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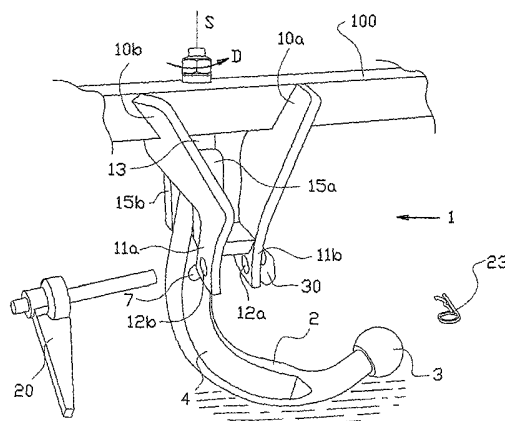
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(54) Title: RATRACKABLE TOW HITCH



(57) Abstract: Tow hitch assembly (1) comprising a tow hitch member (2) having a tow hitch rod (4) and a tow hitch ball (3), and a holder device for the tow hitch member, wherein the holder device comprises holder parts (100, 10a, 10b) which are to be fixedly secured to the vehicle, such as a passenger car, wherein the tow hitch member is connected to the holder device so as to be rotatable about more than one axis for movement with respect to the holder parts and the vehicle between a primary orientation in which the tow hitch ball has a low position and at least a first and a second secondary orientation in which the tow hitch ball has a higher position, wherein said more than one axis intersect at a location which is stationary in vertical level during said movement, the assembly further comprising a locking device (20) for locking the tow hitch member in at least said first secondary orientation, said locking device being located between the inner end of the tow hitch member and the tow hitch ball, in particular at a location along the tow hitch rod.



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Retractable tow hitch.

The invention relates to a retractable tow hitch for passenger cars in particular.

Various types of retractable tow hitches are known. In general, the retractable tow hitches are movable
5 between a position of use, in which the tow hitch extends rearward from the car, in longitudinal direction of the car, and a position of storage, shielded from the surroundings, extending in a plane substantially transverse to the longitudinal direction of the car.

10 In one type of retractable tow hitch, disclosed in DE-A-195.21.896, the tow rod is provided with the tow ball at one end and with a nose at the other end. The tow rod is provided with sideward projecting stubs that in the position of use, or operative position, are received in
15 recesses arranged in the lower edge of a vertical sleeve which is fixed to the car. At a location at the side of the stubs facing the ball end, the tow rod is attached to two vertical suspension rods, which are vertically movable. The sleeve is furthermore provided with an aperture for
20 accommodation of the nose. When the tow hitch is to be moved from the position of use to the position of storage, the locking nose is released so as to permit the tow rod to tilt downward with its ball end, the stubs moving out of the recesses and the tow hitch being suspended from the

suspension rods. As a result, the tow ball will assume a lowered position, below the level of the bumper of the car. Then the tow hitch is rotated about a vertical axis over 90 degrees, bringing the tow rod into an orientation
5 transverse to the longitudinal direction of the car, in the position of storage. In this position of storage, the tow rod is held in position by suspension from the suspension rods, allowing the tow rod some freedom of movement in a vertical plane perpendicular to the stubs. In addition, in
10 the position of storage, the tow ball remains at a relatively low level.

A further embodiment is disclosed in German patent application 10004523, in which a tow rod provided with a ball is attached to a vertically extending rod,
15 which rod can be rotated about a vertical axis and can be moved up and down by a motor. The lower end of the slidable rod must be moved to a level enabling an unhindered passage underneath the bumper during rotation of the tow hitch between an orientation transverse to the longitudinal axis
20 of the car and a rotation parallel to the longitudinal axis of the car.

In another type of retractable tow hitch, disclosed in German patent application 198 26 618, the tow rod has a vertically extending mounting portion which is
25 accommodated in a vertical housing secured to the car so as to be slidable up and down as well as to be rotatable about a vertical axis over 90 degrees. When being moved by operating means from the position of use to the position of storage, the tow rod is lowered, then rotated about an
30 angle of 90 degrees and finally raised. In order to permit an unimpeded movement of the tow ball underneath the bumper, the distance over which the tow rod is lowered must be rather large, with the same consequences for the length of the tow rod portion and its vertical guide.

35 European patent application 1.090.782 discloses a retractable tow hitch, which is pulled into the position of use and locked therein by means of an electromotor. After

release of the locking, the tow hook can be rotated over 90 degrees, about a horizontal axis parallel to the longitudinal axis of the passenger car, into a horizontal orientation. In that position, the tow hook can be lowered
5 to expose a hinge and then be rotated over 90 degrees about a vertical axis so as to bring the tow hook into engagement with a holder for keeping the tow hook in a position of storage. In a preferred embodiment the whole movement of the tow hook between both positions is carried out by the
10 electromotor.

It is an object of the invention to provide a retractable tow hitch of simple construction.

It is another object of the invention to provide a retractable tow hitch that is easy to be transferred from
15 the position of use to the position of storage and back again, possibly by hand.

From one aspect, the invention provides a tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the
20 tow hitch member, wherein the holder device comprises holder parts which are to be fixedly secured to the vehicle, such as a passenger car, wherein the tow hitch member is connected to the holder device so as to be rotatable about more than one axis for movement with
25 respect to the holder parts and the vehicle between a primary orientation in which the tow hitch ball has a low position and at least a first and a second secondary orientation in which the tow hitch ball has a higher position, wherein said more than one axis intersect at a
30 location which is stationary in vertical level during said movement, the assembly further comprising a locking device for locking the tow hitch member in at least said first secondary orientation, said locking device being located between the inner end of the tow hitch member and the tow
35 hitch ball, in particular at a location along the tow hitch rod. Such an embodiment enables a simple build-up of an easy-to-use retractable tow hitch assembly.

In case the first secondary position corresponds to the position of use, the pulling forces exerted on the tow hitch member during use can be taken by the locking device, so that the rotational connection of the tow hitch member to the vehicle can be relieved from those pulling forces to a large extent.

In a further embodiment, the tow hitch member is connected to the holder device for said movement in a non-motorized manner, preferably by hand and by gravity.

10 This embodiment is in particular low-cost and therefore affordable to many users.

In a further simple embodiment, the holder device comprises a holder member which forms part of the holder parts and is to be fixed -directly or indirectly- to the vehicle, and the tow hitch member is attached to the holder member by means of a hinge having more than one axis of rotation, such as a ball hinge.

For ease of operation, in particular in case the tow hitch member is moved by hand, the ball hinge may be provided with guide edges for guiding the movement of the tow hitch member during said movement.

The tow hitch member may be rotatable with respect to the holder parts or the vehicle about a first axis and about a second axis which is at an angle to the first axis, wherein the first axis has a dominant upward directional component, and is preferably substantially vertical and wherein the second axis has a dominant horizontal directional component and is preferably substantially horizontal.

30 In another embodiment, of the tow hitch assembly according to the invention, the holder device comprises a holder member which is rotatable with respect to the vehicle about a first axis and the tow hitch member is rotatable with respect to the holder member about a second axis which is at an angle to the first axis. In this embodiment, the rotational connection between tow hitch member and vehicle is built up from two or more rotational

connections that may be non-coincident, spaced from one another.

Here too, the first axis may have a dominant upward directional component, and is preferably substantially vertical. Likewise, the second axis may have a dominant horizontal directional component and is preferably substantially horizontal.

The holder member may be elongated and the rotation axis coincides with a longitudinal axis of the elongated holder member.

In a further development of the above described embodiments, the locking device is provided with operation means for locking and/or unlocking the locking device by hand, so that the tow hitch member can be transferred from a position of use to a position of storage and vice versa by hand, rendering the construction simple and keeping the manufacturing costs low.

In a further embodiment, the locking device comprises first locking means which are fixed to the holder device, said tow hitch member being provided with second locking means, wherein the assembly is furthermore provided with third locking means for locking the first and second locking means to each other in said first secondary orientation of the tow hitch member. The holder device may be provided with fourth locking means arranged for locking cooperation with the second locking means and preferably the third locking means for locking the fourth and second locking means to each other in said second secondary orientation of the tow hitch member, wherein, preferably, the fourth locking means provide a positioning means for the tow hitch member in its second secondary orientation.

The first and fourth locking means may be oriented substantially transverse to each other, and/or the first and second secondary orientations of the tow hitch member are substantially transverse to each other, corresponding to the position of use and the position of storage.

In a simple and reliably working structure, the first and fourth locking means comprise holes and the third locking means comprise a locking pin insertable in said holes, wherein preferably the tow hitch bar is provided with a hole forming the second locking means. Such a locking pin is easy to handle.

The first locking means may comprise two plates fixedly secured to the holder parts, wherein the plates leave an upward passage free for movement of the tow hitch member towards and away from the first secondary position.

In all embodiments, the tow hitch member may be attached to the holder device at an inner end of the tow hitch member. In that case the rotational components may be more easily shielded from the rear side of a passenger car, as the distance from the tow hitch ball will be largest here. In addition, such a location distal from the tow hitch ball facilitates the handling of the tow hitch member by hand.

In a further embodiment, in the first secondary orientation the tow hitch ball is located at a higher level than in a second secondary orientation. Usually, in its first secondary orientation the tow hitch member is in its position of use, and in its second secondary orientation the tow hitch member is in its position of storage.

From another aspect, the invention provides a tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device is provided with means for mounting the holder device to a vehicle, such as a passenger car, and a holder member, wherein holder member is attached to the holder device so as to be rotatable about a rotation axis, the tow hitch member at an inner end thereof being attached to the holder member so as to be hingeable about a hinge axis substantially transverse to the rotation axis.

In further development of this embodiment, that is stably operable, the holder member is elongated and the

rotation axis coincides with a longitudinal axis of the elongated holder member. The hinge axis and the rotation axis may intersect, and/or in the position of use the rotation axis is vertical, and/or the hinge axis is substantially perpendicular to the rotation axis.

From another aspect, the invention provides a tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device is provided with means for mounting the holder device to a vehicle, such as a passenger car, wherein the tow hitch member is attached to the holder device so as to be rotatable about more than one axis for movement with respect to the vehicle between a primary orientation in which the tow hitch ball has a low position and at least a first and a second secondary orientation in which the tow hitch ball has a higher position, the assembly further comprising a locking device for locking the tow hitch member in at least one of said secondary orientations, said locking device comprising a hole in the tow hitch member and a locking pin which is insertable in said hole.

The locking device may comprise a locking member fixedly attached to the vehicle and provided with a hole for passage of the locking pin.

The locking device may be located between the inner end of the tow hitch member and the tow hitch ball.

Said more than one axis may intersect at a location which is stationary in vertical level during said movement.

From another aspect, the invention provides a tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device is provided with means for mounting the holder device to a vehicle, such as a passenger car, and an elongated holder member, wherein the tow hitch member is rotatable about a rotation axis substantially parallel to the elongated holder member,

the tow hitch member being attached to the holder member by a hinge so as to be hingeable about a hinge axis substantially transverse to the rotation axis between a primary orientation in which the tow hitch ball has a low position and at least a first and a second secondary orientation in which the tow hitch ball has a higher position.

From another aspect, the invention provides a tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device is provided with means for mounting the holder device to a vehicle, such as a passenger car, and a holder member, wherein the tow hitch member is attached to the holder member so as to be rotatable about a rotation axis, the tow hitch member being attached to the holder member by a hinge so as to be hingeable about a hinge axis substantially transverse to the rotation axis between a primary orientation in which the tow hitch ball has a low position and at least a first and a second secondary orientation in which the tow hitch ball has a higher position.

From another aspect, the invention provides a tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device is provided with means for mounting the holder device to a vehicle, such as a passenger car, wherein the tow hitch member is hinged to the holder device so as to be rotatable about more than one axis to enable transfer of the tow hitch member between a primary orientation in which the tow hitch ball has a low position and at least a first and a second secondary orientation in which the tow hitch ball has a higher position, further comprising a locking device for locking the tow hitch member in at least said first secondary orientation, said locking device being located between the inner end of the tow hitch member and the tow hitch ball. The hinge may be a ball hinge. The ball hinge

may have a housing fixed to the holder device and a ball secured to the tow hitch bar, wherein the housing is provided with one or more guiding edges for guiding the hinging movement of the ball in the housing. The ball may
5 be connected to the tow hitch bar, preferably the inner end thereof, by a connector, such as a rod, and the housing has guide edges for the connector.

From another aspect, the invention provides a passenger car provided with a tow hitch assembly according
10 to the invention. In a simple embodiment, the car comprises a rear cross beam, wherein the holder device is attached to the rear cross beam. Preferably, in the second secondary orientation, the tow hitch ball is located below the rear cross beam.

15 The aspects and measures described and/or shown in the application can where possible also be used individually. Said individual aspects and other aspects may be the subject of divisional patent applications related thereto.

20 The invention will be elucidated on the basis of exemplary embodiments shown in the drawings, in which:

Figure 1 shows a schematic view of an exemplary embodiment of the tow hitch assembly according to the invention, from the rear side;

25 Figures 1A-C show details, from the rear and from the front, respectively, of the front end of the tow hitch assembly of figure 1;

Figure 2A shows a first stage in the retraction of the tow hook of the tow hitch assembly of figure 1;

30 Figure 2B shows a second stage in the retraction of the tow hook of the tow hitch assembly of figure 1;

Figure 2C shows a third stage in the retraction of the tow hook of the tow hitch assembly of figure 1;

35 Figure 2D shows a fourth stage in the retraction of the tow hook of the tow hitch assembly of figure 1;

Figure 2E shows a final, locking stage in the retraction of the tow hook of the tow hitch assembly of

figure 1;

Figure 3 shows a second exemplary embodiment of the tow hitch assembly according to the invention, in a side view, in the position of use;

5 Figures 3A-C show details of the hinge connection of the tow hitch member of the tow hitch assembly of figure 3;

Figure 4 shows the tow hitch assembly of figure 3 in a stage of movement from the position of use towards the
10 position of non-use;

Figure 4A shows a detail of figure 4;

Figure 5 shows the tow hitch assembly of figure 3 in a further stage of movement from the position of use towards the position of non-use; and

15 Figure 6 shows the tow hitch assembly of figure 3 in yet a further stage of movement from the position of use towards the position of non-use.

In figure 1 the tow hitch assembly 1 according to the invention includes a cross beam or bar 100 which is to
20 be attached to the chassis of a passenger car (not shown) and forms part of a holder device for a tow hitch member 2.

The tow hitch assembly 1 thus comprises a tow hook (tow hitch member) 2, which at its outer end is provided with a ball 3 which forms a unity with a tow bar
25 or rod 4, which serves to attach the tow hook 2 to fastening means attached to the cross beam or bar 100 and to transfer towing forces exerted on the ball 3 to the cross beam 100 and through the cross beam 100 to the chassis of the vehicle.

30 As can be seen in figures 1B and 1C, a short vertical rod 14 has been attached to the cross beam 100. The rod 14 is attached to the cross beam 100 in a rotary-fixed manner by means of nuts 26a and 26b and locking rings (not shown).

35 A sleeve or ring 13 has been mounted on a lower portion of the vertical rod 14 extending below the cross beam 100, so as to be freely rotatable about an axis S of

the vertical rod 14, supported by nut 26c which is locked on rod 14 (figure 1B).

Two vertical plates 15a, 15b form one fixed unity with the sleeve ring 13, so as to be rotatable therewith about axis S, and form a generally inverted U-shaped member with the sleeve or ring 13.

At their lower end, the plates 15a, 15b have been provided with aligned holes, through which a horizontally oriented bolt 16 extends, fastened to the plates 15a,b by means of nut 17 and bolt head 18.

The tow bar 4 has an outer inner end 5, which is provided with a horizontally extending bore or hole 6. As can be seen in figures 1B and 1C, the bolt 16 extends through the hole 6, the tow bar inner end 5 being in part accommodated within a space formed between the plates 15a, 15b. The connection of the tow bar inner end 5 to the plates 15a, 15b by means of the bolt 16 is such that the tow bar 4 is rotatable about an axis T of bolt 16 in a vertical plane, with respect to the plates 15a, 15b.

As can be seen in all figures, at the rear side of the vertical rod 14 two inclined plates 10a, 10b have been secured by welding to the cross beam 100 and define a generally V-shaped space. At their lower ends, the plates 10a, 10b merge into vertical and parallel lower plate ends 11a, 11b, which are spaced apart so as to enable the accommodation of the tow bar 4 in between them.

The lower end plates 11a, 11b have been provided with aligned holes 12a,b, for accommodation of a locking pin 21 of a locking member 20, as can be seen in figure 1A. The locking member 20 has been provided with a handle 22 at one end, and with a locking groove 24 at its other end, vide figure 1B. A locking spring clamp 23 has been slid transversely over this outer end of the pin 21, accommodated in the groove 24, so that the locking pin 21 is secured against removal.

At a distance from its inner end 5 the tow bar 4 has been provided with a transverse hole 7, which is

dimensioned to closely receive the pin 21 when aligned with the holes 12a,b.

As can be seen in figures 1B and 1C, the lower plate 11a has been provided with a plate 30, that is oriented in a vertical plane and, considered in the horizontal plane, is at an angle of 90 degrees to the lower plate 11a. The plate 30 slopes downward at an angle of approximately 45 degrees, and is provided with a hole 31, which is dimensioned to closely receive the pin 21, as will be discussed later.

In case the user wants to transfer the tow hitch assembly 1 from the position of use depicted in figure 1 to the retracted position of storage depicted in figure 2E, he takes the ring 23a of locking wire 23 and pulls the locking clamp 23 towards him, so as to release it from the groove 24 and from the outer end of the pin 21 (figure 2A).

He then takes the handle 22 of locking member 20, to pull the pin 21 out of the holes 12a, 12b of the lower plates 11a, 11b and hole 7 of the tow bar 4 (figure 2B).

Then the tow bar 4 is attached to the rear cross beam 100 (indirectly) at its inner end 5 by hinge pin 16 only. As a consequence, the tow bar 4 will be able to cant freely downwards in direction C (figure 2C), to a position in which the tow hook 2 rests on a sub surface, in particular the pavement.

In that position, the user can easily take the ball 3 so as to move the tow hook 2 to the position in figure 2D, transverse to the longitudinal axis of the car, in which movement (arrow D) the inner end 5 of the tow bar 4 will be rotated about vertical axis S, about an angle of 90 degrees.

Then the user puts his hand below the tow bar 4 and urges the tow hook 2 upward in direction E into the position depicted in figure 2E, in which the tow bar 4 is adjacent the plate 30. The user ensures that the hole 7 is aligned with the hole 31 in plate 30, and then takes the handle 22 of locking member 20, and inserts the pin 21

into, first, hole 7 of tow bar 4 and then into hole 31 of plate 30. The plate 30 may serve as an abutment for tow rod 4 preventing further rotation of the tow rod 4 about the axis S during the insertion of the pin 21. Finally, he takes the clamping wire 23 by its ring 23a, and places the clamping wire 23 on the pin 21 again, after which it is clampingly accommodated in groove 24 of the pin end to lock the pin end. The tow hook 2 is then secured in the position of storage, parallel to the cross beam 100.

As can be seen in figures 2A and 2E the level of the ball 3 in the position of storage is lower than the level of the ball 3 in the position of use, which is realised by a suitable location of hole 31 and by suitable location and dimensions of the plate 30.

In case the user wants to use the tow hitch assembly 1 again, the aforementioned steps are executed in reverse order.

The second exemplary embodiment of a tow hitch assembly according to the invention, depicted in figures 3-6, comprises a tow hitch assembly 101, attached to a cross bar 100 which is to be secured to a vehicle (further not shown). Two vertical plates 110a,b have been fixedly secured to the beam 100. The plates 110a,b define a vertical space 160 in which tow hitch member 102 can be accommodated, in the position of use depicted in figure 3.

Tow hitch member 102 comprises a tow hitch ball 103 and a tow bar 104 having an inner end 105. Halfway, the tow bar 104 has been provided with a transverse through-hole 107, which hole 107 can be aligned with holes 112a,b in vertical plates 110a,b. In order to secure the tow hitch member 2 in the position of use, a pin 121 is inserted through the holes 112a,b and 107 and secured in that position, in a manner not shown but similar to the securing of the pin 21 in the previous example.

At their front edges, the plates 110a,b are connected to each other by a transverse, vertical plate 115. A bearing housing 132 is fixedly attached to the plate

115, and defines (vide figures 3A-C) a housing for bearing ball 131, which is fixedly attached to the inner end 105 of tow bar 104 via neck 130.

In the position of use, vide also figure 3B, the
5 neck or rod 130 extends through a rearward directed opening 134 of bearing housing 132. The opening 134 is limited by flanged edge 134a, which extends in a vertical plane, perpendicular to the neck 130.

As can be seen in figures 3A and 3C, the edge
10 134a is interrupted to leave a passage 135 free. The passage 135 merges into opening 136 in the bearing housing 132, which opening 136 is limited by edge 133.

Fixed to the plate 110a, perpendicular thereto,
is a plate 150, which is provided with a hole 151, for
15 accommodation of the pin 121 for storing the tow bar 104 in the position of non-use.

In order to transfer the tow bar 104 from the position of use of figure 3, via the intermediate positions depicted in figures 4, 5 and 6, to a position of non-use
20 (not shown), the user removes the locking pin 121, as a result of which the tow bar 4 will fall downward in direction C. In this movement, the neck 130 passes through the opening 135, the tow bar 4 rotating about a horizontal axis T through the centre of the ball bearing 131/132,
25 guided by the side plates 110a,b. This motion of the tow bar 104 can take place under the influence of gravity due to the tow bars 4 own weight.

The opening 136 allows the tow bar 4 to cant downwards until the tow bar 104 hits the ground. Then, the
30 user can grasp the tow bar 104, and rotate it about, for instance a vertical axis through the centre of the ball bearing 131/132 to a position below the locking plate 150 (figure 6), and then upwards to bring the hole 107 in line with the hole 151, after which the locking pin 121 can be
35 inserted and secured to lock the tow bar 104 in the position of non-use.

The ball bearing 131/132 permits various other

directions of movement, for instance a combined rotation about a vertical axis and a rotation about a horizontal axis T which rotates together with the ball 131.

As can be seen, all movements and locking and
5 unlocking actions can be performed by hand (from the outside of the car), rendering the tow hitch assembly discussed simple in construction and therefore of low cost.

The tow hitch assembly according to the invention, including the parts for its operation/movement,
10 is located outside the car with all its components, so that no particular provisions inside the car need to be made for mounting and operating the tow hitch assembly.

C L A I M S

1. Tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device comprises holder parts which are to be fixedly secured to the vehicle, such as a passenger car, wherein the tow hitch member is connected to the holder device so as to be rotatable about more than one axis for movement with respect to the holder parts and the vehicle between a primary orientation in which the tow hitch ball has a low position and at least a first and a second secondary orientation in which the tow hitch ball has a higher position, wherein said more than one axis intersect at a location which is stationary in vertical level during said movement, the assembly further comprising a locking device for locking the tow hitch member in at least said first secondary orientation, said locking device being located between the inner end of the tow hitch member and the tow hitch ball, in particular at a location along the tow hitch rod.

2. Tow hitch assembly according to claim 1, wherein the tow hitch member is connected to the holder device for said movement in a non-motorized manner, preferably by hand and by gravity.

3. Tow hitch assembly according to claim 1 or 2, wherein the holder device comprises a holder member which forms part of the holder parts and is to be fixedly secured to the vehicle, and the tow hitch member is attached to the holder member by means of a hinge having more than one axis of rotation.

4. Tow hitch assembly according to claim 3, wherein the hinge is a ball hinge.

5. Tow hitch assembly according to claim 4, wherein the ball hinge is provided with guide edges for guiding the movement of the tow hitch member during its movement.

5 6. Tow hitch assembly according to any one of the preceding claims, wherein the tow hitch member is rotatable with respect to the holder parts about a first axis and about at least one second axis which is at an angle to the first axis, wherein the first axis has a dominant upward
10 directional component, and is preferably substantially vertical and wherein the second axis has a dominant horizontal directional component and is preferably substantially horizontal.

7. Tow hitch assembly according to claim 6,
15 wherein there are at least two second axes, which extend transverse to each other.

8. Tow hitch assembly according to claim 1, wherein the holder device comprises a holder member which is rotatable with respect to the holder parts about a first
20 axis and the tow hitch member is rotatable with respect to the holder member about a second axis which is at an angle to the first axis.

9. Tow hitch assembly according to claim 8, wherein the first axis has a dominant upward directional
25 component, and is preferably substantially vertical.

10. Tow hitch assembly according to claim 8 or 9, wherein the second axis has a dominant horizontal directional component and is preferably substantially horizontal.

30 11. Tow hitch assembly according to claim 8, 9 or 10, wherein the holder member is elongated and wherein the rotation axis coincides with a longitudinal axis of the elongated holder member.

12. Tow hitch assembly according to any one of
35 the preceding claims, wherein the locking device is provided with operation means for locking and/or unlocking the locking device by hand.

13. Tow hitch assembly according to any one of the preceding claims, wherein the locking device comprises first locking means which are fixed to the holder device, said tow hitch member being provided with second locking
5 means, wherein the assembly is furthermore provided with third locking means for locking the first and second locking means to each other in said first secondary orientation of the tow hitch member.

14. Tow hitch assembly according to claim 13,
10 wherein the holder device is provided with fourth locking means arranged for locking cooperation with the second locking means and preferably the third locking means for locking the fourth and second locking means to each other in said second secondary orientation of the tow hitch
15 member, wherein, preferably, the fourth locking means provide a positioning means for the tow hitch member in its second secondary orientation.

15. Tow hitch assembly according to claim 14, wherein the first and fourth locking means are oriented
20 substantially transverse to each other.

16. Tow hitch assembly according to claim 14 or 15, wherein the first and second secondary orientations of the tow hitch member are substantially transverse to each other.

25 17. Tow hitch assembly according to any one of the claims 12-16, wherein the first and fourth locking means comprise holes and the third locking means comprise a locking pin insertable in said holes, wherein preferably the tow hitch bar is provided with a hole forming the
30 second locking means.

18. Tow hitch assembly according to any one of the claims 12-17, wherein the first locking means comprise two plates fixedly secured to the holder parts, wherein the plates leave an upward passage free for movement of the tow
35 hitch member towards and away from the first secondary position.

19. Tow hitch assembly according to any one of

the preceding claims, wherein the tow hitch member is movably connected to the holder device at an inner end of the tow hitch member.

20. Tow hitch assembly according to any one of
5 the preceding claims, wherein in the first secondary orientation the tow hitch ball is located at a higher level than in a second secondary orientation.

21. Tow hitch assembly according to any one of
the preceding claims, wherein in its first secondary
10 orientation the tow hitch member is in its position of use.

22. Tow hitch assembly according to any one of
the preceding claims, wherein in its second secondary orientation the tow hitch member is in its position of storage.

15 23. Tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device is provided with means for mounting the holder
20 member, wherein holder member is attached to the holder device so as to be rotatable about a rotation axis, the tow hitch member at an inner end thereof being attached to the holder member so as to be hingeable about a hinge axis substantially transverse to the rotation axis.

25 24. Tow hitch assembly according to claim 23, wherein the holder member is elongated and wherein the rotation axis coincides with a longitudinal axis of the elongated holder member.

25. Tow hitch assembly according to claim 23 or
30 24, wherein the hinge axis and the rotation axis intersect.

26. Tow hitch assembly according to claim 23, 24 or 25, wherein in the position of use the rotation axis is vertical.

27. Tow hitch assembly according to any one of
35 the claims 23-26, wherein the hinge axis is substantially perpendicular to the rotation axis.

28. Tow hitch assembly comprising a tow hitch

member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device is provided with means for mounting the holder device to a vehicle, such as a passenger car, wherein the
5 tow hitch member is attached to the holder device so as to be rotatable about more than one axis for movement with respect to the vehicle between a primary orientation in which the tow hitch ball has a low position and at least a first and a second secondary orientation in which the tow
10 hitch ball has a higher position, the assembly further comprising a locking device for locking the tow hitch member in at least one of said secondary orientations, said locking device comprising a hole in the tow hitch member and a locking pin which is insertable in said hole.

15 29. Tow hitch assembly according to claim 28, wherein the locking device comprises a locking member fixedly attached to the vehicle and provided with a hole for passage of the locking pin.

20 30. Tow hitch assembly according to claim 28 or 29, said locking device being located between the inner end of the tow hitch member and the tow hitch ball.

31. Tow hitch assembly according to claim 28, 29 or 30, wherein said more than one axis intersect at a location which is stationary in vertical level during said
25 movement.

32. Tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device is provided with means for mounting the holder
30 device to a vehicle, such as a passenger car, and an elongated holder member, wherein the tow hitch member is rotatable about a rotation axis substantially parallel to the elongated holder member, the tow hitch member being attached to the holder member by a hinge so as to be
35 hingeable about a hinge axis substantially transverse to the rotation axis between a primary orientation in which the tow hitch ball has a low position and at least a first

and a second secondary orientation in which the tow hitch ball has a higher position.

33. Tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device is provided with means for mounting the holder device to a vehicle, such as a passenger car, and a holder member, wherein the tow hitch member is attached to the holder member so as to be rotatable about a rotation axis, the tow hitch member being attached to the holder member by a hinge so as to be hingeable about a hinge axis substantially transverse to the rotation axis between a primary orientation in which the tow hitch ball has a low position and at least a first and a second secondary orientation in which the tow hitch ball has a higher position.

34. Tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device is provided with means for mounting the holder device to a vehicle, such as a passenger car, wherein the tow hitch member is hinged to the holder device so as to be rotatable about more than one axis to enable transfer of the tow hitch member between a primary orientation in which the tow hitch ball has a low position and at least a first and a second secondary orientation in which the tow hitch ball has a higher position, further comprising a locking device for locking the tow hitch member in at least said first secondary orientation, said locking device being located between the inner end of the tow hitch member and the tow hitch ball.

35. Tow hitch assembly according to claim 34, wherein the hinge is a ball hinge.

36. Tow hitch assembly according to claim 35, wherein the ball hinge has a housing fixed to the holder device and a ball secured to the tow hitch bar, wherein the housing is provided with one or more guiding edges for

guiding the hinging movement of the ball in the housing.

37. Tow hitch assembly according to claim 36, wherein the ball is connected to the tow hitch bar, preferably the inner end thereof, by a connector, such as a
5 rod, and the housing has guide edges for the connector.

38. Tow hitch assembly comprising a tow hitch member having a tow hitch rod and a tow hitch ball, and a holder device for the tow hitch member, wherein the holder device comprises holder parts which are to be fixedly
10 secured to the vehicle, such as a passenger car, wherein the tow hitch member is connected to the holder device so as to be rotatable for movement with respect to the holder parts and the vehicle between a primary orientation in which the tow hitch ball has a low position and at least a
15 first and a second secondary orientation in which the tow hitch ball has a higher position, wherein said more than one axis intersect at a location which is stationary in vertical level during said movement, the assembly further comprising a locking device for locking the tow hitch
20 member in at least said first secondary orientation, said locking device being located between the inner end of the tow hitch member and the tow hitch ball, in particular at a location along the tow hitch rod, wherein the tow hitch member is connected to the holder device for said movement
25 in a non-motorized manner, preferably by hand and by gravity.

39. Passenger car provided with a tow hitch assembly according to any one of the preceding claims.

40. Passenger car according to claim 39,
30 comprising a rear cross beam, wherein the holder device is attached to the rear cross beam.

41. Passenger car according to claim 39 or 40, wherein in the second secondary orientation, the tow hitch ball is located below the rear cross beam.

42. Tow hitch assembly provided with one or more
35 of the characterising features described in the attached description and/or shown in the attached drawings.

43. Vehicle provided with one or more of the characterising features described in the attached description and/or shown in the attached drawings.

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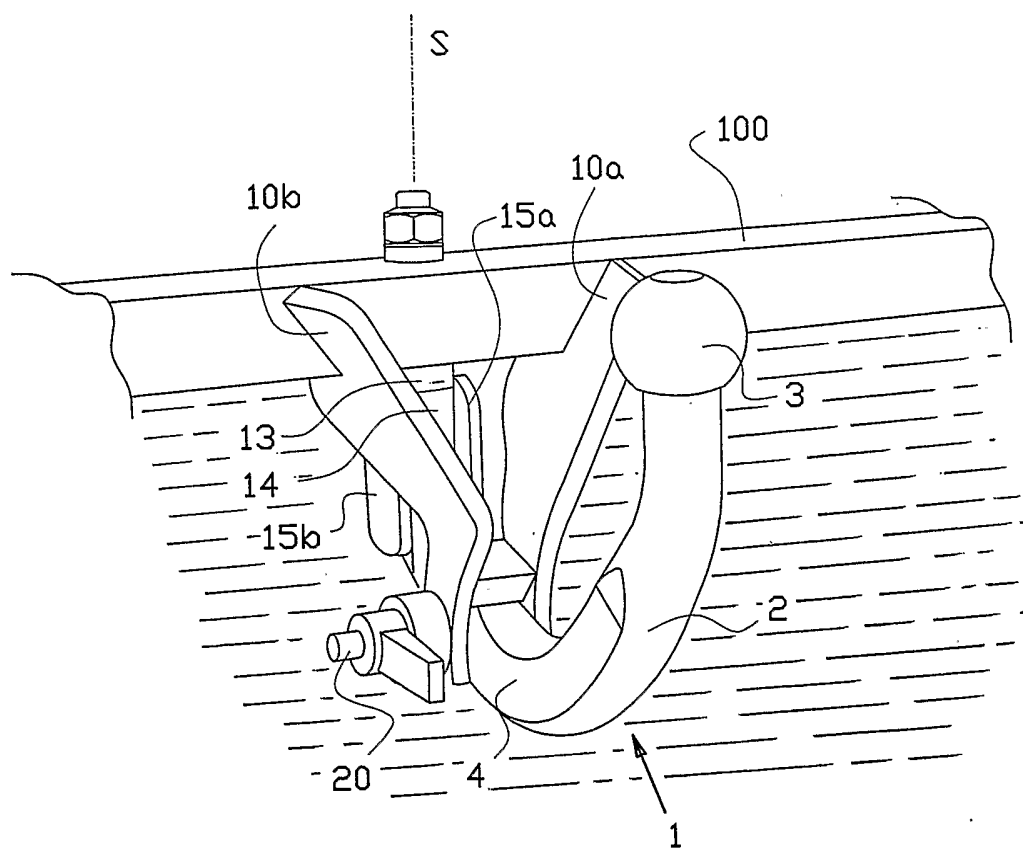


FIG. 1

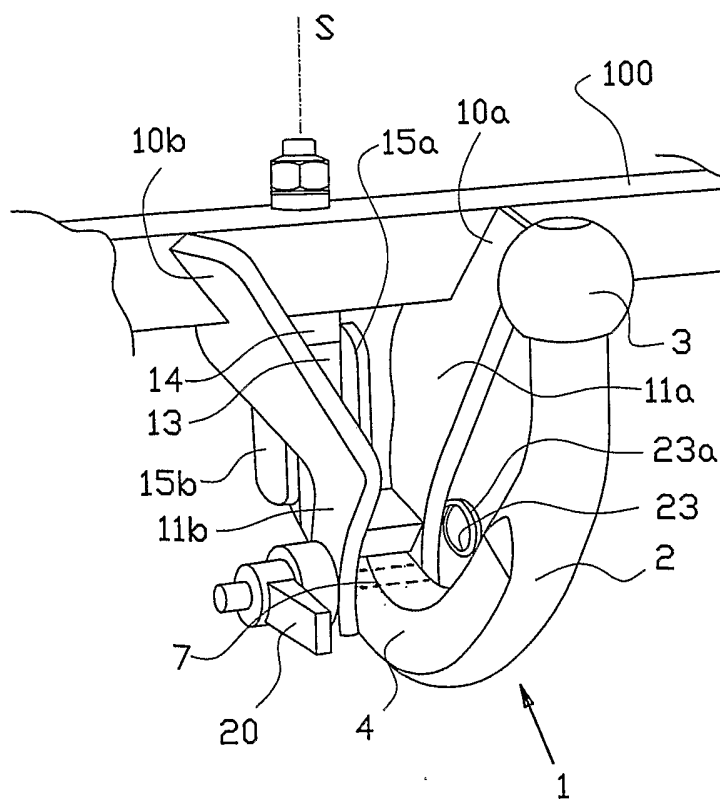


FIG. 1A

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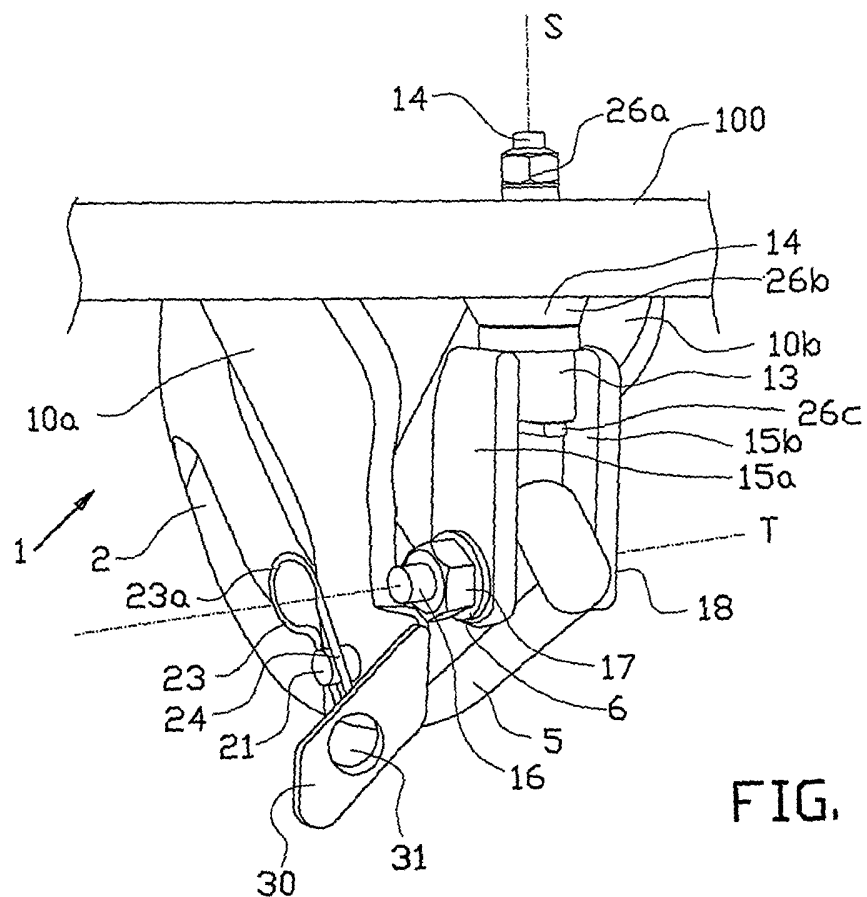


FIG. 1B

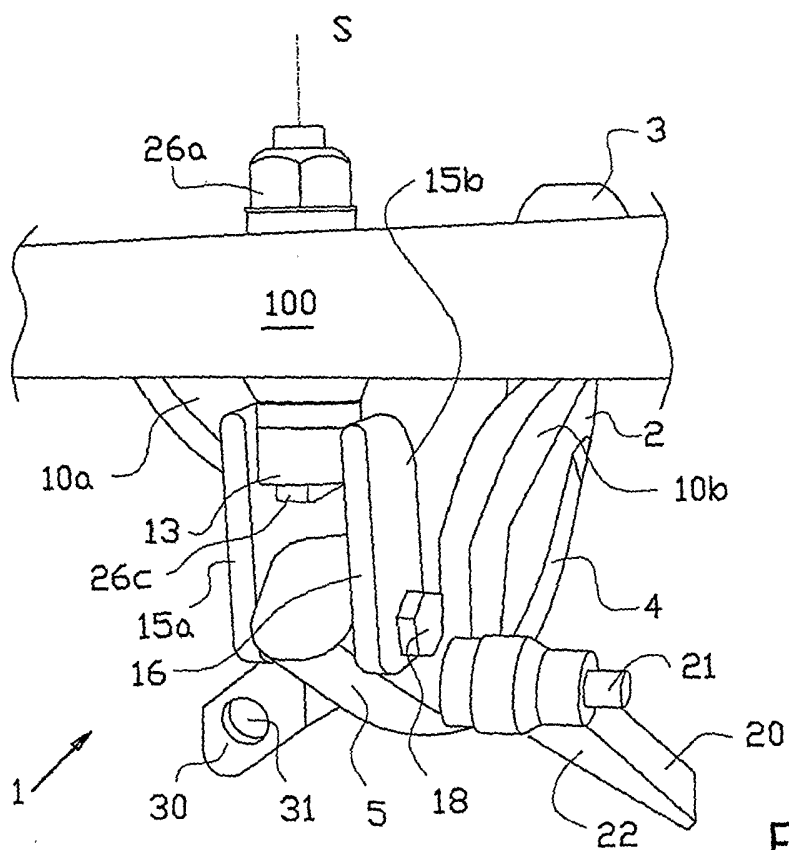


FIG. 1C

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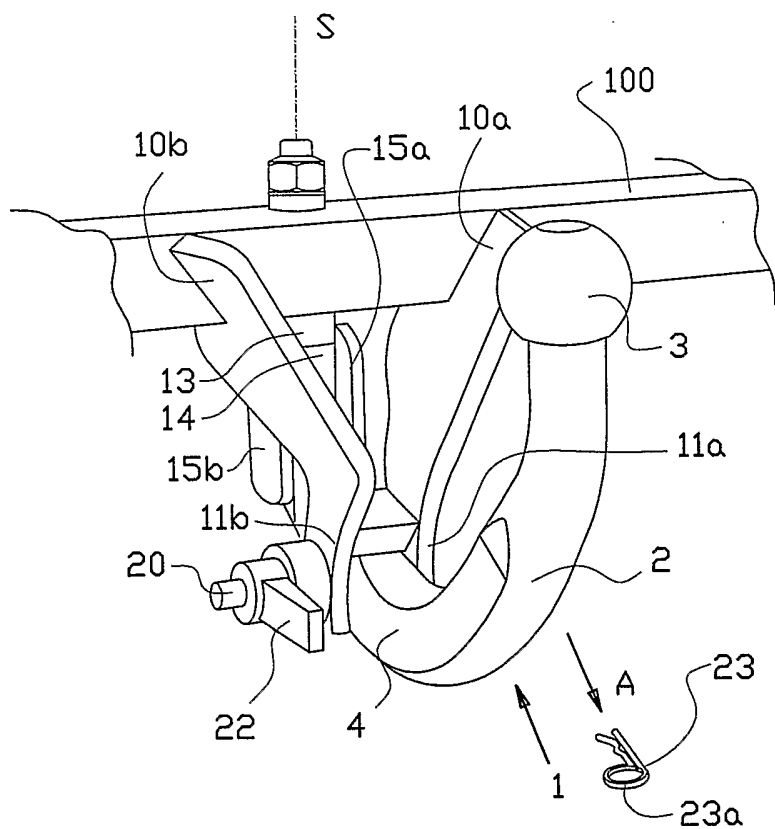


FIG. 2A

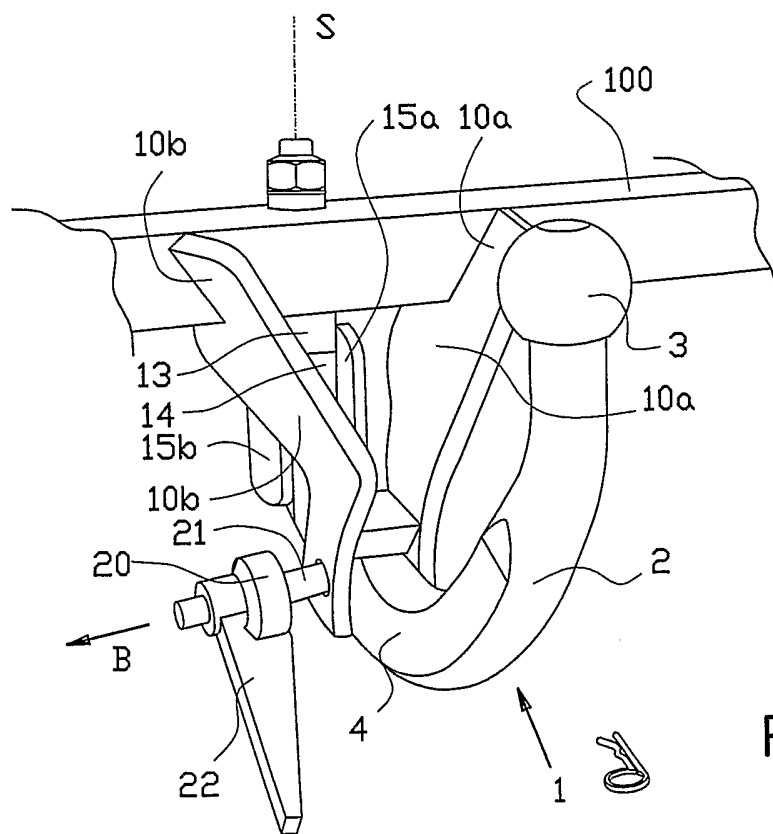
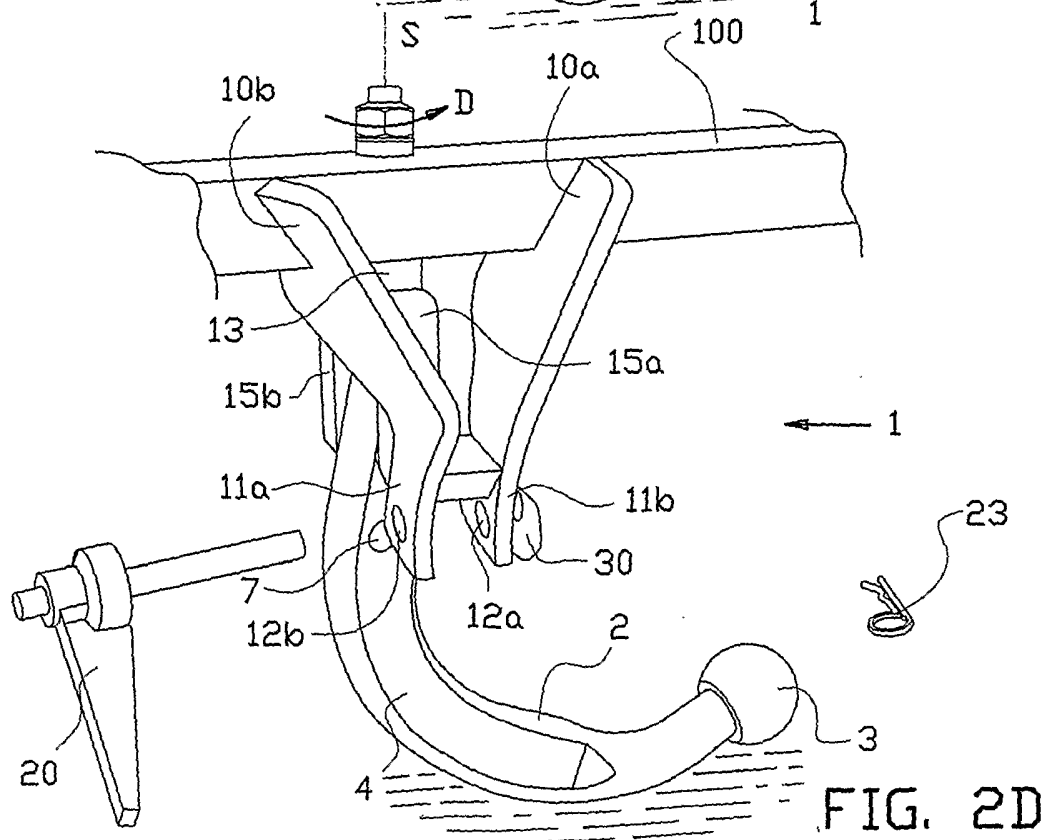
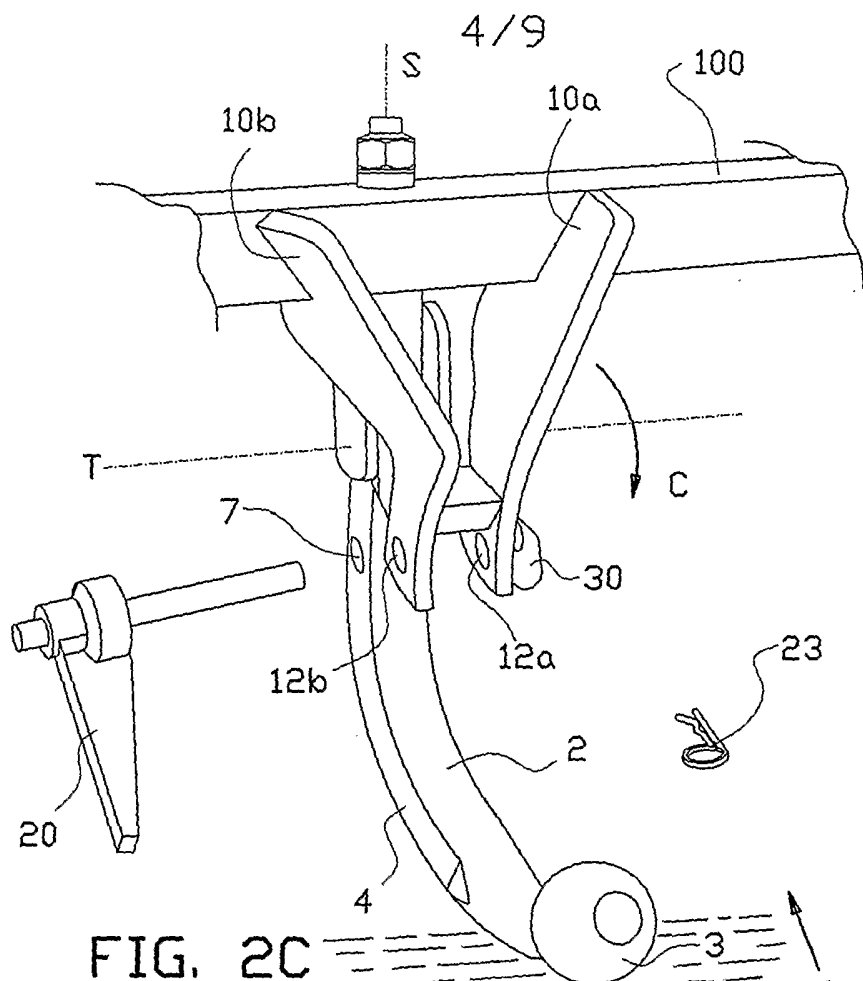


FIG. 2B



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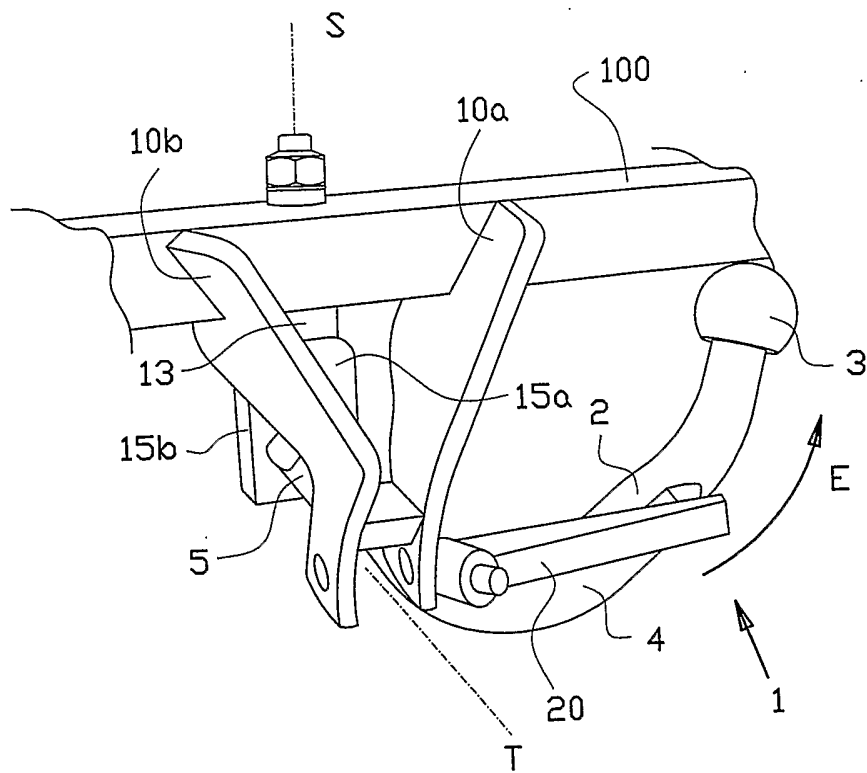


FIG. 2E

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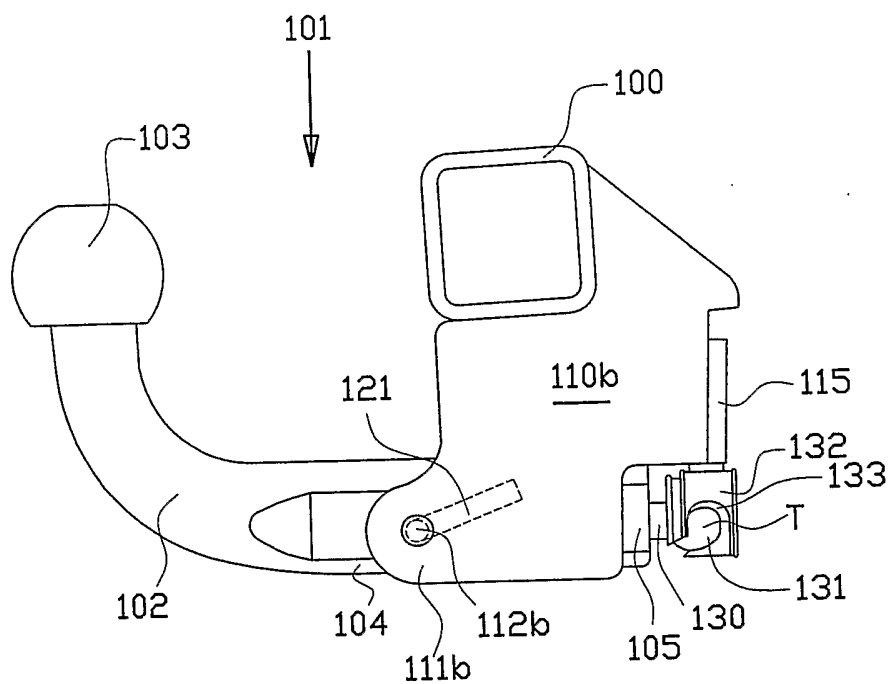


FIG. 3

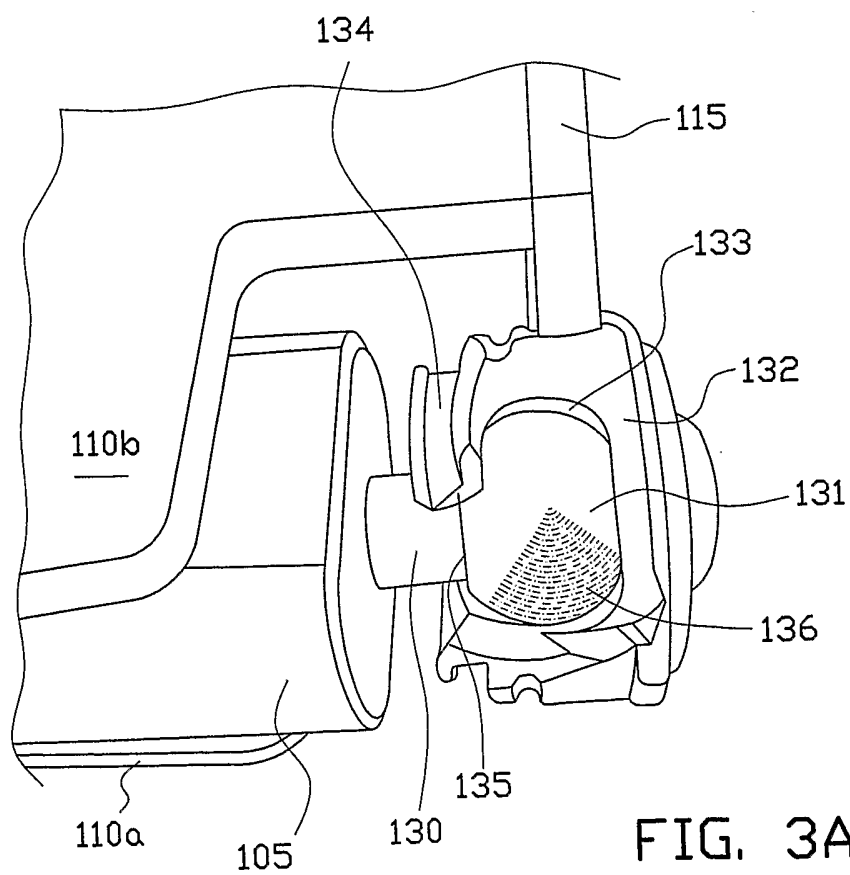
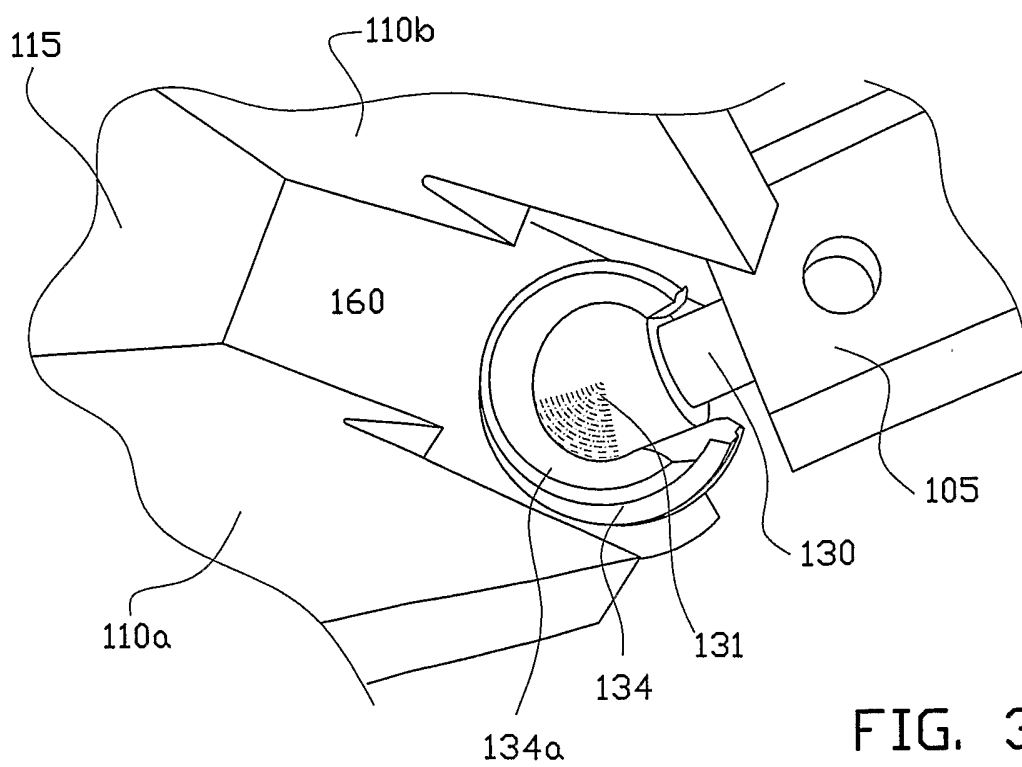
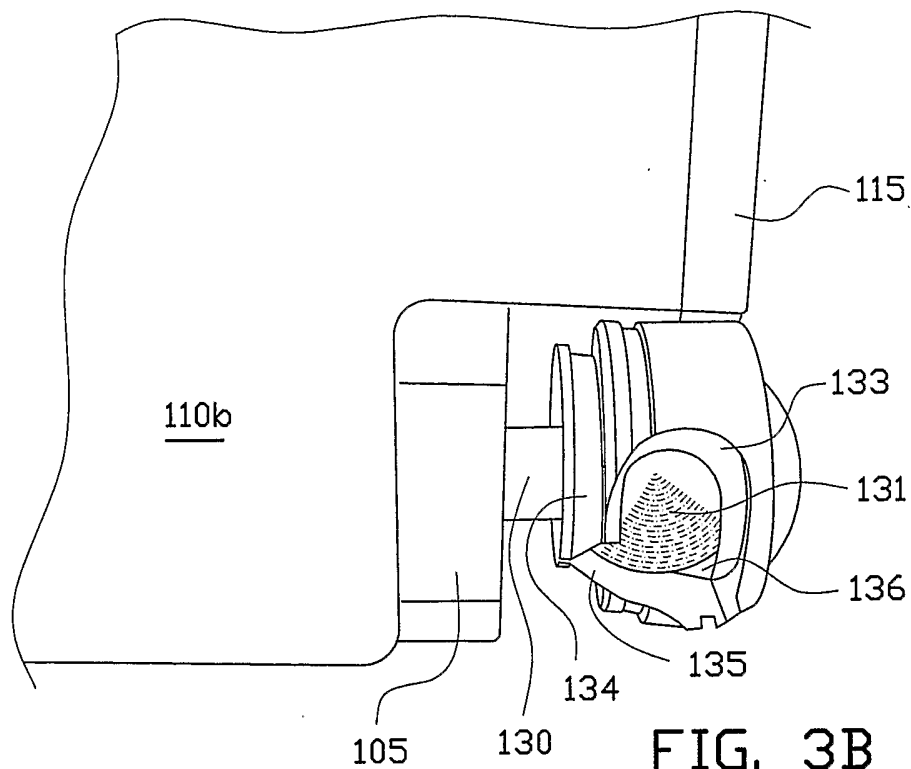


FIG. 3A

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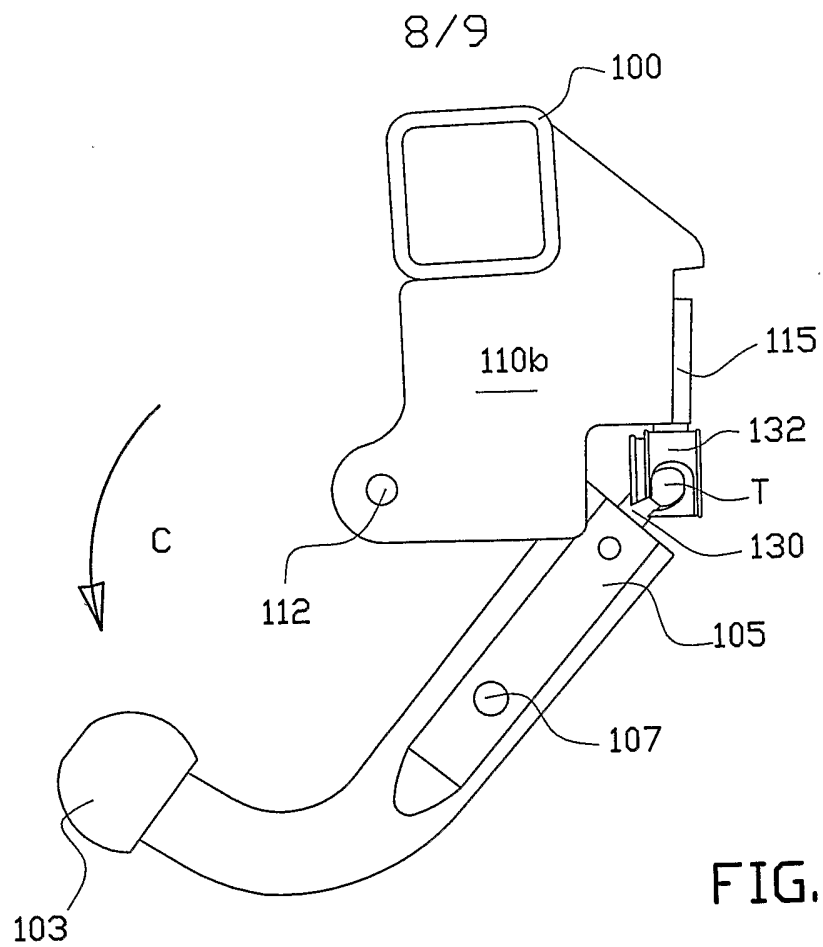


FIG. 4

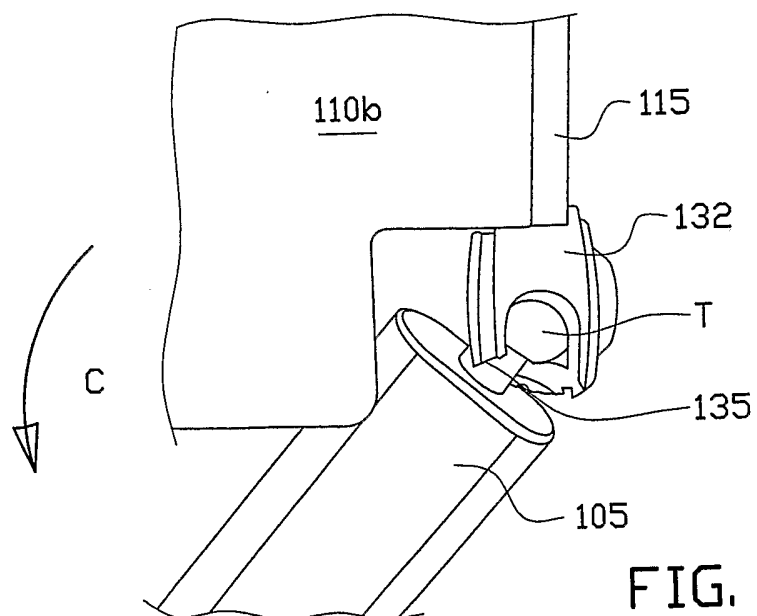
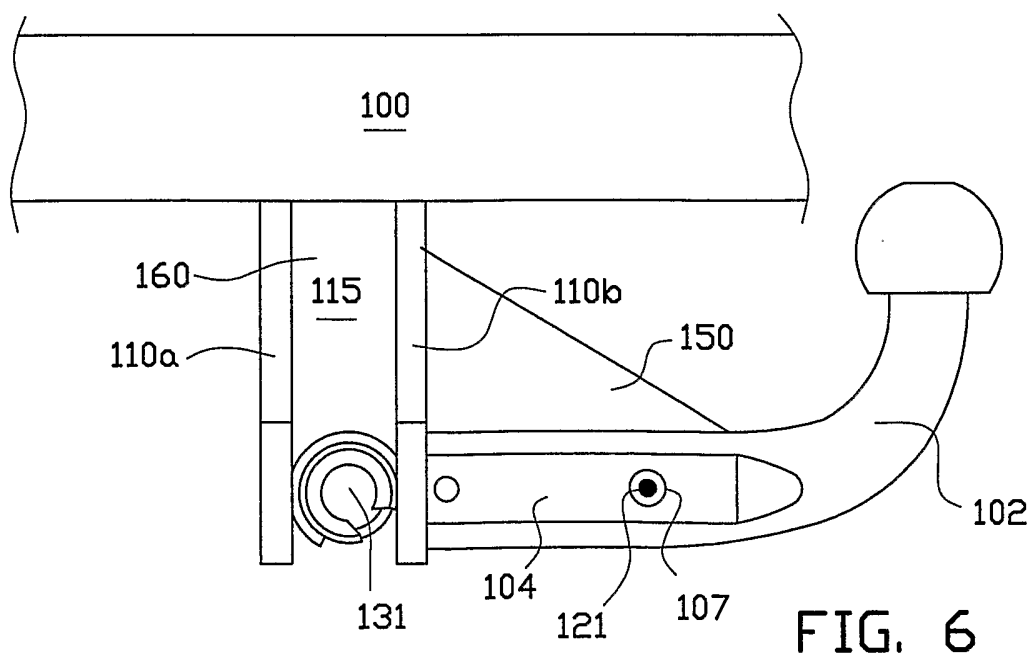
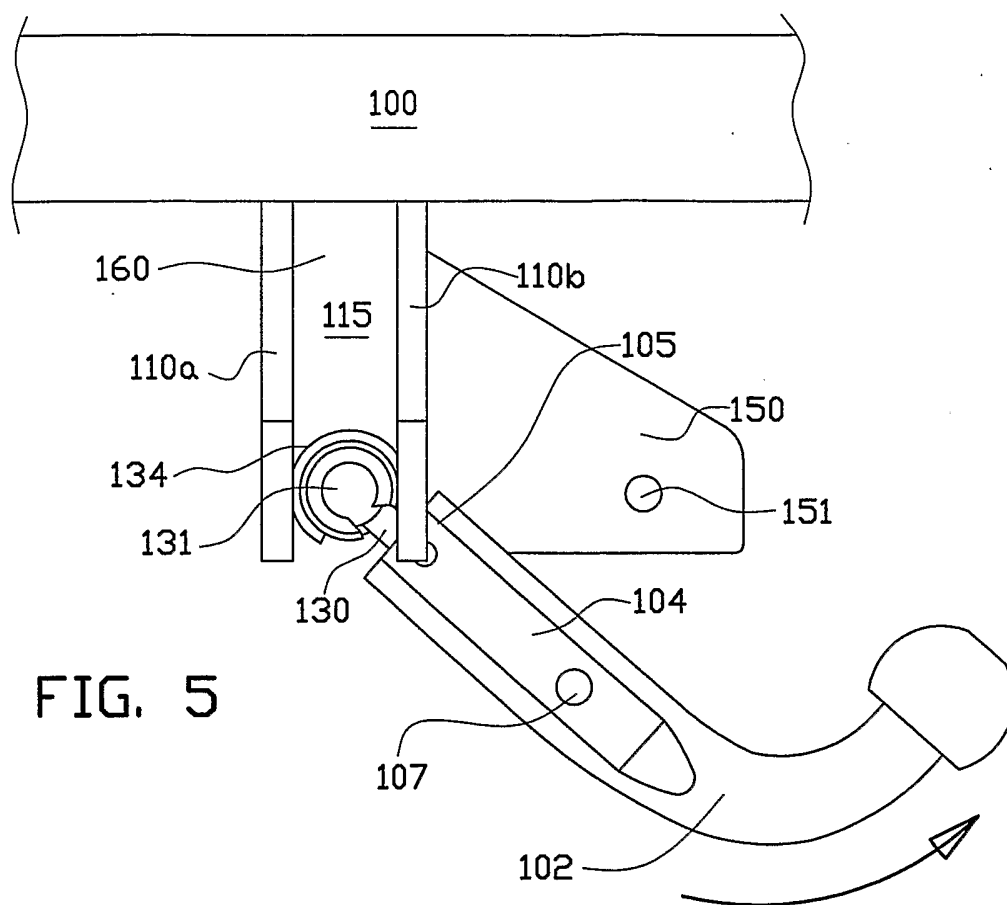


FIG. 4A

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INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2005/000893

A. CLASSIFICATION OF SUBJECT MATTER

INV. B60D1/54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B60D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 712 381 B1 (MOSS NEWELL RYAN) 30 March 2004 (2004-03-30) column 5, line 32 - column 6, line 28 column 12, line 39 - column 13, line 5 figures 1,2,19,20 -----	1,2,8, 10-12, 19-22, 28-34, 38-43
X	EP 1 090 782 A (PEKA-FAHRZEUGBAU GMBH & CO. KG) 11 April 2001 (2001-04-11) cited in the application figures 1-6 -----	23-27
P,X	EP 1 557 299 A (ORIS FAHRZEUGTEILE HANS RIEHLE GMBH) 27 July 2005 (2005-07-27) the whole document ----- -/--	1-43

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

12 April 2006

Date of mailing of the international search report

21/04/2006

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Verkerk, E

INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2005/000893

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	EP 1 557 300 A (ORIS FAHRZEUGTEILE HANS RIEHLE GMBH) 27 July 2005 (2005-07-27) the whole document -----	1-43

INTERNATIONAL SEARCH REPORT

International application No

PCT/NL2005/000893

Information on patent family members

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