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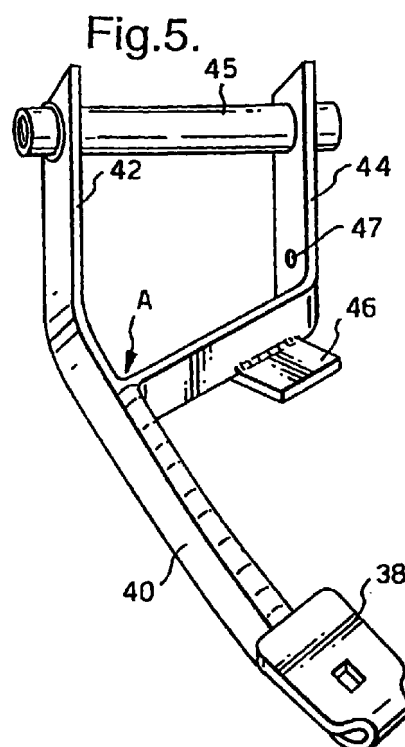
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(54) **Foot pedal**

(57) A foot pedal for operating a mechanism of a vehicle, comprising a first generally elongate member (40,42) having a foot plate (38) at one end and being adapted for pivotable mounting on the vehicle generally at its other end and a second generally elongate member (44) extending from the first member (40,42), the second member (44) being adapted generally at its distal end for pivotable mounting on the vehicle at a position spaced apart along a common axis from the pivotably mountable end of the first member.



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Description

[0001] This invention relates to a foot pedal for operating a mechanism of a vehicle comprising a first generally elongate member having a foot plate at one end and being adapted for pivotable mounting on the vehicle generally at its other end and a second generally elongate member extending from the first member, the second member being adapted generally at its distal end for pivotable mounting on the vehicle at a position spaced apart along a common axis from the pivotably mountable end of the first member. Typically, the vehicle mechanism is a clutch mechanism or braking system.

[0002] This type of foot pedal is known from US-A-5416295. This document describes a pedal bracket assembly for use in a drive-by-wire control arrangement. The bracket assembly is constructed using a plurality of washers, springs and also electrical transducers. The object is to simulate the feel of a Bowden cable connection with a mechanism to be controlled. This document also discloses a foot pedal for use with the pedal bracket assembly, and which has a pivotable foot plate.

[0003] According to the invention, the known pedal is characterised by the foot plate being formed integrally with the first member.

[0004] Furthermore, pedals of this type have traditionally been constructed using forging and welding techniques or have been pressed from sheet metal. Examples of the latter type are described in FR-A-2506971.

[0005] Increasingly, however, demands are being placed on the positioning of components surrounding the driver of a vehicle in order to improve the vehicle's safety, for example, during a crash. Consequently, new demands are being made on the construction of foot pedals.

[0006] According to a second aspect of the invention there is provided a method of manufacturing a foot pedal for controlling a mechanism of a vehicle, characterised by the steps of cutting a metallic sheet to form a generally planar bifurcated blank of predetermined outline having an elongate common part before the bifurcation and two elongate branch members beyond the bifurcation, folding the common part of the blank generally along its major axis to form a main member of generally U-shaped cross-section, folding at least one of the branch members so that the distal ends of the branch members are separated in a direction generally transverse the said major axis and adapting the said distal ends to be pivotably mounted on the vehicle.

[0007] Foot pedals embodying the invention will now be described by way of example with reference to the drawings in which:

Figure 1 is a side elevation of a prior art pedal;

Figure 2 is a front elevation of the pedal of Figure 1;

Figure 3 is a perspective view of another prior art pedal;

Figure 4 is a perspective view of another prior art pedal;

Figure 5 is a perspective view of a pedal embodying the invention;

Figure 6 is a perspective view of the pedal of Figure 5 without a pivot tube;

Figure 7 is a plan view of a flat blank ready to be pressed to form the pedal of Figure 6; and

Figure 8 is a diagrammatic perspective view of a pedal embodying the invention.

[0008] With reference to Figures 1 and 2, the prior art pedal has a foot plate 10 attached to a pressed metallic arm 12. The arm includes a cylindrical bearing 14 which permits the pedal to be pivotally mounted. On the diametrically opposite side of the bearing 14 from the foot plate 10, a hole 16 is provided which allows a cable such as a clutch cable to be attached to the pedal.

[0009] This type of pedal is formed by pressing from sheet metal. However, this type of pedal is expensive to manufacture since it must be constructed from thick material in order to avoid unacceptable deformation in use. Furthermore, as a result of the thickness of the material, this type of pedal is fragile and liable to fatigue failure.

[0010] The prior art pedal of Figure 3 comprises an elongate first member 20 which carries a foot plate 22 at one end. The first member 20 is pivotally mounted on a pivot tube 26.

[0011] A second member 24 is also pivotally mounted on the pivot tube 26 and the two members 20 and 24 are connected together in the region of their pivotal mounting. At the distal end of the second member 24, a hole 28 is formed. The hole 28 is arranged to be coupled, for example, to a clutch cable.

[0012] As will be seen from the Figure, both members extend generally in the same direction from the pivot tube 26 but since the second member 24 is shorter than the first member 20, the hole 28 is positioned generally radially between the foot plate 22 and the pivot tube 26. Thus the arrangement provides a mechanical advantage.

[0013] However, this pedal suffers from deformation in the region 29 when the pedal is used.

[0014] Figure 4 shows a modification of the arrangement of Figure 3 which is intended for use where higher forces are applied to the foot pedal 22. In this arrangement, the first member 20A is modified to be fixed directly to the pivot tube 26A. Similarly, the second member 24A is fixed directly to the pivot tube 26A.

[0015] The fixing positions of the members

20A, 24A are displaced along the pivot tube 26A and thus there is no need to crank the members 20A and 24A in the manner of Figure 3. This means that deformation in the cranked area of the members 20 and 24 is avoided when high forces are applied to the pedal.

[0016] However, the pivot tube 26A allows twisting to occur between the two members 20A and 24A. This is undesirable and the arrangement of Figure 4 is unsuitable particularly where small forces are applied to the pedal plate 22, since movement of the foot pedal 22 due to small forces will largely be absorbed by the elasticity of the pivot tube 26A.

[0017] With reference to Figure 5, one embodiment of the invention has a generally elongate member having a foot plate 38 at one end of a common portion 40. At the other end of the common portion 40 is a bifurcation A from which branches 42 and 44 extend.

[0018] The distal ends of the branches 42 and 44 are fixed to a pivot tube 45 which may be pivotally mounted on a vehicle.

[0019] A hole 47 is formed in the branch 44 for coupling to a mechanism such as a brake or clutch mechanism of a vehicle. The coupling typically will be achieved via a cable or a hydraulic system (not shown).

[0020] The arrangement of Figure 5 may conveniently be pressed out of a single sheet of metal. The common portion of the pedal 40 may conveniently have a U-shaped or generally U-shaped section as shown in Figure 5A. The two branches 42 and 44 which are formed by the division in the region A may be formed of a single thickness of the material used to form the common portion 40. The section of these branches may be flat or curved as shown in Figure 5B.

[0021] The cranked portion of the branch 44 may also incorporate a flap 46 which may be used to operate a switch such as a brake light switch.

[0022] The space delimited by the branches 42 and 44 and the pivot tube 45 conveniently allows the passage of another vehicle control such as a steering column. However, this space is provided without compromising the rigidity and therefore functionality, of the pedal.

[0023] Figure 6 shows an alternative embodiment of Figure 5 in which the pivot tube 45 is omitted.

[0024] One of the advantages of the construction of Figure 6 over that of Figure 5 is that of easier mounting on the vehicle. Since the divided arms 42 and 44 are open at the top, it is easier to fit the pedal to the vehicle with, for example, a steering column passing between the arms. The pivot holes 50 and 52 formed at the ends of the arms 42 and 44 may be kept axially aligned by means of their mounting to the vehicle.

[0025] The pedal of Figure 6 is typically mounted to a vehicle using two half-axes (not shown) of a similar form to the pivot tube 45 but divided into two pieces generally midway between the pivot holes 50 and 52. This arrangement allows, for example, a steering column to pass upwards out of the space between the branches

42 and 44 during a crash.

[0026] Figure 7 shows the pedal of Figure 5 or Figure 6 as a flat blank prior to being pressed into shape. The reference numerals used in Figure 7 are those used for the corresponding component shown in Figure 6. To form the generally U-shaped channel of the common portion 40, the blank is folded generally along the line 48. The foot plate 22 is also formed by folding and thus is also an integral part of the blank.

[0027] Figure 8 shows an alternative form of the pedal of Figure 6.

[0028] The sectional shape of various portions of the pedal are shown by section lines 60. It will be appreciated that the sectional shape of the pedal will vary according to application. This pedal also may be formed by pressing from sheet metal. This construction has the advantage of added rigidity over that shown in Figure 6. This may be enhanced by the inclusion of so called "bananas" which are grooves running generally along the top surface 62 of the pedal, and so called "bulldozers" which are grooves running generally horizontally around the corners of the pedal (for example around corner 64). The folded over sides forming the vertical walls leading up to the top face 62 also greatly enhance the rigidity and strength of the pedal. This allows the pivot tube 45 to be omitted with the consequent advantages described above in connection with the pedal of Figure 6. The inherent rigidity of the construction also allows the thickness of the material from which the pedal is constructed to be reduced. This reduces the cost of the pedal.

Claims

1. A foot pedal for operating a mechanism of a vehicle, comprising a first generally elongate member having a foot plate at one end and being adapted for pivotable mounting on the vehicle generally at its other end and a second generally elongate member extending from the first member, the second member being adapted generally at its distal end for pivotable mounting on the vehicle at a position spaced apart along a common axis from the pivotably mountable end of the first member characterised by the foot plate being formed integrally with the first member.
2. A foot pedal according to claim 1, wherein the second member is adapted for coupling to the mechanism to be operated.
3. A foot pedal according to any preceding claim, wherein the first member is arranged such that the plane of rotation of the foot plate about the common axis passes generally through the pivotal mounting of the first member.
4. A foot pedal according to any preceding claim,

wherein the two members are mechanically coupled by a third member which is generally coaxial with the common axis.

5. A foot pedal according to claim 5, wherein the third member is generally tubular. 5

6. A foot pedal according to any preceding claim, wherein at least part of one of the members has a generally U-shaped cross-section. 10

7. A foot pedal according to any preceding claim, wherein at least part of one of the members has a generally non-planar cross-section. 15

8. A foot pedal according to any preceding claim, constructed from cut and folded sheet-metal.

9. A method of manufacturing a foot pedal for controlling a mechanism of a vehicle, characterised by the steps of cutting a metallic sheet to form a generally planar bifurcated blank of predetermined outline having an elongate common part before the bifurcation and two elongate branch members beyond the bifurcation, folding the common part of the blank generally along its major axis to form a main member of generally U-shaped cross-section, folding at least one of the branch members so that the distal ends of the branch members are separated in a direction generally transverse the said major axis and adapting the said distal ends to be pivotably mounted on the vehicle. 20 25 30

10. A method according to claim 9 further comprising the step of folding the main member at its end furthest from the bifurcation along a line generally transverse the major axis to form a foot plate for pressing by a driver of the vehicle. 35

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Fig.1.

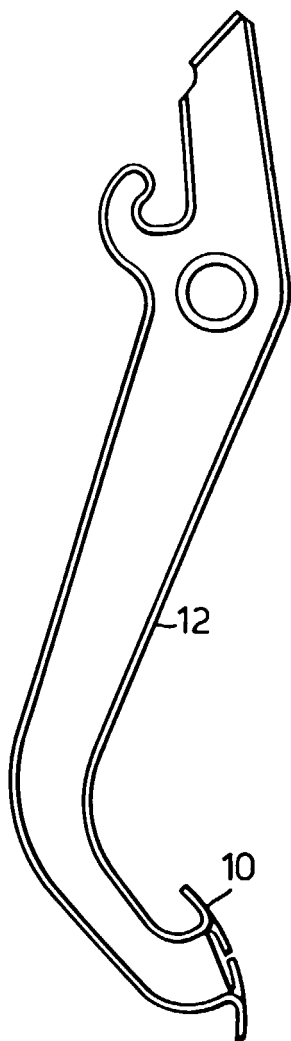
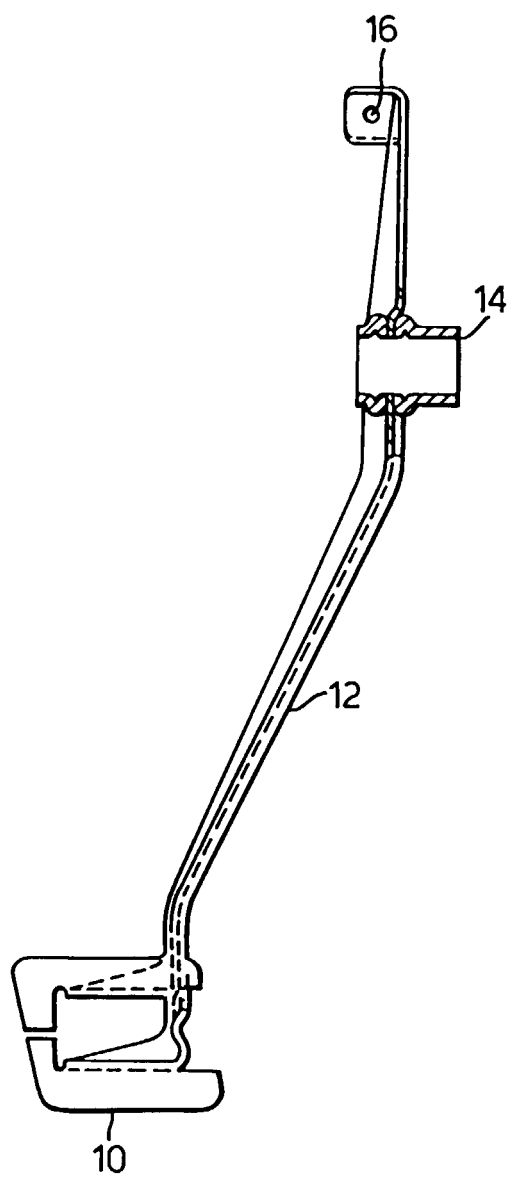
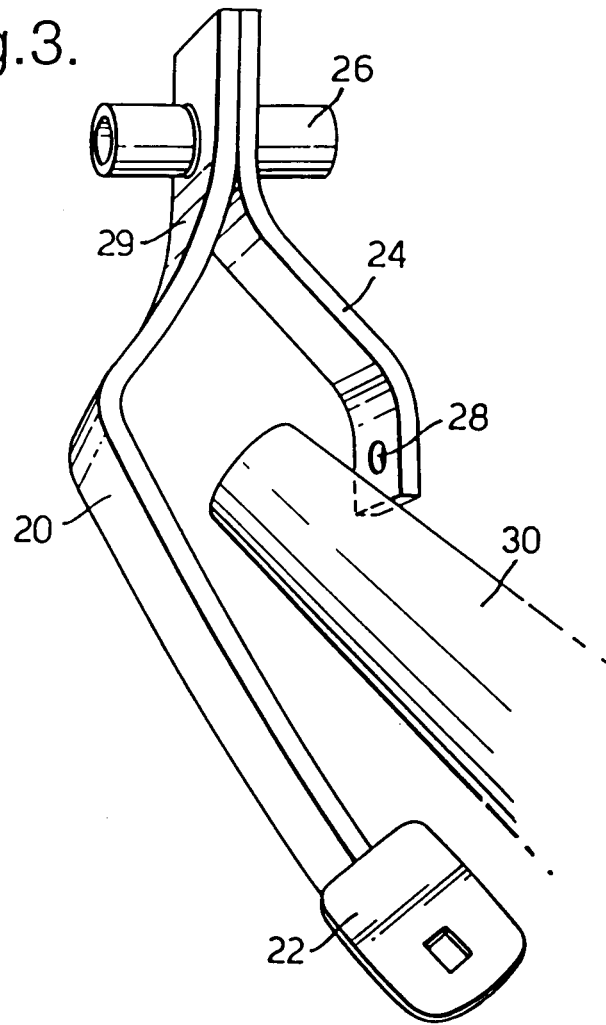


Fig.2.



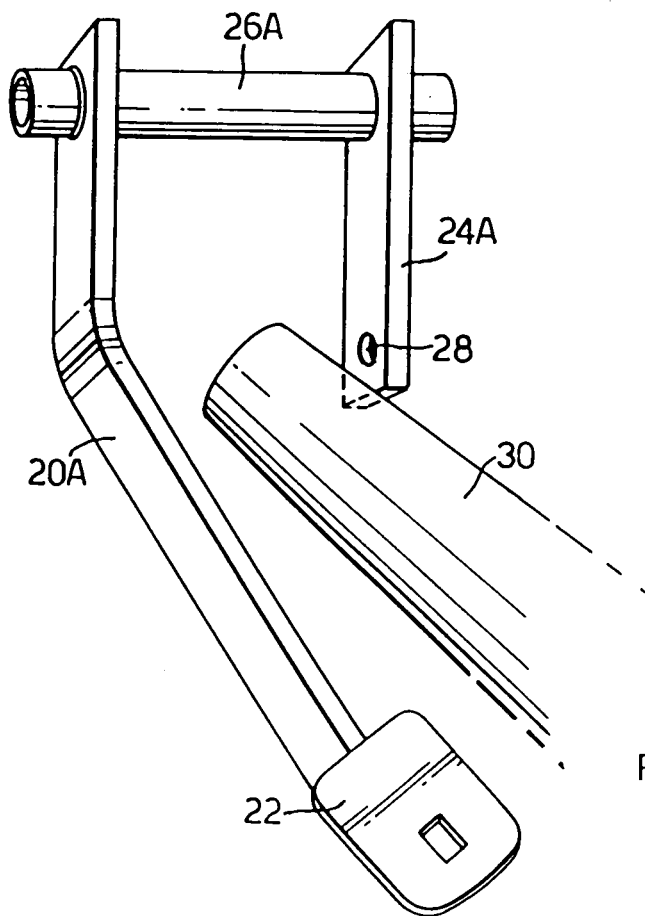
PRIOR ART

Fig.3.



PRIOR ART

Fig.4.



PRIOR ART

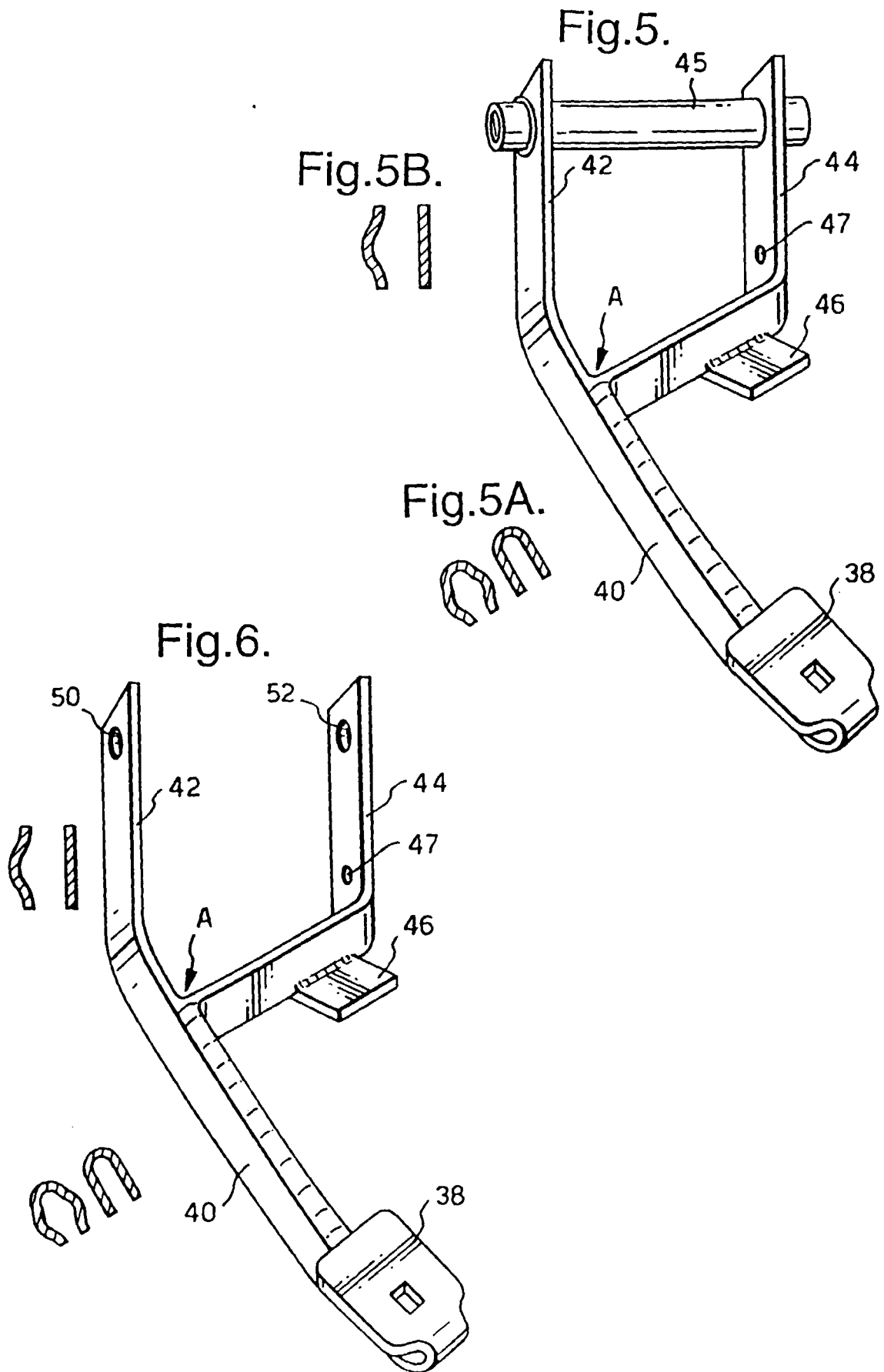


Fig.7.

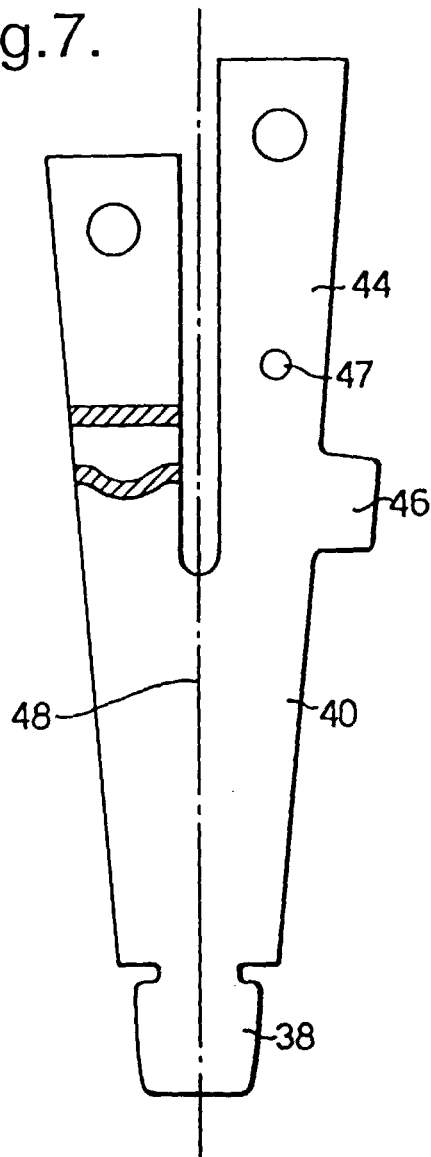


Fig.8.

