



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.03.2009 Bulletin 2009/13

(51) Int Cl.:
E05D 3/16 (2006.01)

(21) Application number: **08164599.6**

(22) Date of filing: **18.09.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
 Designated Extension States:
AL BA MK RS

(71) Applicant: **De Molli Giancarlo Industries S.p.A.**
21040 Castronno (Varese) (IT)

(72) Inventor: **De Molli, Romeo**
21040 Castronno (IT)

(30) Priority: **18.09.2007 IT MI20071802**

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

(54) **Seven fulcrum hinge**

(57) The present invention relates to an articulated joint or hinge particularly suitable for connecting two parts of a structure that have to move in relative rotation, such as for example a frame and a door, the structure of a wardrobe and its door, the frame of a vehicle and its door and the like.

to obtain the relative movement of the two parts also in presence of bulges and/or obstacles preventing the rotation in a traditional hinge. The hinge according to the present invention therefore achieves a rotation by means of a strong mechanism, with precise movements, with seven axis of rotation, but at the same time easy to construct.

The hinge according to the present invention allows

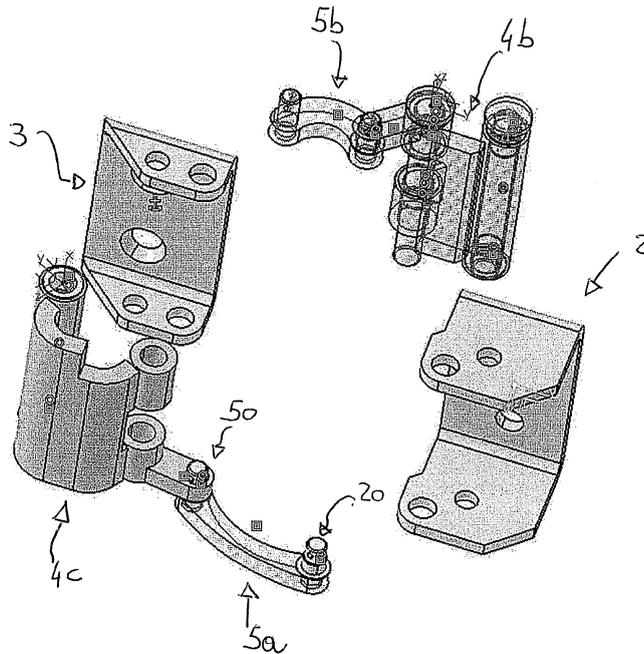


Fig. 2

Description**FIELD OF THE INVENTION**

[0001] The present invention relates to an articulated joint or hinge for doors, wardrobe doors or the like and in general for any type of mechanical structure comprising two parts that have to move in relative rotation. As it is known, there are specially provided hinges placed between the doors and the fixed parts (frames or bodies) of the vehicles, as are between the doors and the fixed parts of different kind of furniture.

[0002] Particularly in the furnishing field, hinges are known that allow the doors opening by means of a simple rotation around a substantially vertical axis.

[0003] The hinge used for the opening of such doors or the like has to guarantee the required accessibility to the compartment and at the same time the necessary joint's strength.

[0004] A particular use is that of steel-clad doors. It is known, actually, that the hinges for steel-clad doors have to meet particular strength requirements, having to be resistant to possible attempts at unhinging.

[0005] Moreover, the big dimensions and high weight of steel-clad doors imply remarkable static and dynamic stress on the articulated joint itself. The latter has also the task to allow repeated openings/closings, without any mechanical interference between the involved parts.

[0006] The articulated joint of the type known, which usually provides kinematic constraints of the "hinge" type are generally structured in order to define a motion act according to which the doors rotates around a main axis of rotation (usually oriented according to the vertical) that is movable in space: such main axis of rotation changes its position in space by means of appropriate kinematic mechanisms, which generally provide intermediate articulation elements defining auxiliary axis of rotation.

[0007] More in detail, a particular type of articulated joint is known in the art, in which five axis of rotation are defined, all of them substantially vertical, and in which two auxiliary axis of rotation are movable in space by means of constraints of the type "sliding shoe": in other words, such auxiliary axis of rotation move by a translation parallel to themselves thanks to the relative sliding of appropriate parts or the articulated joint itself.

[0008] This solution, however, has a number of drawbacks, due above all to the fact that the high loads stressing parts of the articulated joint (which are placed in relation of mutual sliding) remarkably wear the articulated joint itself and make the door's movement difficult and not smooth.

SUMMARY OF THE INVENTION

[0009] The aim of the present invention is to obtain an articulated joint or hinge for doors, wardrobe doors, steel-clad doors and the like, suitable for overcoming the drawbacks mentioned above.

[0010] In particular, the aim of the present invention is to contrive an articulated joint guaranteeing the necessary kinematic freedom (namely the absence of mechanical interferences between the door and the frame) together with a regular and smooth movement of the door itself.

[0011] At the same time, the present invention aims to contrive an articulated joint that is not subject to wear and/or to the reciprocal rubbing of its own components.

[0012] Also, the aim of the present invention is to provide an articulated joint or hinge allowing at least openings of 180° in all kind of doors, vehicle doors or others as well, and, more in general, in all kind of structures wherein there is a fixed part and a movable part which have to rotate one with respect to the other but that, using a traditional hinge, have interference problems during rotation. The present hinge may therefore be used on any mechanical structure and in any situation wherein there are elements which rotate relatively to each other.

[0013] In case of a door, as in the example of figure 1, if the frame constitutes an obstacle to the opening when using a traditional hinge, the hinge according to the present invention allows the opening without any interference in the movement of the door itself.

[0014] A further aim of the present invention is to provide a hinge which can be embedded in the frame door, in particular in case of steel-clad doors, as to prevent its forcing from the outside.

LIST OF THE FIGURES

[0015] These and other purposes are achieved by an articulated joint for doors according to the present invention, having the characteristics described in the attached claims and in the following description of an embodiment that is merely illustrative and not limitative, and is shown in the attached figures, in which

- figure 1 shows a schematic view of a door provided with a hinge according to the present invention, in a first position of closed door and in a second position of open door;
- figure 2 shows an exploded perspective view of the hinge according to the present invention;
- figure 3 shows an overall perspective view of the hinge according to the present invention;
- figures 4 and 5 respectively show a top view and a side view of the hinge according to the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION.

[0016] With reference to the attached figures from 2 to 5 the hinge according to the invention is generally indicated with the number 1 and substantially comprises a first connection body 2 that can be mounted on a fixed part of a piece of furniture or on a door frame and a second

connection body 3 that can be mounted on said door or wardrobe door. Then there is a movement portion 4 placed between the first connection body 2 and the second connection body 3: such movement portion defines a main axis of rotation 4a and at least two auxiliary axis of rotation.

[0017] More in detail, the first connection body 2 defines a first fixed auxiliary axis of rotation 10 and a second fixed auxiliary axis of rotation 20.

[0018] The second connection body 3 defines a third movable auxiliary axis of rotation 30 and a fourth movable auxiliary axis of rotation 40.

[0019] Said movement portion 4 which comprises in its turn a main semi-hinge 4a articulated to the first connection body 2 and an auxiliary semi-hinge 4c articulated to the second connection body 3 (advantageously, such main and auxiliary semi-hinges define the main axis of rotation 4a in mutual collaboration).

[0020] Moreover the hinge according to the present invention comprises appropriate position variation means 5.

[0021] In their turn the position variation means 5 comprise:

- a main articulated connecting rod 5a placed between the first connection body 2 and the auxiliary semi-hinge 4c (the main articulated connecting rod 5a is hinged to the first connection body 2 in correspondence of the second fixed auxiliary axis of rotation 20 and is at the same time hinged to the auxiliary semi-hinge 4c in correspondence of a fifth movable auxiliary axis of rotation 50); and
- an auxiliary articulated connecting rod 5b placed between the second connection body 3 and the main semi-hinge 4b (the auxiliary articulated connecting rod 5b is hinged to the second connection body 3 in correspondence of the fourth fixed auxiliary axis of rotation 40 and is at the same time hinged to the main semi-hinge 4b in correspondence of a sixth movable auxiliary axis of rotation 60).

[0022] Thanks to the architecture described above, which, as it can be seen, comprises a main axis of rotation and six auxiliary axis of rotation, there is no reciprocal sliding between the different components (articulated connecting rods and semi-hinges) of the movement means 4 and of the position variation means 5, but between these same components there are only relative rotations.

[0023] Moreover, among the auxiliary axis of rotation, only the axis 10 and 20 are "fixed" in space (that is fixed with respect to the vehicle frame), while the remaining axis 30, 40, 50, and 60 move, defining in their turn the trajectory of the axis 4a thanks to the connections existing between them.

[0024] Therefore the hinge according to present invention allows the rotation of the door not only around an axis but with a translation movement which pushes the

door away from the position it has when it is closed.

[0025] This way, as said, it is possible to mount the hinge inside the door frame, making it invisible when the door is closed and obtaining an advantage both in terms of safety, because the hinge cannot be forced from the outside, and in terms of appearance.

[0026] At the same time, even though the hinge is mounted inside the frame, it is possible to obtain a 180° opening thanks to the peculiar translation movement, which allows to pass over the bulk of the frame profile, as shown in figure 1.

[0027] According to what is described so far, the hinge according to the present invention is a seven fulcrum hinge.

[0028] It has been showed that the seven fulcrum hinge according to the present invention allows to achieve the aims proposed.

[0029] In particular, the hinge according to the present invention guarantees the necessary kinematic freedom (namely the absence of mechanical interferences between the door and the frame) together with a regular and smooth movement of the door itself. Moreover the hinge according to the present invention is not subject to wear and/or reciprocal rubbing of its own components, which do not slide one over the other.

[0030] Also, the hinge according to the present invention achieves the aim to allow a 180° opening passing at the same time over the bulk of the door frame profile, in case the hinge is embedded in the frame, as in steel-clad doors, as shown in figure 1.

[0031] It will be apparent to the person skilled in the art that various modifications can be conceived and reduced to practice without departing from the scope of the invention.

[0032] Therefore, the scope of the claims is not limited to the illustrations or the preferred embodiments shown in the description as an example, but rather the claims include all the patentable novelties deriving from the present invention, including all the equivalent embodiments for a person skilled in the art.

Claims

1. Articulated joint or hinge, suitable for connecting two parts in relative movement of a mechanical structure such as doors, wardrobe doors, vehicle doors or the like, of the type comprising:

- a first connection body (2) that can be mounted on a fixed part (F) of a frame of a piece of furniture or the like;
- a second connection body (3) that can be mounted on a door (P) or shutter or the like;

characterized in that

said first connection body (2) defines a first fixed auxiliary axis of rotation (10) and a second fixed auxiliary

axis of rotation (20).

said second connection body (3) defines a third movable auxiliary axis of rotation (30) and a fourth movable auxiliary axis of rotation (40).

and **in that** it also comprises:

5

- a movement portion (4) placed between said first connection body (2) and said second connection body (3), said movement portion (4) comprising a main semi-hinge (4b) articulated to the first connection body (2) and an auxiliary semi-hinge (4c) articulated to the second connection body (3), said main and auxiliary hinges cooperatively defining a main axis of rotation (4a);

10

15

- position variation means (5) comprising in their turn a main articulated connecting rod (5a) placed between the first connection body (2) and the auxiliary semi-hinge (4c), said main articulated connecting rod (5a) being hinged to the first connection body (2) in correspondence of said second fixed auxiliary axis of rotation (20) and being hinged to the auxiliary semi-hinge (4c) in correspondence of a fifth movable auxiliary axis of rotation (50); and an auxiliary articulated connecting rod (5b) placed between the second connection body (3) and the main semi-hinge (4b), said auxiliary articulated connecting rod (5b) being hinged to the second connection body (3) in correspondence of said fourth fixed auxiliary axis of rotation (40) and being hinged to the main semi-hinge (4b) in correspondence of the sixth movable auxiliary axis of rotation (60).

20

25

30

2. Hinge according to the previous claim, **characterized in that** it allows a relative movement between the parts which consists in a 180° rotation of the movable part (P).

35

40

45

50

55

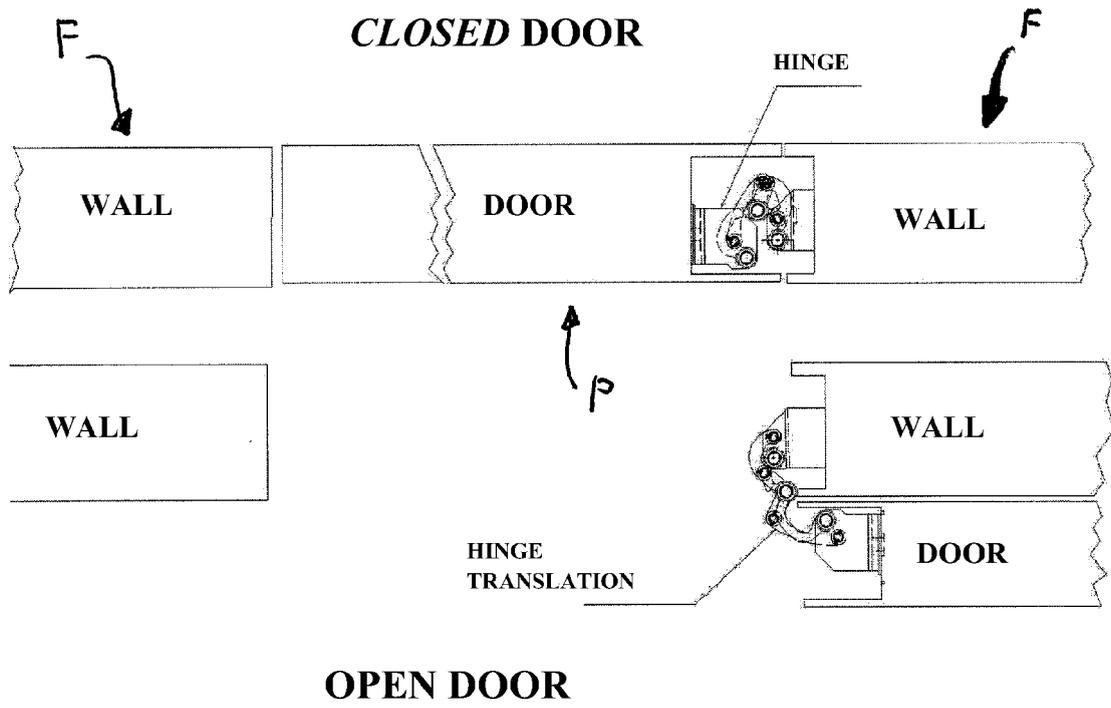


Fig. 1

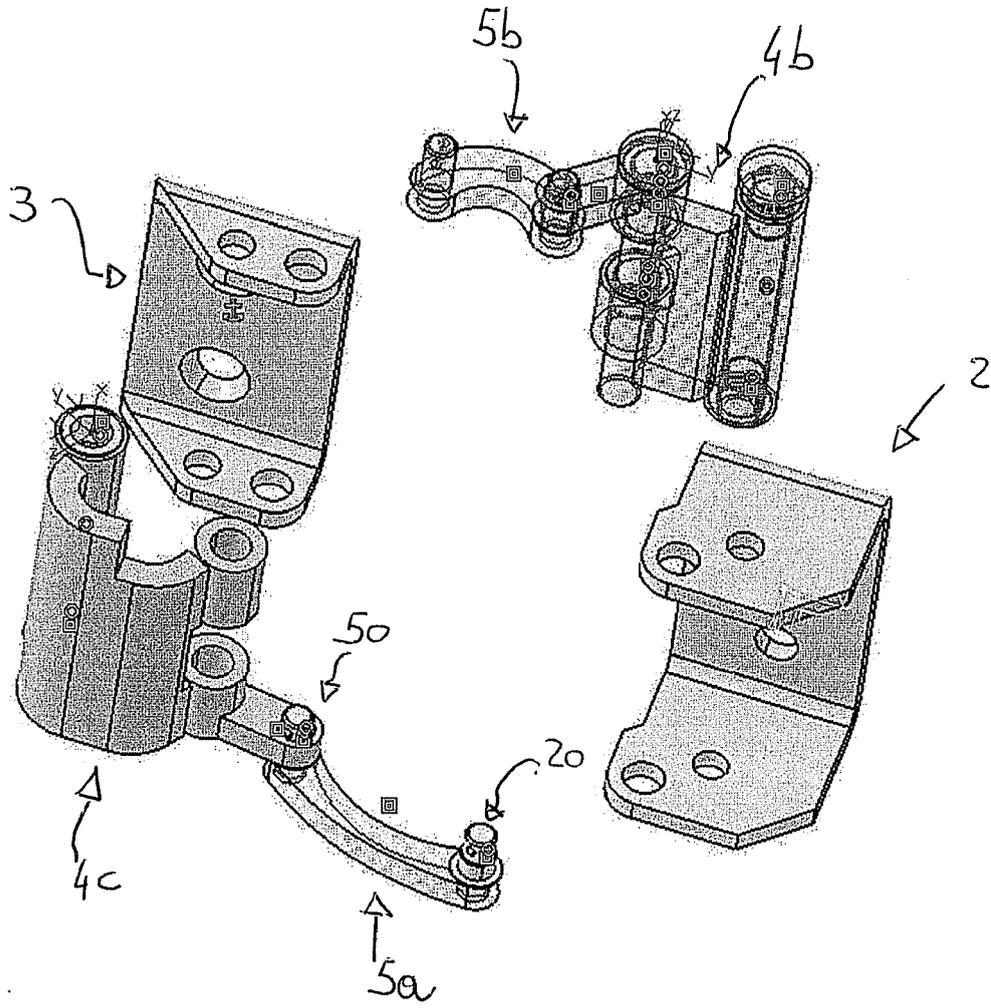


Fig. 2

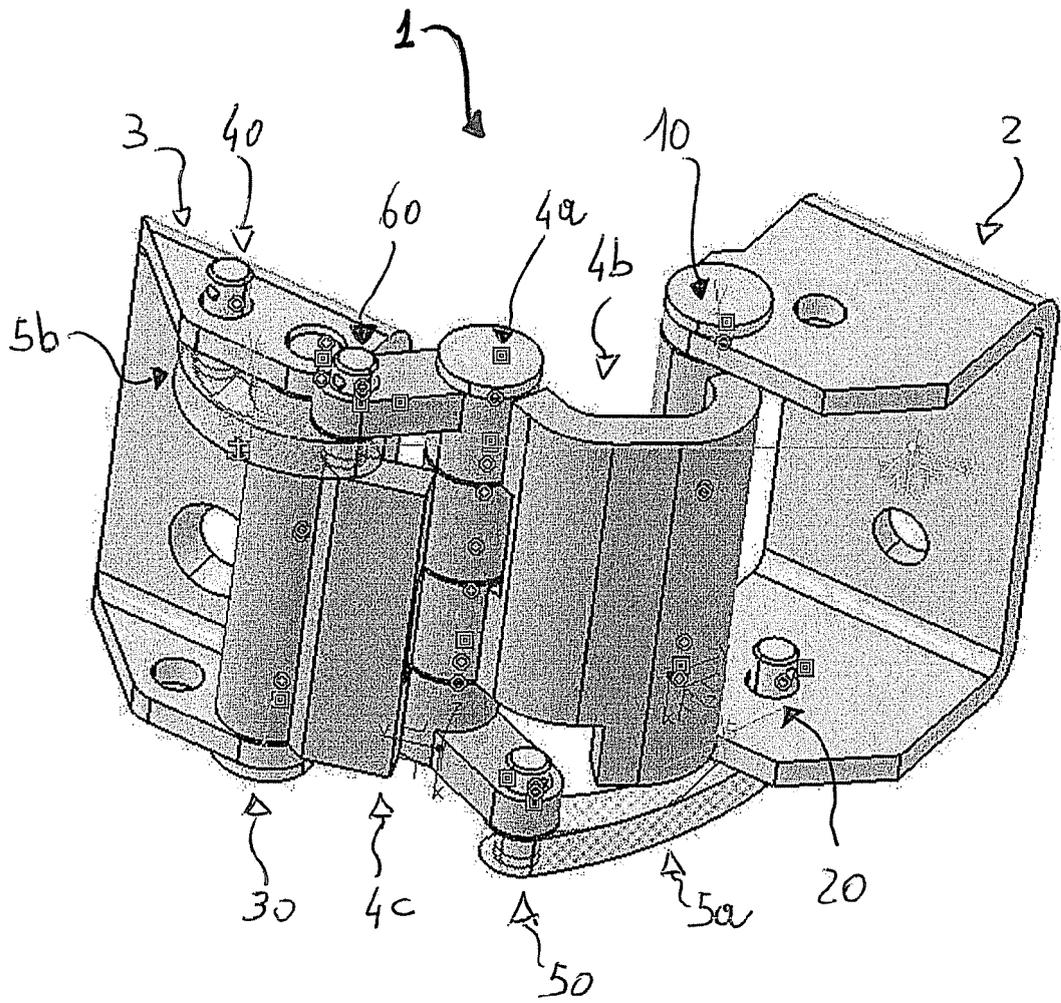


Fig. 3

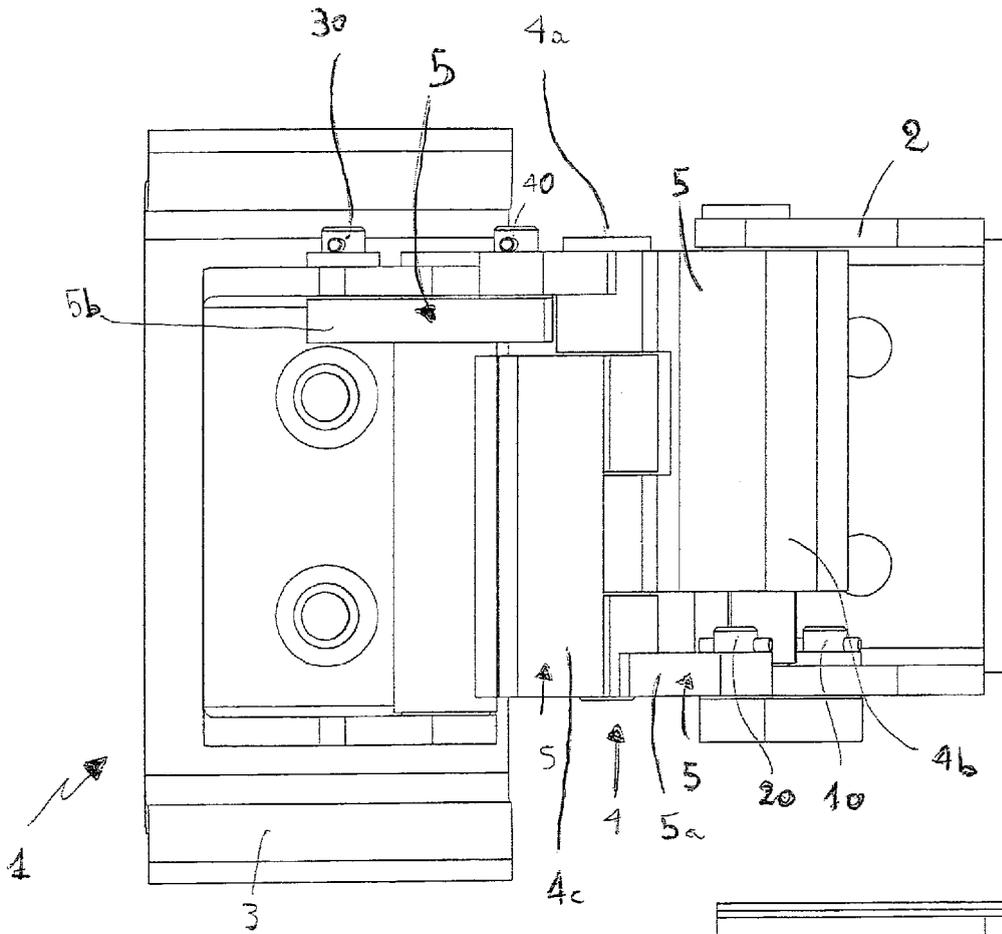


FIG. 4

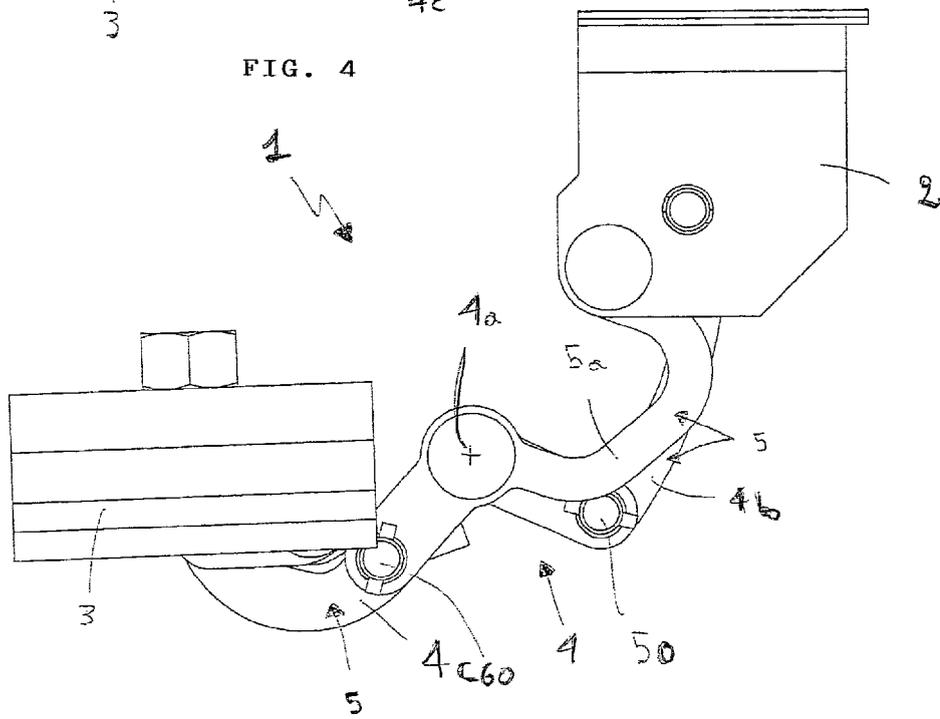


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 08 16 4599

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2 135 280 A (JOHN ERICKSON) 1 November 1938 (1938-11-01) * figures 1-3 *	1	INV. E05D3/16
X	JP 04 027089 A (SUGATSUNE KOGYO) 30 January 1992 (1992-01-30) * figures 1-5 *	1,2	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 January 2009	Examiner Witasse-Moreau, C
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	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

3
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 16 4599

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

07-01-2009

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2135280	A	01-11-1938	NONE	

JP 4027089	A	30-01-1992	JP 2007656 C	11-01-1996
			JP 7018288 B	01-03-1995

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82