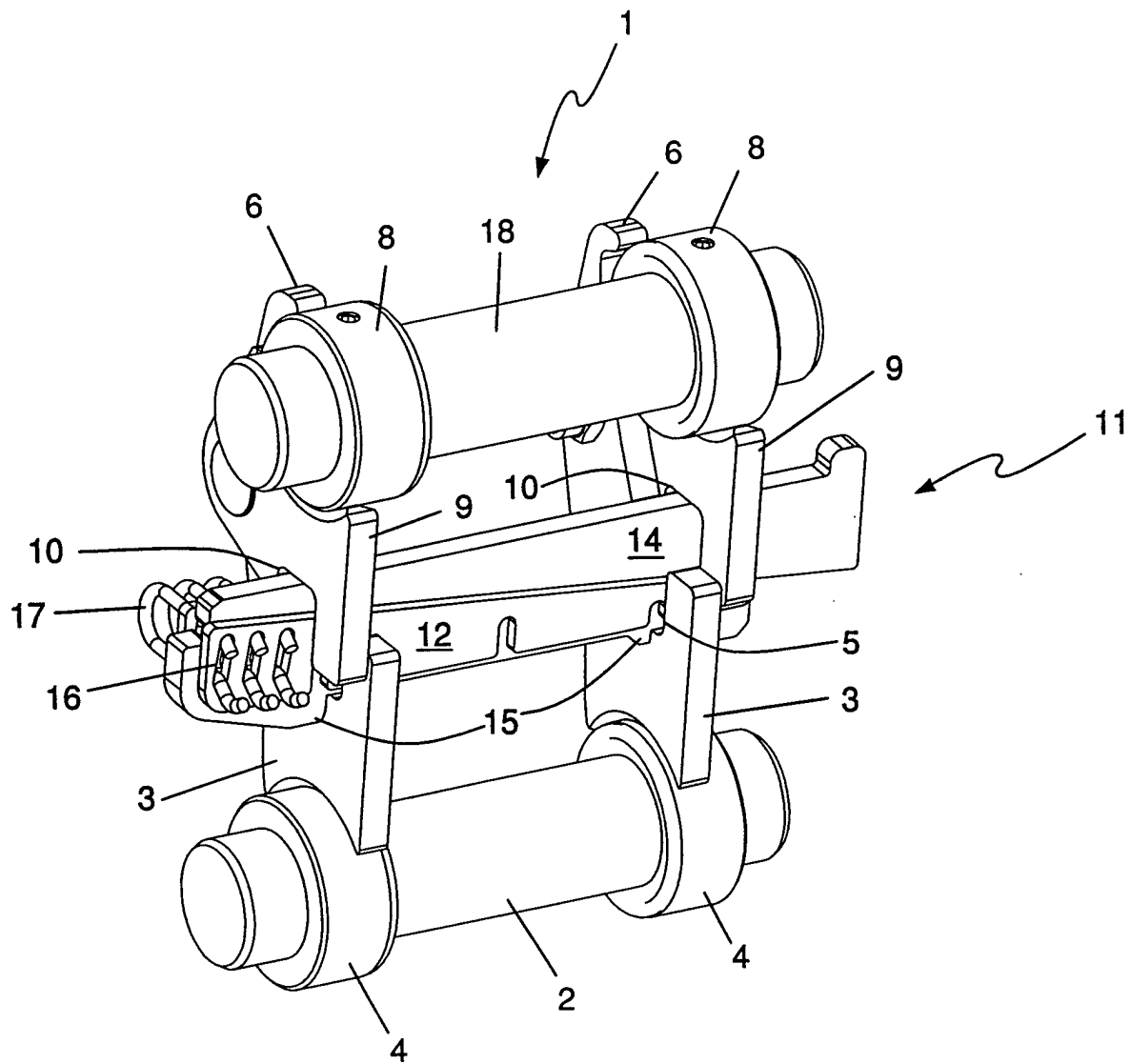


FIG.1

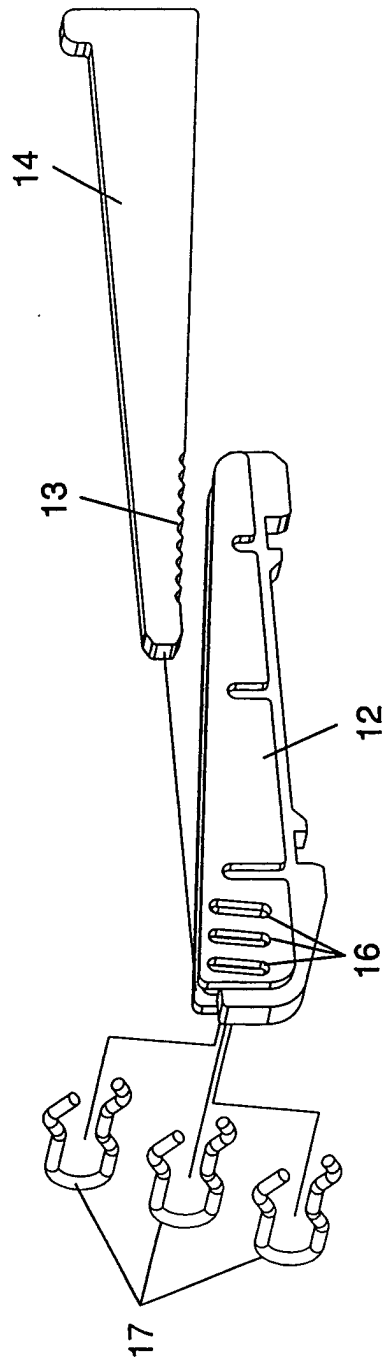
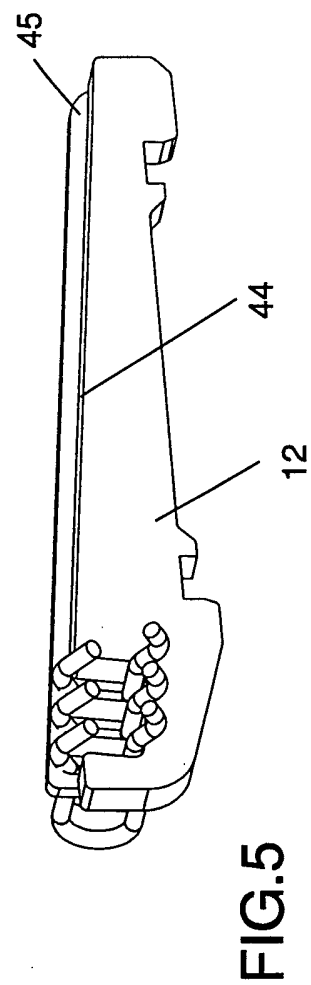
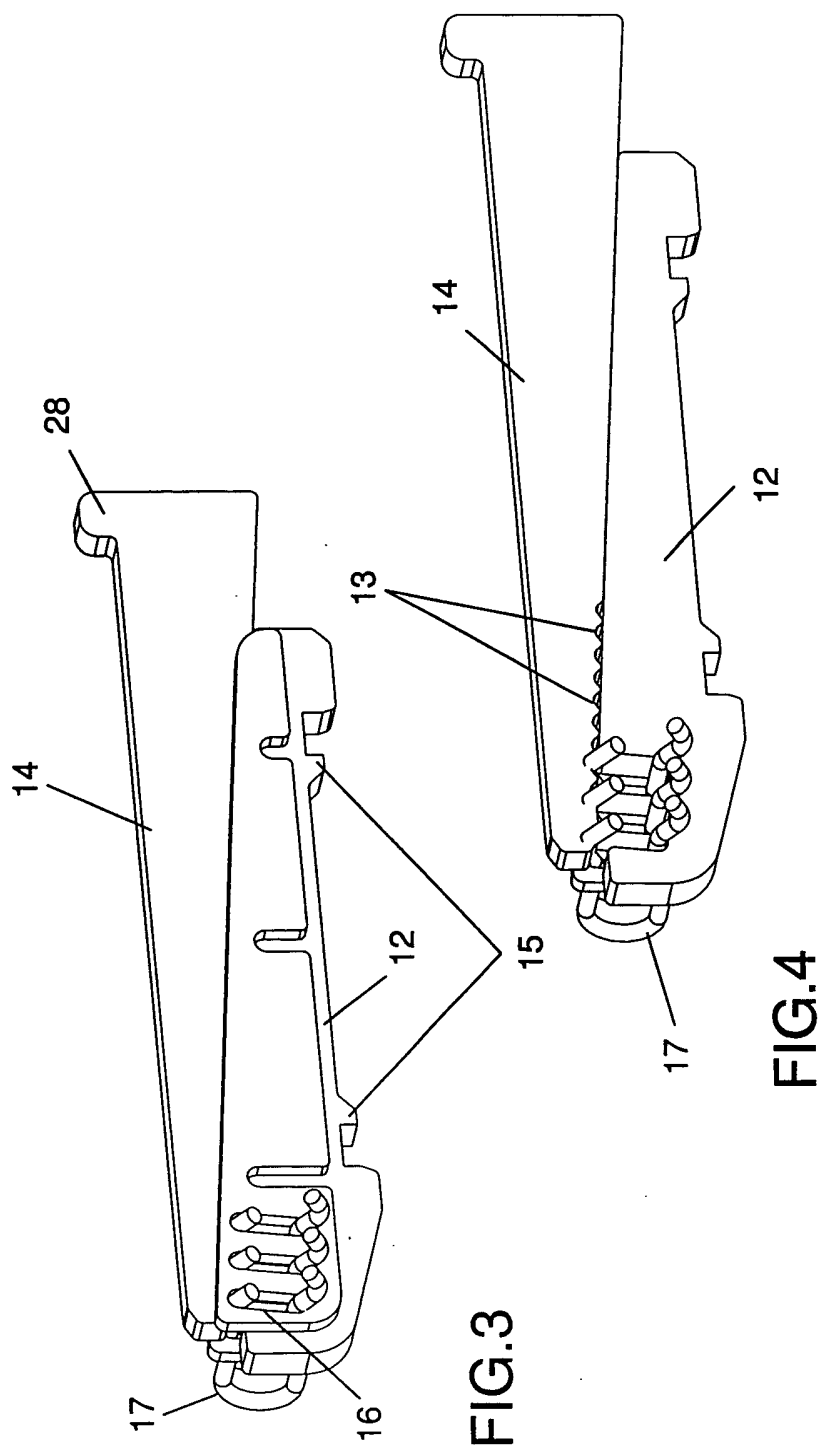


FIG.2



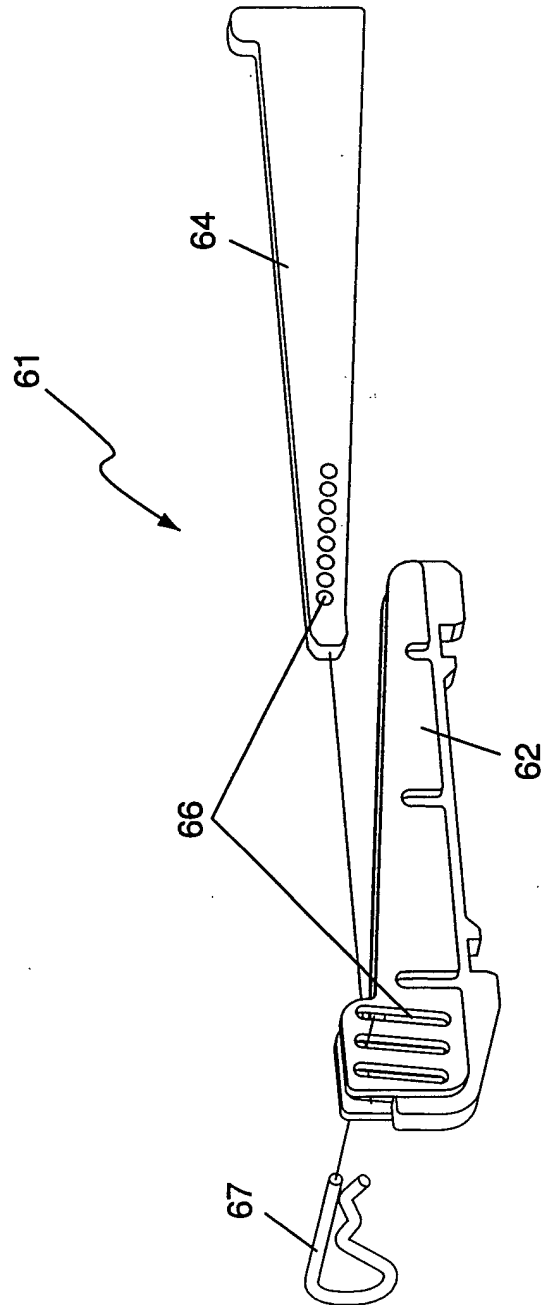


FIG. 6





European Patent  
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Application Number  
EP 02 02 6002

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Place of search MUNICH		Date of completion of the search 10 January 2003	Examiner Laurer, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document 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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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