(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 853 669 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.04.2015 Bulletin 2015/14

(51) Int Cl.:
E05F 1/10 *(2006.01)*

(21) Application number: **14186188.0**

(22) Date of filing: **24.09.2014**

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

(30) Priority: **27.09.2013 IT TV20130152**

(71) Applicant: **Perin SpA**
31018 Albina di Gaiarine (TV) (IT)

(72) Inventor: **CASAGRANDE, Mirco**
31018 GAIARINE (TV) (IT)

(74) Representative: **Citron, Massimiliano**
Via Primo Maggio, 6
31020 San Fior (TV) (IT)

(54) **Opening/closing mechanism for doors or leaves**

(57) To simplify its production, a method is shown for hinging the ends of a gas spring to an anchoring element (30, 60) that is fixable to a compartment (12) to be closed and/or to a movable closing element (14) for the compartment. In the method one of the end or the anchoring element is equipped with a first retaining portion (66, 68, 36, 38) in the shape of a clamp or fork which defines a seat (V), and the other is equipped with a second portion (26) shaped substantially complementarily to the seat, the shape of the seat being such that, once the second portion is inserted in the seat, they become inseparable by interposition of parts but relatively movable about an axis (X).

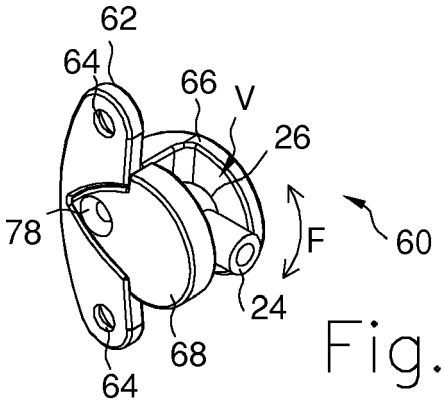

Fig. 4

EP 2 853 669 A1

Description

[0001] The invention relates to a closing/opening mechanism for doors or leaves, in particular furniture doors.

[0002] In the following we will refer by way of example to a door for furniture items, but the mechanism can be applied to any kind of hinged closure element, e.g. the hood or the trunk of a car, a lid, and so on.

[0003] In the field of furniture items mechanisms are known such as the one in FR2822494, useful for servoing the opening and closing movement of a door 104 hinged to a frame. There is a gas spring 12 whose ends are hinged to a fixed side of the cabinet and to the inner surface of the door 104.

[0004] The challenge of these types of mechanisms is the maximum cost reduction trough simple structures to be produced and assembly methods with the minimum number of operations. In FR2822494 the attachment to the cabinet (fig. 7) is in itself very complex and expensive, and requires a previous hole 24 on the cabinet that each installer would prefer to avoid for economy of time and costs. The hole 24, once done, also has the disadvantage of tying the cabinet to mount that kind of mechanism.

[0005] Note also that in FR2822494 the anchorages for the gas spring 12 are different, with cost, storage and replacement disadvantages.

[0006] From FR2822494 is also known an anchoring assembly (fig. 2) comprising a plate to which the end of the gas spring 12 is hinged by a pin 9. The big disadvantage is the cost and assembly of the pin.

[0007] Obviating one or more of these problems is the object of the invention, and this is the beneficial effect of what is hereby attached in the claims, in which the dependent ones define other advantageous variants.

[0008] It is thus proposed a method for hinging the ends of a gas spring (or hydraulic or pneumatic piston) to an anchoring element which is fixable to a compartment to be closed and/or to a movable closing element for the compartment (door, leaf, etc.), characterized by equipping one of the end or the anchoring element with a first retaining portion in the shape of a clamp or fork which defines a seat, and equipping the other with a second portion shaped substantially complementarily to the seat, the shape of the seat being such that, once the second portion is inserted in the seat,
they become inseparable by interposition of parts but relatively movable about an axis.

[0009] In doing so the structure of the anchoring assembly and the coupling to the gas spring is greatly simplified, and the assembly can take place without any complicated operations. This applies even more given that one can produce an anchoring assembly or its components in single piece, e.g. by molding, or with a maximum of only two pieces. The saving of complexity is evident.

[0010] Preferably the seat is defined by two substantially flat walls, mutually parallel to each other and spaced apart to define between them the seat. This involves: extreme ease of production, ease of assembly by insertion or snap action between the walls of the attachment for the gas spring, and the absence of complicated shaping as in FR2822494.

[0011] Preferably, a wall is adjustable in the distance from the other wall, in order to accommodate/couple different types of gas spring.

[0012] Preferably, a wall is separable/detached, and mountable at a certain distance, from the other. The pieces of the anchoring assembly are only two and the coupling with the gas spring is fast and easy to do.

[0013] The method can envisage that the wall is mounted separated at a certain distance from the other, in order to carry out the seat.

[0014] In the seat said end can be bound in many ways; preferably the end is retained in the seat by interposition of parts so as not to get out but to able to rotate about a pivoting axis. The interposition of parts ensures the minimum number of pieces, robustness and simplicity of manufacture, which can be even improved if the anchoring assembly is molded as one piece (e.g. out of plastic or zamak).

[0015] Preferably the inner surface of the seat, or of one or two of the walls, comprises a complementary concavity/convexity to a convexity/concavity located on the end of the gas spring. This ensures excellent retention in the seat. In particular, the inner surface of the seat or of a wall can comprise a concavity complementary to a spherical head present on the end. The coupling is simple, effective, and has the characteristics of a ball joint, good thing to allow movements of the gas spring which can deviate slightly from those contained strictly in a plane.

[0016] Preferably in the seat there is mounted integrally a pin that is inserted in the end, in order to reinforce the holding action inside the seat.

[0017] Another aspect of the invention is an anchoring assembly with the features defined here, in particular an anchoring element which is fixable to a compartment to be closed and/or to a movable closing element for the compartment (door, gate, etc.), characterized in that it comprises a retaining portion, having the shape of a clamp or fork, which defines a seat.
As variants, the anchoring element can

- be in one piece, e.g. made by molding, or at most made by only two pieces; and/or comprise:
- a seat defined by two walls or substantially flat portions, parallel and spaced with each other to define between them an empty space which constitutes the seat;
- a wall, e.g. one of the two, which is adjustable in the distance from the other wall;
- a wall, e.g. one of the two, which is separable/detached, and mountable fixedly at some distance, from the other;
- an inner surface of the seat, or of one or two of the walls, which comprises a concavity/convexity com-

plementary to a convexity/concavity present on the end of the gas spring;
- a pin mounted integrally in the seat which is inserted into the end;
- a bored flange for fixing to the compartment or to the closing element, the flange being flat and with a lying plane substantially parallel or orthogonal to the lying planes of said walls. The simple change of orientation for the flange changes the anchoring assembly by adapting it for the attachment to the compartment or to the closing element.

[0018] Another aspect of the invention is a kit comprising one or two anchoring elements with the features defined here, and a gas spring compatible and couplable with them.

[0019] Advantageously, the kit can comprise the gas spring and the anchoring assemblies already pre-mounted to it (the heads 26 already mounted inside the walls 66, 68 and/or 36,38). The savings of time and operations for the end user is evident. This is allowed by the substantial equality and symmetry of the anchoring assemblies regarding the clamp- or fork-shaped retaining portion.

[0020] The advantages of the invention will be still clearer from the following description of a preferred embodiment of mechanism, making reference to the attached drawing wherein

- Fig. 1 schematically shows a cabinet equipped with the mechanism;
- Fig. 2 shows an enlargement of the cabinet of Fig. 1 (circle C1);
- Fig. 3 shows another enlargement of the cabinet of Fig. 1 (circle C2);
- Fig. 4 shows a three-dimensional view of an anchoring assembly;
- Fig. 5 shows a three-dimensional, exploded view of the anchoring assembly of Fig. 4;
- Fig. 6 shows another three-dimensional, exploded view of the anchoring assembly of Fig. 4;
- Fig. 7 shows a side view of the anchoring assembly of Fig. 4;
- Fig. 8 shows a side view of a second anchoring assembly;
- Fig. 9 shows a view from above of the anchoring assembly of Fig. 8;
- Fig. 10 shows a second side view of the anchoring assembly of Fig. 8;
- Fig. 11 shows a sectional view of the anchoring assembly of Fig. 8 according to plane XI-XI;
- Fig. 12 shows a sectional view of the anchoring assembly of Fig. 8 according to plane XI-XI without a component to which it is coupled;
- Fig. 13 shows a three-dimensional, exploded view of the anchoring assembly of Fig. 8;
- Fig. 14 shows shape-coupling variations between an anchoring assembly and a gas spring.

[0021] In the following figures, identical numbers indicate identical or functionally equal parts.

[0022] A cabinet 10 (fig. 1) generically has a body or compartment 12 to which are hinged doors 14 servo-assisted in the opening/closing movements by a gas spring 25 formed by a cylinder 20 and a piston 22 sliding in it.

[0023] The piston 22 is hinged to an element 60 for anchoring to a side of the body 12, while the cylinder 20 is hinged to an element 30 for anchoring to a door 14 (fig. 2 and 3). The hinging axes are orthogonal to the sheet.

[0024] Figures 4 to 6 show in detail the anchoring element 60, which is a compound piece that comprises two semi-shells or pieces to be assembled together. The first piece comprises a flange 62 provided with pass-through holes 64 for screws or fastening means to the cabinet (not shown). From the center of the flange 62 a wall 66 extends cantilevered and parallel to the lying plane of the flange 62, and in its inner surface has a recess or concavity 72, e.g. with the shape of a spherical cap. At the center of the flange 62, below the base of the wall 66, there is a cavity 76, having a shape complementary to a, e.g. triangular, margin 74 of the second piece. From the margin 74 there extends a second wall 68, equal to the wall 66, in which a cavity 70 is present, similar to the cavity 72.

[0025] The margin 74 has a pass-through hole 78 in which a screw or a fastening means (not shown) is inserted to fasten together the two pieces (see assembled configuration of fig. 4 and 7). When the assembly is completed the walls 66, 68, being mutually parallel to each other and separated by a certain distance, define between them an empty space V which is exploitable as receiving seat for a spherical head 26 integral with a bushing 24 connectable or to be screwed or integrated at the end of the piston 22. The head 26 is suitable to stay inside the cavities 70, 72, which are complementary to it, and hold it in position but so as to be capable of rotating on itself. Overall, the piston 22 is kept held between the walls 66, 68 but the sphere 26 can rotate inside the cavities 70, 72 and the bushing 24 can move parallel to, and between, the walls 66, 68 rotating about an axis X. Therefore the piston 22 is functionally hinged to the anchoring element 60 (see degree of freedom indicated by arrow F and hinging axis X).

[0026] The resolution into two pieces of the anchoring assembly 60 is optional, but with the advantage of mounting precisely the sphere 26 into the cavities 70, 72 and then clamping around it the walls 66, 68. The anchoring assembly 60 can be made in one piece, thereby facilitating the production, e.g. by snap-insertion of the head 26 between the walls 66, 68, which can be constructed with a sufficiently flexible material to allow the insertion.

[0027] One can mount a pin (not shown) that passes through the head 26 and is anchored to the walls 66, 68, in order to improve the robustness of the obtained hinge and the maximum capacity in weight.

[0028] Figures 8 to 13 show in detail the anchoring

assembly 30, comprising two pieces to be assembled together. The first piece comprises a flange 32 provided with two through-holes 34 for screws or fastening means to the door 14 (not shown). From the flange 32 there extend, orthogonally to its lying plane, two equal parallel walls 36, 38 which in their inner surface respectively have a recess or concavity 40 (fig. 12), e.g. as a spherical cap. At the center of the flange 32 there is a cavity or opening 56 (fig. 13), with a complementary shape to the second piece 42, e.g. with a T-shaped cross-section.

[0029] The walls 36, 38, (like the walls 66, 68) are mutually parallel to each other and separated by a certain distance. They define between them a space V which makes a receiving seat for a spherical head 46 integral with, through a bushing 48, the end of the cylinder 20. The head 46 stays inside cavities complementary to it, which retain it movably. Overall, the cylinder 20 remains held between the walls 36, 38 but the sphere 46 can rotate about an axis X inside them as the head 26, and therefore the cylinder 20 is functionally hinged to the anchoring assembly 30. Note that the piece 42 serves (i) to close the cavity 56 and the lower part of the piece 30, (ii) to define a portion of the cavity 56, and (iii) to abut or nearly abut on the head 46 increasing its stability inside the space V. For this purpose the piece 42 can have the end to be inserted in the cavity 56 of concave shape.

[0030] For the mounting, the head 46 is inserted between the walls 36, 38 through the opening 56, closed after by applying the second piece 42. The cylinder 20 is connected to the bushing 48, which protrudes from the walls 36, 38 into the space V, e.g. by screwing.

[0031] Fig. 14 shows other variations of shape-coupling between an anchoring assembly 30, 60 and one end of the gas spring. In particular, a generic shaping or portion 90 shaped as a clamp or fork can be applied to the anchoring assembly or to the end of the gas spring 92. The portion 90 can comprise on its inner walls reliefs or concavities 96 which engage by shape-coupling corresponding and substantially complementary concavities or reliefs 96 in the portion 92 of the gas spring when the latter is inserted inside the former. In this way the two portions 90, 92 become inseparable by interposing parts 96 but relatively movable about an axis, that of hinging.

Claims

1. Method for hinging the ends of a gas spring to an anchoring element (30, 60) that is fixable to a compartment (12) to be closed and/or to a movable closing element (14) for the compartment, **characterized by**
   equipping one of the end or the anchoring element with a first retaining portion (66, 68, 36, 38) in the shape of a clamp or fork which defines a seat (V), and equipping the other with a second portion (26) shaped substantially complementarily to the seat,
   the shape of the seat being such that, once the second portion is inserted in the seat, they become inseparable by interposition of parts but relatively movable about an axis (X).

2. Method according to claim 1, wherein the seat is defined by two substantially flat walls (66, 68, 36, 38), mutually parallel to each other and spaced apart to define between them the seat.

3. Method according to claim 1 or 2, wherein a wall (68) is mounted separated at a certain distance from the other.

4. Method according to claim 1 or 2 or 3, wherein the end is retained in the seat by interposition of parts (26, 70) so as not to get out but to be able to rotate about a pivoting axis (X).

5. Method according to any one of the preceding claims, wherein the anchoring element is molded in one piece.

6. Anchoring element (30, 60), for the end of a gas spring, which can be fixed to a compartment (12) to be closed and/or to a movable element (14) for closing the compartment,
   characterized by comprising a retaining portion shaped as a clamp or fork (66, 68, 36, 38) that defines a seat in which said end can be retained.

7. Element according to claim 6, **characterized by** the fact of being a single one-piece or at most made by only two parts.

8. Element according to claim 7 or 8, wherein the seat is defined by two substantially flat walls or portions (66, 68, 36, 38), mutually parallel to each other and spaced apart to define between them an empty space (V) which constitutes the seat.

9. Element according to claim 6 or 7 or 8, wherein a wall (68) is separable and mountable fixed at a certain distance from the other.

10. Element according to any one of the preceding claims, wherein the inner surface of a wall comprises a concavity/convexity (70) complementary to a convexity/concavity present on the end (26) of the gas spring.

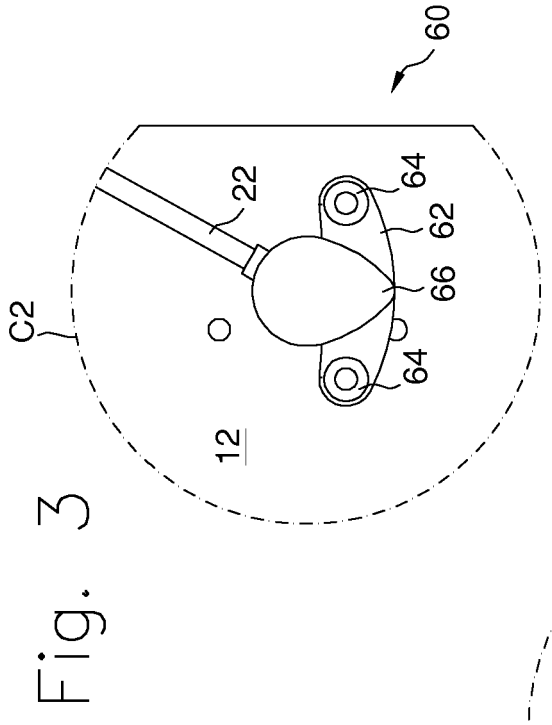

Fig. 3

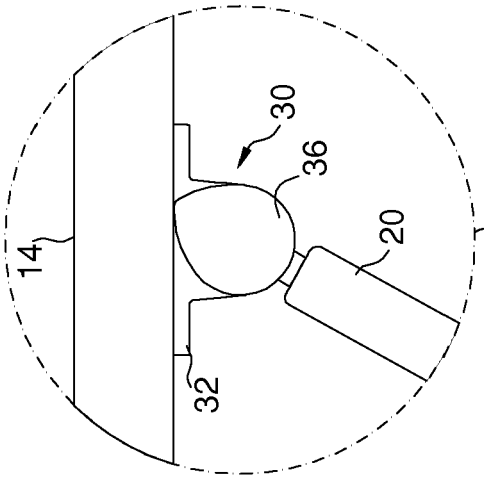

Fig. 2

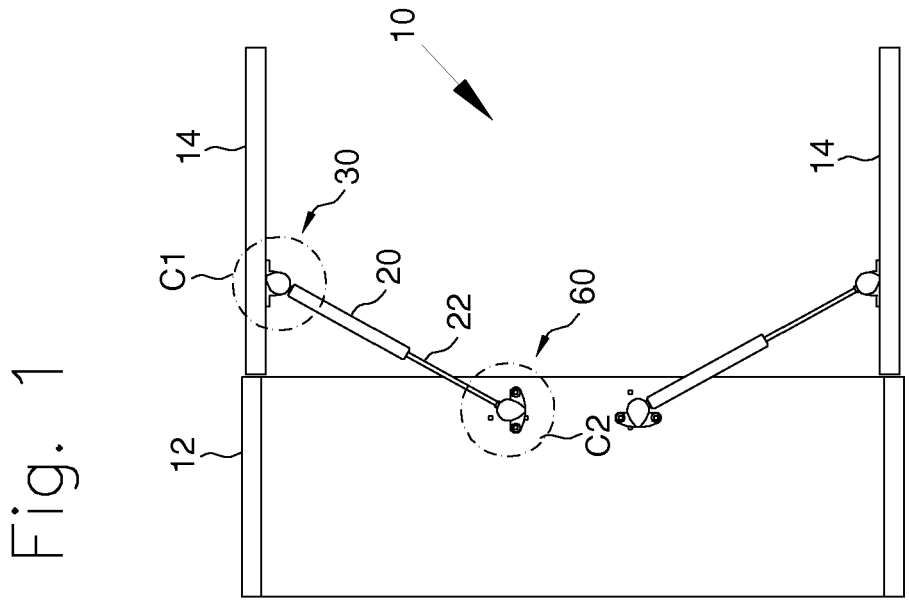

Fig. 1

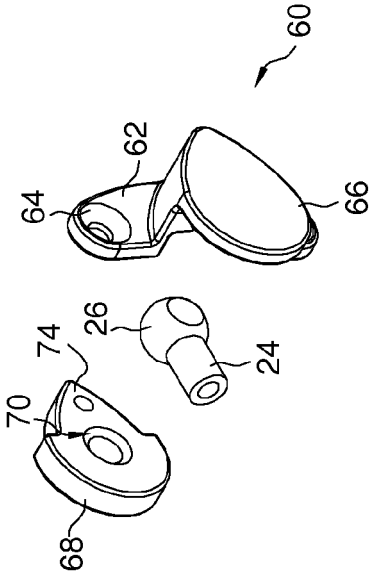

Fig. 6

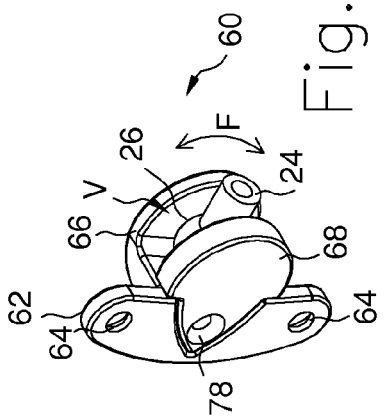

Fig. 4

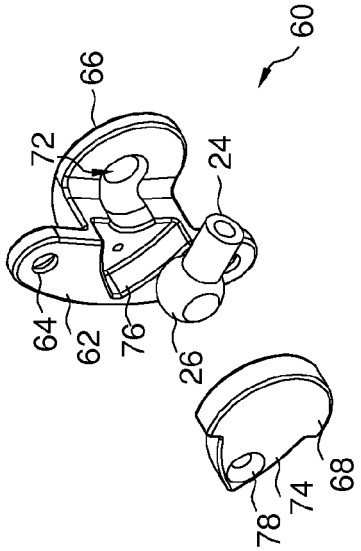

Fig. 5

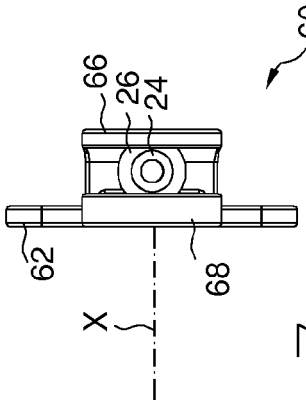

Fig. 7

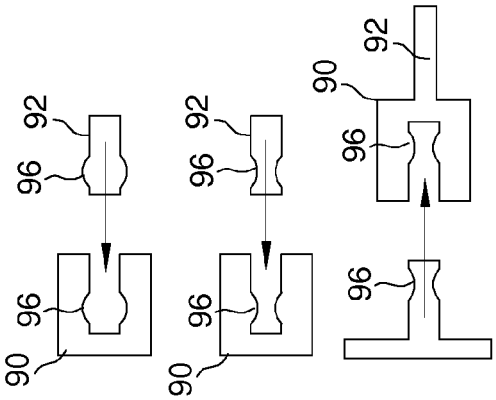

Fig. 14

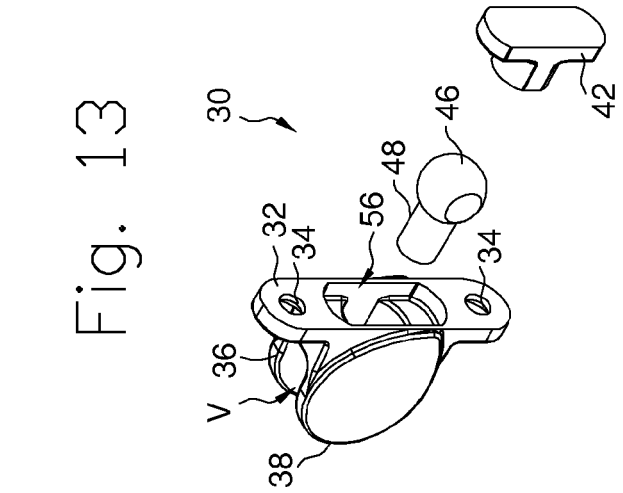

Fig. 13

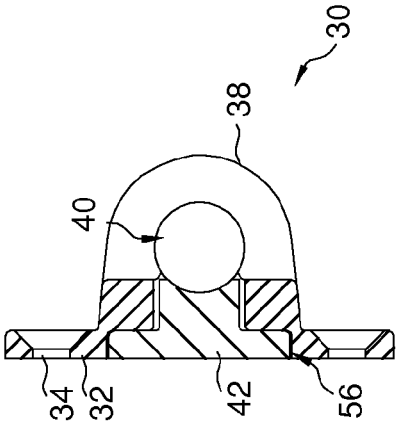

Fig. 12

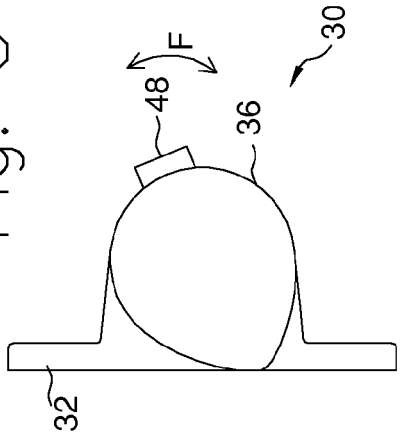

Fig. 8

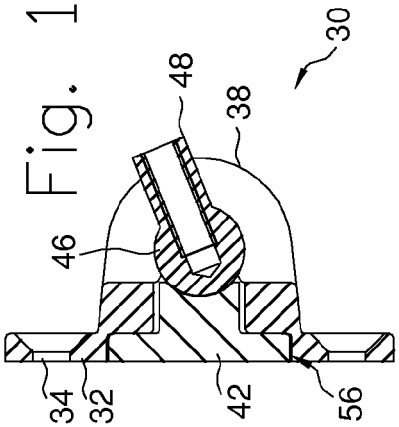

Fig. 11

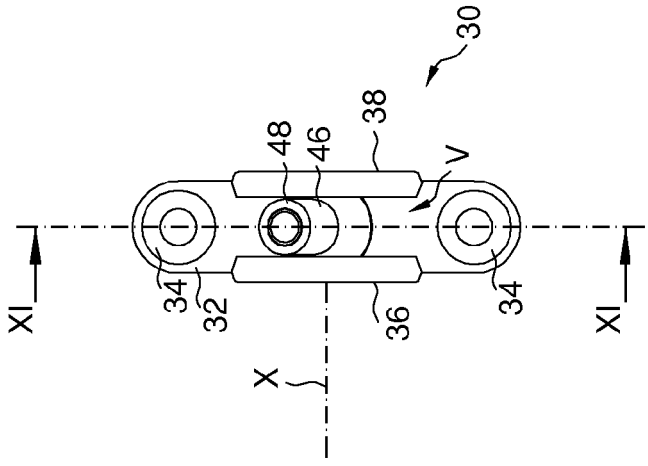

Fig. 9

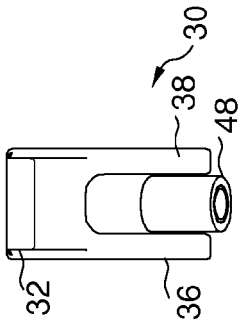

Fig. 10

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 18 6188

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	WO 2005/033549 A1 (VAPSINT SRL [IT]; PAGOTTO ANGELO [IT]; PAGOTTO MARGHERITA [IT]) 14 April 2005 (2005-04-14) * page 6, line 31 - page 7, line 31 * * figures 1,2,4 * -----	1-4,6-8, 10	INV. E05F1/10
X	US 5 833 383 A (BAUMAN WALTER DOUGLAS [US]) 10 November 1998 (1998-11-10) * column 4, lines 14-62 * * figures 1,2 * -----	1-10	
A,D	FR 2 822 494 A1 (FERRAMENTA LIVENZA [IT]) 27 September 2002 (2002-09-27) * figures 1,5-8 * -----	1,6	

TECHNICAL FIELDS SEARCHED (IPC)
F16C
E05F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	28 January 2015	Klemke, Beate

CATEGORY OF CITED DOCUMENTS

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

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 18 6188

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.

28-01-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005033549 A1	14-04-2005	AT 417216 T	15-12-2008
		EP 1676048 A1	05-07-2006
		WO 2005033549 A1	14-04-2005
US 5833383 A	10-11-1998	CA 2243385 A1	23-01-1999
		DE 19833030 A1	28-01-1999
		GB 2327707 A	03-02-1999
		JP H1193938 A	06-04-1999
		US 5833383 A	10-11-1998
FR 2822494 A1	27-09-2002	AT 5992 U1	25-02-2003
		DE 20203942 U1	27-06-2002
		ES 1051448 U	01-08-2002
		FR 2822494 A1	27-09-2002
		IT PN20010013 U1	23-09-2002

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- FR 2822494 **[0003] [0004] [0005] [0006] [0010]**