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(71) Applicants:
• **IVECO S.p.A.**
10156 Torino (IT)
• **De Molli Giancarlo Industrie S.p.A.**
21040 Castronno (VA) (IT)

(72) Inventors:
• **Marando, Francesco**
10088 Volpiano (IT)
• **de Molli, Romeo**
21040 Castronno (IT)

(74) Representative: **Borsano, Corrado et al**
Notarbartolo & Gervasi S.p.A.
Corso di Porta Vittoria, 9
20122 Milano (IT)

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

(57) 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 (1) suitable to be fastened to a 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 to each of said elements are not coincident with the pivot axes of said central body. The rod presents profiles (12, 12') suitable to interact with followers (13) fastened to the central body, thrust by springs (16, 16', 16''), so as to hold the wing in specific positions, until the force of the springs is overcome by acting on the wing.

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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 to 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.

SUMMARY

[0005] 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.

[0006] 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

[0007] 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:

[0008] 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;

[0009] 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 corresponding 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

[0010] 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.

[0011] 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 cathaphoresis 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.

[0012] 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°.

[0013] 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.

[0014] 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.

[0015] 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).

[0016] 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.

[0017] 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.

[0018] The solution represented is extremely advantageous, for compactness and operation other structures are possible, such as a traction spring connecting opposite followers.

[0019] 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.

[0020] 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.

[0021] Those skilled in the art can choose the most appropriate materials for the various components.

[0022] 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 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 to each of said elements are not coincident with the pivot axes of said central body.
2. Hinge as claimed in claim 1, suitable to allow a rotation of the wing of 270°.
3. Hinge as claimed in claim 1 or 2, comprising means for holding the door in predetermined open positions.
4. Hinge as claimed in claim 3, wherein said means are housed in said central body.
5. Hinge as claimed in claim 3 or 4, wherein said means comprise at least a profile (12, 12') and a follower (13) suitable to cooperate with said profile, fastened to two different components (5, 8) of the hinge.
6. Hinge as claimed in claim 5, wherein said profile is produced on a face of the rod and the follower is fastened rotatably to said body.
7. Hinge as claimed in claim 6, wherein two symmetrical profiles are produced on opposite faces of the rod and two followers are disposed symmetrically each to cooperate with one of said profiles.
8. Hinge as claimed in any one of claims 5 to 7, wherein said profiles comprise recesses (19) at predetermined opening positions in which the wing is held.
9. Hinge as claimed in any one of claims 5 to 8, wherein said follower is thrust towards said profile by a spring (16, 16', 16") secured to said central body.
10. Hinge as claimed in claim 9, wherein said spring is supported by a socket 17 screwed in a lateral portion (18) of said central body, suitable to adjust the load of the spring.
11. Hinge as claimed in any one of claims 3 to 10, wherein a predetermined position corresponds to an opening of the wing to 90°.
12. Hinge as claimed in any one of claims 3 to 11, wherein a predetermined position corresponds to an open-

ing of the wing to 180°.

- 13.** Hinge as claimed in any one of claims 3 to 12, wherein a predetermined position corresponds to an opening of the wing to 270°.

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- 14.** 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.

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- 15.** Door as claimed in claim 14, wherein rotation of the wing takes place about a substantially vertical axis.

- 16.** Door with two wings as claimed in claim 14 or 15.

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- 17.** Vehicle, in particular an industrial vehicle provided with a door as claimed in any one of claims 14 to 16.

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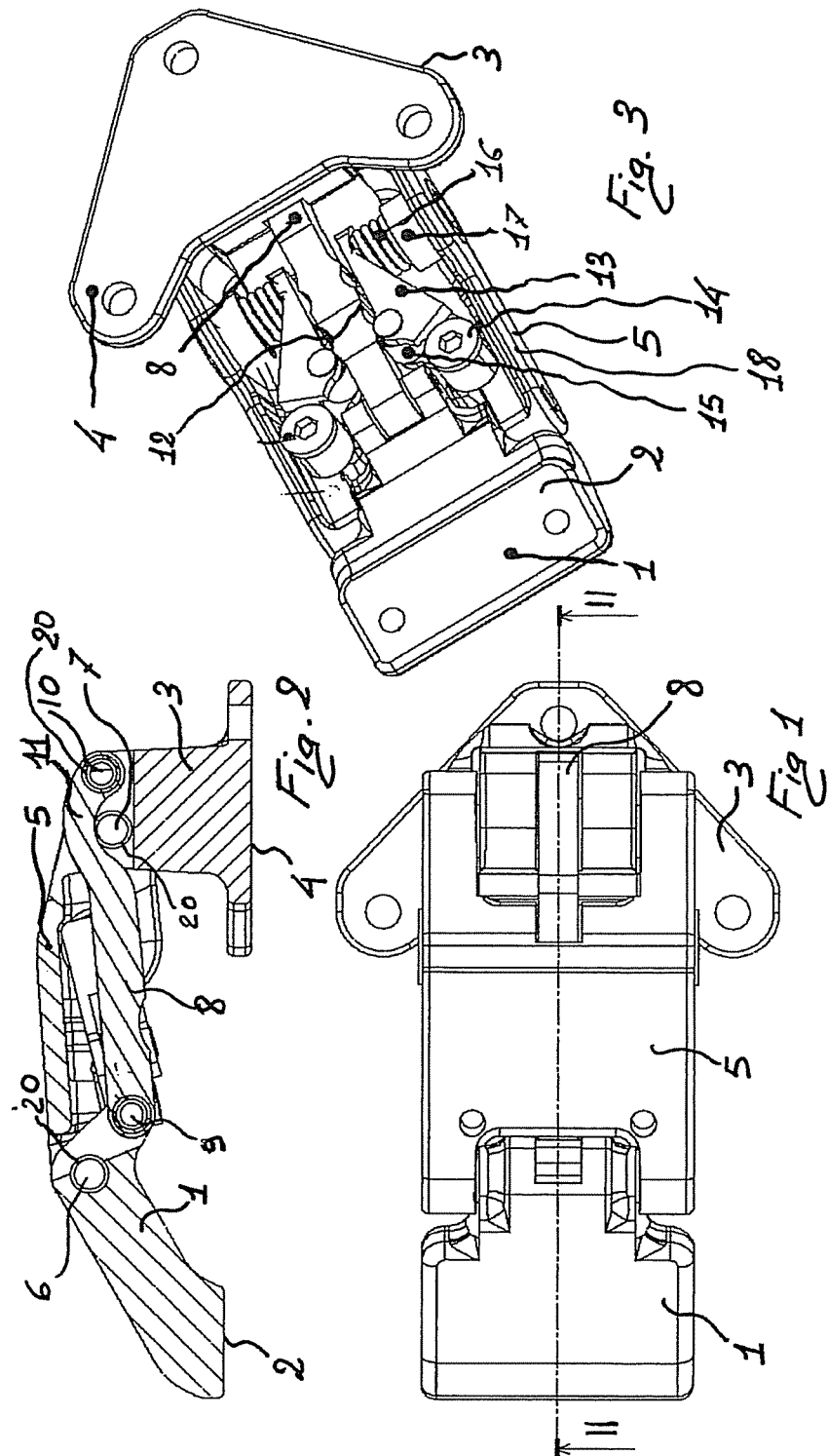
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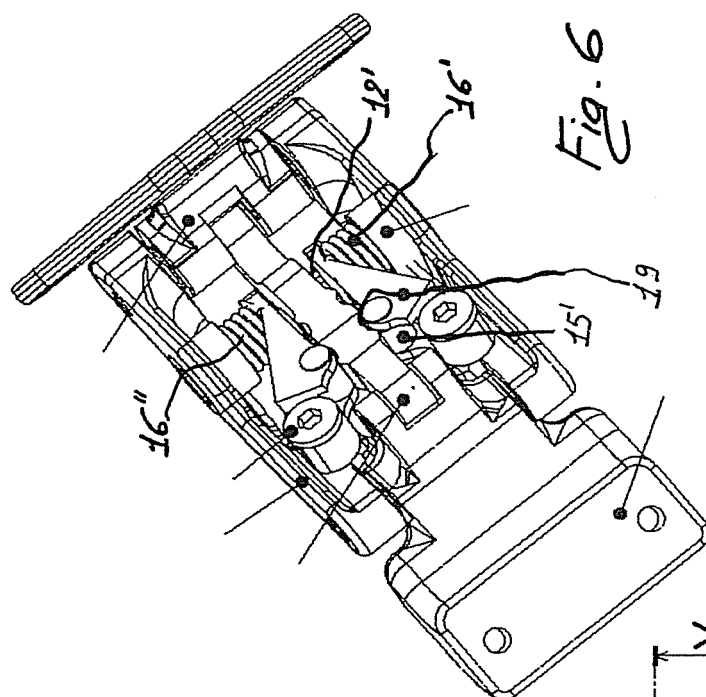


Fig. 6

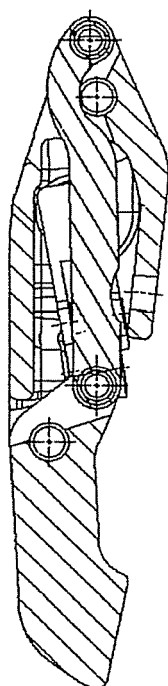


Fig. 5

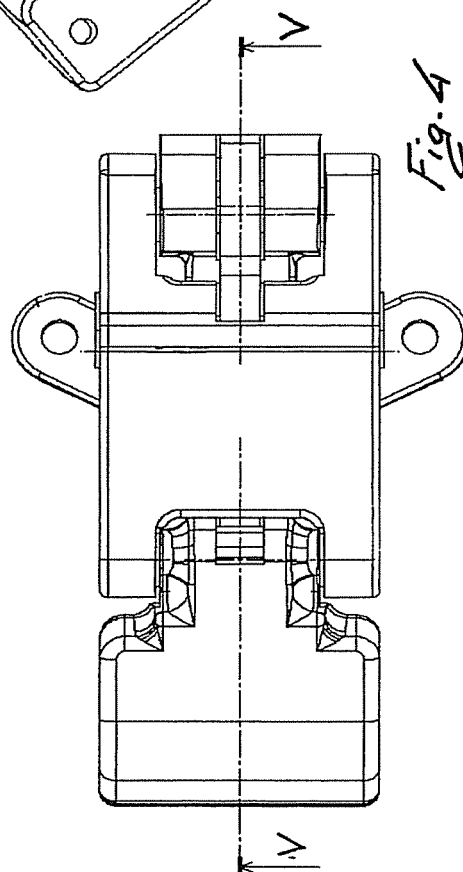


Fig. 4



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 12 3981

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A	WO 2006/076757 A (M T M PTY LTD [AU]; CLARK STUART MALCOLM [AU]) 27 July 2006 (2006-07-27) * the whole document *	1-17	
			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 May 2008	Examiner Balice, Marco
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 07 12 3981

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The members are as contained in the European Patent Office EDP file on
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14-05-2008

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