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(54) **HYDRAULIC HINGE FOR GLASS DOORS**

(57) It comprises a base (1) with two covers (2,3), between whose covers the door is fixed, a hydraulic circuit (4) and an eccentric axis (5) that is fixed to one of the covers (2), characterized in that the cover (2) that is fixed to the eccentric axis (5) comprises:
- cavities (6), one per end of the axis (7), with a first slope (8), and which configure a second slope (10) in its upper part, which reduces the inner space of the cavity (6),
- shoes (9) that block the cavities (6), immobilize the ends (7) of the eccentric axis (5) by contact and are fixed against the cover (2), and that have a third slope (11), which is facing the second slope (10), and
- fixing means (12), which are fixed to the shoes (9), arranged perpendicular to the cover (2).

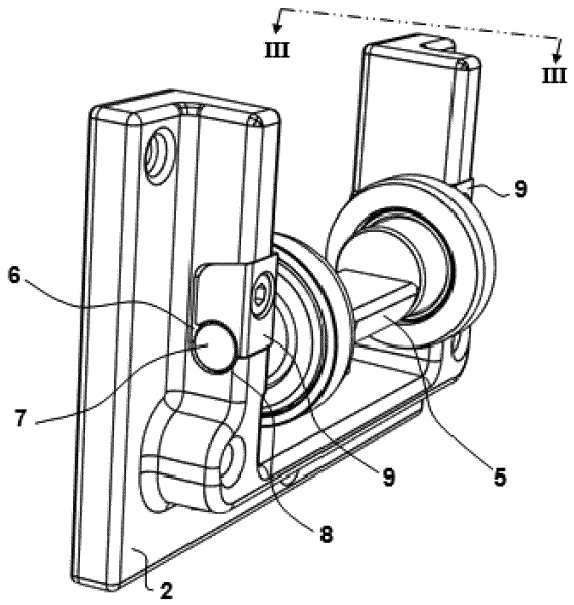

FIG. 2

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Description

[0001] Hydraulic hinge for glass doors, of the type that comprises a base with two covers, between whose covers the door is fixed, a hydraulic circuit and an eccentric axis that is fixed to one of the covers, characterized in that the cover that is fixed to the eccentric axis comprises: - cavities, one per end of the axis, with a first slope, and which configure a second slope in its upper part, which reduces the inner space of the cavity, - shoes that block the cavities, immobilize the ends of the eccentric axis by contact and are fixed against the cover, and that have a third slope, which is facing the second slope, and - fixing means, which are fixed to the shoes, arranged perpendicular to the cover.

BACKGROUND OF THE INVENTION

[0002] Different hinge systems for the automatic closing of glass doors are known in the state of the art.

[0003] It's a document of the state of the art the European Patent 2746509 (ES2701185), "DOOR CLOSING HINGE, PARTICULARLY FOR GLASS DOORS", of the year 2010, in the name of IN&TEC, srl, which refers to a system for closing a glass door which is supported by a floor, the door being movable between an open position and a closed position, the system comprising: - a door closing hinge; - a mounting plate to be anchored on the floor by suitable fasteners; wherein the door closing hinge comprises: - a fix element anchorable to the floor through the mounting plate; - a movable element anchorable to the door, the movable element being rotatably coupled to the fix one to rotate about a first longitudinal axis between the open door position and the closed door position; - said movable element comprising a box-shaped body, said fix element comprising a pin which defines the first longitudinal axis; - closing means for the automatic return of the door from the open to the closed position, said closing means comprising a first cam element interacting with a first plunger element movable within said box-shaped body between a first compressed end position corresponding to the open door position and a first extended end position corresponding to the closed door position; - braking means acting on said closing means for counteracting the action thereof, said braking means comprising a second cam element interacting with a second plunger element movable within said box-shaped body between a second compressed end position, corresponding to the closed door position and a second extended end position, corresponding to the open door position; wherein - both said first and second cam elements are unitary with said pin; - said pin is interposed between said first and second plunger elements, the latter being reciprocally opposite with respect to said pin; - said first and second plunger elements are both slidably movable along a second axis substantially perpendicular to said first axis, the box-shaped body having an elongated shape along said second axis; wherein said first plunger element comprises a substantially cylindrical first back portion and a first front portion including at least one first pushing head, said second plunger element comprising a substantially cylindrical second back portion and a second front portion which include at least one second pushing head, characterized in that said first and second plunger elements are slidably movable in a single operating chamber defining said second axis through which said first and second plunger elements are coaxially inserted, in that said operating chamber comprises a working fluid, said first and second back portions being designed to separate said operating chamber into a first, a second and a third adjacent variable volume compartments in reciprocal fluidic communication, and further characterized in that said operating chamber comprises control means for controlling the flow of the working fluid designed to allow the flow thereof from said first compartment to said third compartment through said second compartment upon the opening of the door and to allow the backflow thereof from said third compartment to said first compartment through said second compartment upon the closing of the door.

[0004] It is also known the European Patent No. 2019895 (ES2354124) " HINGE STRUCTURE FOR SELF-CLOSING DOORS OR THE LIKE, PARTICULARLY GLASS DOORS OR THE LIKE, AND ASSEMBLY INCORPORATING SUCH STRUCTURE" of 2007, in the name of Dianora Gosio, which refers to a hinge structure for self-closing doors or the like, comprising: - a first stationary element attachable to the frame of a door pivotally mounted to a first movable element of the hinge structure attachable to the door for rotating about a longitudinal axis between an open door position and a closed door position; - closing means acting on said first movable element for automatically returning the door to said closed position upon opening thereof; - hydraulic damping means acting on said first movable element to oppose and damp the closing movement of said closing means; - both said closing means and said hydraulic damping means being housed in a first operating chamber located internally of said first stationary element; wherein said closing means include a first cam element unitary with said first movable element and having a first substantially flat contact surface, and a first plunger element movable within said first operating chamber along a transverse axis between a compressed end position, corresponding to said open door position, and an extended end position, corresponding to said closed door position, said plunger element having a front face which is susceptible to contact engage said surface of said cam element; wherein said closing means include first counteracting elastic means operating on said first plunger element for urging said front surface against said first contact surface of said first cam element; characterized in that said first contact surface of said first cam element is offset with respect to said longitudinal axis by a predetermined distance such as the front face of said plunger element in its extended end position is positioned beyond said longitudinal axis,

in such a manner to allow the automatic closing of the door; and said first plunger element has a substantially cylindrical side wall and an end wall defining said front face, said end wall being designed to separate said at least one first operating chamber into a first variable volume compartment and a second variable volume compartment which are adjacent and in fluid communication with each other for the hydraulic damping, said first counteracting elastic means being located in said first compartment.

[0005] Patent WO2018/002805 " HINGE FOR THE ROTATABLE MOVEMENT OF A DOOR OR OF A SIMILAR CLOSING ELEMENT", of the year2017, in the name of COLCOL GROUP, refers to a hinge for the rotatable movement of a door (D) or of a similar closing element anchored to a wall (W) or to a similar stationary support, the hinge comprising a fixed element couplable to the wall (W) or to the similar stationary support and a movable element couplable to the door (D) or to the similar closing element. The fixed and movable elements being rotatably coupled to each other to reciprocally rotate between an open position and a closed position around a first longitudinal axis. In particular, one of the movable elements and the fixed element includes a hinge body, the other of the movable element and the fixed element including at least one pivot defining the longitudinal axis (X). The pivot comprises cam means rotating around the axis (X) and the hinge body comprises at least one working chamber defining a second axis (X') substantially parallel to the axis (X) and spaced apart thereto. The working chamber further comprises at least one slider sliding along the axis (X') between a first and a second end stroke positions. In particular, the hinge further comprises cam follower means engaged with cam means and interacting with the slider so that the rotation of the movable element around the axis (X) corresponds to the slinding of the slider along the axis (X').

[0006] The applicant firm is the owner of the European Patent Application No. 2472036 "HYDRAULIC MECHANISM FOR DOOR OPENING", of the year 2011, which refers to a hydraulic mechanism for opening doors of the type fixed to a structure, such as a wall, frame or floor of the type comprising a base with two covers between which covers the door is fixed by securing means, characterised in that it comprises: an eccentric shaft, a first piston, connected to at least one spring and to the eccentric shaft and a closed circuit with lubricant fluid or oil that moves in function of whether the referred spring is compressed or decompressed, thus regulating the door-opening or closing speed.

[0007] The European Patent No. 2808474 "HYDRAULIC HINGE FOR A GLASS DOOR", from 2013, in the name of GANG GWO INDUSTRIAL CO., LTD, refers to a hydraulic hinge for a glass door has a fixing plate, a base, a pivot, a buffer module, and a clamping module. The base is combined with the fixing plate and has an oil passage. The oil passage is formed in the base. The pivot is rotatably mounted in the base and has an adjusting space communicating with the oil passage. The buffer module is mounted in the base and has a sliding tube abutting the pivot. The clamping module is pivotally mounted on the pivot and can clamp a glass door. The glass door can be pivoted relative to the base. With the buffer module and the oil passage, the glass door can be closed in a smooth movement.

[0008] Finally, Patent US2009188082 "ADJUSTABLE GLASS HINGE, in the name of Shih-Chang Huang, from 2008, describes an adjustable glass hinge mainly includes a fastening assembly fastened to a door frame and a clipping plate assembly to clip a glass panel. The fastening assembly includes a fastening seat, two bucking elements disposed from one side in the fastening seat and coupled respectively with an elastic element, a pintle running through another side of the fastening seat and a seat board fastened to the fastening seat. The clipping plate assembly has a first clip plate and a second clip plate that are coupled together, two pads held on an inner side of the first and second clip plates and a clipping blade to hold and confine two directing members. Alignment of the glass panel can be accomplished quickly.

BRIEF DESCRIPTION OF THE INVENTION

[0009] The present invention falls within the field of hydraulic hinges for opening glass doors with automatic closing.

[0010] The closest document is Patent US2009188082.

[0011] Said patent solves the problem of how to fix the eccentric axis in the cover by means of a fixing system, by means of a threaded pin that goes through a partition in the base and said pin linearly pushes the shoe against the axis.

[0012] The main problem comes from the fact that due to the weight of the glass door, tensions are generated in the hinge, which can cause that even when the shoe is pressed with the threaded pin, it is very difficult to leave the axis in a specific and secured position, and it can create some kind of slack.

[0013] In addition, this system does not guarantee that the axis will not end up rotating due to the action of the forces that said axis should support when the door is turned, so that after a certain time it has to be disassembled and fixed again.

[0014] The present invention solves both problems by making cavities in one of the covers, where the ends of the eccentric axis are positioned, and a shoe that blocks said cavity at the same time that, when said shoe is fixed against the cover, it blocks and fixes the eccentric axis by contact.

[0015] The fixing means, contrary to what happens in the background of the invention, is located perpendicular to the lid. This allows that the shoe to absorb the stresses due to the fact that when the fixing means are pressed against the shoe, from one side the shoe is positioned and repositioned by the action of the friction between the

slopes, which makes the shoe is pushed against the base by the action of the fixing means and against the axis by the pressure of friction between slopes.

[0016] In this way, the shoe has a position caused by parallel forces to the base and by perpendicular forces to the base, with a single fixing means, generating an adaptability of the shoe to be able to immobilize the end of the axis in a more solid way.

[0017] This shoe can then be adapted to small imperfections at the end of the axis, because it will always end up accommodating or adjusting to the end of the axis and will be able to fix said end of the axis.

[0018] The eccentric axis, being inside the cavities, is in a stable position, which makes it easier for the shoe to be fixed to it, and at the same time, as the shoe is fixed against the cover and, in addition, there is a double contact between the shoe against the cover and the shoe against the end of the axis, the contact surface is increased and the fixation is ensured.

[0019] An object of the present invention is a hydraulic hinge for glass doors, of the type that comprises a base with two covers, between whose covers the door is fixed, a hydraulic circuit and an eccentric axis that is fixed to one of the covers, characterized in that the cover that is fixed to the eccentric axis comprises: - cavities, one per end of the axis, with a first slope, and which configure a second slope in its upper part, which reduces the inner space of the cavity, - shoes that block the cavities, immobilize the ends of the eccentric axis by contact and are fixed against the cover, and that have a third slope, which is facing the second slope, and - fixing means, which are fixed to the shoes, arranged perpendicular to the cover.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] In order to facilitate the explanation, four sheets of drawings are attached to this description in which a practical embodiment has been represented, which is cited by way of example, not limiting the scope of the present invention:

- Figure 1 is a general view of the hinge,
- Figure 2 is a perspective view of one of the covers, without the hydraulic system,
- Figure 3 is a section of Figure 2 along lines III-III, and
- Figure 4 is a perspective detail of the shoe .

CONCRETE EMBODIMENT OF THE PRESENT INVENTION

[0021] Thus, in figure 1 a base 1, a cover 3 and a hydraulic circuit 4 are illustrated.

[0022] Figure 2 shows a cover 2, an eccentric axis 5 with its end 7, cavities 6, a first slope 8 and a shoe 9.

[0023] Figure 3 shows the cover 2, the eccentric axis 5 with its end 7, the cavities 6, the first slope 8, a second slope 10, a third slope 11, the angle (α), the angle (β) and the shoe 9 with its screw 12.

[0024] Finally, in figure 4 the shoe 9 and the second slope 10 are illustrated.

[0025] Thus, the device of the present invention is a hydraulic hinge, one of those installed to fix glass doors, with an automatic closing system.

[0026] It comprises a base 1 that is fixed to a wall or fixed structure, with two covers 2, 3, between whose covers the door is fixed, a hydraulic circuit 4 that will serve to allow the return of the door, and an eccentric axis 5 that it is fixed to one of the covers 2.

[0027] The cover 2 that is fixed to the eccentric axis 5 comprises cavities 6, one per end of the axis 7, with a first slope 8 and some shoes 9 that block the cavities 6, immobilize also the ends 7 of the eccentric axis 5 by contact and are fixed against the cover 2. In this way, the operator can place the eccentric axis 5 in the correct position without hardly any effort, leaving it immovably fixed.

[0028] The cavities 6, in their upper part, comprise a second slope 10, which reduces the inner space of the cavity 6, and because the shoes 9 comprise a third slope 11, which faces the second slope 10. This combination of slopes allows the operator to regulate the pressure of the shoe 9, said shoe always remaining fixed. In this way, the shoe 9 can be adapted to different types of ends 7, of different sizes, since the slopes 10, 11 always allow the shoe 9 to be fixed and locked against the walls of the cavity 6.

[0029] It also comprises fixing means 12, in this embodiment a screw, which are fixed to the shoes 9, arranged perpendicular to the cover 2.

[0030] Optionally, the angle (α) of the third slope 11 is between 20° and 40°, that is, the angle taken in relation to the position of the base 1.

[0031] It would be possible to configure the angle (β) of the second slope 10 to be equal to or greater than the angle (α), thus allowing the shoe 9 to adapt to the end of the axis 7 and to the stresses to which it may be subjected.

[0032] It is a manufacturing option that the fixing means 12 are located above the end of the axis 7, and mostly or totally in the upper half of the shoe 9. This is done to allow a small tilting of the shoe 9 when fixing and that it can be adapted to the end of axis 7.

[0033] Also, optionally, the shoes 9 can be made of metal to provide greater rigidity.

[0034] Thus, in a specific embodiment, the operator would place the end of the axis 7 inside the cavities 6. The first slope 8 would allow a correct placement of the end of the axis 7 in the cavity 6.

[0035] Next, it would place the shoe 9 inside the cavity 6, pressing the shoe 9 by contact to the end of the axis 7. By tightening the shoe 9 by means of the screw 12 against the cover 2 (with a force that is perpendicular to the cover 2) it is exerted a pressure of the third slope 11 against the second slope 10 that causes the thrust of the shoe 9 against the end 7 and at the same time of the shoe 9 against the base 2 fixing it, which immobilizes the

shoe 9, thus being able to regulate the right point for the correct operation of the glass door. In other words, when screwing the screw 12, the shoe 9 from one side collides at the third slope 11 against the second slope 10, which causes a force in the direction towards the end of the axis 7, shackling it, and at the same time another force perpendicular and directed towards the base 2, fixing the shoe itself 9 against the base 2 and laterally shackling the end of the axis 7.

[0036] In the event that the return system did not work correctly, it could be adjusted by loosening or tightening the screw 12 that would reduce or increase the pressure of the shoe 9 against the end 7.

[0037] The inventors have verified that if the angle (α) of the third slope 11 is between 20° and 40°, the end of the axis 7 is immobilized efficiently. The variation depends on the materials used and the stresses that the end of the axis 7 can receive. For example, there may be variations between a displaced or centered base 2 or depending on the thickness of the glass.

[0038] For a centered base 2, made of aluminum or aluminum alloy and a glass thickness of up to 21mm, very relevant results have been found for the angle (α) around 30°, which may vary depending on the material, the weight of the glass and, above all, of the tensions that the hinge 1 has to undergo.

[0039] It would be possible to configure the angle (β) of the second slope 10 to be equal to or greater than the angle (α). Thus, when pushing the shoe 9 by means of the third slope 11, the second slope 10 can always guide it downwards and into the cavity 6, thus allowing the shoe 9 to adapt to the end of the axis 7 and the tensions to which it may be subjected. The proposed angles would be the same as for angle (α).

[0040] The screw 12 being located above the end of the axis 7, and mostly or completely in the upper half of the shoe 9, allows that while the screw 12 is being screwed, and the second slope 10 pushes the third slope 11 for the end of the axis 7, this asymmetry of being located the screw 12 in the upper half of the shoe 9 makes it possible to adapt, to have a small tilt so that it can be better adjusted to the end of the axis 7.

[0041] The present invention describes a new hydraulic hinge for glass doors. The examples mentioned here are not limiting of the present invention, therefore it may have different applications and/or adaptations, all of them within the scope of the following claims.

Claims

1. Hydraulic hinge for glass doors, of the type that comprises a base (1) with two covers (2,3), between whose covers the door is fixed, a hydraulic circuit (4) and an eccentric axis (5) that is fixed to one of the covers (2), **characterized in that** the cover (2) that is fixed to the eccentric axis (5) comprises:
   - cavities (6), one per end of the axis (7), with a first slope (8), and which configure a second slope (10) in its upper part, which reduces the inner space of the cavity (6),
   - shoes (9) that block the cavities (6), immobilize the ends (7) of the eccentric axis (5) by contact and are fixed against the cover (2), and that have a third slope (11), which is facing the second slope (10), and
   - fixing means (12), which are fixed to the shoes (9), arranged perpendicular to the cover (2).

2. Hinge, according to claim 1, **characterized in that** the angle (α) of the third slope (11) is between 20° and 40°.

3. Hinge, according to claim 2, **characterized in that** the angle (β) of the second slope (10) is equal to or greater than the angle (α).

4. Hinge, according to claim 1, **characterized in that** the fixing means (12) are located above the end of the axis (7), and mostly or totally in the upper half of the shoe (9).

5. Hinge, according to claim 1, **characterized in that** the shoes (9) are metallic.

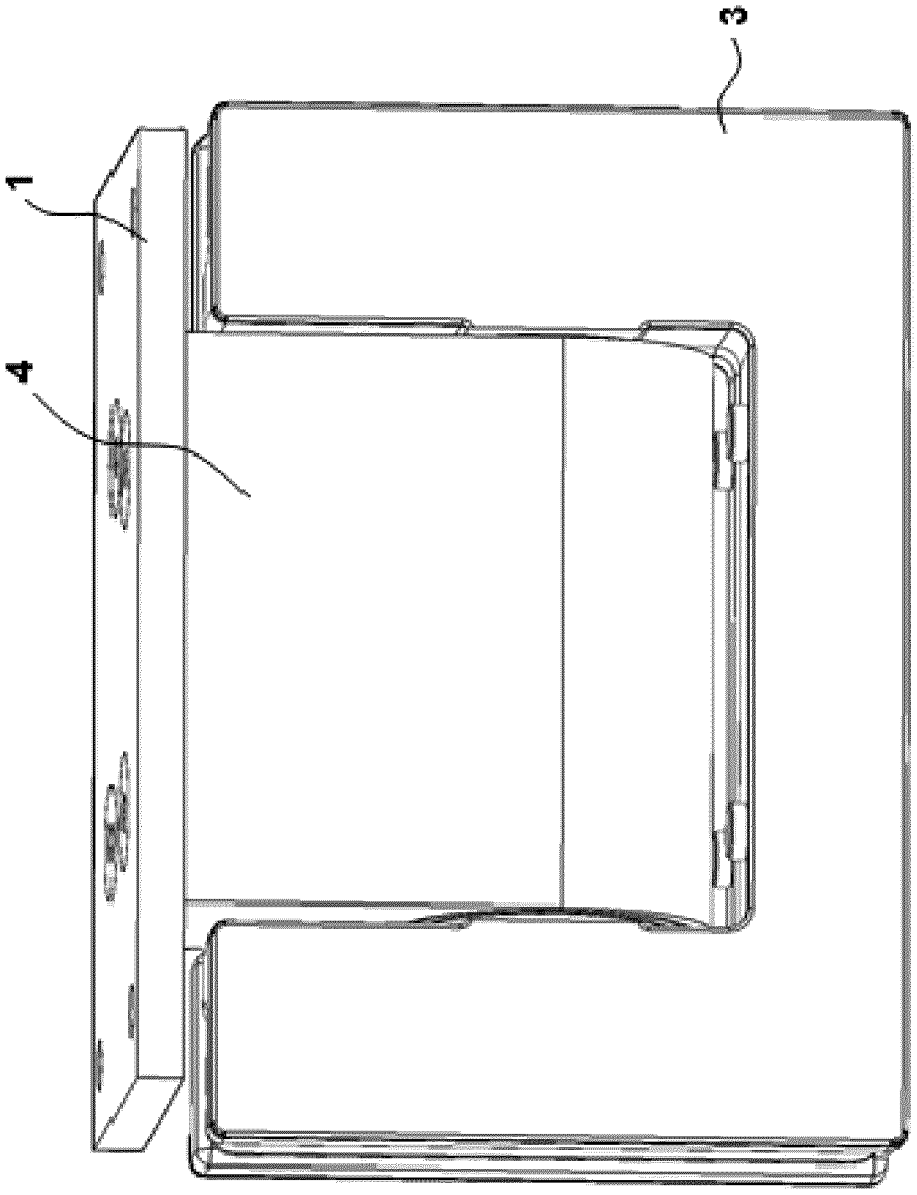

FIG. 1

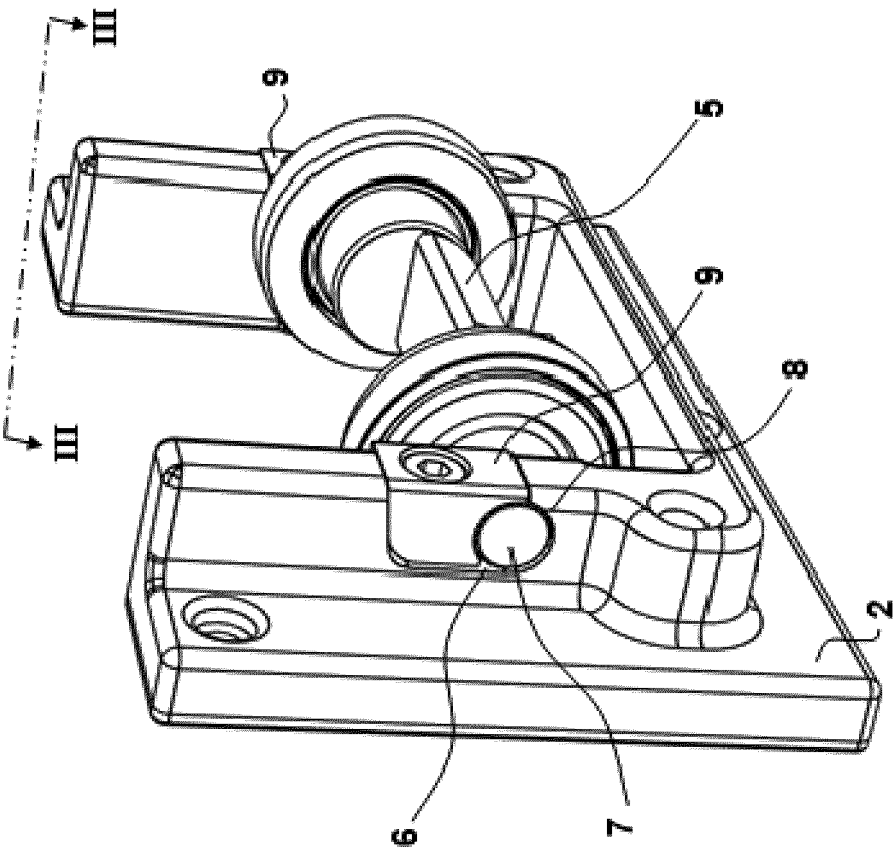

FIG. 2

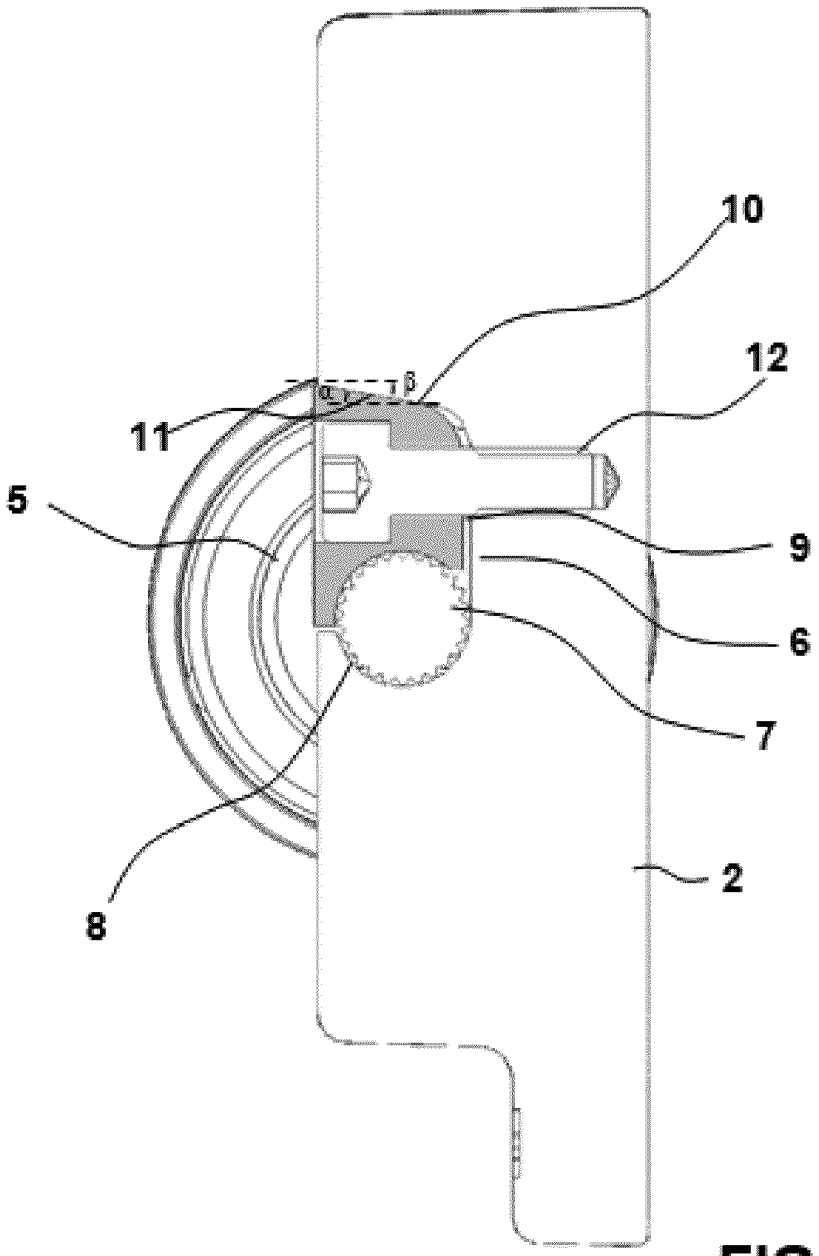

FIG. 3

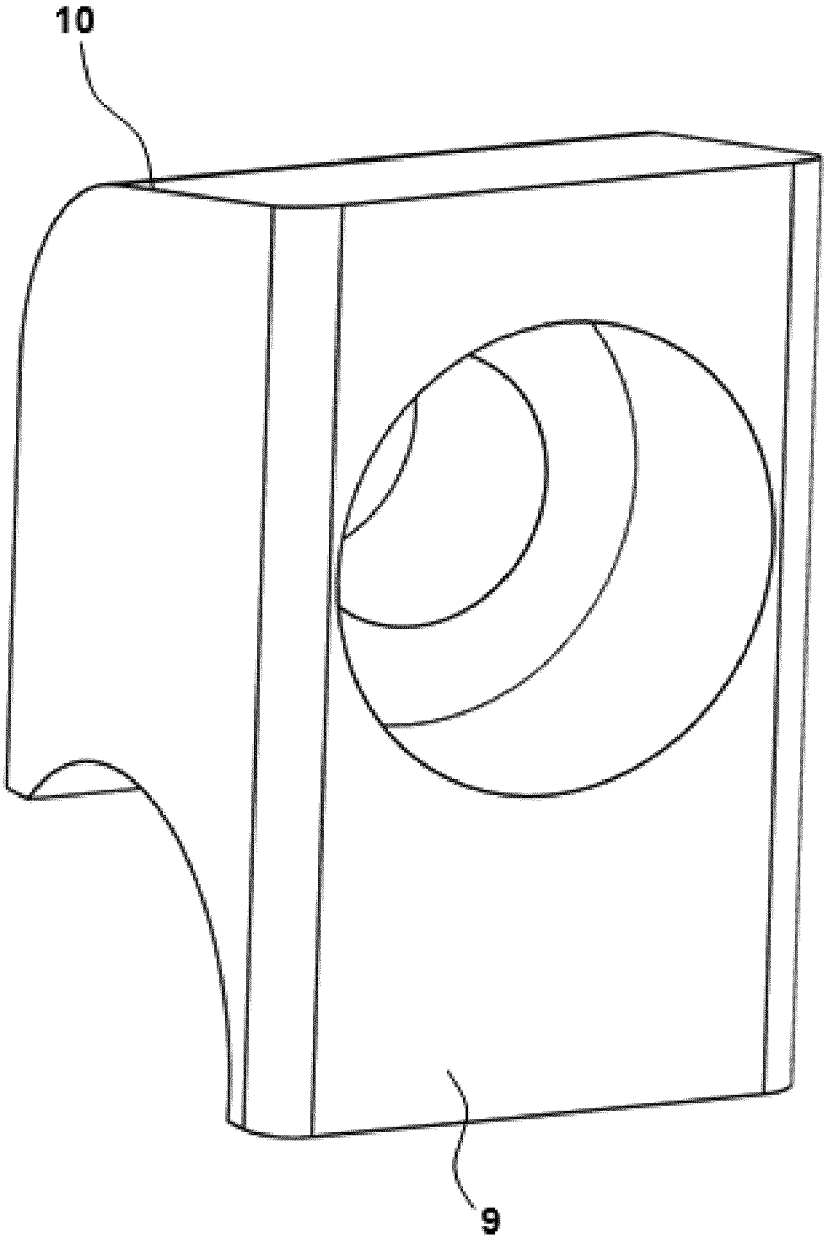

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 23 15 2218

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,D	EP 2 808 474 A1 (GANG GWO IND CO LTD [TW]) 3 December 2014 (2014-12-03) * paragraph [0031]; figures 1,9 * -----	1-5	INV. E05D5/02 E05D5/12 E05D7/10
A,D	US 2009/188082 A1 (HUANG SHIH-CHANG [TW]) 30 July 2009 (2009-07-30) * the whole document * -----	1-5	

TECHNICAL FIELDS SEARCHED (IPC)

E05D
E05F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 June 2023	Berote, Marc

CATEGORY OF CITED DOCUMENTS

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06-06-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2808474 A1	03-12-2014	EP 2808474 A1	03-12-2014
		HU E029317 T2	28-02-2017
		PL 2808474 T3	30-11-2016
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- ES 2354124 **[0004]**
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- EP 2472036 A **[0006]**
- EP 2808474 A **[0007]**
- US 2009188082 A **[0008] [0010]**