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(54) **Hinge for vehicle door, in particular of a van**

Scharnier für eine Fahrzeugtür, insbesondere für einen Transporter

Charnière pour porte de véhicule, en particulier d'un fourgon

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Description

FIELD OF THE INVENTION

[0001] The present invention refers to a hinge for vehicle door, in particular for a rear door of a van.

BACKGROUND ART

[0002] Commonly, industrial vehicles such as vans are provided with a rear door, usually with two wings, hinged according to a substantially vertical axis. Many of these doors allow opening of the wings to approximately 270°, i.e. with the wings disposed along the sides of the vehicle. Hinges of this type are provided with a movement with combined rotation about two different centres of rotation. A central body is hinged at one end to the wing and at the other to the angle iron on the vehicle chassis. This is because the hinge is usually fastened, as well as to the wing, also to a surface of the chassis adjacent to the wing and substantially coplanar and the centre of rotation of the wing must be made to project laterally beyond the outline of the vehicle to perform the rotation from 180 to 270° avoiding projecting hinges, which would not be tolerable on a vehicle. For this reason the hinge is produced so that rotation about a pivot closest to the wing can only start at an appropriate moment of wing opening, typically when the wing is already open to 180° by means of rotation on the other pivot. This can take place due to a mechanism that makes use of a sort of bolt slidable along the central body; the portion of pivot integral with the vehicle chassis and the portion integral with the wing have an external profile cooperating with the two ends of the bolt. The profiles are shaped so as to cause, in the point in which the axis of rotation must change, sliding of the bolt between two positions, in which the hinges are alternatively free.

[0003] This type of solution has some drawbacks. The friction between bolt and profiles of the hinges requires the use of wear-resistant materials, which nonetheless allow sliding without excessive friction. Even small clearances in the sliding fastening of the bolt on the central body can cause sticking, which could determine breakage of the hinge, besides causing considerable inconvenience for the user. Moreover, during manufacture of the vehicle, the hinges are generally mounted before the cataphoresis and painting treatments. Therefore, the material must also be non-receptive to these treatments, as a layer of deposited material would have to be removed to prevent sticking or in any case excessive friction or bonding. Small mounting errors can result in lack of synchronisation between sliding of the bolt of the upper and lower hinge of the wing.

[0004] Moreover, when the wings can be opened beyond 90° a stop system must be provided to prevent accidental opening beyond this limit, due to gusts of wind, the slope of the ground or the like, to prevent the doors from knocking against obstacles and causing possible

damage. For this purpose, additional spring devices are usually mounted, which must be released by the user (i.e. by acting on the wing with sufficient force or by releasing the device in another way). This increases manufacturing costs. It would therefore be desirable to obtain a hinge that allows the wing to be opened in the most continuous and fluid way possible, while allowing movement beyond the edge of the vehicle chassis, in particular when the hinge is fastened to a surface substantially coplanar with the closed wing, as is usually the case for the rear door of vans. Moreover, it must be possible to subject the hinge to the aforesaid treatments together with the vehicle, without this jeopardizing operation and without the need for supplementary operations for removal of deposited material and/or for protection of the reciprocally sliding parts. Finally, it would be desirable to integrate in the hinge a mechanism to lock opening in the desired positions (i.e. 90° and optionally 180°) without the need for additional locking devices.

[0005] The patent US2002/0194705 discloses a vehicle door hinge assembly comprising an articulated parallelogram and a lock mechanism for holding a door only in one predetermined open position.

SUMMARY

[0006] The aforesaid problems have been solved according to the present invention by a hinge for vehicle doors, in particular for the rear doors of vans, with rotation of the wings about substantially vertical axes, comprising a first element suitable to be fastened to a wing, a second element suitable to be fastened to a fixed part of the vehicle, a central body pivoted at one end to said first element and at an opposite end to said second element, a rod pivoted at one end to said first element and at an opposite end to said second element, wherein the pivot axes that pivot the rod to each of said elements are not coincident with the pivot axes of said central body.

[0007] The invention also refers to a vehicle, in particular a van having a door provided with one or more hinges as described above.

LIST OF FIGURES

[0008] The present invention will now be described by means of the detailed description of preferred, but not exclusive, embodiments, provided purely by way of example, with the aid of the accompanying figures, wherein:

[0009] Figures 1, 2 and 3 schematically represent respectively a front view, a sectional plan view according to the plane II-II in Figure 1 and an isometric view of a hinge (in particular the lower hinge of a wing of a rear door with two wings of a van), according to the present invention, in the position with the wing closed;

[0010] Figures 4, 5 and 6 schematically represent respectively a front view, a sectional plan view according to the plane V-V in Figure 4 and an isometric view of another hinge (in particular the upper hinge correspond-

ing to that of the previous figures) according to the present invention, with the wing in a closed position in Figures 4 and 5 and in a partly open (90°) position in Figure 6.

DETAILED DESCRIPTION OF AN EMBODIMENT

[0011] With reference to Figures 1, 2 and 3, a hinge according to the present invention presents a first element 1 suitable to be fastened in an appropriate position to the wing of a vehicle door. The surface 2 is suitable to be positioned against the surface of the wing. Fastening can take place through screws, welding, gluing, or in any other known way. The second element 3 is intended to be fastened, also in a known way, to the angle iron of the door, that is, to a column of the chassis positioned laterally to said wing, with the surface 4 against the surface of the angle iron. As usual, the surface of the wing and of the angle iron can form a continuous surface, i.e. they can be substantially coplanar (obviously, apart from more or less marked convexities), but the hinge, if appropriately designed, can also be applied to other types of structure.

[0012] The central body 5, of appropriate shape, is pivoted by means of the pins 6 and 7, according to two parallel axes (which can be substantially vertical with respect to the vehicle), respectively to the first and to the second element. The rod 8 is also pivoted in an appropriate manner to said two elements by means of the pins 9 and 10, also parallel, but not coincident with the pivot axes of the central body. The rod and the body will be shaped so that they do not interfere during the entire movement. A mechanism has been produced, which can be defined as articulated quadrilateral, whose sides are, with reference to Figure 2, the distance between the axes of the pins 6 and 9, integral with respect to the first element, the distance between the axes of the pins 7 and 10, integral with respect to the second element, the distance between the axes of the pins 9 and 10, integral with the rod, the distance between the axes of the pins 6 and 7 integral with the body 5 (the sides integral with the rod and central body cross in the case described). The pins are represented integral with the first and second elements, while the corresponding eyelets are on the rod and central body. Naturally, a different solution can be chosen if desired. Bushings 20 made of an appropriate material (for example, nylon or PTFE) can be interposed between pin and eyelet. This eliminates problems caused by painting and cataphoresis treatments: the pins and corresponding eyelets are not reached by these treatments given the presence of the bushing, which in any case can be made of a material that is not receptive to deposition of the layers of paint. Moreover, with appropriate materials of the bushings lubrication is not necessary. From Figure 2 operation of the device can be easily understood: rotation of the central body 5 about the pin 7 causes a combined rotation of the first element 1 about the pin 6, so that the surface 2 can rotate to 270° and beyond with respect to

the original position, while the pin 6 moves towards positions in which the door open beyond 180° cannot interfere with the edge of the vehicle and can be disposed along the side thereof, if desired. The rod 8 is shaped so that it does not interfere for its entire travel with other components; for example, the curve 11 allows it to reach the closed position against the pin 7 without interferences. The central body 5 can be concave, with the concavity facing the vehicle, to substantially contain the rod and the mechanism which will be described below, protecting it. It too will have a shape suitable to allow travel of the rod. Those skilled in the art can dimension the kinematic mechanism appropriately, for example the distances between the pins and their position according to requirements. The drawings provide an example of embodiment of a form of application suitable for use on a van.

[0013] The hinge according to the present invention also provides for the possibility of integrating a system for locking in the partly open positions (for example 90° and/or 180°) in which it is desirable, without the need for additional locking and release devices to be mounted separately. It is also possible not to use systems, such as magnets, commonly utilized to hold the wing against the side in the position open to 270°.

[0014] According to an embodiment of the invention, there can be provided an appropriately shaped profile on one of the components of the hinge and a follower, suitable to interact with said profile to generate a return force, when the wing is in a predetermined position that must be overcome, acting on the wing, to remove the wing from said position. Preferably, the follower is an elastic element or is pressed against the profile by an elastic element, such as a spring. According to an embodiment, the two components involved are the central body and the rod.

[0015] According to a preferred embodiment shown in the figures, the profile is obtained on a lateral face of the rod and the follower 13 is secured to the central body 5. Preferably, two profiles are provided on opposite faces of the rod and two followers are suitable to interact with the profiles. According to an embodiment of the invention, the profiles and the followers are disposed symmetrically with respect to the rod. This allows elimination of friction between the rod and the connection points with the central body due to the thrust that would be generated by a single spring. According to the embodiment represented, the follower 13 is pivoted to the central body, for example through the pin 14 screwed in the body and suitable to retain the follower, which can rotate about the pin to move towards or away from the profile 12; the inclination of the axis of the pin with respect to the central body can be chosen appropriately. A roller 15, suitable to come into contact with the profile, can be present. If wished, the roller can have a groove to guide the rod, or portions of the follower can exceed the roller to act as a guide. Possible movement of the rod must be taken into account. The follower can be pressed against the profile 12 by the spring 16 supported by the central body by means of the

fastening device 17, which can be a pin or a socket suitable to contain the end of the spring. This device can be fixed (for example it can be a pin riveted to or produced integral with the body 5, which is the most simple embodiment, but makes any replacement of components very difficult. Otherwise it can be a detachable and adjustable element, as in the case represented, where it has the structure of a threaded socket on the external surface, and screwed in a hole produced in the lateral portion 18 of the central body. In this way it can be detached easily and the load of the spring can be adjusted simply by screwing or unscrewing the socket 17. In the hinges of the figures, the profiles of the rod are provided with recesses in which the roller of the follower is located when the wing is in the open position in which it is to be stopped. In figure 3 the hinge is in the closed position, so that stopping by the hinge is not necessary. The rollers of the followers are not located in the recesses of the profile. The roller can be made of appropriate material. It must be noted that the roller on profile coupling can be structured so as to avoid generating excessive friction, eliminating problems related to any deposition of layers of paint or cataphoresis and subsequent elimination of the layer.

[0016] The hinge in Figure 6 is shown in the position open to 90°; here the wing is to be held in this position. The roller 15' is in the recess 19. To move the wing from the position indicated in any direction, it is necessary to apply sufficient force to overcome the resistance of the spring 16' (and of the corresponding spring 16", as two profiles and two followers are present).

[0017] In determining the load of the springs, it must be taken into account that there are two springs and that, in general, more than one hinge is provided for a wing, and each can have an analogous retaining system.

[0018] Recesses of the profile of the rod can be provided for all the positions desired, in the case represented they are provided for opening to 90 and 180°. As stated, recesses can also be provided for other positions, such as 270°, and therefore the device to hold the wing in this position can be eliminated. Inclination of the various recesses will correspond to the inclination taken by the roller with respect to the rod in the various open positions.

[0019] The solution represented is extremely advantageous, for compactness and operation other structures are possible, such as a traction spring connecting opposite followers.

[0020] Operation of the hinge of figures 4, 5, and 6, is entirely analogous to the previous one, with only the structure changing to adapt to the different position for which it is intended.

[0021] The hinges shown have a symmetrical structure, to be mounted both on a right and left wing of the door. Nonetheless, other configurations are possible.

[0022] Those skilled in the art can choose the most appropriate materials for the various components.

[0023] The hinge of the present invention can replace prior art hinges without requiring any type of modification

to the vehicle. Among the other advantages delineated above, they have a compact structure, are simple to assemble and their operation is smooth, without oscillations and without any possibility of sticking. The embodiments described also allow the elimination of separate retaining devices, such as stop bars.

Claims

1. Hinge for vehicle doors, comprising a first element (1) suitable to be fastened to a door wing, a second element (3) suitable to be fastened to a fixed part of the vehicle, a central body (5) pivoted at one end to said first element and at an opposite end to said second element, a rod (8) pivoted at one end to said first element and at an opposite end to said second element, wherein the pivot axes that pivot the rod (8) to each of said first and second elements (1,2) are not coincident with the pivot axes of said central body and means for holding the door in predetermined open positions, said means comprises at least one profile (12, 12') and a follower (13) suitable to cooperate with said profile, fastened to two different components (5, 8) of the hinge and **characterised in that** said profile is produced on a face of the rod (8) and the follower (13) is fastened rotatably to said central body (5).
2. Hinge as claimed in claim 1, suitable to allow a rotation of the wing of 270°.
3. Hinge as claimed in claim 1, wherein said means for holding the door in predetermined open positions are housed in said central body (5).
4. Hinge as claimed in claim 1, wherein, in a sectional plan view, the sides defining the rod (8) and central body (5) cross each other.
5. Hinge as claimed in claim 1, wherein two symmetrical profiles are produced on opposite faces of the rod (8) and two followers (13) are disposed symmetrically each to cooperate with one of said profiles.
6. Hinge as claimed in claim 5, wherein said profiles comprise recesses (19) at predetermined opening positions in which the wing is held.
7. Hinge as claimed in any one of claims 5 or 6, wherein said follower (13) is thrust towards said profile by a spring (16, 16', 16") secured to said central body (5),
8. Hinge as claimed in claim 7, wherein said spring (16, 16', 16") is supported by a socket (17) screwed in a lateral portion (18) of said central body (5), suitable to adjust the load of the spring (16, 16', 16").

9. Hinge as claimed in any one of the preceding claims, wherein a predetermined position corresponds to an opening of the wing to 90°.
10. Hinge as claimed in any one of the preceding claims, wherein a predetermined position corresponds to an opening of the wing to 180°.
11. Hinge as claimed in any one of the preceding claim, wherein a predetermined position corresponds to an opening of the wing to 270°.
12. Vehicle door, in particular the rear door of a van, provided with one or more hinges for a wing as claimed in any of the previous claims.
13. Door as claimed in claim 12, wherein rotation of the wing takes place about a substantial vertical axis.
14. Door with two wings as claimed in claim 12 or 13.
15. Vehicle, in particular an industrial vehicle provided with a door as claimed in any one of claims 12 to 14.

Patentansprüche

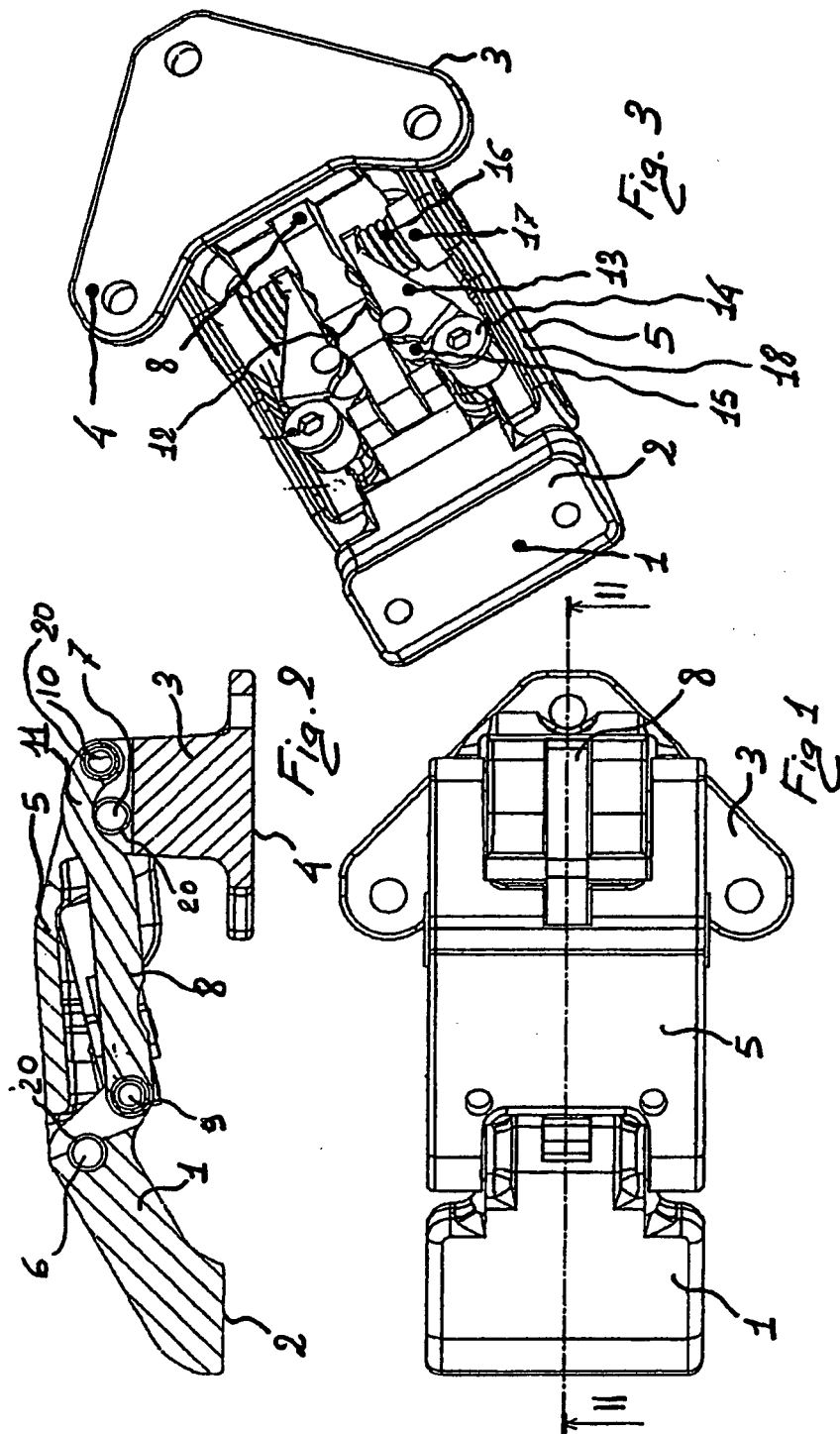
1. Scharnier für Fahrzeugtüren aufweisend ein erstes Element (1), geeignet um an einen Türflügel befestigt zu werden, ein zweites Element (3), geeignet an ein feststehendes Teil eines Fahrzeuges befestigt zu werden, einen schwenkbar an einem Ende des ersten Elements und an einem gegenüberliegenden Ende des zweiten Elements gelagerten Zentralkörper (5), eine schwenkbar an einem Ende des ersten Elements und an einem gegenüberliegenden Element des zweiten Endes schwenkbar gelagerte Stange (8), wobei die Schwenkachsen, welche die Stange (8) um jedes des ersten und zweiten Elementes schwenkt, nicht mit den Schwenkachsen des Zentralkörpers übereinstimmen, und Mittel, um die Tür in einer vorbestimmten Offenstellung zu halten, wobei diese Mittel zumindest ein Profil (12, 12') aufweisen und eine Nachführung (13), das geeignet mit dem Profil zusammenarbeitet, und an zwei verschiedene Komponenten (5,8) des Scharniers befestigt sind, **dadurch gekennzeichnet, dass** das Profil auf einer Seite der Stange (8) ausgearbeitet ist und die Nachführung (13) drehbar an dem Zentralkörper (5) befestigt ist.
2. Scharnier nach Anspruch 1, geeignet eine Drehung des Flügels um 270° zu ermöglichen.
3. Scharnier nach Anspruch 1, bei dem die Mittel zum Halten der Tür in einer vorbestimmten Offenstellung in dem Zentralkörper (5) aufgenommen sind.

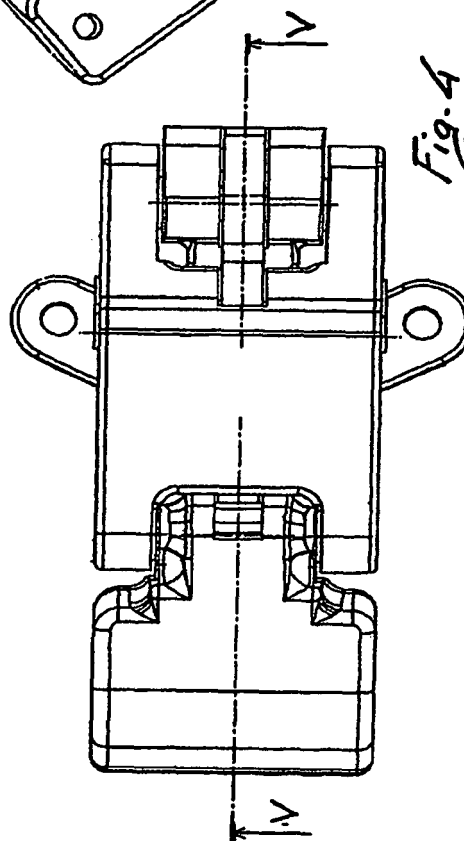
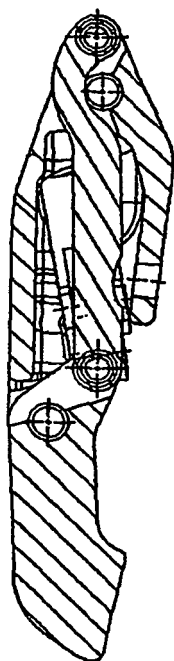
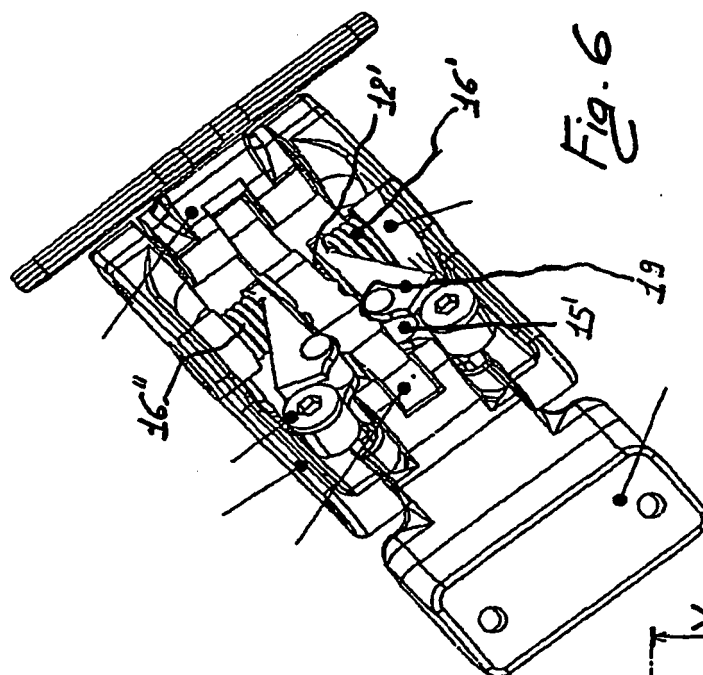
4. Scharnier nach Anspruch 1 bei dem, in einem ebenen Querschnitt, die Seiten, welche die Stange (8) und den Zentralkörper (5) definieren, einander kreuzen.
5. Scharnier nach Anspruch 1, bei dem zwei symmetrische Profile auf gegenüberliegenden Oberflächen der Stange (8) ausgearbeitet sind und zwei Nachführungen (13) symmetrisch angeordnet sind damit jede mit einem der beiden Profile zusammenarbeitet.
6. Scharnier nach Anspruch 5, bei dem die Profile Rücksprünge für bestimmte Offenstellungen aufweisen, in denen der Türflügel gehalten wird.
7. Scharnier nach einem der Ansprüche 5 oder 6, bei dem die Nachführung (13) mittels einer Feder (16, 16', 16'') gegen das Profil gedrückt wird, welche an dem Zentralkörper (5) angebracht sind.
8. Scharnier nach Anspruch 7 bei dem die Feder (16, 16', 16'') durch einen Sockel (17) unterstützt ist, der in einem seitlichen Bereich (18) des Zentralkörpers (5) angeschraubt ist, und geeignet ist, die Kraft der Feder (16, 16', 16'') einzustellen.
9. Scharnier nach einem der vorangegangenen Ansprüche, bei dem eine vorbestimmte Stellung einer Öffnung des Türflügels um 90° entspricht.
10. Scharnier nach einem der vorangegangenen Ansprüche, bei dem eine vorbestimmte Stellung einer Öffnung des Türflügels um 180° entspricht.
11. Scharnier nach einem der vorangegangenen Ansprüche, bei dem eine vorbestimmte Stellung einer Öffnung des Türflügels um 270° entspricht.
12. Fahrzeugtür, insbesondere eine Hecktür eines Transporters, mit einem oder mehreren Scharnieren für einen Türflügel nach einem der vorangegangenen Ansprüche.
13. Tür nach Anspruch 12, bei der die Drehung des Türflügels um eine im Wesentlichen vertikale Achse erfolgt.
14. Tür mit zwei Türflügeln nach Anspruch 12 oder 13.
15. Fahrzeug, insbesondere ein Gewerbefahrzeug, mit einer Tür nach einem der Ansprüche 12 bis 14.

Revendications

1. Charnière pour portes de véhicule, comprenant un premier élément (1) approprié pour être fixé à un

- battant de porte, un second élément (3) approprié pour être fixé sur une partie fixe du véhicule, un corps central (5) pivoté au niveau d'une extrémité, par rapport audit premier élément, et au niveau d'une extrémité opposée par rapport audit second élément, une tige (8) pivotée au niveau d'une extrémité par rapport audit premier élément et au niveau d'une extrémité opposée par rapport audit second élément, dans laquelle les axes de pivot qui font pivoter la tige (8) par rapport à chacun desdits premier et second éléments (1, 2) ne coïncident pas avec les axes de pivot dudit corps central et des moyens pour maintenir la porte dans des positions ouvertes prédéterminées, lesdits moyens comprennent au moins un profil (12, 12') et un poussoir (13) approprié pour coopérer avec ledit profil, fixé sur deux composants (5, 8) différents de la charnière et **caractérisée en ce que** ledit profil est produit sur une face de la tige (8) et le poussoir (13) est fixé de manière rotative sur ledit corps central (5).
2. Charnière selon la revendication 1, appropriée pour permettre une rotation du battant de 270°.
 3. Charnière selon la revendication 1, dans laquelle lesdits moyens pour maintenir la porte dans des positions ouvertes prédéterminées sont logés dans ledit corps central (5).
 4. Charnière selon la revendication 1, dans laquelle, sur une vue en plan en coupe, les côtés définissant la tige (8) et le corps central (5) se croisent.
 5. Charnière selon la revendication 1, dans laquelle deux profils symétriques sont produits sur des faces opposées de la tige (8) et deux poussoirs (13) sont disposés symétriquement l'un par rapport à l'autre pour coopérer avec l'un desdits profils.
 6. Charnière selon la revendication 5, dans laquelle lesdits profils comprennent des évidements (19) dans les positions d'ouverture prédéterminées dans lesquelles le battant est maintenu.
 7. Charnière selon l'une quelconque des revendications 5 ou 6, dans laquelle ledit poussoir (13) est poussé vers ledit profil par un ressort (16, 16', 16'') fixé sur ledit corps central (5).
 8. Charnière selon la revendication 7, dans laquelle ledit ressort (16, 16', 16'') est supporté par une douille (17) vissée dans une partie latérale (18) dudit corps central (5), approprié pour ajuster la charge du ressort (16, 16', 16'').
 9. Charnière selon l'une quelconque des revendications précédentes, dans laquelle une position prédéterminée correspond à une ouverture du battant à 90°.
 10. Charnière selon l'une quelconque des revendications précédentes, dans laquelle une position prédéterminée correspond à une ouverture du battant à 180°.
 11. Charnière selon l'une quelconque des revendications précédentes, dans laquelle une position prédéterminée correspond à une ouverture du battant à 270°.
 12. Porte de véhicule en particulier la porte arrière d'un fourgon, prévue avec une ou plusieurs charnières pour un battant selon l'une quelconque des revendications précédentes.
 13. Porte selon la revendication 12, dans laquelle la rotation du battant a lieu sur un axe sensiblement vertical.
 14. Porte avec deux battants selon la revendication 12 ou 13.
 15. Véhicule, en particulier un véhicule industriel prévu avec une porte selon l'une quelconque des revendications 12 à 14.





REFERENCES CITED IN THE DESCRIPTION

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