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(54) **Device for hinging and supporting a vehicle bonnet**

Vorrichtung zum Halten und Anlenken einer Fahrzeugklappe

Dispositif pour articuler et supporter un bonnet de véhicule

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EP 2 048 308 B1

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Description

[0001] The present invention relates to a device for hinging and supporting a vehicle bonnet, according to the first part of claim 1 (see document US-A-3815176).

[0002] On vehicles, particularly motor vehicles, the use of a bonnet is known, in particular an engine bonnet, which pivots in relation to the body of the vehicle about a horizontal hinge axis between an open position and a closed position.

[0003] At the same time, a supporting device is provided to hold the bonnet in the open position. The supporting device normally comprises a rod, which is hinged at one end thereof to the body of the vehicle and is moved manually between a rest position, in which the rod is arranged in a substantially horizontal position and is releasably blocked by means of a snap mechanism on the body, and an operating position, in which the rod is arranged in a raised position and has an upper end that supports the bonnet in the open position.

[0004] Another solution is disclosed in European patent application EP1719865, which shows a pair of levers that are hinged to one another at one of their ends and hinged, at the opposite ends, respectively to the bonnet and to the body of the vehicle. When the bonnet is open, the two levers are held by a fixing mechanism in a position so that they are aligned with one another, acting as a stay to support the bonnet. To lower and close the bonnet, the fixing mechanism must be released manually using a Bowden cable.

[0005] While eliminating the need for a rod that must be raised manually when opening the bonnet, the solution known in the prior art described above makes closing the bonnet a relatively complex operation and comprises a relatively large number of components.

[0006] Moreover, when the bonnet is open, the position of the normal supporting rod or the position of the arms described in EP1719865 laterally limits the amount of space available for maneuvering when carrying out maintenance in the engine compartment.

[0007] The purpose of the present invention is to provide a device for hinging and supporting a vehicle bonnet, which overcomes the drawbacks described above in a simple and cost-effective manner.

[0008] According to the present invention a device for hinging and supporting a vehicle bonnet is provided, said device comprising:

- a first bracket suitable to be fixed to said bonnet;
- a second bracket suitable to be fixed to a body of the vehicle and directly hinged to said first bracket about a substantially horizontal axis of rotation in order to allow said bonnet to pivot between a raised position and a lowered position;
- supporting means able to move between a first operating position, in which they support said bonnet in the raised position, and a second operating position, corresponding to the lowered position of said

bonnet;

characterized in that said supporting means comprise a toggle lever mechanism consisting of a first and a second lever directly hinged to one another about a first hinge axis; said first lever being directly hinged to said first bracket about a second hinge axis parallel to said first hinge axis; said second lever being directly hinged to said second bracket about a third hinge axis parallel to said first hinge axis.

[0009] The present invention will now be described with reference to the attached drawings, illustrating a nonlimiting embodiment thereof, in which:

- Figure 1 shows a perspective view of a preferred embodiment of the device for hinging and supporting a vehicle bonnet according to the present invention;
- Figure 2 shows the device in Figure 1 from a different perspective and in a larger scale;
- Figure 3 is similar to Figure 2 and shows the device in a different operating position.

[0010] In Figure 1, reference number 1 indicates a hinging and supporting device to couple a bonnet 2, in particular an engine bonnet (partially and schematically illustrated by means of the dashed line) to a body 3 of a vehicle, in particular a motor vehicle.

[0011] The device 1 comprises a bracket 4, which is fixed to the body 3, consists of a single piece, and comprises three walls 9, 10, 11 which are joined together. The wall 9 defines a substantially horizontal base; the wall 10 is substantially vertical and is at the rear, i.e. it faces a passenger compartment of the vehicle; and the wall 11 is arranged laterally and is also substantially vertical. The bracket 4 also comprises an appendix 12, extending in a cantilevered fashion from the upper end of the wall 10 in a position facing the wall 11; and a stop element 13 (Figure 2), extending in a cantilevered fashion from an intermediate front portion 14 of the wall 11 in a position facing the walls 9 and 10.

[0012] The device 1 comprises a bracket 15, which comprises two end portions 16 and 17 arranged opposite one another and coupled to the bonnet 2 and, respectively, to the bracket 4. The portion 16 is directly fixed to a lower surface of the bonnet 2, while the portion 17 is directly hinged to an upper end 18 of the wall 11 to pivot about a horizontal axis 19, which is fixed in relation to the body 3, and thus make the bonnet 2 pivot between a closed lowered position and an open raised position.

[0013] The portion 17 is substantially rectilinear, it is joined to an intermediate portion 20 of the bracket 15 via a curved portion 21, and has a slit 22 (Figure 3) that is engaged by the appendix 12 when the bonnet 2 is arranged in the closed lowered position.

[0014] The device 1 comprises a toggle lever system 23, which consists of an upper lever 24 and a lower lever 25 having respective plate shaped end portions 26 and 27 that are hinged about an axis 29. The axis 29 is parallel

to the axis 19, and fixed in relation to each of the levers 24 and 25, and is able to move from and towards the axis 19 during the closing and, respectively, opening of the bonnet 2.

[0015] The lever 24 has an upper end 30 (Figure 1), which is opposite the portion 26 and is directly hinged to the portion 20 of the bracket 15 about an axis 31. The axis 31 is parallel to the axes 19 and 29 and is fixed in relation to each of the levers 5 and 24. Similarly, the lever 25 has a lower end 33, which is opposite the portion 27 and is directly hinged to a lower and front portion 34 of the wall 11 about an axis 35. The axis 35 is also parallel to the axes 19 and 29 and fixed with respect to the lever 25 and the bracket 4.

[0016] The portions 26 and 30 of the lever 24 are staggered in relation to one another in a direction parallel to the axes 29 and 31 and are joined together by means of a transversal portion 36 which faces the bracket 15 in a direction at right angles to the axis 19. Therefore, the portions 26 and 27 and, thus, the hinge defined by the axis 29 are aligned vertically with the bracket 15. The lever 24 also comprises a tab 37, which extends in a cantilevered fashion from the portion 26 in a position facing the bracket 15 and defines a grip portion for a user, to manually push the toggle lever mechanism 23 from a first operating position, corresponding to the open raised position of the bonnet 2, against the force exerted by a spring 38. The spring 38 is of the coil type and the ends of said spring are hooked to the wall 10 of the bracket 4 and, respectively, to the portion 27 of the lever 25. In the first operating position, the toggle lever mechanism 23 is arranged in the end-of-travel position, resting against the stop element 13 in a direction substantially parallel to the force exerted by the spring 38. In this way, the toggle lever mechanism 23 supports the bonnet 2 in the open raised position. In particular, an intermediate portion 39 of the lever 25 has a hollowed rear edge 40 that is engaged by the stop element 13. At the same time, the portion 36 is arranged in a position adjacent to the portion 21.

[0017] When the bonnet 2 is arranged in the closed lowered position, the toggle lever mechanism 23 is arranged in a second operating position, in which the axis 29 is further away from the axis 19. During the movement between the two operating positions, the toggle lever mechanism 23 moves beyond a dead center position, in which the axes 29, 31 and 35 are aligned in relation to one another and, thus, the bonnet 2 is raised to the maximum height allowed by the toggle lever mechanism 23.

[0018] When the bonnet 2 is pivoted manually in order to be opened, the lever 25 is automatically raised due to the pulling force exerted by the spring 38 towards the bracket 4 and the upward force exerted by the bonnet 2 via the lever 24. When the bonnet 2 is raised with the maximum angle of rotation, the toggle lever mechanism 23 is in the dead center position, but the force exerted by the spring 38 means this position is automatically exceeded. Subsequently, the force of the spring 38, com-

bined with the weight of the bonnet 2 tend to move and hold the toggle lever mechanism 23 in the first operating position. At this stage, the weight of the bonnet 2 is discharged by the bracket 15 onto the bracket 4 via the hinges of the lever mechanism 23 and via the support defined by the stop element 13, without the need for a manual support.

[0019] During the closing of the bonnet 2, however, the tab 37 must be operated manually to move the toggle lever mechanism 23 away from the first operating position, by raising the bonnet 2 slightly with respect to the raised open position, and then to move beyond the dead center position. Once the dead center position has been passed, the bonnet 2 can simply be allowed to lower itself due to the effect of its weight in order to move the toggle lever mechanism 23 back to and hold it in the second operating position.

[0020] In the second operating position of the toggle lever mechanism 23, the appendix 12 engages the slit 22 in order to block the bracket 15 in case the hinge defined by the axis 19 should give way during a collision or accident.

[0021] From the above description it is clear that the device 1 holds the bonnet 2 in the raised position in a simple manner, with a relatively small number of components and limited overall dimensions.

[0022] The device 1 has the function of making the bonnet 2 pivot by means of the hinge defined by the axis 19, and also the function of keeping the bonnet 2 blocked in the open raised position. In particular, the device 1 holds the bonnet 2 open without obstructing the engine compartment laterally, thus making the engine compartment more accessible for servicing, in that the toggle lever mechanism 23 is connected directly to the brackets 4 and 15.

[0023] The solution is also made extremely simple by the presence of the dead center position and the end-of-travel position defined by the stop element 13, which means there is no need for any additional blocking mechanisms to keep the levers 24 and 25 in the relative fixed position when they must support the weight of the bonnet 2.

[0024] Moreover, the operations to move the bonnet 2 to the open raised position are simple, in that the toggle lever mechanism 23 moves to its first operating position automatically, thanks to the spring 38. The device 1 is also relatively cheap and relatively light.

[0025] Lastly, from the above description, it is clear that modifications and variations may be made to the device 1 described herein without departing from the scope of the present invention as set forth in the appended claims.

[0026] In particular, the end-of-travel surface for the first operating position of the toggle lever mechanism 23 could be defined directly by a portion of the bracket 4, and/or could be provided by the bracket 15, and/or could support the lever 24 with or instead of the lever 25.

[0027] Furthermore, the axes 29, 31 and 35, while par-

allel to one another, need not be parallel to the axis 19 and/or may be defined by ball joints.

[0028] Lastly, the spring 38 could be of a different type, for example it could be a torsion spring arranged about the axes 29, 31 or 35, or it could be arranged in a different position with respect to that described by way of example.

Claims

1. Device (1) for hinging and supporting a vehicle bonnet (2), said device comprising:

- a first bracket (15) suitable to be fixed to said bonnet (2);
- a second bracket (4) suitable to be fixed to a body (3) of the vehicle and pivotally connected to said first bracket (15) in order to allow said bonnet (2) to pivot between a raised position and a lowered position;
- supporting means (23) able to move between a first operating position, in which they support said bonnet (2) in the raised position, and a second operating position, corresponding to the lowered position of said bonnet (2); wherein

said supporting means comprise a toggle lever mechanism (23) consisting of a first (24) and a second (25) lever directly hinged to one another about a first hinge axis (29); said first lever (24) being directly hinged to said first bracket (15) about a second hinge axis (31) parallel to said first hinge axis (29); said second lever (25) being directly hinged to said second bracket (4) about a third hinge axis (35) parallel to said first hinge axis (29),

characterized in that said first bracket (15) is directly hinged to said second bracket (4) about a substantially horizontal axis of rotation (19).

2. Device according to claim 1, **characterized in that** said first and second operating positions of said toggle lever mechanism (23) are arranged on opposite sides of a dead center position, wherein said first, second and third hinge axes (29,31,35) are aligned in relation to one another.
3. Device according to claim 2, **characterized by** comprising elastic means (38) which exert an elastic force in order to move said toggle lever mechanism (23) automatically towards said first operating position when said bonnet (2) is pivoted towards its raised position.
4. Device according to claim 3, **characterized in that** said elastic means comprise a coil spring (38) having the ends hooked to said second bracket (4) and, respectively, to said second lever (25).

5. Device according to any of the claims from 2 to 4, **characterized by** comprising stop means (13) provided by said second bracket (4) in a fixed position and defining an angular end-of-travel position for at least one of said first and second levers (24,25) in said first operating position.

6. Device according to claim 5, **characterized in that** said stop means (13) define a support to carry the weight of said bonnet (2) which is discharged by said first bracket (15) onto said second bracket (4) via said toggle lever mechanism (23).

7. Device according to any of the previous claims, **characterized by** comprising a grip portion (37) provided by one of said first and second levers (24,25) and which can be operated manually to pull said toggle lever mechanism (23) towards said second operating position.

8. Device according to any of the previous claims, **characterized in that** said first, second and third hinge axes (29,31,35) and said axis of rotation (19) are parallel to one another.

Patentansprüche

1. Vorrichtung (1) zum Anlenken und Abstützen einer Fahrzeughaube (2), wobei die Vorrichtung Folgendes umfasst:

- eine erste Stütze (15), die dafür geeignet ist, an der Haube (2) befestigt zu werden,
- eine zweite Stütze (4), die dafür geeignet ist, an einer Karosserie (3) des Fahrzeugs befestigt und gelenkig mit der ersten Stütze (15) verbunden zu werden, um zu ermöglichen, dass die Haube (2) zwischen einer erhöhten Stellung und einer abgesenkten Stellung schwenkt,
- Abstützmittel (23), die dazu in der Lage sind, sich zwischen einer ersten Betriebsstellung, in der sie die Haube (2) in der erhöhten Stellung abstützen, und einer zweiten Betriebsstellung, die der abgesenkten Stellung der Haube (2) entspricht, zu bewegen, wobei
- die Abstützmittel einen Kniehebelmechanismus (23) umfassen, der aus einem ersten (24) und einem zweiten (25) Hebel besteht, die um eine erste Scharnierachse (29) unmittelbar aneinander angelenkt sind, wobei der erste Hebel (24) um eine zweite Scharnierachse (31), parallel zu der ersten Scharnierachse (29), unmittelbar an die erste Stütze (15) angelenkt ist, wobei der zweite Hebel (25) um eine dritte Scharnierachse (35), parallel zu der ersten Scharnierachse (29), unmittelbar an die zweite Stütze (4) angelenkt ist,

dadurch gekennzeichnet, dass die erste Stütze (15) um eine im Wesentlichen horizontale Drehachse (19) unmittelbar an die zweite Stütze (4) angelehnt ist.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die erste und die zweite Betriebsstellung des Kniehebelmechanismus (23) auf entgegengesetzten Seiten einer Totpunktstellung angeordnet sind, wobei die erste, die zweite und die dritte Scharnierachse (29, 31, 35) im Verhältnis zueinander ausgerichtet sind.
3. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** sie elastische Mittel (38) umfasst, die eine elastische Kraft ausüben, um den Kniehebelmechanismus (23) selbsttätig zu der ersten Betriebsstellung hin zu bewegen, wenn die Haube (2) zu ihrer erhöhten Stellung hin geschwenkt wird.
4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** die elastischen Mittel eine Schraubenfeder (38) umfassen, deren Enden an die zweite Stütze (4) bzw. an den zweiten Hebel (25) gehakt sind.
5. Vorrichtung nach einem der Ansprüche 2 bis 4, **dadurch gekennzeichnet, dass** sie Anschlagmittel (13) umfasst, die durch die zweite Stütze (4) in einer unbeweglichen Stellung bereitgestellt werden und eine Endlagen-Winkelstellung für wenigstens einen von dem ersten und dem zweiten Hebel (24, 25) in der ersten Betriebsstellung definieren.
6. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** die Anschlagmittel (13) eine Abstützung definieren, um das Gewicht der Haube (2) zu tragen, das über den Kniehebelmechanismus (23) durch die erste Stütze (15) auf die zweite Stütze (4) abgeführt wird.
7. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie einen Griffabschnitt (37) umfasst, der durch einen von dem ersten und dem zweiten Hebel (24, 25) bereitgestellt wird und der von Hand betätigt werden kann, um den Kniehebelmechanismus (23) zu der zweiten Betriebsstellung hin zu ziehen.
8. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die erste, die zweite und die dritte Scharnierachse (29, 31, 35) und die Drehachse (19) parallel zueinander sind.

Revendications

1. Dispositif (1) permettant d'articuler et soutenir un ca-

pot de véhicule (2), ce dispositif se composant :

- d'un premier support (15) destiné à être fixé sur le capot (2) ;
- d'un second support (4) destiné à être fixé sur le châssis (3) de véhicule *et solidarisé par un assemblage à pivot* avec le premier support (15) afin de permettre au capot (2) de pivoter entre une position haute et une position basse ;
- des éléments d'appui (23) pouvant se déplacer entre une première position de fonctionnement, dans laquelle ils soutiennent ledit capot(2) en position haute, et une seconde position de fonctionnement correspondant à la position basse du capot (2) ;

où lesdits éléments d'appui comprennent un mécanisme à leviers articulés (23) se composant d'un premier levier (24) et d'un second levier (25) directement reliés l'un à l'autre par un premier axe charnière (29) ; le premier levier (24) étant directement relié au premier support (15) par un second axe charnière (31) parallèle au premier axe charnière (29) ; le second levier (25) étant directement relié au second support (4) par un troisième axe charnière(35) parallèle au premier axe charnière (29)

se caractérisant par le fait que *le premier support (15) est directement articulé sur le second support (4) sur un axe de rotation presque horizontal (19).*

2. Dispositif tel que décrit dans la Revendication 1, **caractérisé par le fait que** les première et seconde positions de fonctionnement du mécanisme à leviers articulés (23) se trouvent de part et d'autre d'une position de point mort, dans laquelle les premier, second et troisième axes charnière (29, 31, 35) sont alignés les uns par rapport aux autres.
3. Dispositif tel que décrit dans la Revendication 2, **se caractérisant par** des éléments élastiques (38) qui exercent une force élastique permettant de déplacer automatiquement le mécanisme à leviers articulés (23) dans la première position de fonctionnement lorsque le capot (2) pivote en position haute.
4. Dispositif tel que décrit dans la Revendication 3, **se caractérisant par le fait que** les éléments élastiques comprennent un ressort en spirale (38) dont les extrémités sont accrochées au second support (4) et, respectivement, au second levier (25).
5. Dispositif tel que décrit dans toute revendication 2 à 4, **se caractérisant par** le fait de comprendre des éléments d'arrêt (13) se trouvant sur le second support (4) dans une position fixe et définissant une position de fin de course angulaire pour au moins l'un des premier et second leviers (24, 25) dans la première position de fonctionnement.

6. Dispositif tel que décrit dans la Revendication 5, **se caractérisant par le fait que** les éléments d'arrêt (13) forment un support pour soutenir le poids dudit capot (2) qui est porté sur le second support (4) via le mécanisme à leviers articulés (23). 5
7. Dispositif tel que décrit dans l'une des revendications précédentes, **se caractérisant par** le fait de comprendre un élément de prise (37) se trouvant sur l'un des premier et second leviers (24, 25) et qui peut être actionné manuellement pour tirer le mécanisme à leviers articulés (23) vers la seconde position de fonctionnement. 10
8. Dispositif tel que décrit dans l'une des revendications précédentes, se caractérisant pas le fait que les premier, second et troisième axes (29, 31, 35) et l'axe de rotation (19) sont parallèles. 15

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FIG. 1

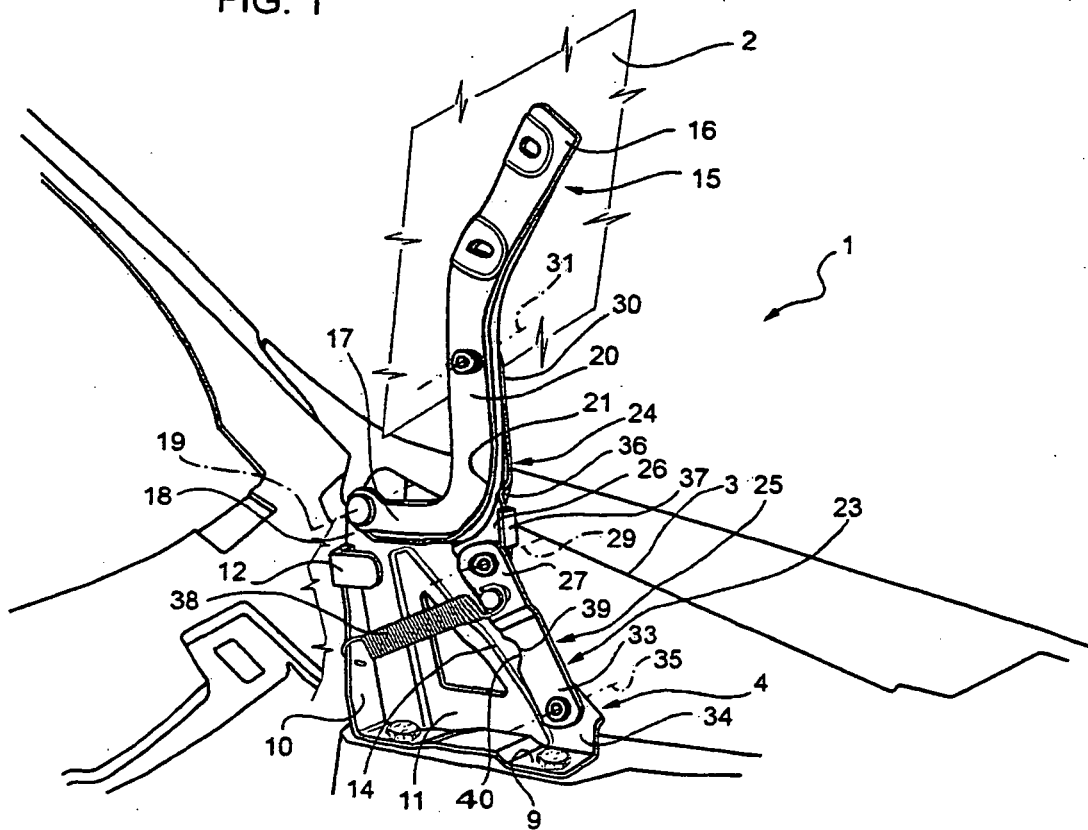


FIG. 2

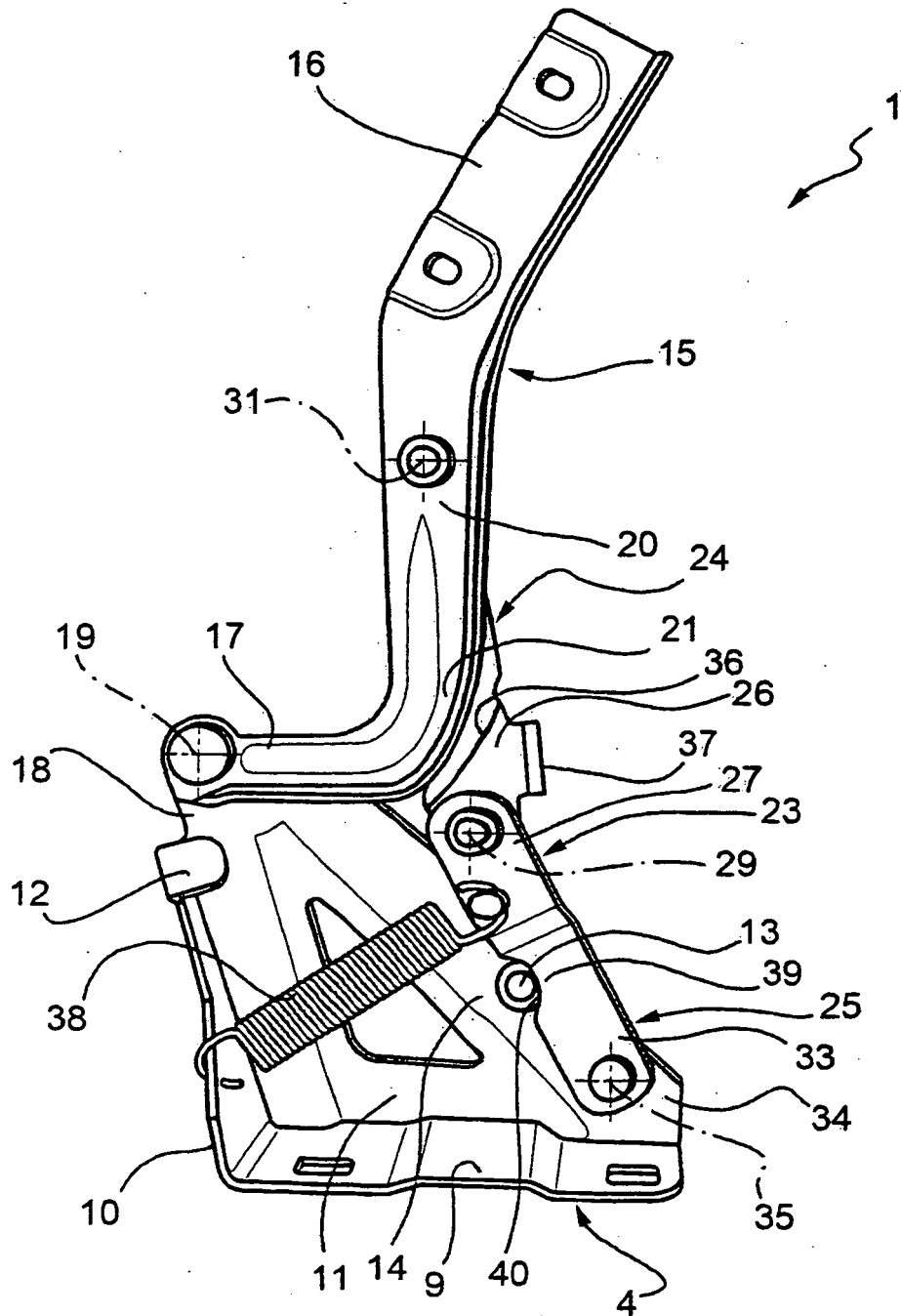
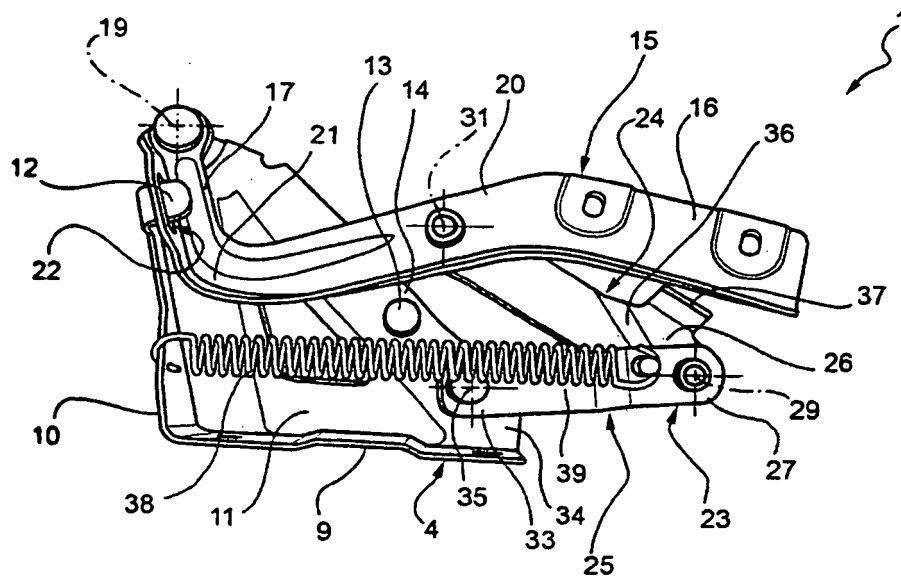


FIG. 3



REFERENCES CITED IN THE DESCRIPTION

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