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⑯ **Control levers.**

⑯ Mounting means for a control lever (6) comprising first and second spaced-apart mounting members (21,24) of which the first member (21) has a first circular aperture (25) to receive a first end of a pivot shaft (12) associated with the control lever (6) and the second member (24) has a second circular aperture (26) concentric with the first aperture (25) to receive a second end of the pivot shaft (12). The second aperture (26) communicates with an edge of the second mounting member (24) via a parallel-sided slot (27) of which the width is less than the diameter of the second aperture (26). The first end of the pivot shaft (12) has a first terminal portion (13) of reduced diameter to form a first shoulder (14) at that end. Said first reduced diameter portion (13) is rotatably received in said first aperture (25) and said first shoulder (14) is engageable with the associated face of the first mounting member (21). The second end of the pivot shaft (12) has a second terminal portion (15) of reduced diameter to form a second shoulder (16). Said second terminal portion (15) also is provided with a pair of diametrically opposed flats (17) having a distance therebetween which is such as to make this second terminal portion (15) slidably fit in said parallel-sided slot (27) and furthermore, the second shoulder (16) is engageable with the corresponding face of the second mounting member (24), the arrangement being such that, when the pivot shaft (12) is rotated such that the flats (17) thereon are no longer in alignment with said parallel-sided slot (27), the pivot shaft (12) is axially retained

between the first and second mounting members (21,24) by the first and second shoulders (14,16) and the misalignment of the flats (17) and slot (27) prevents any transverse movement of the pivot shaft (12).

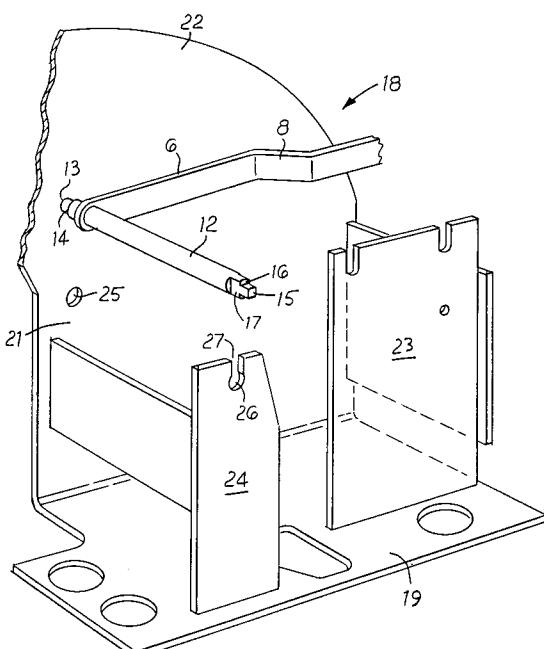


Fig.4

This invention relates to control levers and more particularly, to the mounting of such control levers.

It is common for control levers to act over a limited arcuate range of movement and also common for them to pivot on a fixed pivot or be attached to a rotatable pivot. If a fixed pivot is employed, the lever may be attached to a sleeve rotatably mounted on the fixed pivot. If the pivot actually forms a pivot shaft, the lever has to be connected thereto in some way. The pivot, irrespective of whether it is fixed or rotatable, is often mounted between two spaced mounting plates and needs to be retained in position in relation thereto. One known way of mounting a control lever between two spaced mounting plates is for the pivot shaft first to be inserted into aligned holes in the respective plates, then the control lever attached to the pivot shaft, and then providing means on the outside of the plates to prevent axial movement of the pivot shaft relative thereto. An alternative arrangement is for one plate to be provided with a slot extending from one edge into which one end of the pivot shaft can be slid so as to make the assembly a little easier. However, means still have to be provided for axially retaining the pivot shaft and in both of the known arrangements discussed, these means may be in the form of cover plates bolted or otherwise secured to the exterior of the mounting plates and having recesses into which the corresponding ends of the pivot shaft project.

The provision of one or more recessed cover plates and corresponding attachment means increases the component count and also increases assembly time.

An object of the present invention is to provide mounting means for a control lever which have a reduced component count and are simplistic in assembly.

According to the present invention, mounting means for a control lever are provided; said mounting means comprising first and second spaced-apart mounting members of which the first member has a first circular aperture to receive a first end of a pivot shaft associated with the control lever and the second member has a second circular aperture concentric with the first aperture to receive a second end of the pivot shaft and being characterised in that the second aperture communicates with an edge of the second mounting member via a parallel-sided slot of which the width is less than the diameter of the second aperture; the first end of the pivot shaft has a first terminal portion of reduced diameter to form a first shoulder at that end; said first reduced diameter portion being rotatably received in said first aperture and said first shoulder being engageable with the associated

5 face of the first mounting member; and the second end of the pivot shaft has a second terminal portion of reduced diameter to form a second shoulder; said second terminal portion being provided with a pair of diametrically opposed flats having a distance therebetween which is such as to make this second terminal portion slidably fit in said parallel-sided slot and the second shoulder being engageable with the corresponding face of the second mounting member whereby, when the pivot shaft is rotated such that the flats thereon are no longer in alignment with said parallel-sided slot, the pivot shaft is axially retained between the first and second mounting members by the first and second shoulders and the misalignment of the flats and slot prevents any transverse movement of the pivot shaft.

10 In some applications of the invention, it will be possible first to engage the terminal portion of the first end of the pivot shaft in the first aperture and then to rotate the pivot shaft about the first end so as to slide the second end through the parallel-sided slot and into the second aperture in which case, it may be necessary only to provide the flats on the second terminal portion of reduced diameter. However, it is preferred to extend the flats into the full diameter portion of the shaft as this enables a quicker assembly of the control lever simply by sliding the second end through the parallel-sided slot without worrying about the location of the first end of the pivot shaft. When the second end of the pivot shaft engages the second aperture, the pivot shaft is then moved axially so as to engage the first end with the first aperture and so as to bring the first and second shoulders into engagement with the corresponding faces of the first and second mounting members. This assembly procedure is very simple, and hence quick and all that is necessary to complete the assembly is to rotate the pivot shaft so as to misalign the flats and the parallel-sided slot.

15 20 25 30 35 40 45 The pivot shaft may be used for one or more other control levers which may be mounted on one or more sleeves, for example, rotatably mounted on the pivot shaft, it being necessary, of course, first to mount the sleeves on the pivot shaft prior to assembly of the latter.

An agricultural tractor embodying the present invention will now be described in greater detail, by way of example, with reference to the accompanying drawings, in which :-

50 55 Figure 1 is a side view of the tractor,
Figure 2 shows the location of the control lever mounted in accordance with the invention within the cab of the tractor,
Figure 3 is a rear view of an overall control arrangement shown in Figure 2,
Figure 4 is a perspective view showing only the

basic mounting means in accordance with the present invention,

Figures 5 to 8 are perspective views taken from the opposite side of Figure 4 and moreover showing only parts of the arrangement shown in this Figure 4; these Figures 5 to 8 illustrating the successive steps in the mounting of a control lever in accordance with the present invention.

Although the illustrative embodiment of the present invention is being described in relation to a control lever mounted in the cab of an agricultural tractor, it will be appreciated that the invention finds wide application and is not restricted to this particular field of use.

Referring to Figures 1 and 2, the tractor is basically conventional having a framework on which a cab 1 is mounted and which is fitted with a pair of front, steerable ground-engaging wheels 2 and a pair of rear, driven, ground-engaging wheels 3. Within the cab 1 is mounted an operator's seat 4 and a steering wheel 5. To the right of the operator's seat 4 there are mounted a.o. two control levers 6 and 7 of which the control lever 6 is mounted in accordance with the present invention.

Turning now to Figure 3, the control lever 6 has a cranked body 8 made from flat stock and has attached to its upper end a cylindrical stud 9 which is threaded at its outer end to receive a control knob 11. The distal end of the lever 6 is welded or otherwise secured to a pivot shaft 12 a first end of which, adjacent the lever 6, has a terminal portion 13 of reduced diameter thus forming a first shoulder 14 generally at that end of the lever 6. The other and second end of the pivot shaft 12 also has a terminal portion 15 of reduced diameter which thus also forms a second shoulder 16. A pair of diametrically opposed and parallel flats 17 are formed at the second end of the pivot shaft 12; these flats extending over the entire length of the terminal portion 15 and also over a short axial length of the full diameter portion of the pivot shaft 12.

Turning now to Figures 3 to 8, the control lever 6 is mounted in mounting means 18 comprising an L-shaped plate 19, the generally vertical wall of which has an upper portion 22 in the general form of a sector. The generally horizontal limb of the plate 19 forms the base of the mounting means 18 which is apertured for attachment to the framework in the cab 1. Welded, or otherwise secured, to this base limb are two plates 23 and 24 which are spaced apart both along the base limb and with respect to the vertical wall 21; the plate 23 being nearer to that wall 21 than the plate 24. The pairs of plates 21,23 and 21,24 provide first and second sets of mounting members for pivot shafts of control levers. Those pivot shafts mounted between the plates 21 and 23 are of conventional form and

thus will not be described in any further detail. The control lever 6 in accordance with the present invention is mounted between the first and second mounting members provided by the plates 21 and 24 and to this end, the plate 21 is provided with a circular aperture 25 rotationally to receive the terminal portion 13 of reduced diameter of the first end of the pivot shaft 12. A circular aperture 26 is also provided in the plate 24; the two apertures 25 and 26 being concentric and the aperture 26 rotationally receiving the terminal portion 15 at the second end of the pivot shaft 12.

In accordance with the present invention, the aperture 26 communicates with the upper edge of the plate 24 via a parallel-sided slot 27 the width of which is less than the diameter of the aperture 26; the aperture 26 and slot 27 together having a general keyhole configuration. As seen in Figure 3, the pivot shaft 12 has fixedly attached thereto one end of a link 28 the other end of which connects with a rod 29 of a general linkage system which is actuated by the control lever 6. In the illustrated embodiment, the lever 6 effects a draft control for the tractor but it will be appreciated that this is incidental to the invention.

Rotationally mounted on the pivot shaft 12 is a sleeve 31 which has fixedly attached thereto the control lever 7 at one end, and a link 32 at the other end which, in turn, is connected to a rod 33 of a further control linkage which is operated by the lever 7. Also as seen in Figure 3, the stud 9 of the control lever 6 extends through a gate 34 fixed to the top of the vertical wall 21 and following the arcuate contour thereof. The gate 34 has a slot 35 formed therein, the ends of the slot determining the extent of arcuate movement of the control lever 6. One edge 36 of the slot 35 is provided with a series of notches which are selectively engageable by the stud 9 so as to retain the control lever 6 in an adjusted position.

To assemble the control levers 6 and 7 in the mounting means, the sleeve 31 is first slid over the pivot shaft 12 (shown only in Figure 3) and then the link 28 secured to the pivot shaft 12 and the link 32 to the sleeve 31. The control lever 6 is then oriented so that the flats 17 are in alignment with the slot 27 (Figure 5) and the second end of the pivot shaft 12 slid down the slot 27 without worrying where the first end of the pivot shaft 12 is in relation to the aperture 25 (Figure 6). When the second end of the pivot shaft 12 engages the aperture 26, the pivot shaft 12 is then moved axially away from the plate 24 and towards the plate 21 so as to engage the first end of the pivot shaft 12, by way of the terminal portion 13 of reduced diameter, in the aperture 25 so that the shoulder 14 engages the inner face of the plate 21 and the shoulder 16 at the second end of the pivot

shaft 12 engages the inner face of the plate 24 (Figure 7). Finally, the control lever 6 is rotated so as to misalign the flats 17 and the slot 27, whereby the terminal portion 15 at the second end of the pivot shaft is retained within the aperture 26 and no general transverse movement of the pivot shaft 12 can take place; the shaft 12 also being retained axially by the shoulders 14 and 16 cooperating with the inner faces of the plates 21 and 24 (Figure 8). Thus, the control lever 6 is mounted in an extremely simple manner, requiring no tools and no further components to secure the attachment of this control lever 6 to the mounting means 18. As it happens, in the illustrated embodiment, the associated control lever 7 is also simply mounted without the requirement for tools.

Thus, the present invention affords a very simple and secure mounting arrangement for a control lever, the operational range of movement of which is limited.

Claims

1. Mounting means for a control lever (6) comprising first and second spaced-apart mounting members (21,24) of which the first member (21) has a first circular aperture (25) to receive a first end of a pivot shaft (12) associated with the control lever (6) and the second member (24) has a second circular aperture (26) concentric with the first aperture (25) to receive a second end of the pivot shaft (12) and

characterised in that:-

the second aperture (26) communicates with an edge of the second mounting member (24) via a parallel-sided slot (27) of which the width is less than the diameter of the second aperture (26);

the first end of the pivot shaft (12) has a first terminal portion (13) of reduced diameter to form a first shoulder (14) at that end; said first reduced diameter portion (13) being rotatably received in said first aperture (25) and said first shoulder (14) being engageable with the associated face of the first mounting member (21); and

the second end of the pivot shaft (12) has a second terminal portion (15) of reduced diameter to form a second shoulder (16); said second terminal portion (15) being provided with a pair of diametrically opposed flats (17) having a distance therebetween which is such as to make this second terminal portion (15) slidably fit in said parallel-sided slot (27) and the second shoulder (16) being engageable with the corresponding face of the second mounting member (24) whereby, when the pivot shaft (12) is rotated such that the flats (17)

thereon are no longer in alignment with said parallel-sided slot (27), the pivot shaft (12) is axially retained between the first and second mounting members (21,24) by the first and second shoulders (14,16) and the misalignment of the flats (17) and slot (27) prevents any transverse movement of the pivot shaft (12).

- 5 2. Mounting means according to claim 1, characterised in that the flats (17) extend, for a predetermined axial distance, into the full diameter portion of the pivot shaft (12) adjacent the terminal portion (15).
- 10 3. Mounting means according to claim 1 or 2, characterised in that a second control lever (7) is rotationally mounted on the pivot shaft (12) via a sleeve (31).
- 15 4. Mounting means according to any of the preceding claims, characterised in that the end of the control lever (6) remote from the pivot shaft (12) extends through a gate (34) which limits rotational movement of this lever (6) over an arc in which the flats (17) are maintained misaligned with the slot (27).

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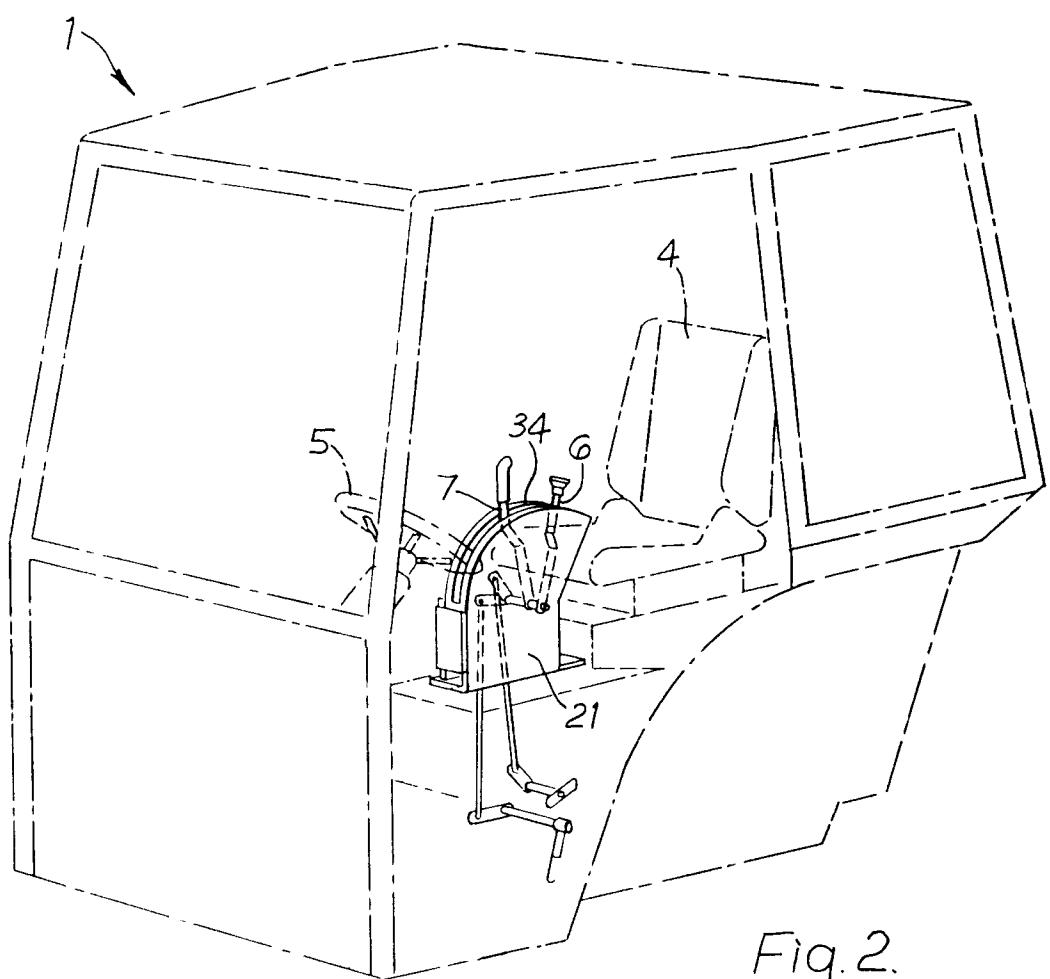
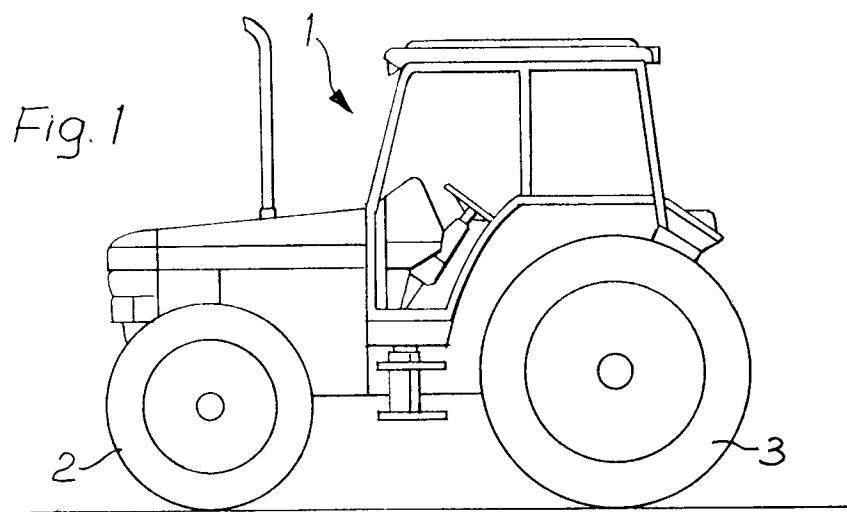
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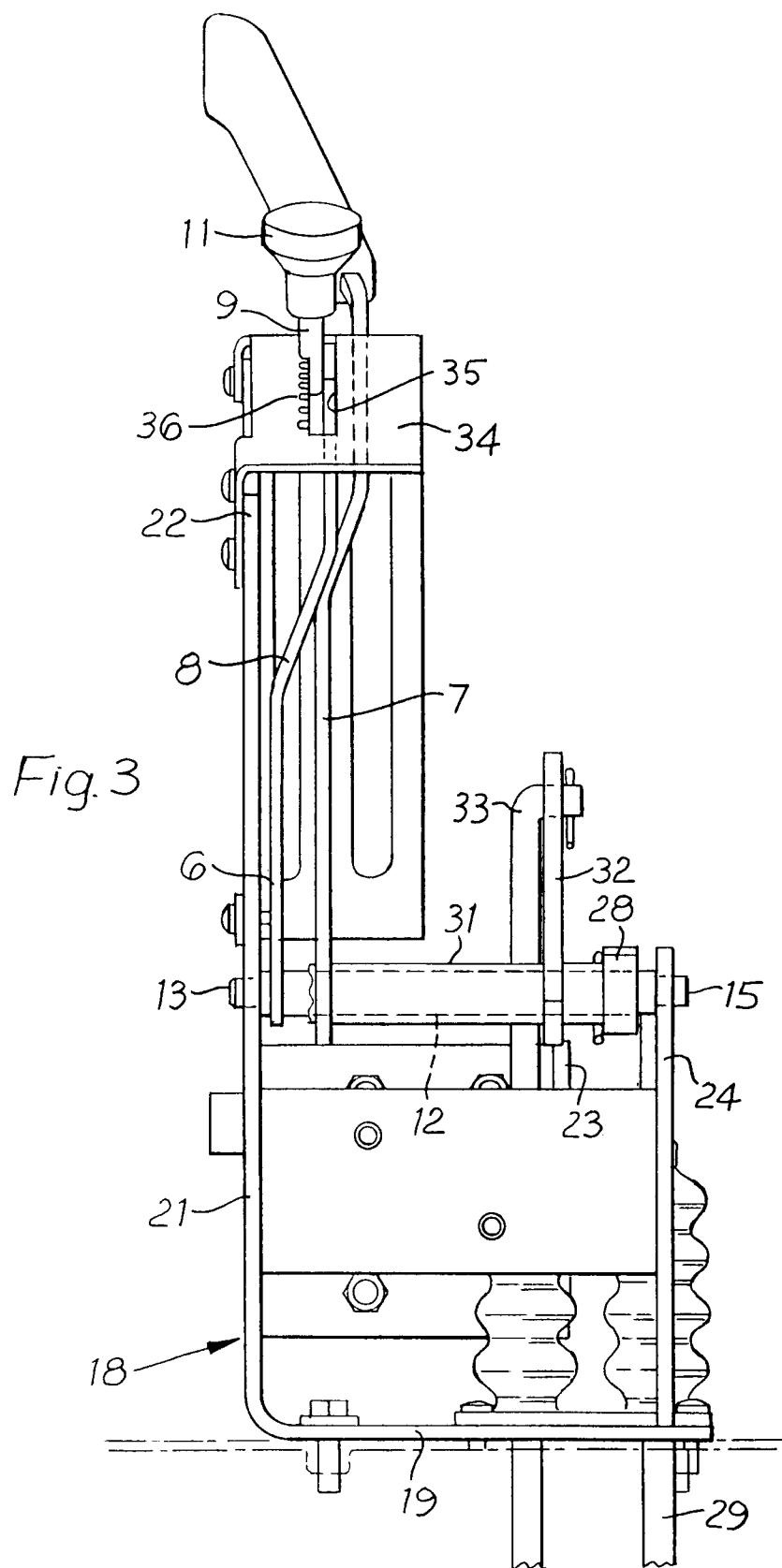
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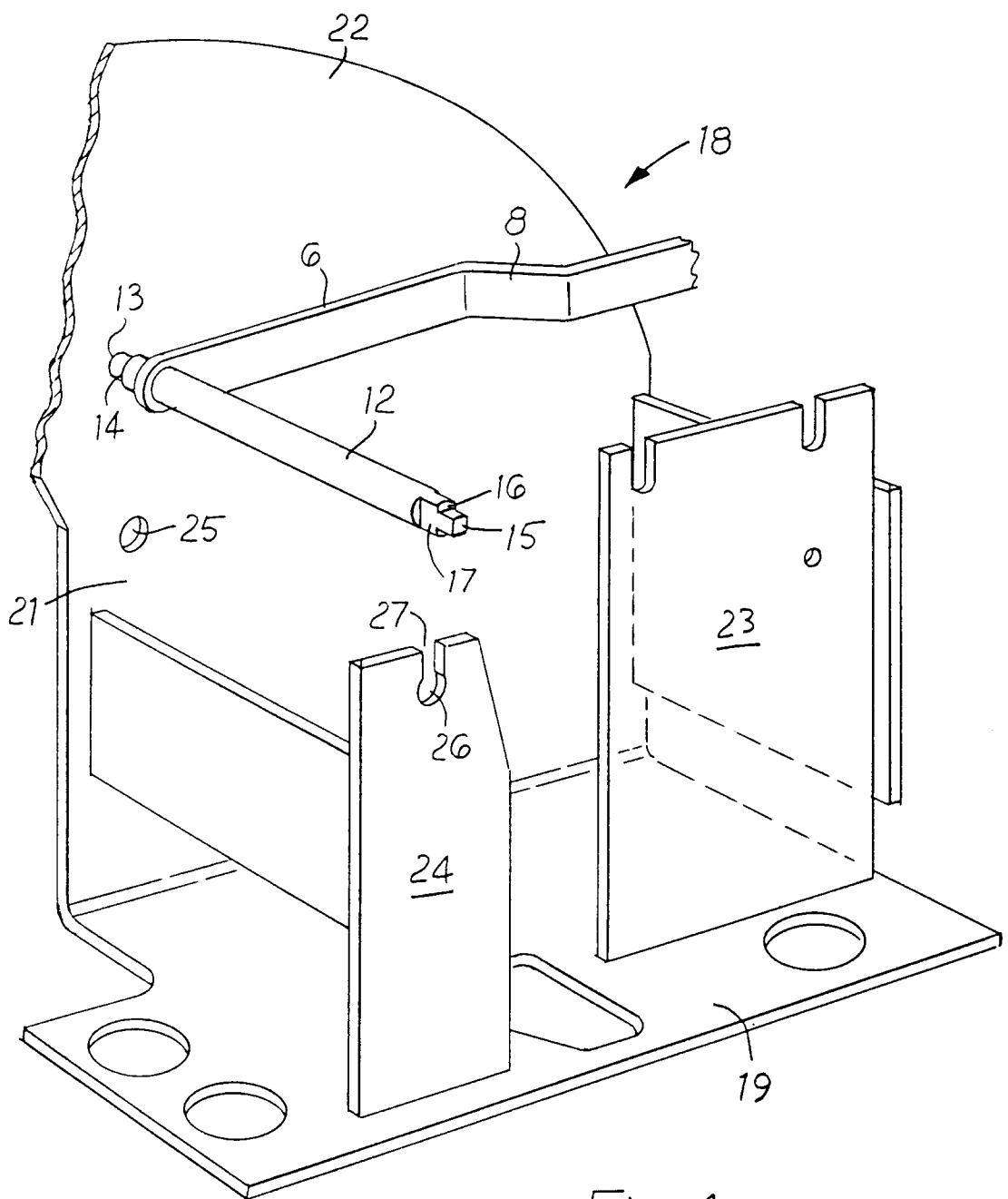


Fig. 4

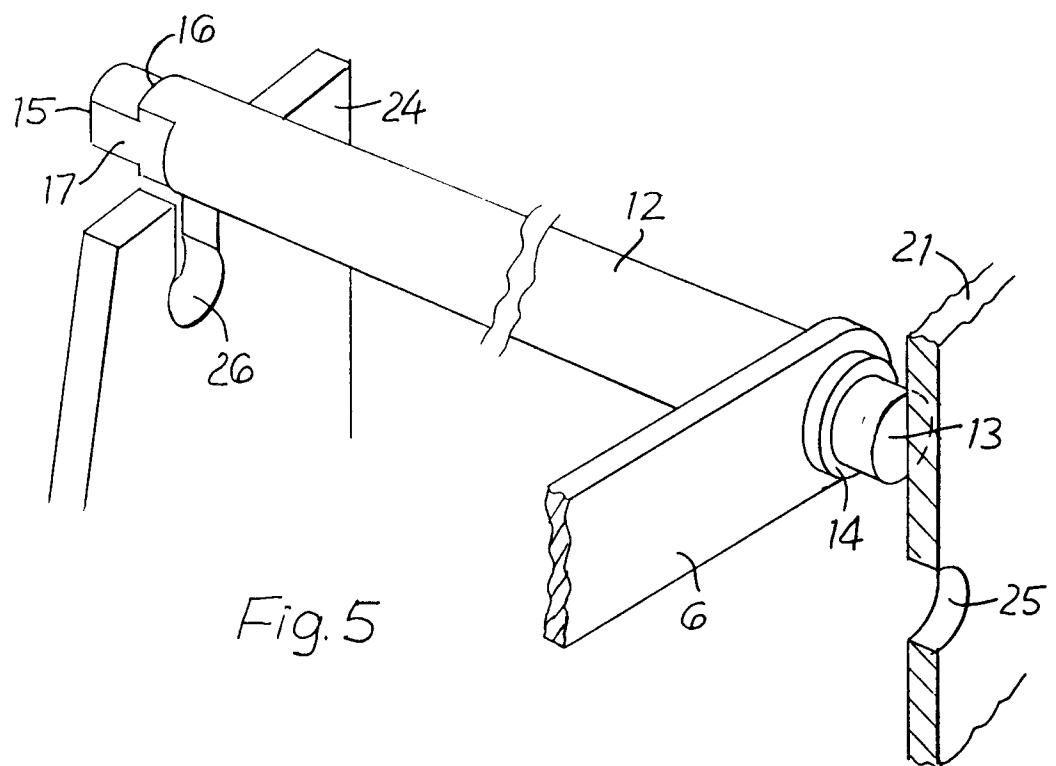


Fig. 5

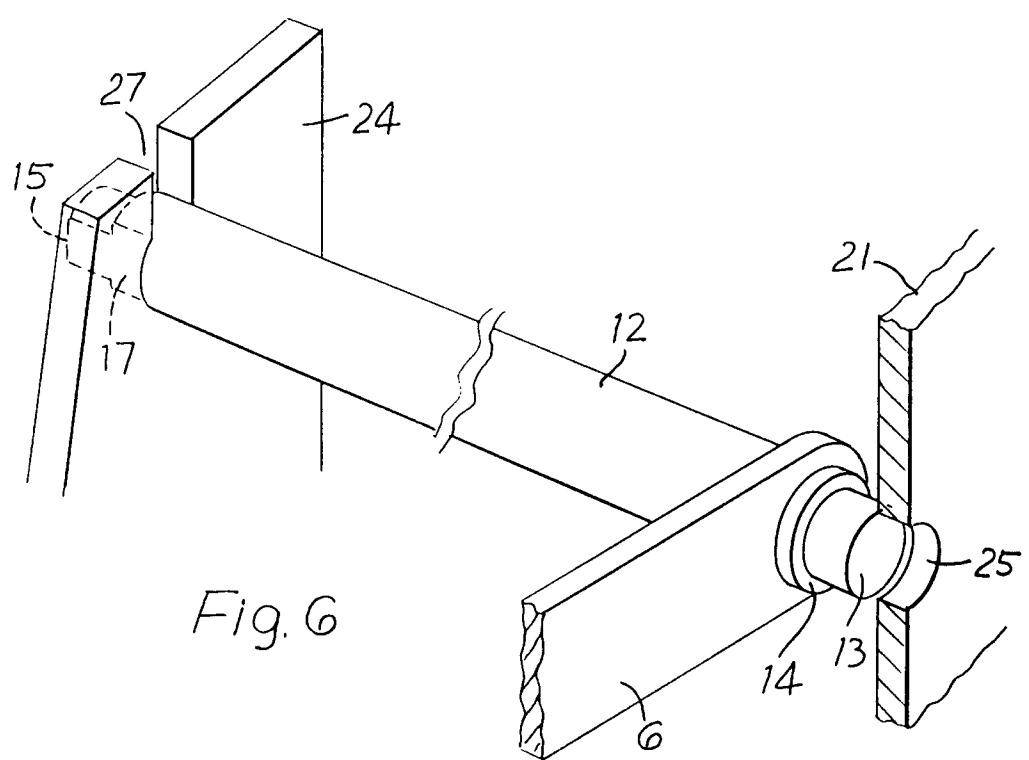


Fig. 6

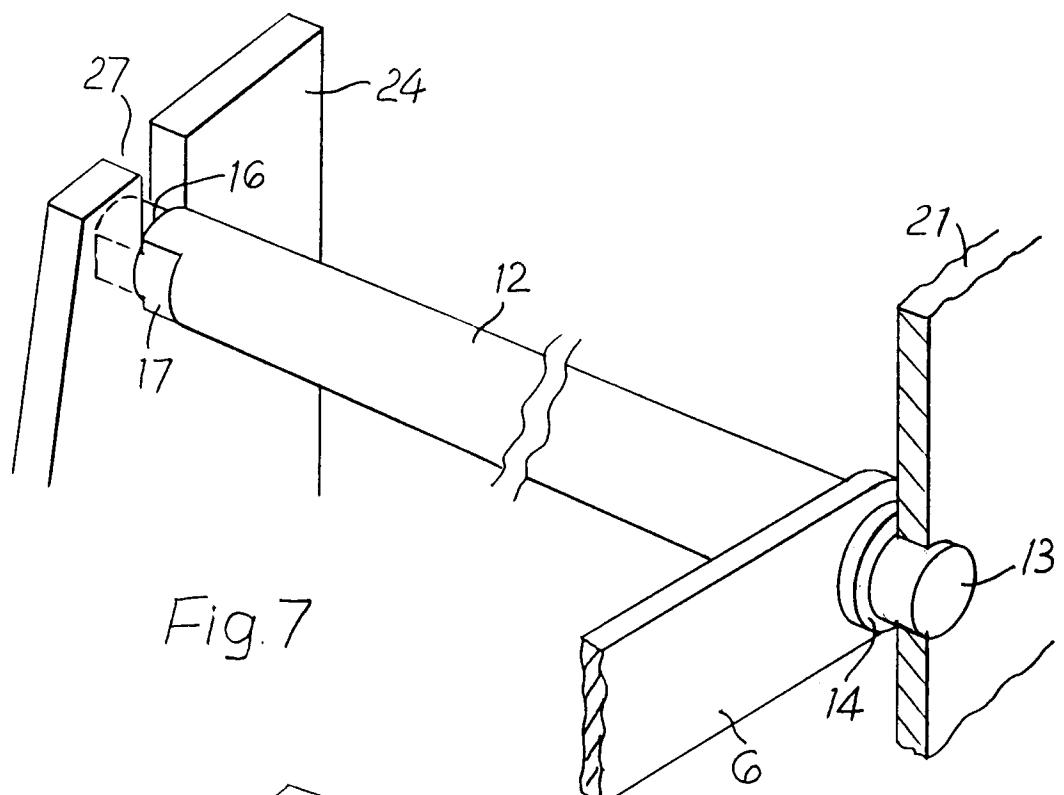


Fig. 7

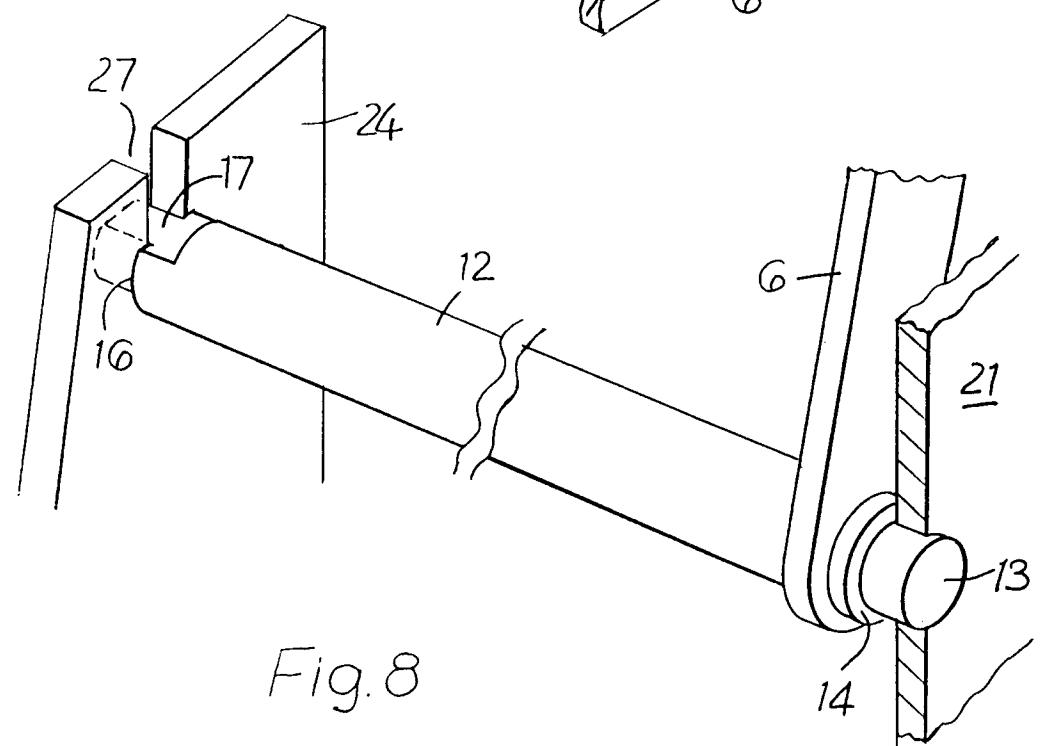


Fig. 8



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EUROPEAN SEARCH REPORT

Application Number

EP 91 20 1333

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	EP-A-0 143 054 (PEUGEOT-CITROEN) * the whole document * ---	1,3	G05G1/04 F16B9/02
A	DE-U-8 803 714 (GROSS) * page 4, line 1 - page 5, line 9; figures * ---	1,4	
A	US-A-4 428 696 (PRICE) * column 4, line 22 - line 36; figures 1-6 * ---	1	
A	DE-A-2 650 905 (DAIMLER-BENZ) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			G05G F16B F16C B62D B60K F16H
<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search	Examiner	
BERLIN	28 JANUARY 1992	KRIEGER P.	
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