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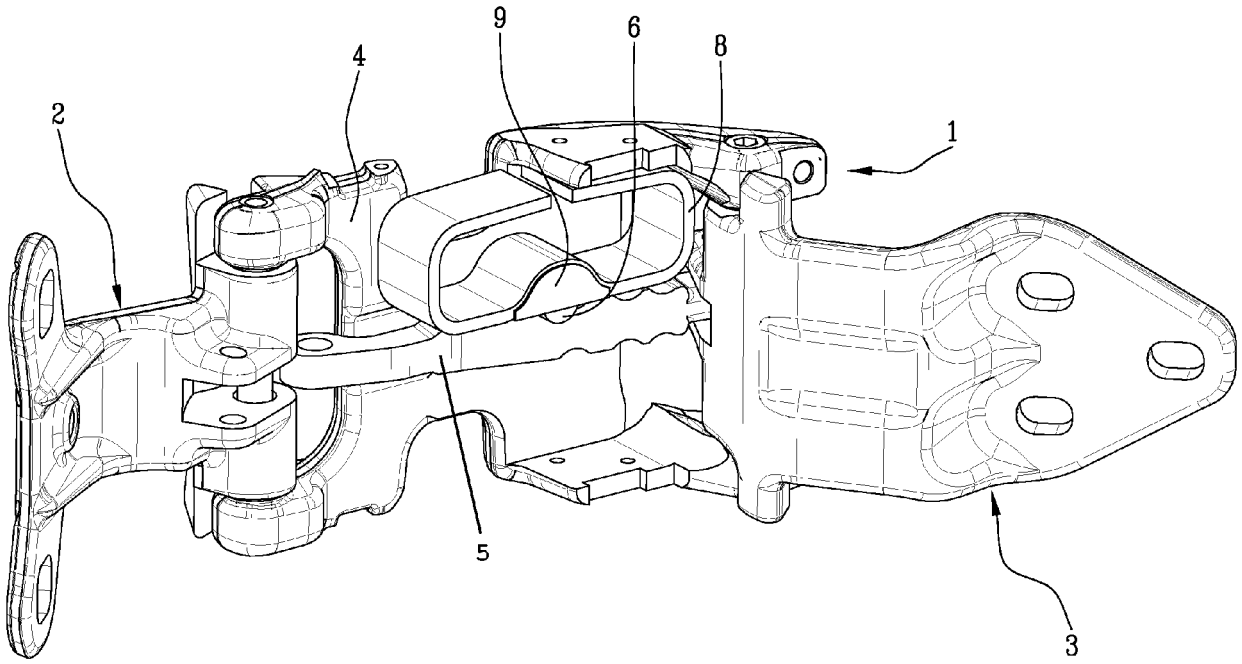
(54) **JOINT FOR DOORS/FURNITURE DOORS WITH SELECTIVE PARTIAL LOCKS**

(57) A hinge joint comprises a main portion and an auxiliary portion respectively connectable to a fixed and a movable part of a complex object, and partial opening means operatively active between the main portion and the auxiliary portion to position the movable part in different intermediate or partial opening configurations with respect to the fixed part; said partial opening means comprise a strut connecting the main portion and the auxiliary portion, an abutment adapted to translate relatively with respect to the strut in a plurality of relative engagement positions and a plurality of engagement slots obtained on the strut and adapted to selectively receive the abutment, to each of the engagement slots corresponding to a partial opening condition of the movable part with respect to the fixed part.

Fig.1



EP 4 191 008 A1

Description

[0001] The present invention relates to a joint (in particular but not for this reason in a limiting manner of the "hinge" type) having the ability to define a predetermined number of so-called "selective partial locks" of a door or leaf with respect to a fixed part of an object (which in turn can be, for example, a frame of a piece of furniture or a vehicle): the expression "selective partial locks" refers, in the spirit of this invention, to a series of possible relative positions of said door/leaf with respect to said fixed part of an object whereby the door/leaf itself can be found in conditions of more or less complete partial opening, thus defining the passage apertures of varying overall section depending on each condition of partial opening itself.

[0002] As is known, the operation of the doors and/or the hatchbacks of the vehicles may require intermediate opening positions with a certain stability, for example in the event that there is not enough space to fully open the door or in the event that a hatchback must remain firm and stable during the loading/unloading operations: in order to obtain such intermediate opening positions, a type of double-pin hinge is known (and therefore such as to define a rotational movement of the "movable part" in which the rotation axis is in turn movable in space), made by the same Applicant, in which appropriate partial opening means incorporating rolling friction interposition elements guarantee a multiplicity of partial opening configurations of the hinge itself, and in which these same partial opening means interact through relative movements that take place along arcs of curved trajectories.

[0003] The prior art described above, while making improvements compared to other "hinge" type devices capable of ensuring one or more "partial opening" configurations of the movable part compared to the fixed one, nevertheless has some drawbacks in terms of distribution of the internal stresses on the components of the hinge itself, and consequently in terms of greater encumbrances/sizings and less structural reliability (for example, in case this hinge must be coupled with very large or heavy doors/leaves, or where an extremely high number of opening and closing cycles are provided).

[0004] In addition, hinges of the known type (including the hinge previously conceived by the Applicant) sometimes involve complications of the assembly processes on the "fixed parts" (such as vehicle or furniture frames) or of the installation of the "movable parts" on them, due to the particular relative positions between their internal components: it may happen, for example, that if screwdrivers are used, such devices must be passed through the hinge, and this peculiar geometric/topological condition is not easy for the hinges of the known type (if not even impossible) to the point of having to partially assemble them, in order to allow such screwdriving actions (and subsequently, to the additional point of having to complete them as to their components before proceeding to the installation of the movable part).

[0005] Furthermore, it should be noted that in hinges of the known type (including the one conceived by the Applicant) the actions "internal" to the hinges themselves that make it possible to acquire and stabilise the partial opening conditions are related to elastic forces, which generally are responsible for the correct maintenance of an inter-penetration relationship between counter-shaped structural components of the hinge itself: these elastic forces nevertheless require appropriate springs being available, which can be too "rigid" or too large, further complicating both the design and production of the hinge itself as well as the assembly of the hinge to the complex object on which it will then operate.

[0006] In the light of what has been observed, the object of the present invention is to provide a hinge with integrated angular locking which is capable of solving the shortcomings just presented.

[0007] In particular, the present invention aims at devising a (joint a) hinge that offers high performance, great reliability, easy assembly, reduced encumbrances and optimized production costs, associated with the possibility of obtaining an even better overall compactness of the hinge itself (besides the possibility of being used both on vehicles, and in other technical fields such as furniture, mechanical joints and so on).

[0008] At the same time, the present invention aims at devising a hinge joint that can be integrated into assembly processes of complex objects, such as vehicles or furniture, optimizing the total number of operations, facilitating access to the various components and to their mounting slots and allowing the use of assembly tools that are simple to use and equally easy to position in the work area.

[0009] These and other objects are realized by a (hinge) joint with selective partial locks in accordance with the present invention, having the characteristics illustrated in the annexed claims and illustrated below in various exemplary but not limiting embodiments, as well as in the accompanying drawings, in which:

- figure 1 shows an axonometric/perspective view in partial transparency of a first embodiment of the joint according to the invention;
- figure 2 shows an axonometric/perspective view in partial transparency of a second embodiment of the joint according to the invention; and
- figure 3 shows a side view of a third embodiment of the joint according to the invention.

[0010] With reference to the accompanying figures, the hinge according to the invention is generally indicated with the number 1 and in functional terms it can be considered as a so-called "hinge joint with movable axle", which is therefore interposable between a fixed part and a movable part of a complex object (which in turn can be respectively a frame or a structure of a vehicle or a piece of furniture as well as a door or a leaf of said vehicle or said piece of furniture).

[0011] From a structural point of view, the joint 1 comprises a main portion 2, connectable to the just exempli-

fied "fixed part", and an auxiliary portion 3, connectable to the just exemplified "movable part": these positions 2 and 3 are in turn connected, by means of appropriate rotational constraints typical of the hinges, to a base body 4 which is therefore adapted to receive them in connection.

[0012] Conveniently, the joint 1 further comprises partially opening means operatively active between the main portion 2 and the auxiliary portion 3 to position the movable part of said (complex) object in a predetermined number of intermediate or partial opening configurations with respect to said fixed part, and advantageously said partial opening means comprise:

- a strut 5 connecting the main portion 2 and the auxiliary portion 3;
- at least one abutment 6 interposed at least between the base body 4 and the strut 5, and further shaped and arranged so as to be adapted to translate relatively with respect to the strut 5 in a plurality of relative engagement positions (with respect to the latter); and
- a plurality of engagement slots 7 obtained on the strut 5 and adapted to selectively receive (that is, in accordance with the invention, upon appropriate action of the user of the complex object, and in particular according to the action of a user who wants to position the movable part in a given condition of partial opening with respect to the fixed part) the abutment 6, so that each of said engagement slots 7 therefore corresponds to a condition of partial opening of the mobile part with respect to the fixed part.

[0013] Going into detail and with reference to the accompanying figures 1 and 2, it must be pointed out, for the sole purposes of illustration of the invention and therefore non-limiting of the scope of the annexed claims, that the main portion 2 has been represented in a condition free from the strut 5, while in conditions of actual and complete assembly of the joint 1 the main portion 2 is connected to the end of the strut 5 through a pin (or similar device) that simultaneously crosses the perforated slots obtained both on the main portion 2 and the end of the strut 5: these figurative representations have been used to maximize the visibility of the components of the joint 1, and in any case it is reasonably believed that a person skilled in the art can consider the kinematic connection of the structural components mentioned above in the most appropriate way in order to allow the joint 1 to carry out its main technical task (that is, to allow a "movable part" to rotate in space with respect to a "fixed part" in a controlled and orderly manner).

[0014] Having made the above premise, it can now be considered that the partial opening means furthermore comprise at least one pressing element 8 interposed between the base body 4 and the strut 5: this pressing element 8 is functionally adapted to push the abutment 6 against the strut 5 and is conveniently - and reversibly - configurable between a transition condition, wherein it pushes the abutment 6 against an edge of the strut 5 interposed between two adjacent engagement slots 7 along the same edge (thus allowing the transition of the movable part from one partial opening condition to another), and a stabilisation condition, wherein it instead pushes the abutment 6 into one of the engagement slots 7 (thus allowing the stabilisation of the position or condition or configuration of a given and "selected" partial opening condition with respect to another). From a functional point of view, it should be noted that the pressing element 8 directly realizes and transfers the stresses, which are perpendicular and tangential, exchanged between the abutment 6 and the strut 7, towards the base body 4.

[0015] In order to be reconfigured and therefore to be able to achieve the functions just indicated, the pressing element 8 can comprise, in a first possible embodiment of the invention, at least one elastically deformable body: this elastically deformable body in turn has a first portion 8a, abutting against the base body 4, and a second portion 8b substantially opposite to this first portion 8a and interfacing with at least one abutment 6.

[0016] Alternatively, in various possible embodiments of the invention, the pressing element 8 can comprise at least one tape spring made of preferably metallic material and typically shaped like a "C" or "M" or "S" or "Z" or "Ω" (or again, depending on the needs of the moment, also non-symmetrical shapes of any kind, provided that they are functionally suitable for the purpose described above): this tape spring offers a significant advantage in terms of functional and structural integration, being de facto a single mechanical element that at the same time occupies little "intermediate" space in the overall volume of the joint 1 but which exerts a significant action on the abutment 6 in its different positions and relative translations with respect to the strut 5.

[0017] Still at the level of possible embodiments and with particular regard to figure 3, it can be seen how the pressing element 8 can comprise at least one axial or linear spring active on at least one abutment 6 according to a predetermined angle of incidence with respect to a longitudinal development axis of the strut 5.

[0018] In order to present symmetrical and controllable mechanical and "force" working conditions, the partial opening means can advantageously comprise, as illustrated for example in figure 2, at least two abutments 6 adapted to interface on edges (typically "lateral", i.e. developing parallel to the longitudinal development direction or axis) opposite to the strut 5: in such a double or symmetrical configuration of the joint 1, each of these two abutments 6 is adapted to be received in a respective engagement slot 7 obtained on a respective edge of the strut 5 (or in other words, the two abutments 6 just mentioned are adapted to be simultaneously received in respective engagement slots 7, which in turn are arranged at the same longitudinal position with respect to the longitudinal development axis of the strut 5).

[0019] Still with reference to the figures, it can be seen how at least one abutment 6 can be shaped like a roller or a cylinder or a rolling body: in this way, this geometric configuration offers the abutment the possibility of rolling along the edge of the strut 5, making the transitions from a partial opening condition to another one smoother and controllable by the user, and at the same time significantly decreasing the peaks of resistant force and/or mechanical wear that are created in the internal components of the joint 1 during the actions imparted there by the user himself.

[0020] With further detail to the structure of the pressing element 8, it can be noted that the latter can comprise a housing slot 9, which is adapted to accommodate the abutment 6 and is simultaneously adapted to allow rotations of the abutment 6 within said housing slot 9 itself; in this case, the pressing element 8 (and typically the second portion 8b of the pressing element 8), comprises a sub-portion countershaped to the housing slot 9. In a further possible embodiment of the invention, the partial opening means may further comprise at least one tooth interposed between the base body 4 and at least the abutment 6: even more conveniently (and to obtain the aforementioned internal stress distribution advantages in a symmetrical manner), it is possible that at least two teeth are present and interposed on opposite edges of the strut 5 respectively between the base body 4 and each of the two abutments 6 in turn interposed and active on said opposite edges of the strut 5 (note that in the embodiment of figure 3, the teeth are structurally combined with pressing elements 8 consisting of axial springs, but this combination is to be considered as exemplary and not limiting, thereby not precluding the possibility that the teeth are structurally and functionally interfaced with other types of pressing elements 8 such as those described above or claimed below).

[0021] From a functional point of view and always with reference to figure 3, the tooth (or teeth, if the needs of the moment make it necessary to have more than one), serve to securely fix the appropriate structural components to the base body 4 (achievable for example but not limited to metal or "metal sheet") that holds the pins of the rocker arms in the axis and at the same time contains the springs.

[0022] The invention makes it possible to obtain important advantages.

[0023] First of all, it should be noted that the peculiar construction architecture of the hinge described above and claimed below makes it possible to implement numerous applications on doors and hatchbacks - or more generally, on movable leaves - that make different intermediate opening positions available, all having considerable stability and all made in spatial configurations where the extreme compactness of the hinge would not make kinematic devices of the known type usable.

[0024] Likewise, it should be noted that the hinge according to the invention is extremely simplified both in terms of the total number of its components and in terms of their geometry and relative arrangement: this makes possible both a quick and simple production, and an equally quick and easy assembly of the hinge to parts (both "fixed" and "movable") of complex objects, thus being able to be housed even in very small spaces and guaranteeing a considerable optimisation of the economies of scale at the design, production and application level.

[0025] It should also be noted that the structural architecture of this joint makes it possible to obtain a high number of partial opening positions, all having a considerable spatial stability and all obtainable with easy movements by the operator who operates the movable part connected to this joint. Finally, it should be noted that the present invention makes it possible to achieve, also thanks to the particular relative movement of its internal components, a better distribution of stresses and internal deformations both during the maintenance of any (partial or total) opening configuration of the movable part, and during any transition from one configuration to another, to the full and further advantage of the possibility of sizing the internal components in a more "reductive" manner, still obtaining considerable robustness and a long operating life.

[0026] With reference to the last advantage listed, it should be noted in even greater detail that in this hinge joint the distribution of stresses, internal constraining reactions and stresses exchanged between the various components at an engagement between the abutments 6 and the relative slots 7 obtained in the strut 5 is highly symmetrical (along the ideal longitudinal development axis of the strut 5 itself), and this allows a better disposal of "unwanted" forces but above all a working mode of the entire joint 1 that greatly increases its ease of use and robustness.

Claims

1. Joint, preferably of the hinge type and even more preferably of the hinge type with movable axle, which can be interposed between a fixed part and a movable part of a complex object, said fixed part being preferably a frame or a structure of a vehicle or a piece of furniture and said movable part being preferably a door or a leaf of said vehicle or said piece of furniture, the joint comprising:

   - a main portion (2) connectable to said fixed part;
   - an auxiliary portion (3) connectable to said movable part;
   - a base body (4) adapted to receive said main and auxiliary portions (2; 3) via connecting means; and
   - partial opening means operatively active between the main portion (2) and the auxiliary portion (3) to position said movable part of an object

in a predetermined number of intermediate or partial opening configurations with respect to said fixed part,

characterised in that said partial opening means comprise:

- a strut (5) connecting said main portion (2) and said auxiliary portion (3);
- at least one abutment (6) interposed at least between said base body (4) and the strut (5), said abutment (6) being adapted to translate relatively with respect to the strut (5) in a plurality of relative engagement positions; and
- a plurality of engagement slots (7) obtained on the strut (5) and adapted to selectively receive the abutment (6), each of said engagement slots (7) corresponding to a condition of partial opening of said mobile part with respect to said fixed part.

2. Joint according to claim 1, wherein the partial opening means further comprise at least one pressing element (8) interposed between the base body (4) and the strut (5) and adapted to push the abutment (6) against the strut (5), said pressing element (8) being reversibly configurable between a transition condition, wherein it pushes the abutment (6) against an edge of the strut (5) interposed between two adjacent engagement slots (7) along said same edge, and a stabilisation condition, wherein it pushes the abutment (6) into one of the engagement slots (7).

3. Joint according to claim 2, wherein the pressing element (8) comprises at least one elastically deformable body having a first portion (8a) abutting the base body (4) and a second portion (8b) substantially opposite to said first portion (8a) and interfacing with at least one abutment (6).

4. Joint according to claim 3, wherein the pressing element (8) comprises at least one tape spring preferably made of metallic material and still more preferably shaped like a "C" or an "M" or an "S" or a "Z" or a "Ω".

5. Joint according to claim 3, wherein the pressing element (8) comprises at least one axial or linear spring active on at least one abutment (6) according to a predetermined angle of incidence with respect to a longitudinal development axis of the strut (5).

6. Joint according to any of the previous claims, wherein the partial opening means comprise at least two abutments (6) adapted to interface on opposite, preferably lateral, edges of the strut (5), each of said two abutments (6) being adapted to be received in a respective engagement slot (7) obtained on a respective abutment edge (5), said two abutments (6) being preferably adapted to be simultaneously received in respective engagement slots (7) arranged at the same longitudinal position with respect to said longitudinal development axis of the strut (5).

7. Joint according to any of the preceding claims, wherein at least one abutment (6) is shaped like a roller or a cylinder or a rolling body.

8. Joint according to claim 7, wherein at least one pressing element (8) comprises a housing slot (9) adapted to accommodate the abutment (6) and adapted to allow rotation of the abutment (6) within said housing slot (9).

9. Joint according to claim 8, wherein the pressing element (8), and preferably the second portion (8b) of the pressing element (8), comprises a sub-portion countershaped to the housing slot (9).

Fig.1

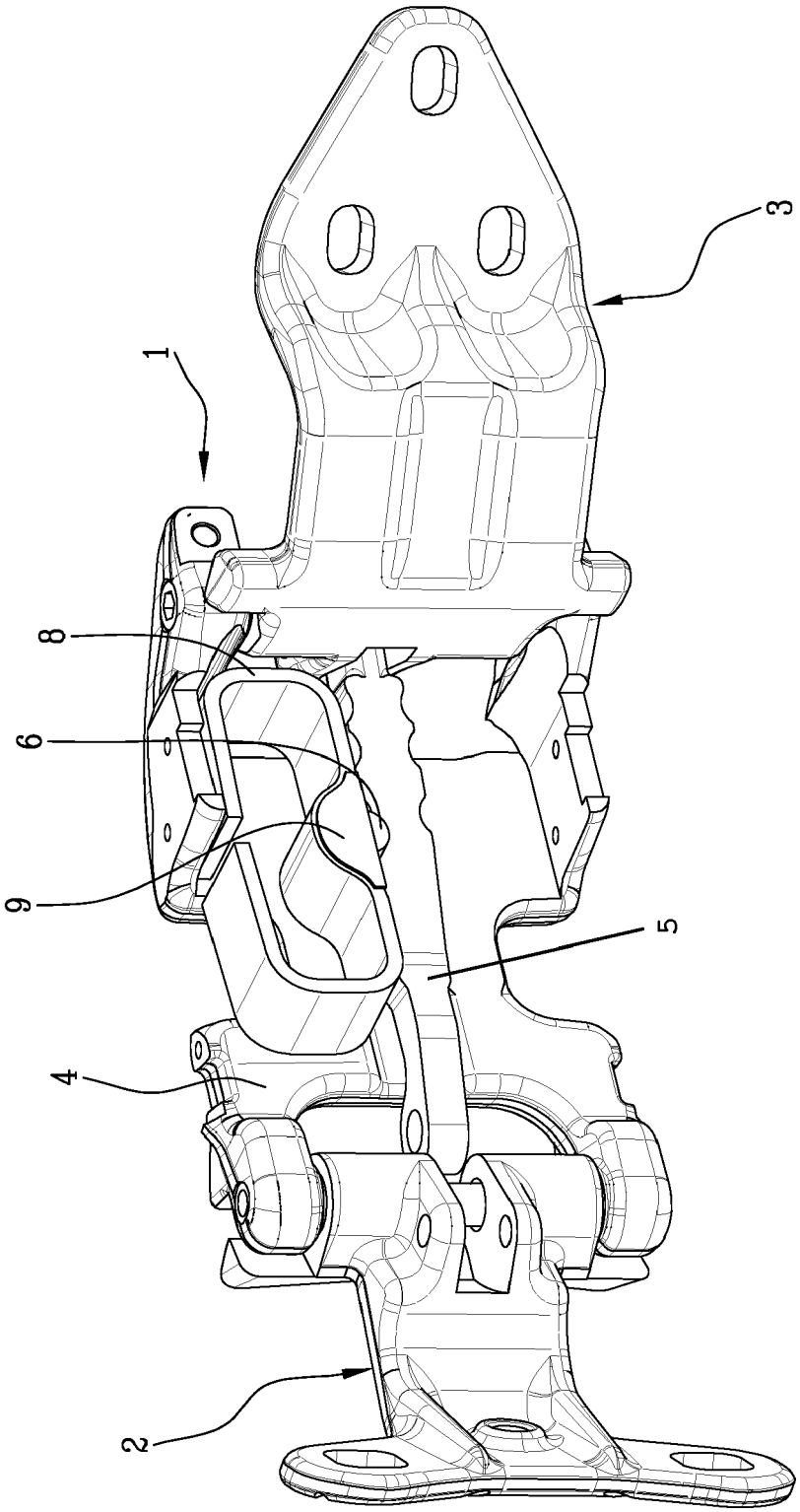


Fig.2

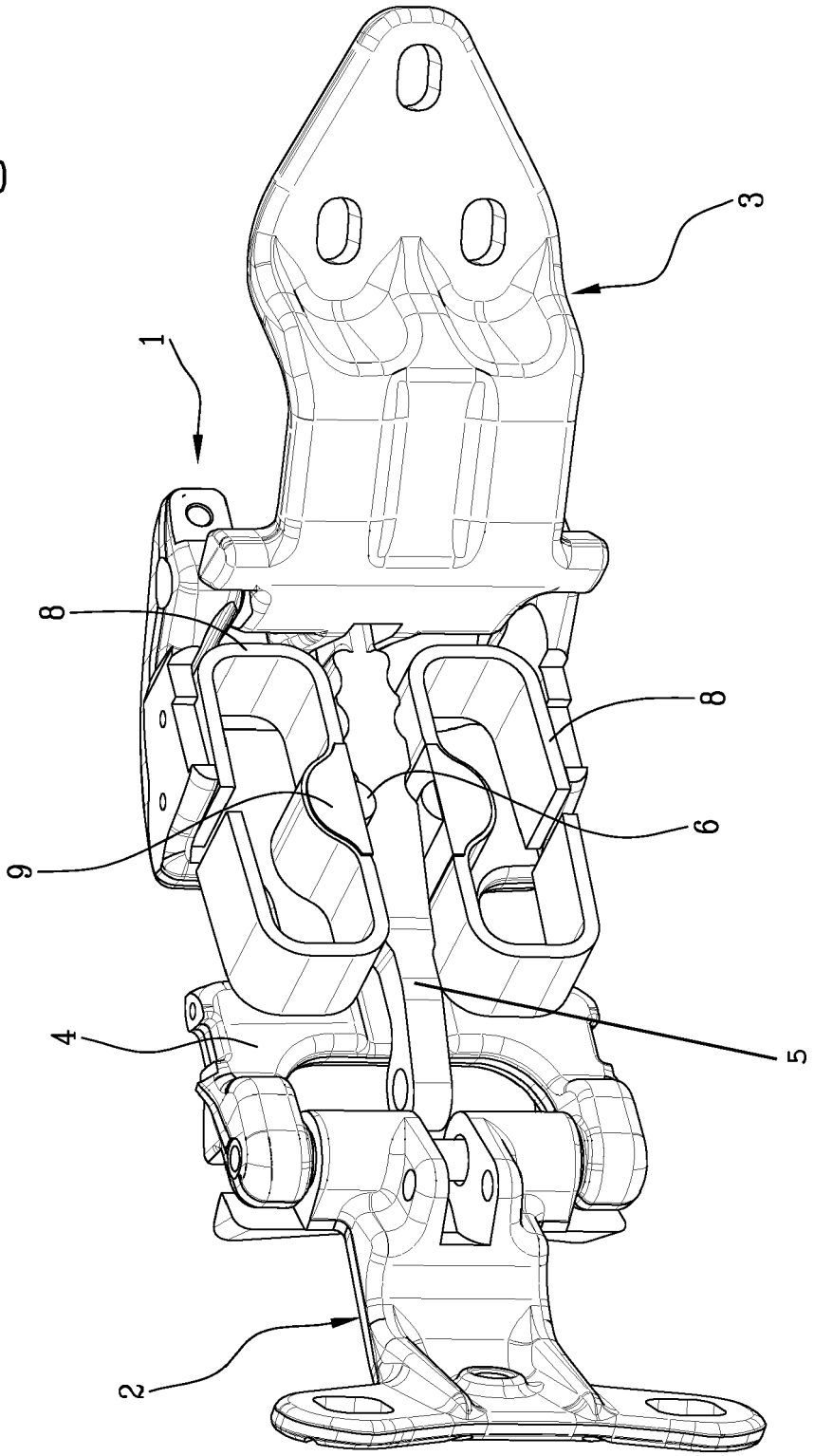
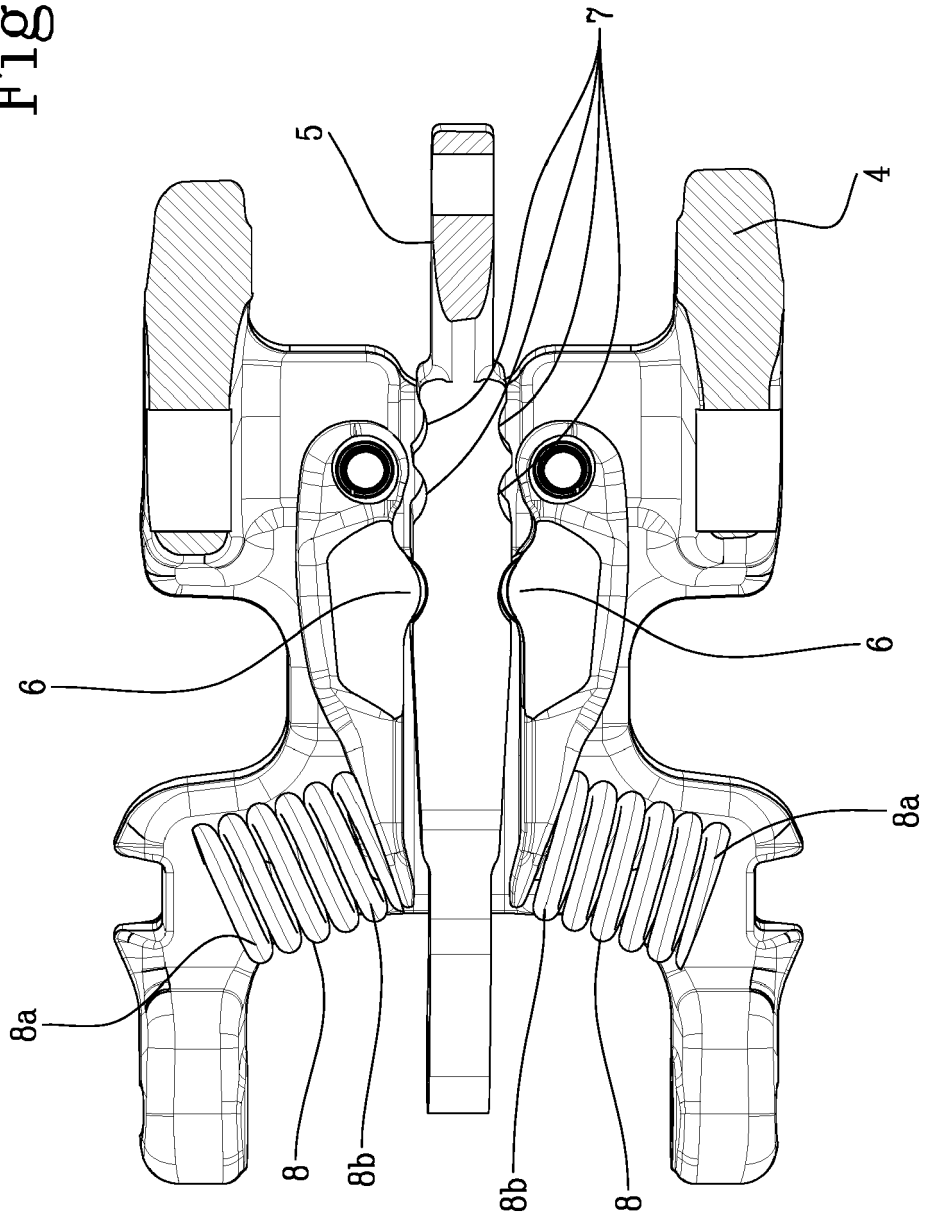


Fig.3



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EUROPEAN SEARCH REPORT

Application Number
EP 22 21 0850

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	FR 3 042 212 A1 (DEFTA SERVICE [FR]) 14 April 2017 (2017-04-14)	1-6	INV. E05D3/12
Y	* page 5, line 1 - page 11, line 22; figures 1,2 * * page 13, line 9 - page 15, line 8 *	7-9	E05D11/10
Y	US 2017/114578 A1 (FREEDMAN DAVID [CA] ET AL) 27 April 2017 (2017-04-27)	7-9	
A	* abstract; figures 1-4 *	1-6	

TECHNICAL FIELDS SEARCHED (IPC)

E05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 April 2023	Berote, Marc

CATEGORY OF CITED DOCUMENTS

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