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(54) MECHANISM FOR SMOOTH OPENING AND RETAINING A CAR DOOR IN A DESIRED POSITION

MECHANISMUS ZUM GLEICHMÄSSIGEN ÖFFNEN UND HALTEN EINER AUTOTÜR IN EINER GEWÜNSCHTEN STELLUNG

MÉCANISME PERMETTANT D'EFFECTUER UNE OUVERTURE EN DOUCEUR ET UNE RETENUE D'UNE PORTIÈRE DE VÉHICULE AUTOMOBILE DANS UNE POSITION SOUHAITÉE

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Description

[0001] The subject of the invention is a mechanism for smooth opening and retaining of a car door in a desired position that gives an impression of "smooth opening" of a car door as with a known spring mechanism and it allows retaining of a car door during opening or closing in a desired position between the fully closed and fully open door and also blocking thereof in such position.

[0002] A technical problem successfully solved by the present invention is a structural solution to the problem of "smooth opening" and retaining of a car door in any intermediate position between the closed and fully open car door.

[0003] Currently known structural variants of car doors allow retaining of a door while it is opening in only two or mostly three positions that are normally determined by grooves on guides of door hinges. A car door (especially a heavy car door) controllably stops somewhere halfway while opening and in the position of the entirely open door. Certain force is needed to move the door in these positions. A problem that arises when getting out of a car in a narrow space (e.g. garage, parking box) lies in that one has to hold the door while getting out of the car to prevent it from hitting the neighbouring car or a garage wall, since there is too little space for the door to stop halfway.

[0004] EP 0 911 471 document discloses the positioner which holds a door or window panel at a required angle, using an electromechanical device for continuous adjustment of the opening angle and a pair of mechanical brake pads, cooperating with a holding element for the door or window panel. The brake pads are operated by an electric motor controlled via an electronic evaluation device with an movement sensor.

[0005] DE 4207706 document discloses the door restraint which consist of one part, esp. a mounting element, on one part of the door system and a second part, esp. a braking and locking element, on the other. The inclination of the door hinge axis from its normal position is detected, Its signal is used by a braking or clamping device to compensate the resulting self-drive of the door. Another device can be used to ensure unhindered door closure motion.

[0006] Apart, described mechanisms for stopping a car door do not provide for a feeling that a driver has when opening a car door with a spring mechanism and other known mechanisms do not allow retaining of a car door in any position.

[0007] The present invention provides a mechanism for smooth opening and retaining a car door in a desired position, which additionally gives an impression of "smooth opening" of a car door as with known spring mechanism in any desired position. Moreover, the conventional door checks including spring mechanism do not allow retaining a door in any desired position, but only in a number of discrete positions which correspond to the fixed indentation of the connecting rod.

[0008] The invention solves the set technical problem by means of the features of claim 1 or 2. According to a first embodiment of the invention, a braking mechanism fixes a car door in a desired position by means of a brake disk driven by an electric motor and thus fixes a connecting rod - sliding within a housing - fastened between a door and the bodywork of a car. Sliding of the rod depends on the mode of a micro switch controlled by a roller located within the housing under the influence of a spring. The roller is guided in an indentation in the housing, which is rigidly fastened to the bodywork by means of a guide.

[0009] The invention will now be explained in more detail by way of two embodiments and drawings representing in:

- **Figure 1** schematic view of arrangement of a mechanism for smooth opening and retaining of a car door in a desired position of the invention and the first embodiment;
- **Figure 2** physical basics of operation of a roller in an indentation in the mechanism for smooth opening and retaining of a car door in a desired position of the invention;
- **Figure 3** mechanism for smooth opening and retaining of a car door in a desired position of the invention and the first embodiment in the situation of a door in motion;
- **Figure 4** mechanism for smooth opening and retaining of a car door in a desired position of the invention and the first embodiment in the situation of a retained door;
- **Figure 5** schematic view of arrangement of a mechanism for smooth opening and retaining of a car door in a desired position of the invention and the second embodiment;
- **Figure 6** mechanism for smooth opening and retaining of a car door in a desired position of the invention and the second embodiment in the situation of a door in motion;
- **Figure 7** mechanism for smooth opening and retaining of a car door in a desired position of the invention and the second embodiment in the situation of a retained door.

[0010] A mechanism for smooth opening and retaining of a car door in a desired position of the invention and the first embodiment is shown in the enclosed drawings 1, 3 and 4. It consists of a connecting rod 1 fastened at one end via hinge 2 to a car door, wherein said connecting rod 1 slides through a housing 3 of the braking section of the mechanism, said housing 3 being fastened to the bodywork via guide 4 by way of a shaft 5,5'. The area of the housing 3 with the arranged guide 4 is provided with a semicircular indentation 9, into which a roller 6 arranged under a spring 7 and within said guide 4 fits and controls a micro switch 8 on said guide 4.

[0011] On said housing 3 there is also arranged an electric motor 10 with a shaft provided with a brake disk

11 and a sensor 12 of movement of said connecting rod 1.

[0012] The functioning of the mechanism for smooth opening and retaining of a car door in a desired position will be explained by way of enclosed drawings, of which Figure 3 shows a mechanism for smooth opening and retaining of a car door in a desired position of the invention in the situation of a door in motion, and Figure 4 illustrates a mechanism for smooth opening and retaining of a car door in a desired position of the invention and the first embodiment in the situation of a retained door.

[0013] As a car door is moved with a sufficient force, the distance L changes, since teeth of said brake disk 11 are in engagement with the teeth of said connecting rod 1 and in this way said housing 3 moves together with said connecting rod 1. In this moment, said roller 6 - despite the pressure of said spring 7 - displaces from said indentation 9 to a position at the edge of said indentation 9 (marking x in Figure 1), when a disk fastened on said spring 7 actuates said micro switch 8 (Figure 3). Said micro switch 8 actuates said electric motor 10 via a microprocessor (not shown in the figure), which lifts said brake disk 11 from the engagement with said connecting rod 1. Due to a reduced component of FI force forcing said roller 6, the pressure between the teeth of said brake disk 11 and said connecting rod 1 is reduced in a way that only small force is needed for disengagement and the teeth of both parts are not loaded. Said housing 3 re-assumes its original position due to the pressure of said spring 7. Said connecting rod 1 is now free and can freely move and the distance L can change. As a movement sensor 12 detects a movement of said connecting rod 1, said brake disk 11 is separated from said connecting rod 1. Immediately as the door stops, said movement sensor 12 actuates said electric motor 10, which lowers said brake disk 11 to said connecting rod 1 and the movement of said connecting rod 1 is blocked. Said connecting rod 1 can be moved only when the force on the door is such to overcome the pressure of said spring 7 exerted on said roller 6, which is then displaced from said indentation 9 and again actuates said micro switch 8 at the edge of said indentation by means of said disk.

[0014] The mechanism for smooth opening and retaining of a car door in a desired position of the invention and the second embodiment is shown in the enclosed drawings 5, 6 and 7. It consists of a connecting rod 13 fastened in this embodiment at one end to a car door, wherein said connecting rod 13 is linked via gear teeth 14 to a toothed pair of disks 14', 15 rotating within a housing 23 of the mechanism embedded on the bodywork of a car via shafts 18, 18'. The housing 23 is provided at one portion with a semicircular indentation 24, into which a roller 19 arranged in a guide 21 with a spring 20 fits and controls a micro switch 25.

[0015] In said housing 23 there is also arranged an electric motor 17 with a shaft provided with a toothed disk 15 and which lies in possible engagement with a toothed disk 14', and a sensor 16 of movement of said connecting rod 13.

[0016] The functioning of the mechanism for smooth opening and retaining of a car door in a desired position will be explained by way of enclosed drawings, of which Figure 6 shows a mechanism for smooth opening and retaining of a car door in a desired position of the invention and the second embodiment in the situation of a door in motion, and Figure 7 illustrates a mechanism for smooth opening and retaining of a car door in a desired position of the invention and the second embodiment in the situation of a retained door.

[0017] As a car door is moved with a sufficient force, the toothed pairs of disks 14' and 15 engage and therefore by moving said connecting rod 13 said housing 23 rotates as well. In this moment, said roller 19 - despite the pressure of said spring 20 - displaces from said indentation 24 to a position at the edge of said indentation 24 (marking x in Figure 1), when a support 22 of said roller 19 actuates a micro switch 25 (Figure 6). Said micro switch 25 actuates said electric motor 17 via a microprocessor (not shown in the figure), which lifts said toothed disk 15 from the engagement with said toothed disk 14', connected with said toothed disk 14 of said connecting rod 13. Due to a reduced component of FI force forcing said roller 19, the pressure between the teeth of said toothed disk 14 and said connecting rod 13 is reduced in a way that only small force is needed for disengagement and the teeth of both parts are not loaded. Said support 22 with said roller 19 re-assumes its original position due to the pressure of said spring 20. Said connecting rod 13 is now free and can freely move and the door may move. As a movement sensor 16 detects a movement of said connecting rod 13, said toothed disks 14' and 15 are no longer in engagement. Immediately as the door stops, said movement sensor 16 actuates said electric motor 17, which engages said toothed disks 14' and 15 and the movement of said connecting rod 13 is blocked. Said connecting rod 13 can be moved only when the force on the door is such to overcome the pressure of said spring 20 exerted on said roller 19, which is then displaced from said indentation 24 and again actuates said micro switch 25 at the edge of said indentation by means of said support 22.

[0018] In both embodiments, the arrangement of the connecting rod and the mechanism can also be reversed in a way that the mechanism is fastened to a car door and the connecting rod is fastened to the bodywork, without changing the essential elements of the structure and operation.

[0019] In this way said mechanism for smooth opening and retaining of a car door in a desired position according to the invention and the enclosed embodiments provides for opening of a car door with a certain initial force and its retention in each opened position.

Claims

1. A mechanism for smooth opening and retaining of a

car door in a desired position, comprising a connecting rod (1), wherein the connecting rod (1), adapted to be fastened at one end via a hinge (2) to the car door, slides through a housing (3) of a braking section of the mechanism and on said housing (3) there is also arranged an electric motor (10) with a shaft provided with a brake disk (11) and a sensor (12) of movement of said connecting rod (1),
characterised in that
the housing (3) is adapted to be fastened to the bodywork of the car via a guide (4) of the mechanism by way of a shaft (5,5') and in the area where said guide (4) is arranged, said housing (3) has a semicircular indentation (9), into which a roller (6) arranged under a spring (7) within said guide (4) fits and the roller (6) controls a micro switch (8) on said guide (4), wherein the movement sensor (12) and the micro switch (8) control the electric motor (10), so that the brake disk (11) can be set in or out of engagement with the connecting rod (1), such that the connecting rod (1) can move together or freely with respect to the housing (3).

2. A mechanism for smooth opening and retaining of a car door in a desired position, comprising a connecting rod (13), wherein the connecting rod (13) is adapted to be fastened at one end via a hinge to the car door, wherein said connecting rod (13) is linked via gear teeth (14) to a toothed disk (14') rotating within a housing (23) of the mechanism and in said housing (23) there is also arranged an electric motor (17),
characterised in that the housing (23) is adapted to be embedded on the bodywork of the car via shafts (18,18') and the housing (23) is provided at one portion with a semicircular indentation (24), into which a roller (19) arranged in a guide (21) of the mechanism with a spring (20) fits and controls a micro switch (25) with a support (22) of the roller (19) and the electric motor (17) comprises a shaft provided with one toothed disk (15) rotating within the housing (23) and which lies in possible engagement with the other toothed disk (14'), and the housing (23) includes a sensor (16) of movement of said connecting rod (13), wherein the movement sensor (16) and the micro switch (25) control the electric motor (17), so that said toothed pair of disks (14',15) can be set in or out of engagement with the connecting rod (13), such that the connecting rod (13) can move together or freely with respect to the housing (23).

Patentansprüche

1. Ein Mechanismus zum gleichmäßigen Öffnen und Halten einer Autotür in einer gewünschten Stellung mit einer Verbindungsstange (1), wobei die Verbindungsstange (1), die dazu ausgelegt ist, um an einem Ende über ein Scharnier (2) mit der Fahrzeugtür befestigt zu werden, durch ein Gehäuse (3) eines Bremsabschnitts des Mechanismus gleitet, und auf dem Gehäuse (3) sind ebenfalls ein Elektromotor (10) mit einer mit einer Welle ausgerüsteten Bremsscheibe (11) sowie ein Bewegungssensor (12) der Verbindungsstange (1) angeordnet,
dadurch gekennzeichnet, dass
das Gehäuse (3) zur Befestigung an der Karosserie des Kraftfahrzeugs ausgelegt ist über eine Führung (4) des Mechanismus mit Hilfe einer Welle (5,5'), und im Bereich, wo die Führung (4) angeordnet ist, das Gehäuse (3) eine halbkreisförmige Vertiefung (9) aufweist, in die eine unter einer Feder (7) angeordnete Rolle (6) im Inneren der Führung (4) passt und die Rolle (6) einen Mikroschalter (8) auf der Führung (4) steuert, wobei der Bewegungssensor (12) und der Mikroschalter (8) den Elektromotor (10) derart steuern, dass die Bremsscheibe (11) in oder außer Eingriff mit der Verbindungsstange (1) gebracht werden kann, so dass sich die Verbindungsstange (1) gleichzeitig oder frei bezüglich des Gehäuses (3) bewegen kann.

2. Ein Mechanismus zum gleichmäßigen Öffnen und Halten einer Autotür in einer gewünschten Position mit einer Verbindungsstange (13), wobei die Verbindungsstange (13) dazu ausgelegt ist, um an einem Ende über ein Scharnier an der Fahrzeugtür befestigt zu werden, wobei die Verbindungsstange (13) über eine Verzahnung (14) innerhalb eines Gehäuses (23) des Mechanismus mit einer drehbaren Zahnscheibe (14') verbunden ist, und innerhalb des Gehäuses (23) ebenfalls ein Elektromotor (17) angeordnet ist,
dadurch gekennzeichnet, dass
das Gehäuse (23) derart angepasst ist, um an der Karosserie eines Kraftfahrzeugs über Wellen (18, 18') eingebettet zu werden, und das Gehäuse (23) in einem Abschnitt mit einer halbkreisförmigen Vertiefung (24) versehen ist, in welche eine in einer Führung (21) des Mechanismus mit einer Feder (20) angeordnete Rolle (19) passt und einen Mikroschalter (25) mit dem Träger (22) der Rolle (19) steuert, und der Elektromotor (17) eine mit einer im Inneren des Gehäuses (23) drehbaren Zahnscheibe (15) versehene Welle umfasst, die in einem möglichen Eingriff mit einer Zahnscheibe (14') liegt, und das Gehäuse (23) einen Bewegungssensor (16) der Verbindungsstange (13) umfasst, wobei der Bewegungssensor (16) und der Mikroschalter (25) den Elektromotor (17) derart steuern, dass die genannten Verzahnungspaare der Scheiben (14',15) in oder außer Eingriff mit der Verbindungsstange (13) derart gebracht werden, dass sich die Verbindungsstange (13) gleichzeitig oder frei bezüglich des Gehäuses (23) bewegt.

Revendications

1. Un mécanisme permettant d'ouvrir en douceur et de retenir une portière de véhicule automobile dans une position souhaitée comprenant une tige de connexion (1), la tige de connexion (1), prévue pour être fixée au niveau d'une extrémité par l'intermédiaire d'une charnière (2) à la porte de la cabine, coulissant à travers un boîtier (3) d'une section de freinage du mécanisme et un moteur électrique (10) est agencé sur ledit boîtier (3) avec un arbre pourvu d'un disque de frein (11) et d'un capteur (12) de déplacement de ladite tige de connexion (1)
caractérisé en ce que
le boîtier (3) est prévu pour être fixé à la carrosserie de la voiture par l'intermédiaire d'un guide (4) du mécanisme via un arbre (5,5') et dans la zone où ledit guide (4) est agencé, ledit boîtier (3) est doté d'une indentation semi-circulaire (9), dans laquelle un rouleau (6) disposé sous un ressort (7) à l'intérieur dudit dispositif de guidage (4) s'insère et le rouleau (6) commande un micro-interrupteur (8) sur ledit guide (4), le capteur de mouvement (12) et le micro-interrupteur (8) commandant le moteur électrique (10), de sorte que le disque de frein (11) peut être mis en contact ou hors de contact avec la tige de connexion (1), de telle sorte que la tige de connexion (1) peut se déplacer simultanément ou librement par rapport au boîtier (3).

2. Un mécanisme permettant d'ouvrir en douceur et de retenir une portière de véhicule automobile dans une position souhaitée comprenant une tige de connexion (13), la tige de connexion (13) étant prévue pour être fixée au niveau d'une extrémité par une charnière à la porte de la cabine, ladite tige de connexion (13) étant reliée par l'intermédiaire d'une denture d'engrenage (14) à un disque denté (14') tournant à l'intérieur d'un boîtier (23) du mécanisme et un moteur électrique (17) étant également disposé dans ledit boîtier (23),
caractérisé en ce que
le boîtier (23) est conçu pour être encastré sur la carrosserie d'une voiture par l'intermédiaire d'arbres (18, 18') et le boîtier (23) est doté sur une partie d'une indentation semi-circulaire (24), dans laquelle un rouleau (19) disposé dans un guide (21) du mécanisme avec un ressort (20) s'insère et commande un micro-interrupteur (25) avec ledit support (22) du rouleau (19) et le moteur électrique (17) comprend une tige pourvue d'un disque denté (15) qui tourne à l'intérieur du boîtier (23) et qui se trouve dans une position lui permettant de s'engager avec un disque denté (14'), et le boîtier (23) comprend un capteur de déplacement (16) de ladite tige de connexion (13), le capteur de mouvement (16) et le micro-interrupteur (25) commandant le moteur électrique (17), de sorte que ladite paire de disques dentés (14',15) peut se trouver en contact ou hors de contact avec la tige de connexion (13), de telle sorte que la tige de connexion (13) peut se déplacer simultanément ou librement par rapport au boîtier (23).

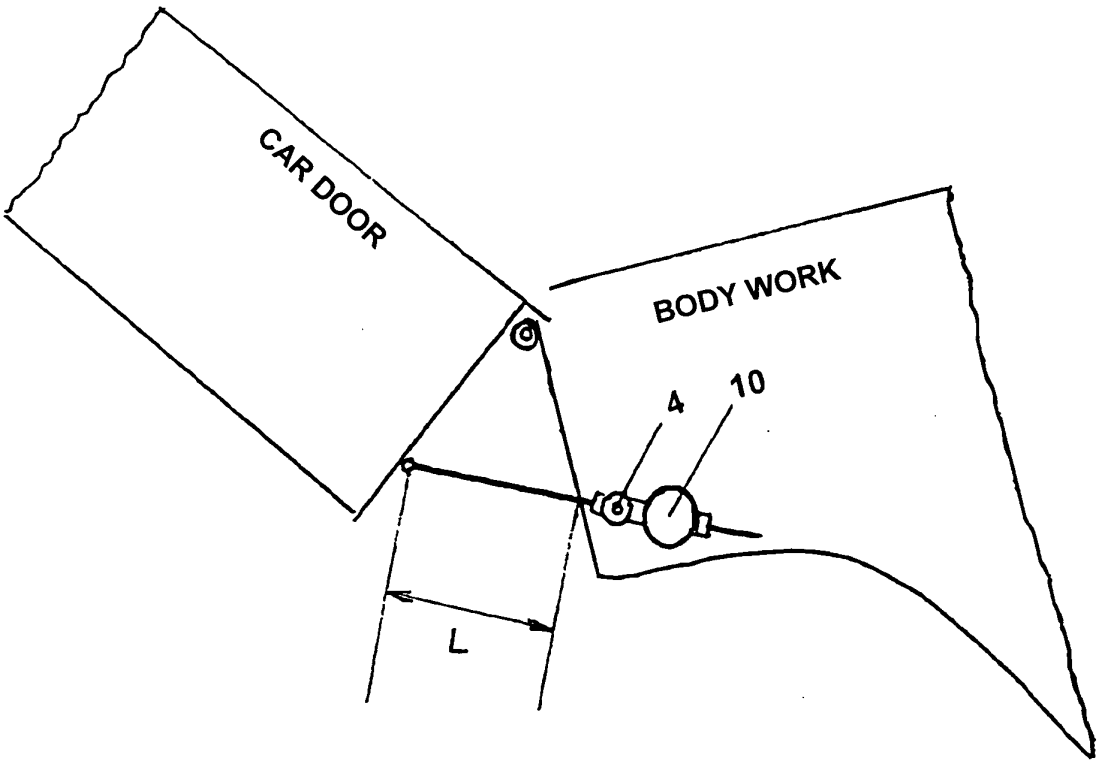

Figure 1

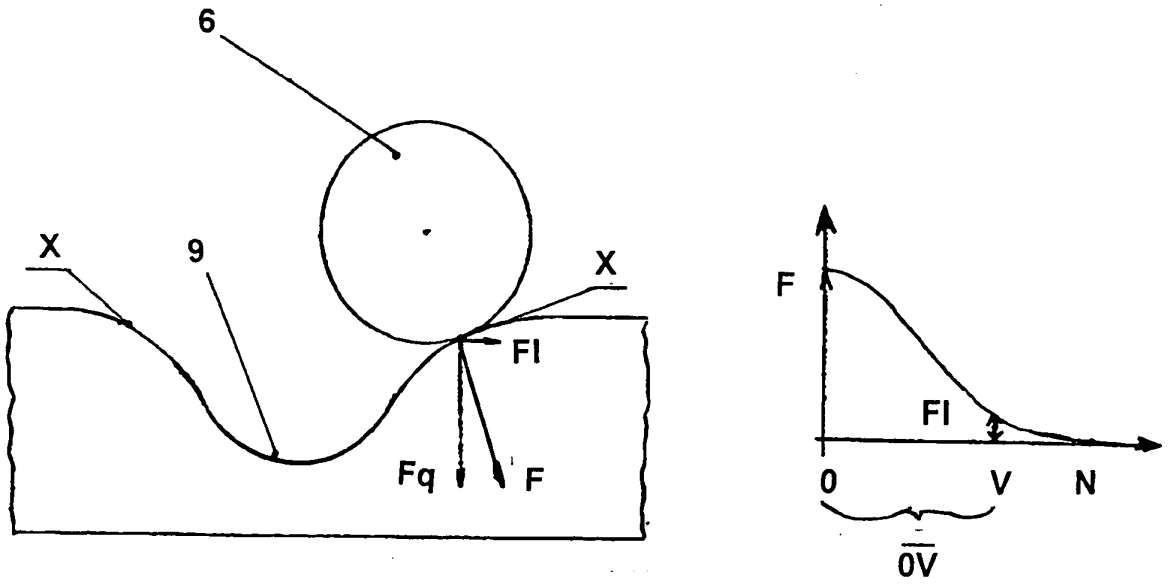

Figure 2

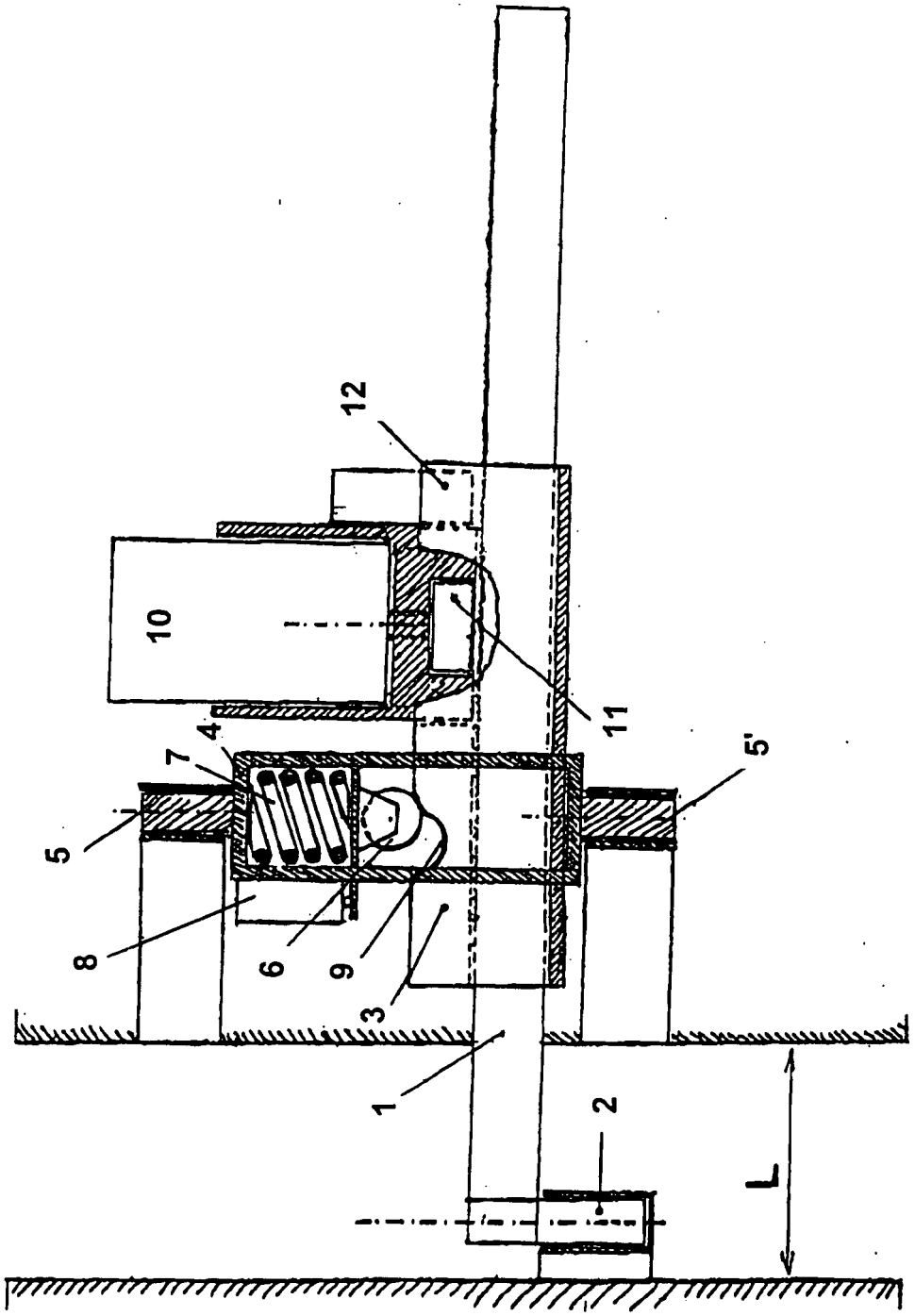

Figure 3

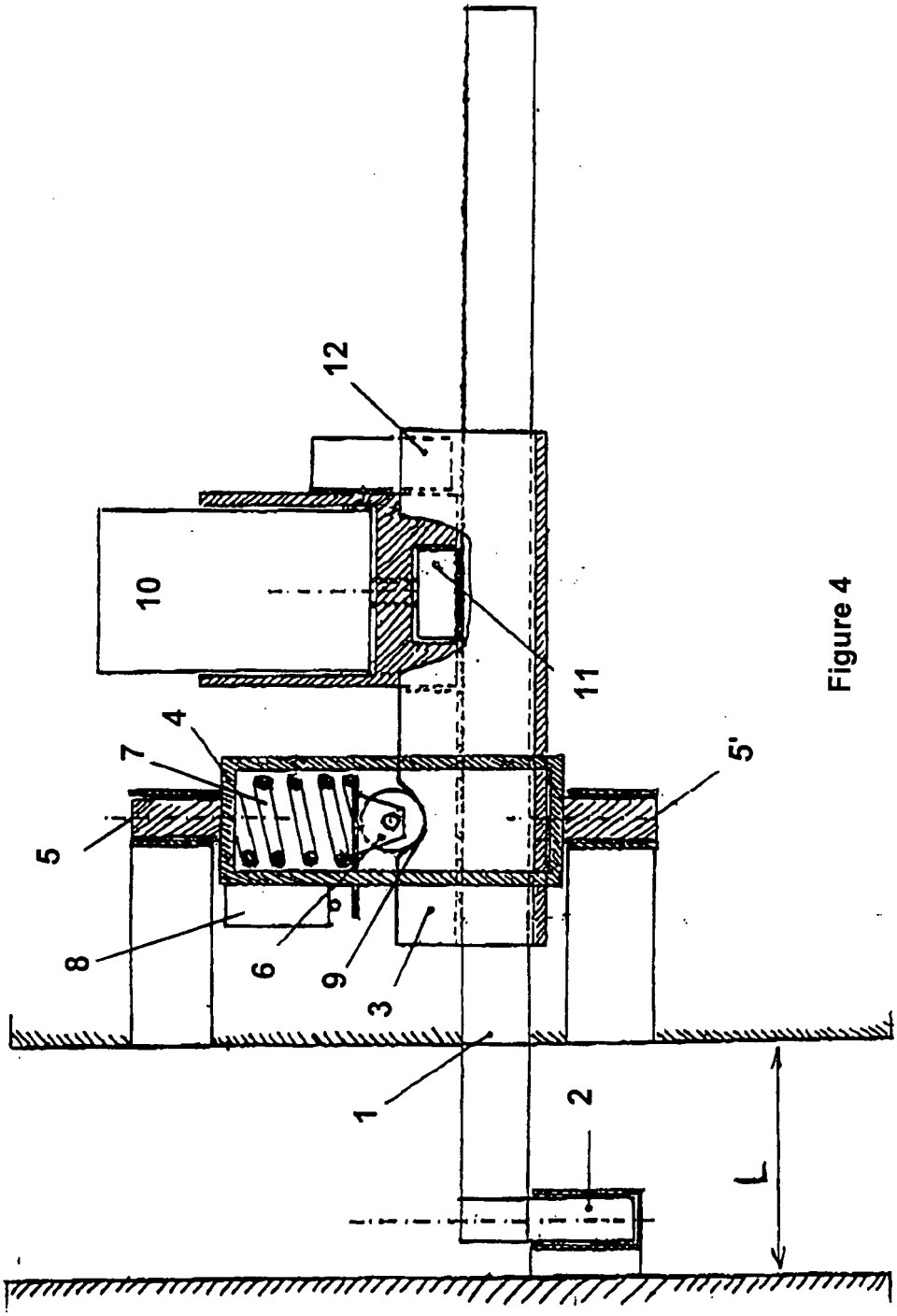

Figure 4

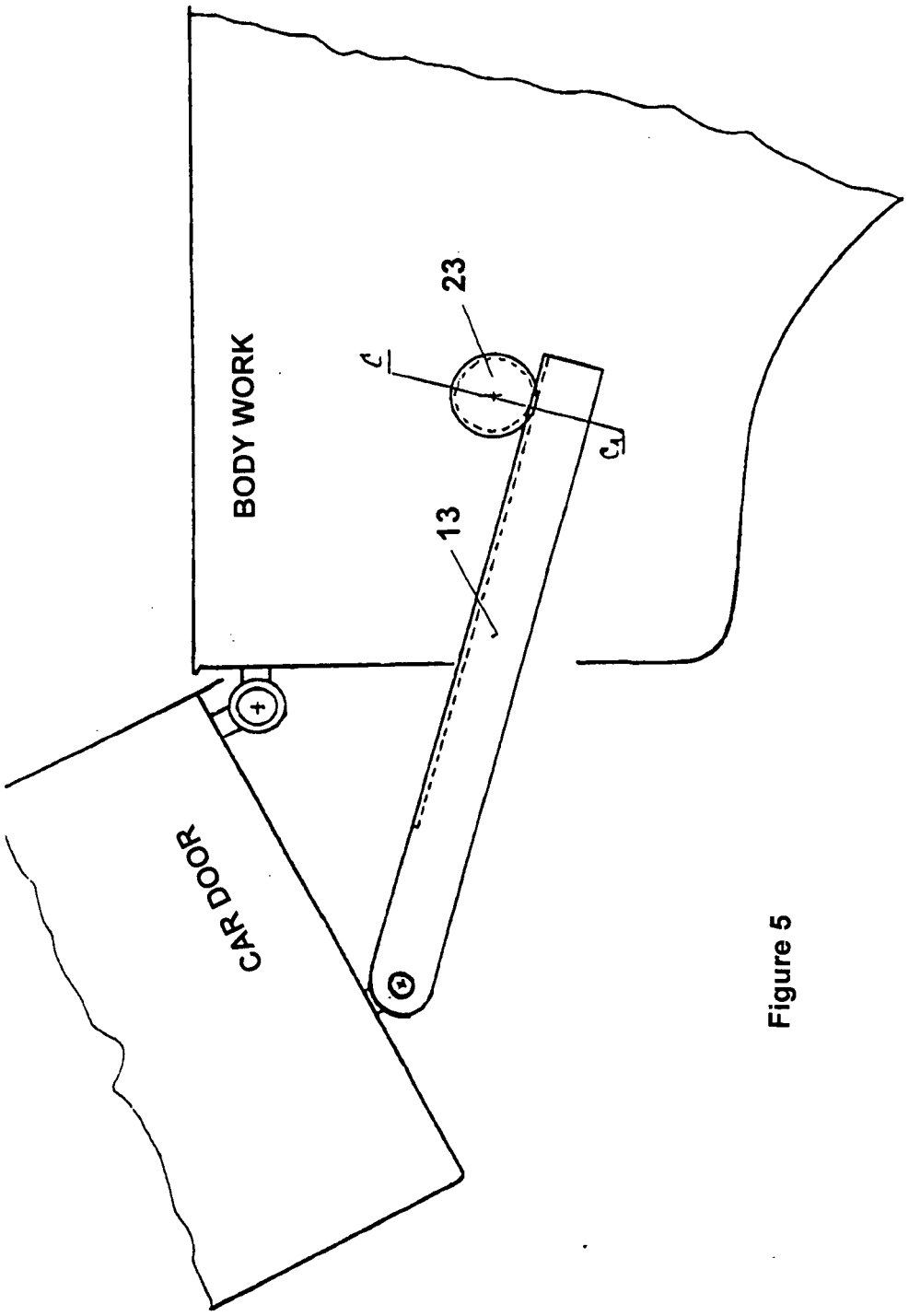

Figure 5

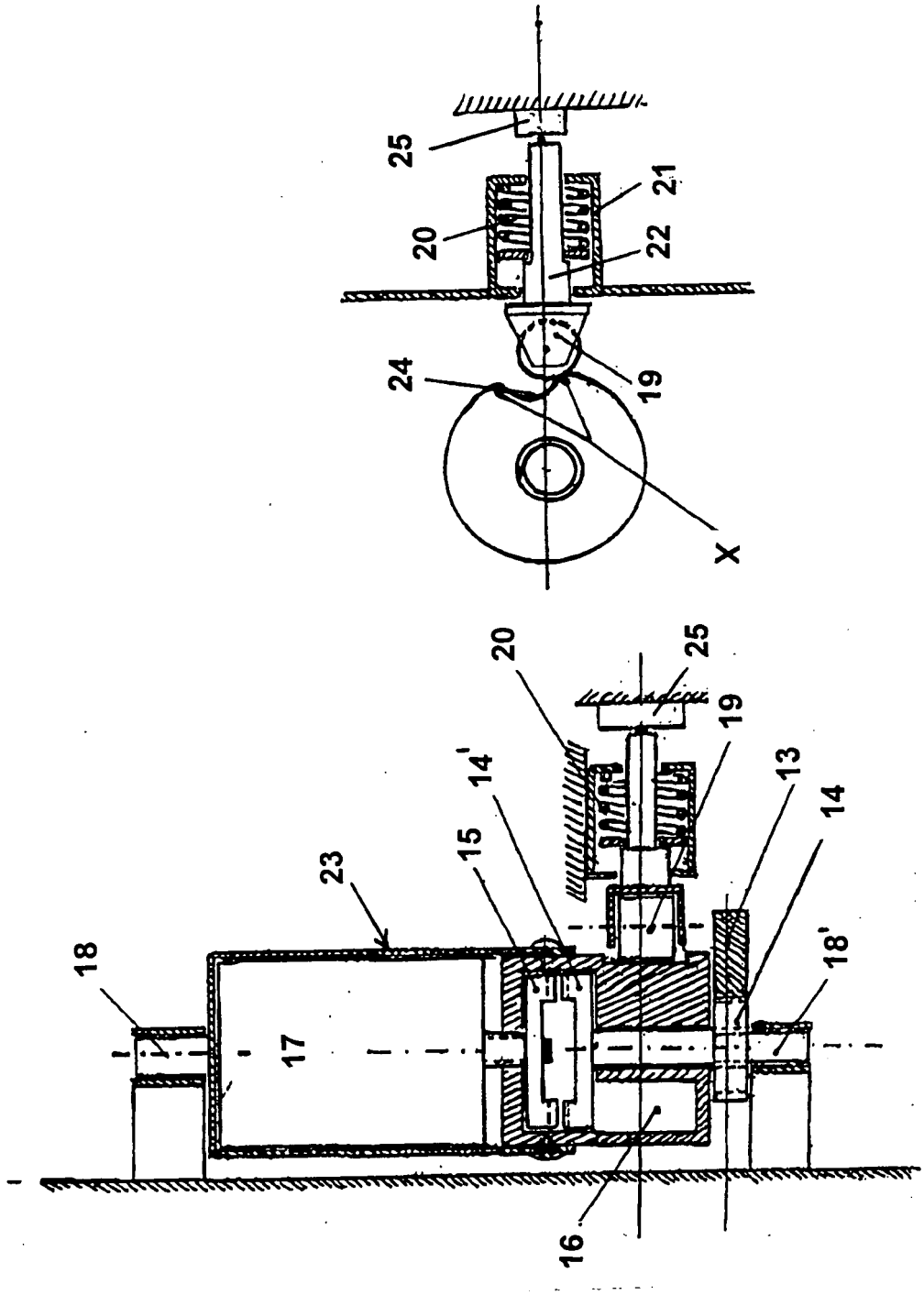

Figure 6

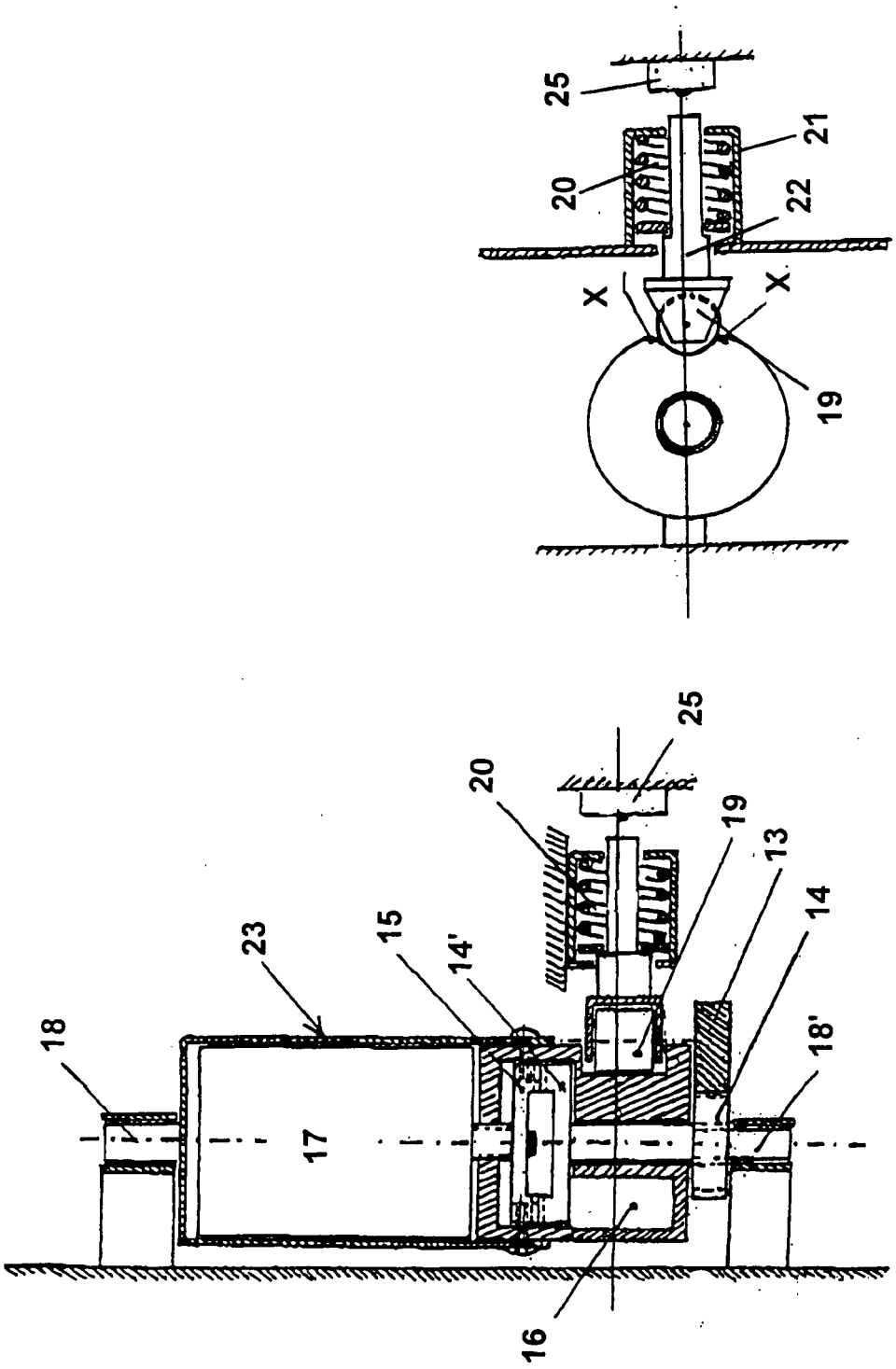

Figure 7

REFERENCES CITED IN THE DESCRIPTION

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