

(19)



(11)

EP 2 048 568 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
15.04.2009 Bulletin 2009/16

(51) Int Cl.:
G05G 1/10^(2006.01)

(21) Application number: **07380193.8**

(22) Date of filing: **29.06.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(72) Inventors:
• **Martins, Gil**
77400 Lagny sur Marne (Paris) (FR)
• **Darmon, Francois**
94500 Chevilly-Larue (Paris) (FR)

(71) Applicants:
• **Autotech Engineering, A.I.E.**
48220 Abadiño (Vizcaya) (ES)
• **Gestamp Vigo, S.A.**
36400 Porriño (Pontevedra) (ES)

(74) Representative: **Carpintero Lopez, Francisco et al**
Herrero & Asociados, S.L.
Alcalá 35
28014 Madrid (ES)

(54) **Pedal mechanism for automotive vehicles and automotive vehicle comprising said mechanism**

(57) The invention relates to a pedal mechanism for automotive vehicles and an automotive vehicle comprising said mechanism, which allows simplifying the elements of said mechanism and reducing the manufacturing costs thereof, comprising a transmission rod (1) configured to rotate with respect to a central axis (14), which is fixed at a first end (2) to a leg (6) of a pedal (7) and at a second end (3) to a push rod (8), said pedal (7) being located between a bearing (4) and a supplementary bearing (4') which bear said pedal (7), where the first end (2) of the transmission rod (1) is borne by a central cross member (9) which is configured to bear and fix the bearing (4) and the supplementary bearing (4') to a board of the pedals, said central cross member (9) being located between said bearings (4, 4').

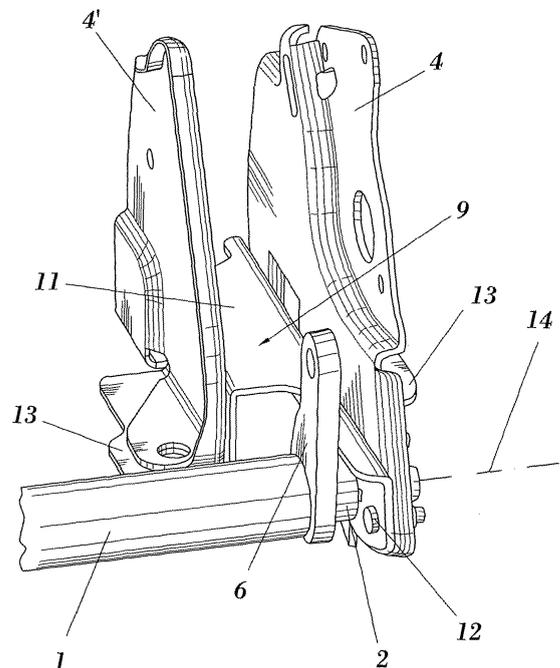


FIG. 5

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Description

OBJECT OF THE INVENTION

[0001] A first aspect of the present invention relates to a pedal mechanism for automotive vehicles and a second aspect relates to an automotive vehicle comprising said mechanism, with an application in the mechanical industry, and preferably within the automotive field.

[0002] The invention allows simplifying, and therefore reducing manufacturing costs, the means necessary for securing transmission or transfer rods that pedal mechanisms comprise, and more specifically in pedal mechanisms of right-hand drive vehicles in which a transfer is carried out by means of the transmission rod between one point in which the force is exerted by means of a pedal, for example a brake pedal, and a point in which a push rod is fixed, for example, for servo brake means.

BACKGROUND OF THE INVENTION

[0003] Automotive vehicles existing today comprise pedal mechanisms which are located in the vehicle interior, usually in the driver's position, said pedals being configured to be actuated by the driver's feet.

[0004] One of the pedals in an automotive vehicle is a brake pedal which, by means of the actuation thereof, is configured to actuate the brake cylinder comprising a hydraulic system housed in a compartment of the engine of the vehicle.

[0005] Another one of the pedals in a manual transmission automotive vehicle today is a clutch pedal, the actuation of which is similar to the actuation of the brake pedal, i.e. when the clutch pedal is actuated by the driver, it is configured to actuate a clutch cylinder also housed in the compartment of the engine.

[0006] The transmission of movement between each of said pedals and the corresponding brake or clutch cylinder is carried out by means of mechanisms comprising a transmission rod acting on the corresponding cylinder, transmitting thereto the movement received from the pedals when the driver acts thereon.

[0007] Today there is a type of automotive vehicles which are intended for driving lessons commonly referred to as driving school vehicles, in which the passenger seat located next to the driver's position is used by a teacher, so said passenger's position has the same pedals as the driver's position does, which is intended for a student, so that the teacher can correct the student while driving.

[0008] Another type of vehicles in which the pedals are located on the right side are the so-called right-hand drive (RHD) vehicles, in which, in contrast with the most common case in which the driver's position is on the left side of the vehicle, the driver's position is on the right side of the vehicle, said right-hand drive vehicles being particularly designed for driving on the left side of the road, as occurs today in the United Kingdom for example.

[0009] The problem with the two types of vehicles de-

scribed above is that in said pedal transmission mechanisms the transmission rod is located on the left side of the corresponding pedal, for example the brake pedal. This problem also occurs in those vehicles in which, as a result of the location of a steering system column of the vehicle, there is not enough room.

[0010] Pedal transmission mechanisms of this type of vehicles today comprise a link rod or push rod, which is a movement transfer element, which is fixed to the transmission rod, also referred to as the transfer or torsion rod, for the purpose of transmitting the actuation movement carried out by the driver when acting on the pedal, to the hydraulic system of the servo brake located in the area of the engine of the vehicle.

[0011] Figure 1 shows an exploded perspective view of a right-hand drive pedal mechanism existing today; Figure 3 shows a detail in perspective view of the area corresponding to the pedal in said mechanism, where the arrangement which allows a transfer of the movement of the pedal by means of the transmission rod between one point located on the right side on which the force is exerted, referred to as the leg, and one point located on the left side, engaging with the push rod, for example, of the servo brake, can be seen.

[0012] This transmission system involves the transmission rod being subjected to high torques, whereby requiring a very rigid support on the driver's side in the case of right-hand drive vehicles, or the teacher's side in the case of driving school vehicles.

[0013] As can be seen in Figures 1 and 3, the brake pedal is secured and borne by two bearings which, in turn, are anchored to the floor or board of the vehicle by means of a baseplate (A) which is the element providing rigidity to the mechanism in right-hand pedal mechanisms today.

[0014] For the purpose of having said rigidity, the baseplate (A), which can be seen in Figure 2 in two perspective views, comprises marked and complex drawings. Said baseplate (A) is fixed or bound on the board of the vehicle, it is necessary to weld a support plate (B) on such board, said support plate consisting of a very thick part on which the transmission rod is supported, specifically by means of housing it in a support hole (B'). Given the demands that the transmission rod is subjected to, in an area located in the vertical of the support hole (B') the baseplate (A) has to have a specific securing or binding area (D) on the board, for the purpose of transmitting to said board part of the stress it is subjected to, between which the fixing of the pedal is located, which is transmitted by its support bearings of the brake pedal, which are spot welded (6) on the baseplate (A), according to planes that are horizontal or parallel to the board.

[0015] A drawback of the aforementioned pedal mechanisms existing today is that given the design of the baseplate (A), complex drawing processes are required to manufacture them, making them very expensive since one part is obtained from working with a large amount of material.

[0016] This difficulty prevents using materials in many cases which have a high elastic limit, and the tremendous structural requirements or demands that the parts are subjected to force adding a reinforcing bearing (C) in the support plate (B), commonly by means of welding.

[0017] Therefore, the main drawback of this type of mechanisms is that the manufacture of the baseplate (A) is extremely complicated, resulting in high production costs. Furthermore, the connection between said baseplate (A) and the bearings of the brake pedal can be carried out by means of spot welding located in horizontal planes, i.e. essentially parallel to the board of the vehicle, whereby they are not strong enough, especially considering the shear stress the connection of said elements is subjected to.

DESCRIPTION OF THE INVENTION

[0018] A first aspect of the present invention relates to a pedal mechanism for automotive vehicles, which allows simplifying and reducing the costs of manufacturing the bearing and securing means for movement transmission rods in right-hand drive pedal mechanisms, i.e. in British-type mechanisms.

[0019] The structure of the invention allows effectively securing bearings of a brake pedal and the actual transmission rod transmitting the movement of said brake pedal to a servo brake

[0020] The pedal mechanism object of the invention comprises a transmission rod, also referred to as a transfer rod or torsion rod, which is configured to rotate with respect to a central axis of said transmission rod, any other degree of freedom being restricted.

[0021] Said transmission rod is fixed at a first end, located on the right side of the vehicle, to a leg, or point where the force is exerted, of a pedal, such as a brake pedal or a clutch pedal.

[0022] In addition, at a second end, located on the left side of the vehicle, the transmission rod is fixed to a push rod, i.e. a link rod or transfer element, configured to carry out a pivoting movement with respect to the central axis when the pedal is actuated.

[0023] The direction of the push rod is selected in an operatively suitable manner according to the direction in which the movement of the pedal must be transmitted, said push rod, for example, possible being oriented parallel to the pedal, in the event that a transfer movement is required.

[0024] The pedal is borne or supported by a bearing and a supplementary bearing that it is located between.

[0025] According to the invention, the first end of the transmission rod is borne by a central cross member which is configured to bear and fix the bearing and the supplementary bearing of the pedal to a board of the pedals or of the automotive vehicle. Said cross member is also configured to transmit to the board of the vehicle the normal stress received from the bearing and from the supplementary bearing, said central cross member being

located between said bearings, which it is obviously fixed to.

[0026] In addition, the second end of the transmission rod is borne by a second support bearing, the push rod acting on the servo brake of the engine, or clutch, as the case may be, being fixed thereto.

[0027] In comparison with the baseplate (A) of the mechanisms of the state of the art described above, the pedal mechanism proposed by the invention allows substantially reducing the price of said baseplate (A) and of the support plate (B), by means of integrating or unifying it in a single part, i.e. the central cross member, carrying out the functions of the other two parts, i.e. bearing a first end of the transmission rod and fixing the entire pedal mechanism to the board of the vehicle, transmitting to such board all the normal stress it receives.

[0028] In addition, the central cross member forming process is very simple and allows using materials with high elastic limit values, as well as very thick parts, because it does not require complex drawings as in the case of the baseplate of the mechanisms of the state of the art. Furthermore, the use of these materials allows dispensing with the specific securing or binding area (D) for the securing or binding to the board for the transfer rod, obtaining the same rigidity at a lower cost.

[0029] The central cross member is preferably U-shaped, having a central section which, when in the assembly position, has a horizontal orientation perpendicular to the bearings of the pedal, said central cross member have two vertical walls, one of said vertical walls having a hole configured to house the first end of the transmission rod.

[0030] Likewise, according to a preferred embodiment of the mechanism of the invention, the central cross member has two side flanges extending from the ends of the vertical walls according to planes parallel to the central section, said side flanges being configured to bear and fix the bearing and the supplementary bearing of the pedal to the board of the pedals, transmitting to such board all the normal stress it receives.

[0031] The possibility that the bearing and the supplementary bearing of the pedal are fixed to the central cross member in the vertical walls, preferably by means of spot welding or by means of any type of riveting, is contemplated.

[0032] Therefore, with this fixing, the weld spots between the bearings of the pedal and the central cross member are in a vertical plane of the vehicle, i.e. working under shear stress, which improves the rigidity of the mechanism.

[0033] In addition, a second aspect of the present invention relates to an automotive vehicle comprising a pedal mechanism according to those described above in which the pedal is preferably a brake pedal, whereas the push rod is configured to transmit its pivoting movement with respect to the central axis to the engine of the vehicle.

[0034] Therefore, according to the described invention, the pedal mechanism for automotive vehicles and

the automotive vehicle comprising said mechanism proposed by the invention is an advance in the mechanisms used until now and solves in a fully satisfactory manner the drawbacks set forth above along the lines of reducing manufacturing costs by replacing the baseplate with a less complex drawing part that can be folded into a U shape or profiled, whereby obtaining optimized cost of the assembly of the pedals as it requires one part less by unifying the functions of the baseplate and the support plate of the transmission rod. It further requires a smaller number of weld spots, likewise reducing the assembly time, for example from 6 to 2 weld spots, which, since they are logistic and not safety weld spots, can be replaced by any less expensive, equivalent fixing means, obtaining an optimized cost of the vehicle due to the fact that by eliminating the specific binding to the board, a screw, a nut and the assembly time are saved.

[0035] From the technical point of view, the rigidity and the longitudinal strength of the mechanism are improved, since the central cross member is a very easy part to obtain which allows using very thick materials with a high elastic limit. Furthermore, the rigidity and the lateral strength are also improved given that the connection of the central cross member with the bearings of the pedal is carried out closer to the torsion axis of said bearings, likewise obtaining a weight reduction as a result of the foregoing, the thickness of elements can be reduced in order to obtain such elements with equivalent rigidity and strength.

[0036] The mechanism of the invention can further be adapted to the second support bearing located on the left side of the transmission rod.

DESCRIPTION OF THE DRAWINGS

[0037] To complement the description being made and for the purpose of aiding to better understand the features of the invention according to a preferred practical embodiment thereof, a set of drawings is attached as an integral part of said description, showing the following with an illustrative and non-limiting character:

Figure 1 shows an exploded perspective view of a pedal mechanism of the state of the art.

Figure 2 shows two perspective views of the baseplate and the support plate of the pedal mechanism shown in the previous figure.

Figure 3 shows a perspective view of a detail of the area corresponding to the pedal in the pedal mechanism of the state of the art shown in the previous figures.

Figure 4 shows an upper perspective view of the central cross member of the pedal mechanism proposed by the invention.

Figure 5 shows a perspective view of a detail of the area corresponding to the pedal in the mechanism of the invention, showing the location of the central cross member shown in the previous figure.

PREFERRED EMBODIMENT OF THE INVENTION

[0038] In view of the discussed figures, it can be seen how in one of the possible embodiments of the first aspect of the invention, the pedal mechanism for automotive vehicles comprises a transmission rod (1), configured to rotate with respect to a central axis (14) of said transmission rod (1), which is fixed at a first end (2) to a leg (6) of a pedal (7) and at a second end (3) to a push rod (8), as shown in Figure 1.

[0039] The pedal (7) is located between a bearing (4) and a supplementary bearing (4') bearing said pedal (7).

[0040] According to the invention, the first end (2) of the transmission rod (1) is borne by a central cross member (9) which is configured to bear and fix the bearing (4) and the supplementary bearing (4') to a board of the pedals, not shown, said central cross member (9) being located between said bearings (4, 4').

[0041] As can be seen in Figure 4, the central cross member (9) is U-shaped, having a central section (11) which, when in the assembly position, shown in Figure 5, is horizontal and perpendicular to the bearings (4, 4') of the pedal (7), said central cross member (9) having two vertical walls (12), one of said vertical walls (12) having a hole (10) configured to house the first end (2) of the transmission rod (1). As shown in Figure 5, the bearing (4) and the supplementary bearing (4') of the pedal (7) are fixed by means of spot welding to the central cross member (9) in the vertical walls (12).

[0042] In addition, the central cross member (9) has two side flanges (13) extending from the ends of the vertical walls (12) according to planes parallel to the central section (11), said side flanges (13) being configured to bear and fix the bearing (4) and the supplementary bearing (4') of the pedal (7) to the board of the pedals.

[0043] A second aspect of the invention relates to an automotive vehicle comprising a pedal mechanism such as the one described above.

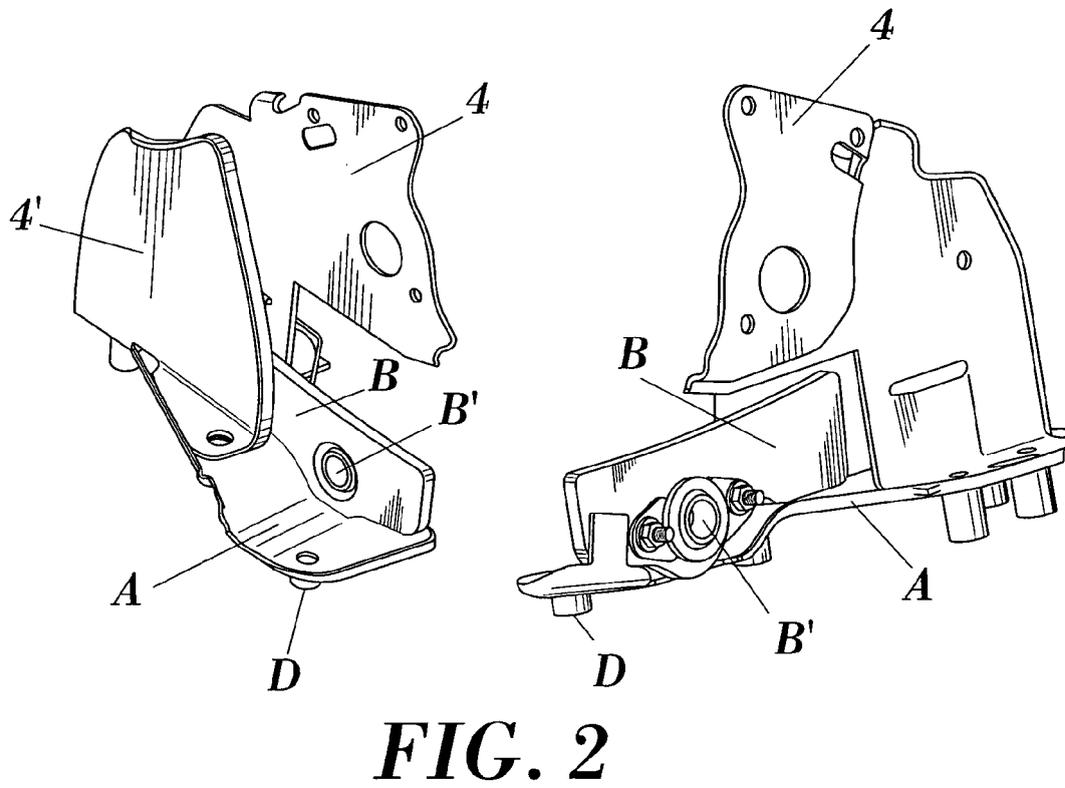
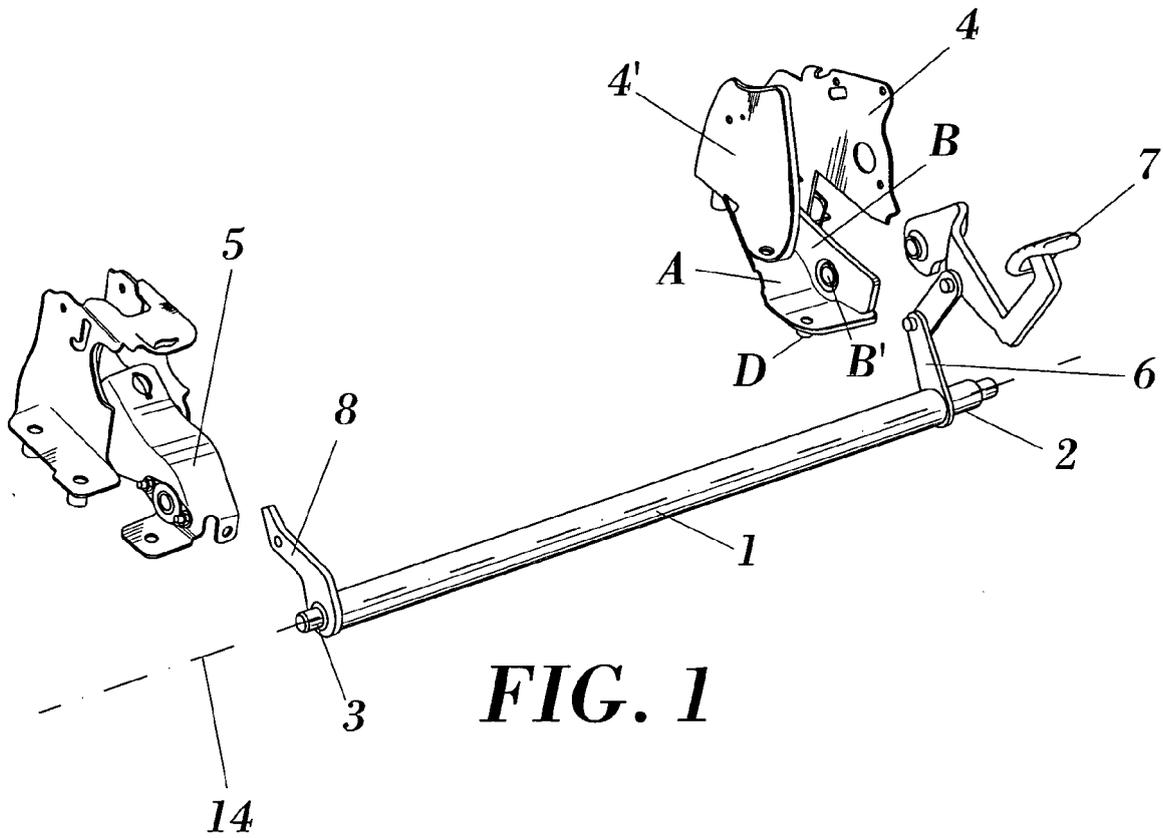
[0044] In view of this description and set of drawings, a person skilled in the art will understand that the embodiments of the invention that have been described can be combined in many ways within the object of the invention. The invention has been described according to several preferred embodiments thereof, but it will be evident for a person skilled in the art that many variations can be introduced in said preferred embodiments without exceeding the scope of the claimed invention.

Claims

1. A pedal mechanism for automotive vehicles comprising a transmission rod (1), configured to rotate

with respect to a central axis (14) of said transmission rod (1), which is fixed at a first end (2) to a leg (6) of a pedal (7) and at a second end (3) to a push rod (8), said pedal (7) being located between a bearing (4) and a supplementary bearing (4') which bear said pedal (7), **characterized in that** the first end (2) of the transmission rod (1) is borne by a central cross member (9) which is configured to bear and fix the bearing (4) and the supplementary bearing (4') to a board of the pedals, said central cross member (9) being located between said bearings (4, 4').

2. A mechanism according to claim 1, wherein the central cross member (9) is U-shaped, having a central section (11) which, when in the assembly position, is horizontal and perpendicular to the bearings (4, 4') of the pedal (7), said central cross member (9) having two vertical walls (12), one of said vertical walls (12) having a hole (10) configured to house the first end (2) of the transmission rod (1).
3. A mechanism according to claim 2, wherein the central cross member (9) has two side flanges (13) extending from the ends of the vertical walls (12) according to planes parallel to the central section (11), said side flanges (13) being configured to bear and fix the bearing (4) and the supplementary bearing (4') of the pedal (7) to the board of the pedals.
4. A mechanism according to any of claims 2 and 3, wherein the bearing (4) and the supplementary bearing (4') of the pedal (7) are fixed to the central cross member (9) in the vertical walls (12).
5. A mechanism according to claim 4, wherein the fixing of the bearing (4) and of the supplementary bearing (4') of the pedal (7) with the vertical walls (12) of the central cross member (9) comprises spot welding.
6. A mechanism according to claim 4, wherein the fixing of the bearing (4) and of the supplementary bearing (4') of the pedal (7) with the vertical walls (12) of the central cross member (9) comprises any type of riveting.
7. An automotive vehicle **characterized in that** it comprises a pedal mechanism according to any of claims 1 to 5.



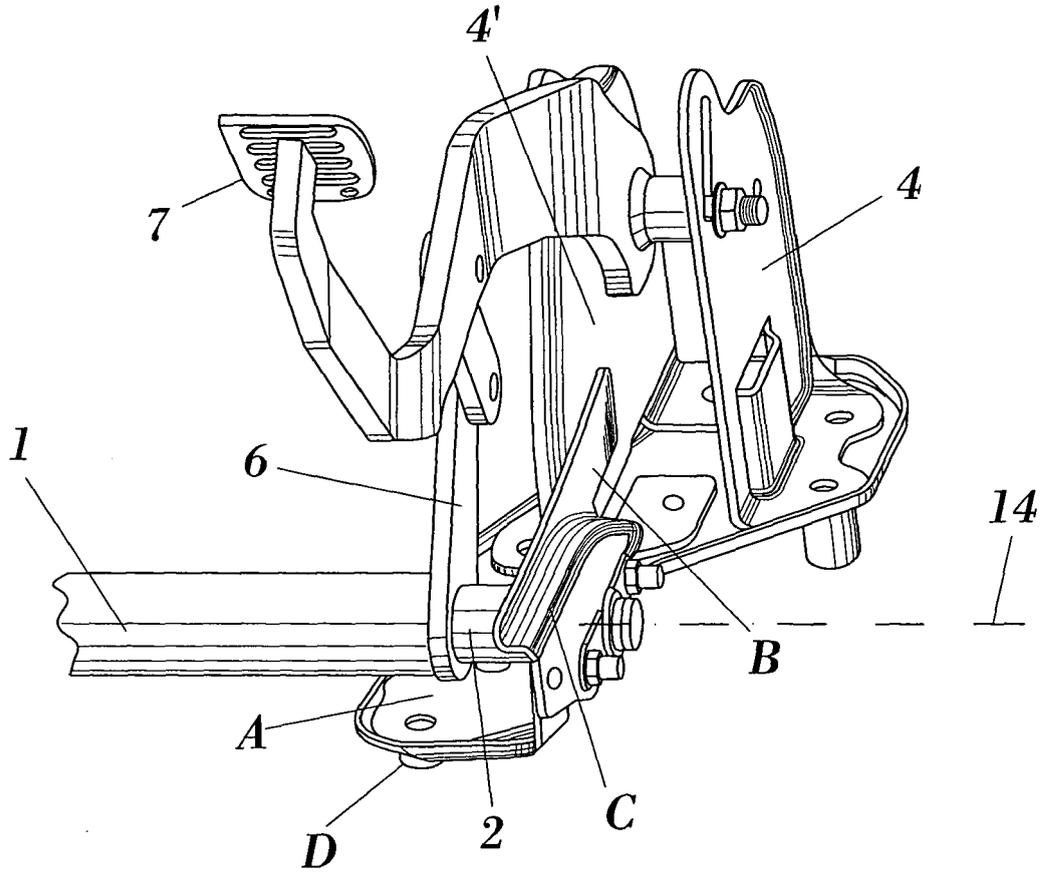


FIG. 3

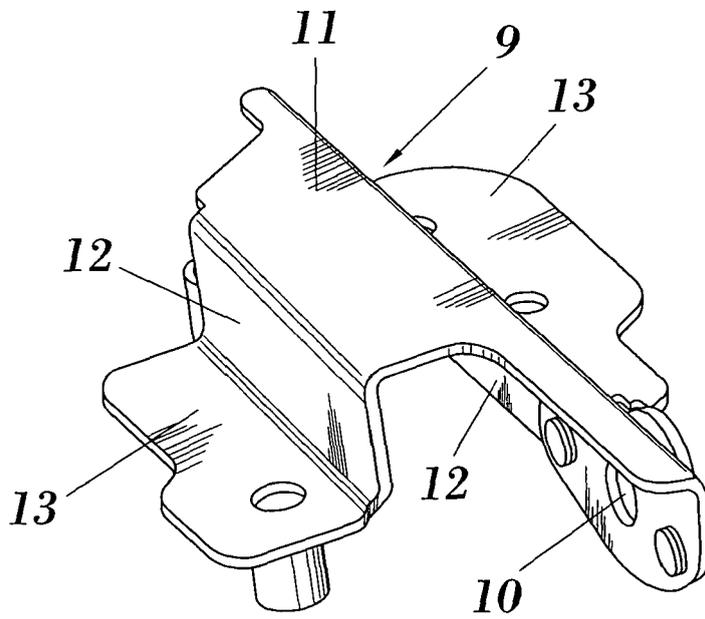


FIG. 4

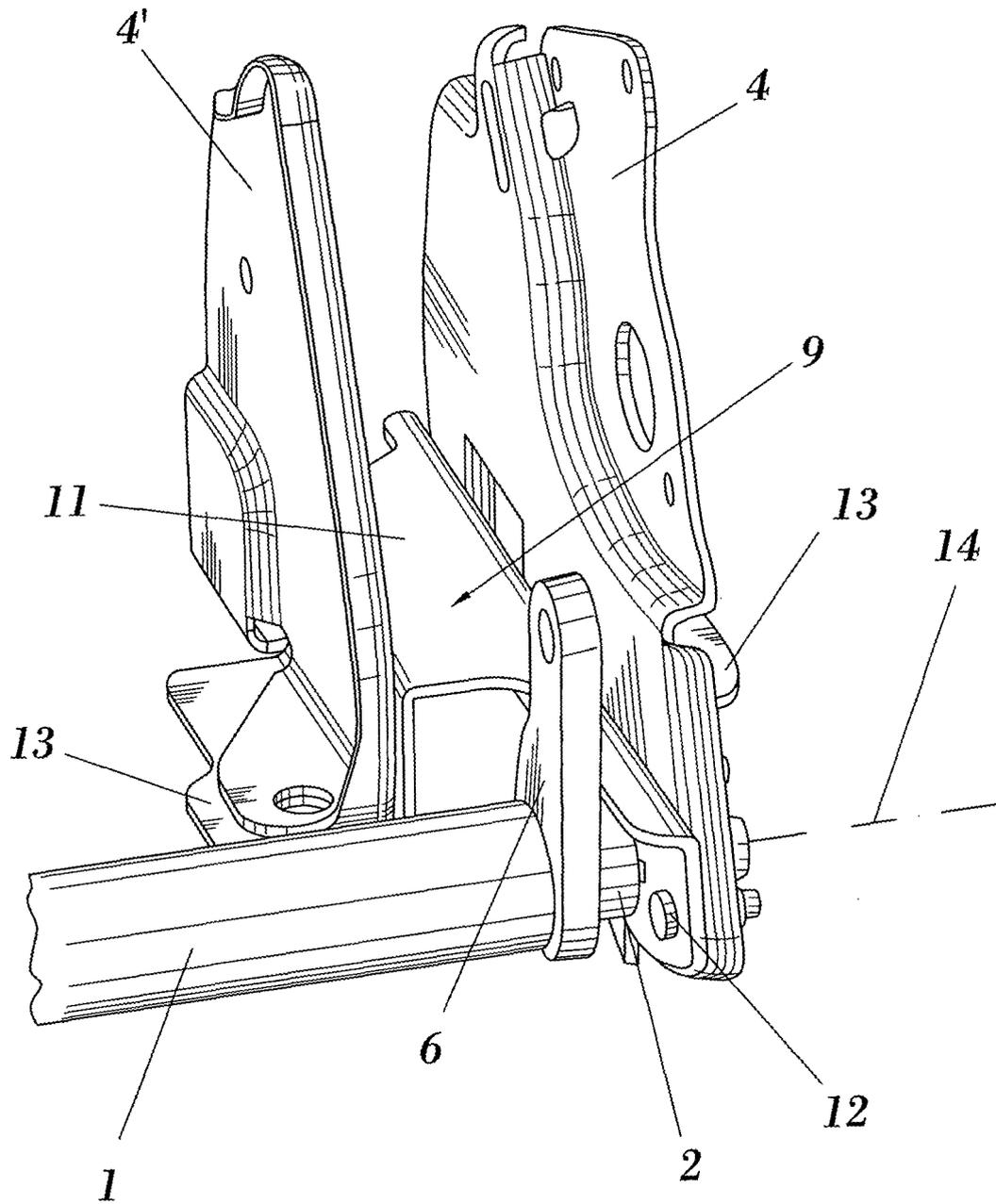


FIG. 5



DOCUMENTS CONSIDERED TO BE RELEVANT				
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Place of search		Date of completion of the search	Examiner	
The Hague		20 November 2007	Popescu, Alexandru	
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. The members are as contained in the European Patent Office EDP file on
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