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(54) HINGE WITH A DAMPING FUNCTION

(57) In a hinge with a damping function comprising a first fastening set (10) with a housing, a second fastening set (20) with a housing, as well as a damping unit (30) situated between the first fastening set (10) and the second fastening set (20), the damping unit (30) comprises a first damping set (31) comprising a first cam (13) non-rotatable in relation to the first fastening set (10) and shaped like a cylinder (11) open at a side of a middle of the hinge (1) and having a facing surface (14) with at least one protrusion (15) directed towards the middle of the hinge (1), a second damping set (32) comprising a second cam (23) non-rotatable in relation to the second fastening set (20) and shaped like a cylinder (21) open at the side of the middle of the hinge (1) and having a facing surface (24) faced towards the facing surface (14) of the first cam (13) and being in contact, at least in one point 27, with the facing surface (14) and comprising at least one skid with an inclined slope to the horizontal, whereas interiors of the first cylinder (11) and the second cylinder (21) form a central chamber in which is situated a damping operator (33) having an actuating cylinder (35), filled with a medium, and a returning piston (36, 136) with at least one pass-through opening and a piston rod (37, 137) slidably positioned in the actuating cylinder (35, 135), whereas the piston rod (37, 137) rests with its free end against a bottom of one of the first cylinder (11) and the second cylinder (21).

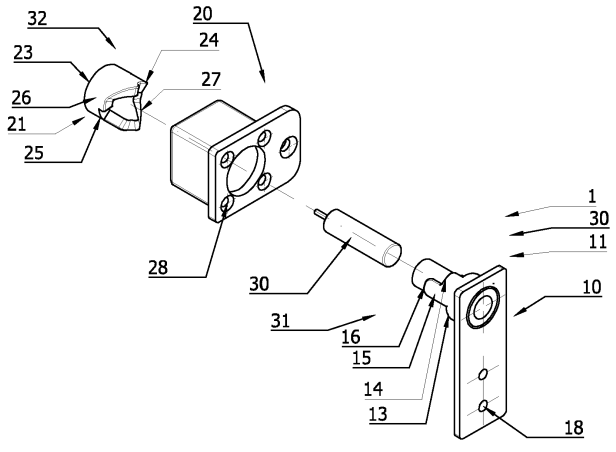


Fig.3

EP 3 760 823 A1

Description

[0001] According to the preamble of claim 1, the present invention relates to a hinge with a damping function thanks to which doors, windows and other opening elements of conditioned or refrigerated rooms will be closed self-acting. In particular, the present invention relates to a hinge with a damping function for swing fitting of doors or windows of rooms or other openable elements, in particular refrigeration cabinets and chambers, and comprising a first fastening set and a second fastening set as well as a damping unit located between the first fastening set and the second fastening set, whereby when one of the first fastening set and the second fastening set is mounted to a casing frame, the other one is mounted to a window leaf frame or door leaf frame.

[0002] Many rooms, especially those air-conditioned or refrigerated, require the use of doors or windows which would close automatically after the cessation of the force holding them open.

[0003] A door hinge with a damping function is known from the publication DE 19717117 A1, comprising a case, the first rotation pin, the second rotation pin, a U-shaped rotation pin, a hinge cup, a connecting element, a torsion spring, a coupling, a bearing case and a damping part. One end of the connecting element swivels in the case using the first rotation pin, and the second end of the connecting element is swivel-connected with the hinge cup using one arm of the U-shaped rotation pin, whereas one end of the coupling swivels in the case using the second rotation pin, and the second end of the coupling is swivel-connected with the hinge cup using the means of the second arm of the U-shaped rotation pin. Moreover, the torsion spring is fastened to the second rotation pin, whereas one end of the torsion spring is fastened to the connecting element, and the other end of the torsion spring rests against the connecting element. The bearing case is fastened to the connecting element, whereas the damping case is supported by the bearing case.

[0004] In turn, the publication MX 2018010668 A1 discloses a hinge with two sections linked by a hinge pin. One section holds the hinge pin via a rolled section. The damping is provided by an elastic insert clipped to one hinge section and pressing onto the outer profile of the other section. The damping effect is variable over the range of movement of the hinge, without a damping effect in one setting of the hinge. The insert has one friction surface which is pressed onto the external profile of one hinge section to generate the damping of movement while closing.

[0005] Furthermore, publication US 20190040667 A1 provides an apparatus connecting a door hinge and a door closer. In one embodiment, the hinge provides a variable hydraulic damping speed control with spring-action closing, as well as an optional stop action. In one embodiment, the hinge of the present invention includes an adjustable compression spring to operate the opening and closing of a door. When the door's angular position is approximately 20 degrees, the hydraulic component of the door may then control the speed of the door closing, preferably from approximately 20 degrees until closed. Additionally, in one embodiment, the closing function allows the door to remain open in a specific position.

[0006] The purpose of this invention is to create a simple-design hinge with a damping function, which could be used for swing fitting of doors or windows or other openable elements of air-conditioned or refrigerated rooms and which also would enable automatic closing of such doors or windows in a slowed-down movement.

[0007] According to the invention, the aim of the invention is reached by a hinge having features of claim 1. The preferred embodiments of the invention are specified in the dependent claims.

[0008] A basic idea of the invention is that when opening the window or door or another openable elements of air-conditioned or refrigerated rooms, energy is collected, which, when the force holding the doors, windows or other openable sash ceases, causes the return movement of the mentioned doors, windows or other openable elements.

[0009] A preferred development of the invention foresees, that in the hinge with the damping function comprising a first damping set comprising a first cam non-rotatable in relation to the housing of the first fastening set and shaped like a cylinder open at a side of a middle of the hinge and having a facing surface with at least one protrusion directed towards the middle of the hinge, second damping set comprising a second cam non-rotatable in relation to the housing of the second fastening set and shaped like a cylinder open at the side of the middle of the hinge and having a facing surface faced towards the facing surface of the first cam and comprising at least one skid with an inclined slope.

[0010] According to one of preferred embodiments a particularly efficient operation of the device according to the invention in that can be seen in that at least one skid or ramp with an inclined slope has a difference of level between 2 mm and 30 mm that is equal to a difference between a quantity b in an open position of a window or door or another closing element, as measured between an inner surface of the housing of the first fastening set and an outer surface of the housing of the second fastening set, and a quantity a in a closed position of the window or door or another closing element, as measured between the inner surface of the housing of the first fastening set and the outer surface of the housing of the second fastening set, whereas the interiors of the first cylinder and the second cylinder form a central space or a central chamber, and a damping operator is situated in the central space or the central chamber that has an actuating cylinder filled with a medium and closed at one end, and surrounded, at least partially, by a first cylindrical shell of the first cam and a second cylindrical shell of the second cam, and a piston with at least one pass-through opening and a piston rod slidably positioned in the actuating cylinder, whereas the piston rod rests with

its free end on a bottom of one of the first cylinder and the second cylinder, with which the bottom of the actuating cylinder is not contacting within an entire range of movement of the first fastening set in respect to the second fastening set.

[0011] It is preferred that between the actuating cylinder and the first cylindrical shell of the first cam as well as the second cylindrical shell of the second cam is situated a sleeve with a length not greater than a length of the actuating cylinder, rotatably mounted in relation to at least one of the first cylindrical shell or mantle of the first cam and the second cylindrical shell or mantle of the second cam.

[0012] Additionally, in one of preferred embodiments the damping operator is an actuator with a movable float tightly dividing a chamber between a bottom of the actuating cylinder and a piston into two parts, whereas a section between the piston and the float contains a medium that during the movement of the piston towards the bottom of the actuating cylinder, flows into the chamber between the piston and the closing element through pass-through openings in the piston, whereas a bottom chamber between the float and the bottom of the actuating cylinder contains compressed gas forcing the piston to return to the position in which the piston rod is most extended or is outermost.

[0013] In another embodiment the damping operator can have a spring located between a bottom of the actuating cylinder and a piston with pass-through slots or openings enabling a flow of a medium from a space enclosed by a wall of the actuating cylinder and located between the bottom and the piston to a space enclosed by the wall of the actuating cylinder between the piston and a lid of the actuating cylinder, with an opening for the piston rod.

[0014] The housing of the second fastening set can have at least one longitudinal rib protruding inside the housing of the second fastening set in direction to its center and having a height not greater than a thickness of the shell of the cam, serving as restrictors of rotation of the window or door after contacting at least one longitudinal rib with side walls of a finger camber.

[0015] Other features and advantages of the invention will become apparent from the description hereinafter with reference to the attached schematic drawings, which are provided only by way of non-limitative examples of the invention, wherein:

Fig. 1 shows an axonometric view of a hinge with a damping function according to the invention;
Fig. 2 shows a longitudinal section of the hinge with the damping function of Fig. 1;
Fig. 3 shows an exploded view of the hinge with the damping function of Fig. 1;
Fig. 4 shows an axonometric view of a mounting set of the hinge with the damping function according to one of embodiments of the invention;
Fig. 5 shows a longitudinal section of the hinge with the damping function of another embodiment of the invention;
Fig. 6 shows an axonometric view of an actuator or damping operator of one of embodiments of the invention that can be effectively implemented in one of embodiments shown in the description below;
Fig. 7 shows an axonometric view of an actuator or damping operator of next embodiment of the invention that can be effectively implemented in one of embodiments shown in the description below;
Fig. 8 shows a side view of one of further embodiments of the hinge with the damping function according to the invention;
Fig. 9 shows a bottom view of one of yet another embodiments of the hinge with the damping function according to the invention;
Fig. 10 shows a longitudinal section of one of yet another embodiments of the hinge with the damping function according to the invention;
Fig. 11 shows an exploded view of next embodiment of the hinge with the damping function;
Fig. 12 shows an axonometric view of the mounting set of the hinge with the damping function of further embodiment according the invention;
Fig. 13 shows an exploded view of yet another embodiment of the hinge with the damping function;
Fig. 14 shows an axonometric view of a mounting set of the hinge with the damping function of Fig. 13; and
Figs. 15 and 16 show location of one of embodiments of hinges with the damping function according to the invention in a frame of sash or window or door leaf or another closing element.

[0016] A hinge 1 with a damping function, shown in Figs. 1, 2, 3 and 4, comprises a first mounting assembly or a first fastening set 10 with openings 18 for mounting thereof, a second mounting assembly or a second fastening set 20 with openings 28 for mounting thereof, as well as a damping unit 30 located between the first fastening set 10 and the second fastening set 20. One of the first fastening set 10 and the second fastening set 20 is mounted to a casing frame, whereas the other is mounted to a window leaf frame or door leaf frame. That means that when the first fastening set 10 is mounted to the casing frame, upon insertion into a nest or cavity adapted or matched to a body, in particular a flat bar, of the first fastening set 10 and fixed by fastening accessories passing through the openings 18, such as screws or nails, the second fastening set 20 is mounted to the window leaf frame or door leaf frame in a nest or cavity adapted or matched to a housing or a body 22, in particular with a cuboidal shape, of the second fastening set 20, as shown in Fig. 4. In turn, when the second fastening set 20 is mounted to the casing frame, upon insertion into the cavity adapted to the body of the second fastening set 20 and fixed by fastening accessories passing through the openings 28, such as screws or nails, the first fastening

set 10 is mounted to the window leaf frame or door leaf frame in the nest adapted to the body of the first fastening set 10. Above described embodiments are shown in Figs. 15 and 16 as examples of window, door or another self-closing unit 70 that has a casing frame 50 and a leaf frame 60.

[0017] In one of the embodiments, the damping unit 30 comprises a first damping set 31, a second damping set 32 and a damping operator 33. The first damping set 31 comprises a first cam 13, non-rotatable in relation to the first fastening set 10 and shaped like a cylinder 11, opened from a side of a middle of a hinge 1 and comprising a facing surface 14 with at least one protrusion 15 or camber 16, directed towards the middle of the hinge 1. In turn, the second damping set 32 has a second cam 23, non-rotatable in relation to the second fastening set 20 and shaped like a cylinder 21, opened from the side of the middle of the hinge 1 and comprising a facing surface 24 directed towards the facing surface 14 of the protrusion of the first cam 13 and being in contact, at least in one point 27, with the facing surface 14 of the first cam 13, and also comprising at least one skid or ramp with an inclined slope, with a difference of levels between 2 mm and 30 mm. Said difference of the levels equals the difference between the size b, marked in Fig. 10, in an open position of the window or door, as measured between an inner surface 19 of a first housing of the first fastening set 10 and an outer surface of a housing of the second fastening set 20, and the size a, marked in Fig. 2, in a closed position of the window or door, as measured between the inner surface 19 of the first housing of the first fastening set 10 and the outer surface of the housing of the second fastening set 20, whereby interiors of first cylinder and second cylinder form a central space 40 or chamber.

[0018] In one of embodiments, the first cam 13 is mounted to the first fastening set 10, and the second cam 23 with a recess or gap 25 is mounted to the second fastening set 20, for example by gluing, press-fitting, welding or bonding. Additionally in one of embodiments, a cam 123 can be immobilized in relation to the second fastening set 120 due to the fact that upon assembling the hinge, an end of a rib 145 shown in Fig. 12, which is a part of the second fastening set 120, enters in a recess or gap 125 of the cam 123.

[0019] A damping operator 33, upon being placed in the central space 40 or chamber formed between the damping set 31 and the other damping set 32, in one of embodiments is the operator shown in Fig. 6, which is known from prior art and which comprises an actuating cylinder 35, closed at one end and surrounded at least partially by a first cylindrical mantle or cylindrical shell of the first cylinder 11 and a second cylindrical mantle or cylindrical shell 26 of the second cylinder 21, as shown in Figs. 2 and 3, and a piston 36 with a piston rod 37 slidably positioned in the actuating cylinder 35, resting with its free end against the bottom of one of the first cylinder 11 or the second cylinder 21, in which the end of the actuating cylinder 35 is not located. The closing of the actuating cylinder 35 may be a bottom of the cylinder or a bottom of a nest or recess made in the window or door leaf frame, or in the casing frame, and adapted to the body of one of the fastening sets. Between the bottom of the actuating cylinder 35 and the piston 36, there is a chamber, tightly divided by a movable float 38 into two parts. In the part between the piston and the float there is a medium that, during the movement of the piston towards the bottom of the actuating cylinder 35, flows into the chamber between the piston 36 and the closing element 39 through pass-through openings in the piston, which slows down the movement of the piston 36 towards the bottom of the actuating cylinder 35 and slows down the rotary movement of the window or door. The return movement of the piston 36 to the position, in which the piston rod is most extended or is outermost, is forced through the effect of the gas compressed or by the action of compressed gas in a bottom chamber 34.

[0020] In the embodiment shown in Fig. 7, a damping operator 133 is an operator which is known from prior art and which comprises an actuating cylinder 135, closed at one end with a bottom and surrounded, at least partially, by the first cylindrical shell or mantle of the first cylinder 11 and a second cylindrical mantle or cylindrical shell 26 of the second cylinder 21, shown in Figs. 2 and 3, and a piston 136 with a piston rod 137, slidably positioned in the actuating cylinder 135 and resting with its free end against the bottom of one of the first cylinder 11 or the second cylinder 21, in which the end of the actuating cylinder 135 is not located. A spring 138 is located between the bottom and the piston, forcing the return movement of the piston with the piston rod. The piston has pass-through slots or openings enabling the flow of the medium, such as a liquid or gas, from the space enclosed by a cylinder wall, and located between the bottom and the piston, into the space enclosed by the cylinder wall between the piston and a closing element 139 of the cylinder. In one embodiment, the closing element 139 of the cylinder is a disc with an opening for the piston rod and an outer thread, screwed into the open, threaded inside, end of the cylinder. In another embodiment, the closing element may be a lid with an opening for the piston rod and with press fitting, clamped at the end of the cylinder.

[0021] In one of embodiments of the invention, between the actuating cylinder 35 and the first cylindrical mantle or cylindrical shell of the first cam 13 as well as the second cylindrical mantle or cylindrical shell 26 of the second cam 23, there is a sleeve 41 with a length shorter than the length of the actuating cylinder 35, rotatably mounted in relation to the second cylindrical mantle or cylindrical shell 26 of the second cam 23 and/or the first cylindrical mantle or cylindrical shell of the first cam 13, however, at least in relation to the second cylindrical mantle or cylindrical shell 26 of the second cam 23, in which the actuating cylinder 35 is placed and which reinforces the actuating cylinder 35, and which performs a function

of a central element enabling the movement of the first fastening set 10 in relation to the second fastening set 20.

[0022] In the embodiment shown in Figs. 8, 9, and 10, in the position when the door or window is open, the first cam 13, like as in Figs. 1 and 2, is placed in the first housing of the first fastening set 10 and has the shape of the cylinder 11 open from the side of the middle of the hinge 1. In the open position of the window or door, the inner surface 19 of the housing of the first fastening set 10 is spaced from the outer surface of the second fastening set 20 by the distance b, as mentioned before, which is greater than a distance a marked in Fig. 2, which is the smallest distance of the inner surface 19 of the housing of the first fastening set 10 from the outer surface of the housing of the second fastening set 20 in the position, when the door or window is closed. The facing surface of the second cam 23, particularly the ramp or skid, is the surface falling in the direction of rotation during closing, in a solution when the inclined slope of the cam is situated at the bottom of the hinge, or rising in the direction of rotation during the closing, in a solution when the inclined slope of the cam is situated at the top of the hinge. The door or window remains open as long as it is being held by a person looking inside the space enclosed by the door or window. Upon cessation of the effect of the force holding the door or window, the gravity of the door or window causes sliding of the frontal part of the protrusion, for example the frontal part of the finger camber, against the falling or rising surface of the cam, with which the frontal part of the protrusion, for example, the frontal part of the finger camber is contacted, and the door or window moves from the open position to the closed position.

[0023] Fig. 11 shows another embodiment of a hinge with a damping function when the leaf during opening moves clockwise as shown of a direction arrow 175. A hinge 100 comprises a first fastening set 110, a second fastening set 120, and a damping unit 130 located between the first fastening set 110 and the second fastening set 120. The damping unit 130 comprises a first damping set 131 with a first cam 113, a second damping set 132 with a second cam 123 shaped like a cylindrical mantle or cylindrical shell 126, as well as a damping operator 35, 135. The first cam 113 is non-rotatable with respect to the first fastening or mounting set 110 and has a shape of a cylinder 111 open towards the center or middle of the hinge 100 and having a facing surface 114 with at least one protrusion 115 or camber 116 directed towards the center or middle of the hinge 100. The second cam 123 is non-rotatable with respect to the second fastening or mounting set 120 and is shaped like a cylinder 121 open towards the center or middle of the hinge 100 and having a facing surface 124 facing a facing surface 114 of the protrusion or camber of the first cam 113 and contact at least in one point 127 with the facing surface 114 of the first cam 113 and having at least one ramp or slide with a slope inclined to the horizontal, so that when opening the window or door leaf or sash, energy is collected, in this case potential energy, which, when the forcer holding the sash ceases, causes the return movement of the sash of the window, door or other opening element. Between the actuator or damping operator 35,135 and the first cylindrical shell of the first cam 113 and the second cylindrical shell 126 of the second cam 123 there can be a sleeve 141 with a length not longer than the length of the actuator 35,135 rotatably mounted in at least one of the first cylindrical shell of the first cam 113 and of the second cylindrical shell 126 of the second cam 123. The sleeve 141 functions as a pin in respect to which the housing of the first fastening or mounting set can rotate relative to the housing of the second fastening or mounting set unless the actuator cylinder 35, 135 is not sufficiently resistant to move the housing of the first fastening or mounting set and the housing of the second fastening or mounting set in rotation relative to each other.

[0024] In the embodiment shown in Fig. 12, in which the maximum tilting or opening of the window or door is limited, the housing of the second fastening or mounting set 120, with an outer surface 129 with openings for its fastening, has at least one longitudinal rib 145 serving as a rotation limiter of rotation of the first mounting set in respect to the second mounting set. The longitudinal rib 145, upon contact with the sidewalls of protrusion or camber, for example 16, 116, 216, prevents further movement of the window or door, thereby protecting the sash of the window or door or other closing element from impact, for example against the nearest wall.

[0025] Figs. 13 and 14 show a further embodiment of a hinge with a damping function in which the sash or window or door leaf moves counterclockwise when opened, as shown by an arrow 275. A hinge 200, like the assembly of Fig. 1, comprises a first mounting assembly or a first mounting set 210, a second mounting assembly or a second mounting set 220 and a damping unit 230 disposed between the first mounting set 210 and the second mounting set 220. The damping unit 230 comprises a first damping set 231 with a first cam 213, a second damping set 232 with a second cam 223 in the shape of a cylindrical mantle or cylindrical shell 226, and a damping actuator or damping operator 35,135. The first cam 213 is non-rotatable with respect to the first mounting set 210 and is shaped like a cylinder 211 open at the side of a middle or center of the hinge 200 and having a facing surface 214 with at least one protrusion 215 or a camber 216 facing the middle or center of the hinge 200. The second cam 223 is non-rotatable with respect to the second mounting set 220 and is shaped like a cylinder 221 open towards the center side of hinge 200 and having a facing surface 224 facing the facing surface 214 of the protrusion of the first cam 213 and contacting at least in one point 227 with the facing surface 214 of the first cam 213 and having at least one ramp or skid with an inclined slope to the horizontal. Between the damping operator 35,135 and the first cylindrical shell of the first cam 213 and the second cylindrical shell 226 of the second cam 223, like as in the embodiment of Fig. 11, a sleeve 241

can be provided with a length not greater than the length of the damping operator 35,135 rotatably mounted at least with respect to one of the first cylindrical shell of the first cam 213 and the second cylindrical shell 226 of the second cam 223. The sleeve 241 functions as a pin in respect to which the housing of the first mounting set can rotate relative to the housing of the second mounting set unless actuator 35, 135 is not sufficiently resistant to move said housings in a pivotal motion relative to each other. Fig. 14 shows the housing of the second mounting set 220, with an outer surface 229 having holes for its fixing.

[0026] A particular advantage of the embodiments described here is that they have an uncomplicated structure, which may be effectively implemented in various size of hinges. Moreover, an advantage thereof is the fact that a damping operator may be suited for doors or windows and, irrespective of their weight, their closing speed may be adjusted by selecting the appropriate size of the pass-through openings or holes in the piston of the damping operator.

[0027] The embodiments described above are only intended to describe the preferred embodiments of the present invention and are not intended to limit the scope of the present invention. Specialists skilled in the art can make the technical solutions of the present invention without departing from the spirit of the present invention. Various modifications and improvements are intended to fall within the scope of the invention as set forth in the appended claims.

List of references

[0028]

1, 100, 200	Hinge with a damping function
10, 110, 210	First mounting assembly or first fastening or mounting set
11, 111, 211	Cylinder
13, 113, 213	First cam
14, 114, 214	Facing surface
15, 115, 215	Protrusion
16, 116, 216	Camber
18	Opening
19, 119, 219	Inner surface of the housing of the first fastening set
20, 120, 220	Second mounting assembly or second fastening or mounting set
21, 121, 221	Cylinder
22	Body or housing of the second fastening set
23, 123, 223	Second cam
24, 124, 224	Facing surface
25, 125, 225	Recess or gap of the cam
26, 126, 226	Cylindrical mantle or cylindrical shell of second cam
27, 127, 227	Point of contact
28	Opening
29, 129, 229	Inner surface of the housing of the second fastening set
30, 130, 230	Damping unit
31, 131, 231	First damping set
32, 132, 232	Second damping set
33, 133	Damping operator
34	Bottom chamber
35, 135	Actuating cylinder
36, 136	Piston
37, 137	Piston rod
38	Movable float
39, 139	Closing element
40	Central space or chamber
41, 141, 241	Sleeve
50	Casing frame
60	Leaf frame
70	Window or door or self-closing unit
138	Spring
145	Longitudinal rib
175	Clockwise direction of rotation
275	Counterclockwise direction of rotation

Claims

1. A hinge with a damping function comprising a first fastening set (10, 110, 210) with a housing, a second fastening set (20, 120, 220) with a housing, as well as a damping unit (30, 130, 230) situated between the first fastening set (10, 110, 210) and the second fastening set (20, 120, 220), **characterized in that** the damping unit (30, 130, 230) comprises

- a first damping set (31. 131, 231) comprising a first cam (13, 113, 213) non-rotatable in relation to the housing of the first fastening set (10, 110, 210) and shaped like a cylinder (11, 111, 211) open at a side of a middle of the hinge (1, 100, 200) and having a facing surface (14, 114, 214) with at least one protrusion (15, 115, 215) directed towards the middle of the hinge (1, 100, 200),
- a second damping set (32,132,232) comprising a second cam (23,123, 223) non-rotatable in relation to the housing of the second fastening set (20, 120, 220) and shaped like a cylinder (21, 121, 221) open at the side of the middle of the hinge (1, 100, 200) and having a facing surface (24, 124, 224) faced towards the facing surface (14, 114, 214) of the first cam (13, 113, 213) and comprising at least one skid with an inclined slope with a difference of level between 2 mm and 30 mm that is equal to a difference between a quantity b in an open position of a window or door, as measured between an inner surface (19, 119, 219) of the housing of the first fastening set (10, 110, 210) and an outer surface of the housing of the second fastening set (20, 120,

220), and a quantity a in a closed position of the window or door or another closing element, as measured between the inner surface (19, 119, 229) of the housing of the first fastening set (10, 110, 210) and the outer surface (29, 129, 229) of the housing of the second fastening set (20, 120, 220), whereas the interiors of the first cylinder (11, 111, 211) and the second cylinder (21, 121, 221) form a central space (40) or a central chamber,

- a damping operator (33) situated in the central space (40) or the central chamber and having an actuating cylinder (35) filled with a medium and closed at one end, and surrounded, at least partially, by a first cylindrical shell of the first cam (13, 113, 213) and a second cylindrical shell (26, 126, 226) of the second cam (23, 123, 223), and a piston (36, 136) with at least one pass-through opening and a piston rod (37, 137) slidably positioned in the actuating cylinder (35, 135), whereas the piston rod (37, 137) rests with its free end against a bottom of one of the first cylinder (11, 111, 211) and the second cylinder (21, 121, 221), with which the bottom of the actuating cylinder (35, 135) is not contacting within an entire range of movement of the first fastening set (10, 110, 210) in respect to the second fastening set (20, 120, 220).

2. The hinge with the damping function according to claim 1, **characterized in that** between the actuating cylinder (35, 135) and the first cylindrical shell of the first cam (13, 113, 213) as well as the second cylindrical shell (26, 126, 226) of the second cam (23, 123, 223), there is a sleeve (41, 141, 241) with a length shorter than a length of the actuating cylinder (35), rotatably mounted in relation to at least one of the first cylindrical shell of the first cam (13, 113, 213) and the second cylindrical shell (26, 126, 226) of the second cam (23, 123, 223).

3. The hinge with the damping function according to claim 1 or 2, **characterized in that** the damping operator (33) is an actuator with a movable float (38) tightly dividing a chamber between a bottom of the actuating cylinder (35) and the piston (36) into two parts, whereas a section between the piston and the float contains a medium that during the movement of the piston towards the bottom of the actuating cylinder (35), flows into the chamber between the piston (36) and a closing element (39) through pass-through openings in the piston (36), whereas a bottom chamber between the float and the bottom of the actuating cylinder (35) contains compressed gas forcing the piston to return to the position in which the piston rod (37) is most extended or is outermost.

4. The hinge with the damping function according to claim 1 or 2, **characterized in that** a damping operator (133) has a spring (138) located between a bottom of the actuating cylinder (135) and the piston with pass-through slots or openings enabling a flow of the medium from a space enclosed by a wall of the actuating cylinder (135) and located between the bottom and the piston to a space enclosed by a lid of the actuating cylinder between the piston and the lid of the actuating cylinder (135) with an opening for the piston rod (137).

5. The hinge with the damping function according to claim 1 or 2 or 3 or 4, **characterized in that** the housing of the second fastening set (120) has at least one longitudinal rib (145) protruding inside the housing of the second fastening set (120) in direction to its center and having a height not greater than a thickness of the shell of the cam (13, 113, 213), serving as restrictors of rotation of the window or door after contacting at least one longitudinal rib (145) with side walls of a finger camber (16, 116, 216).

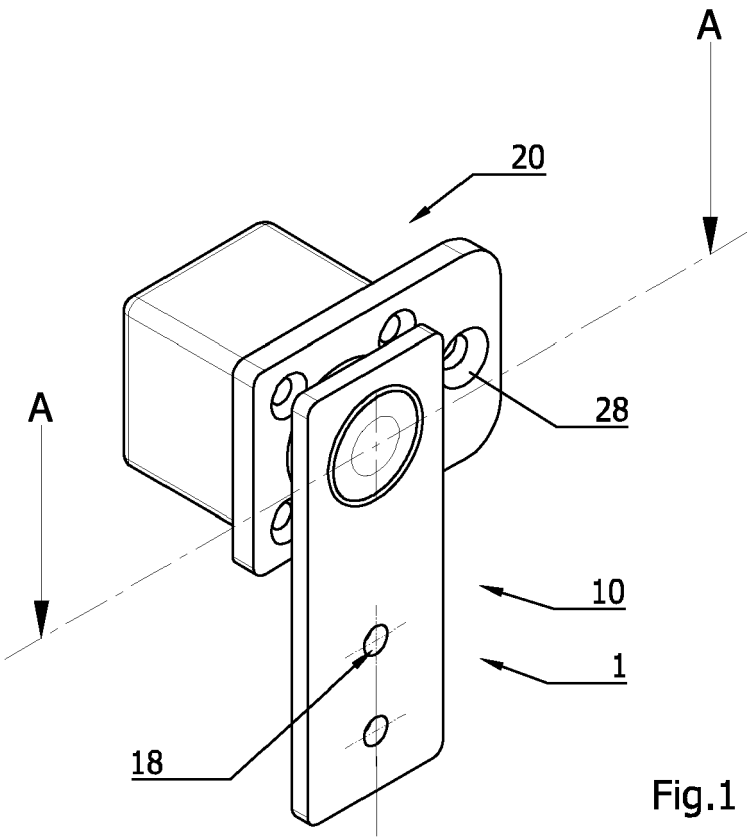

A
20
A
28
10
1
18

Fig.1

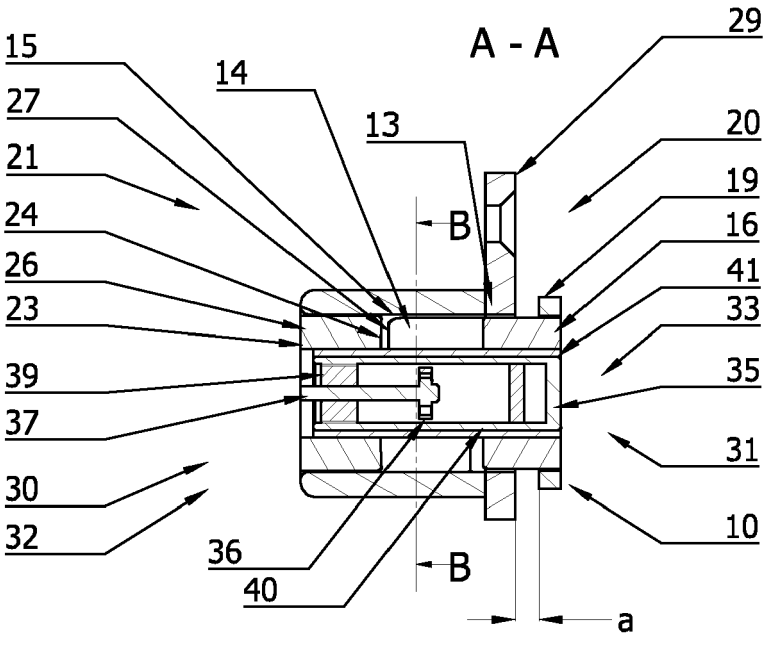

A - A
15
14
27
13
21
29
20
24
19
B
26
16
41
23
33
39
35
37
31
30
10
32
36
B
40
a

Fig.2

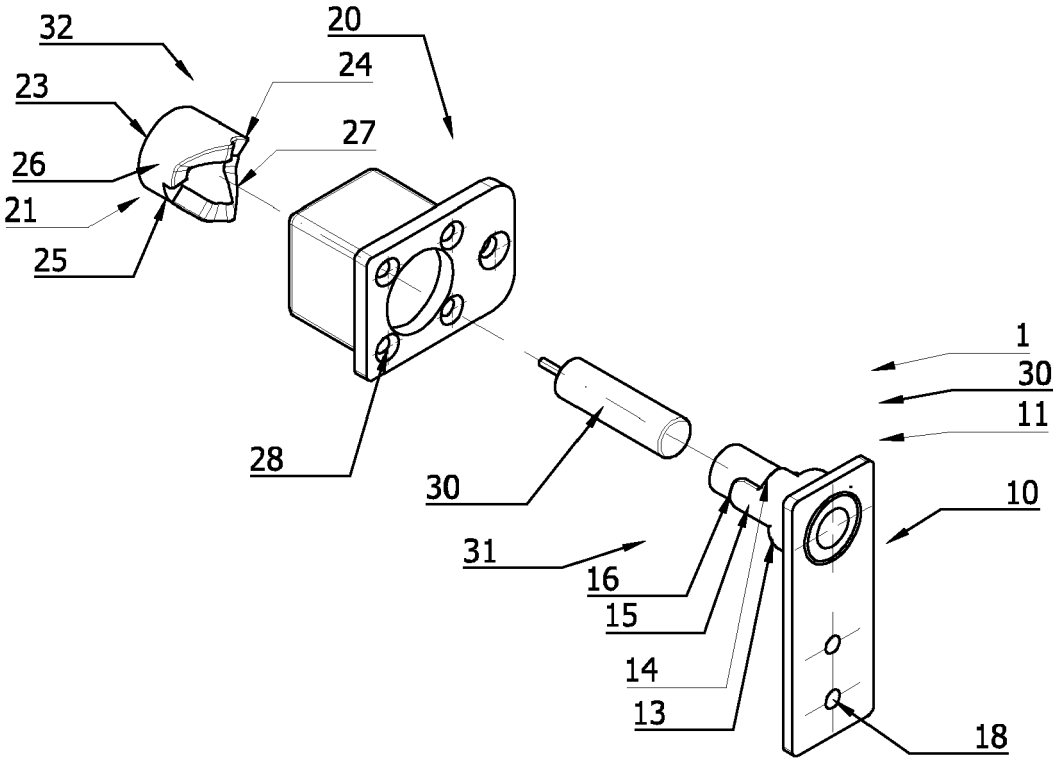


Fig.3

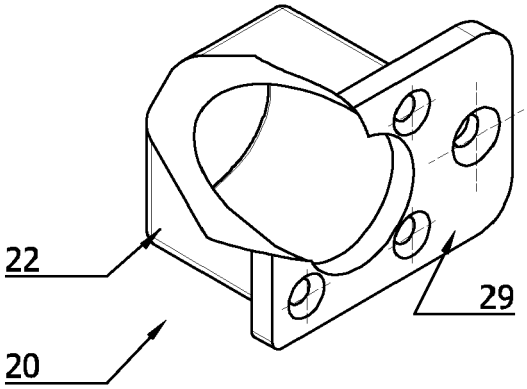


Fig.4

B - B

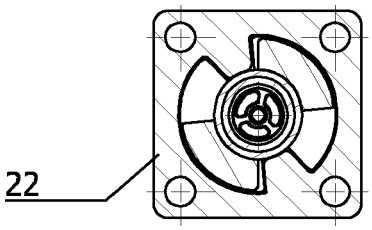


Fig.5

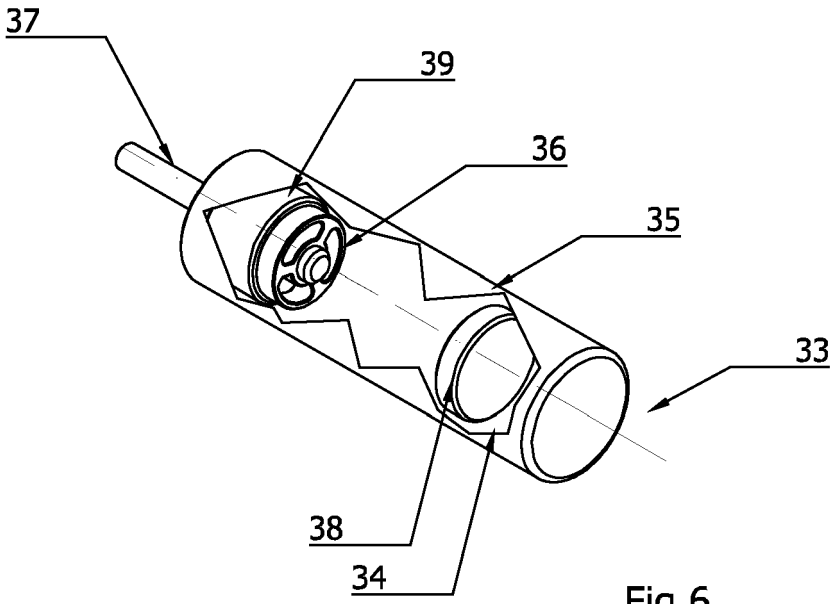


Fig.6

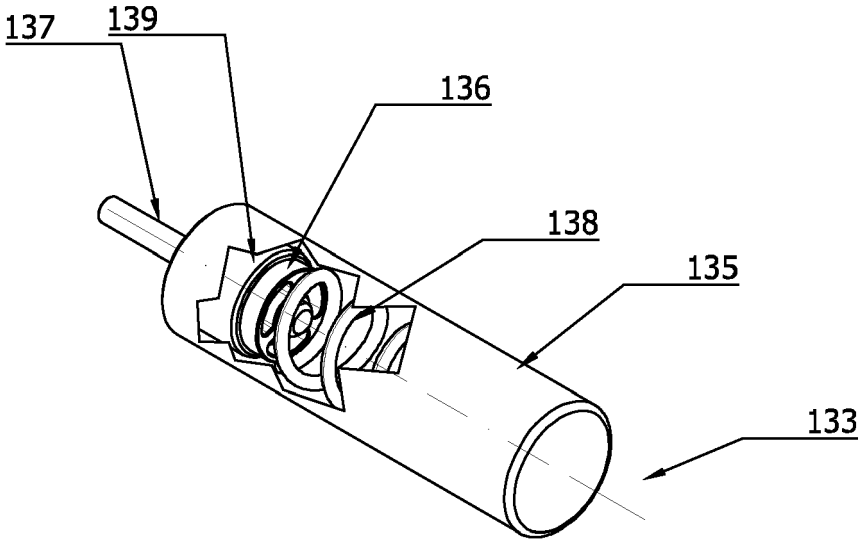


Fig.7

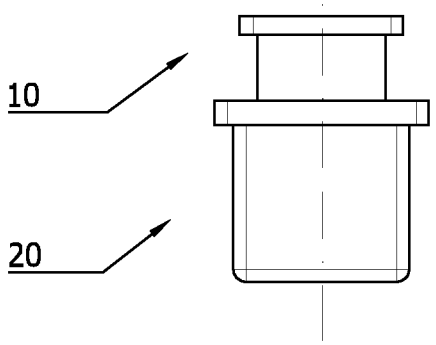


Fig.8

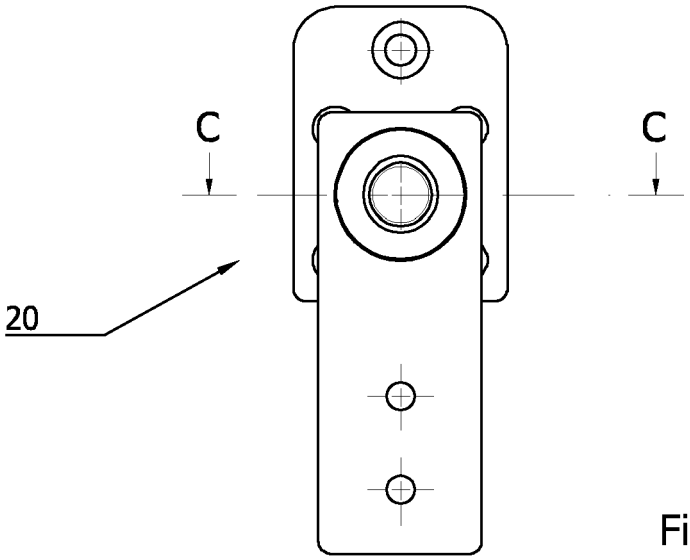


Fig.9

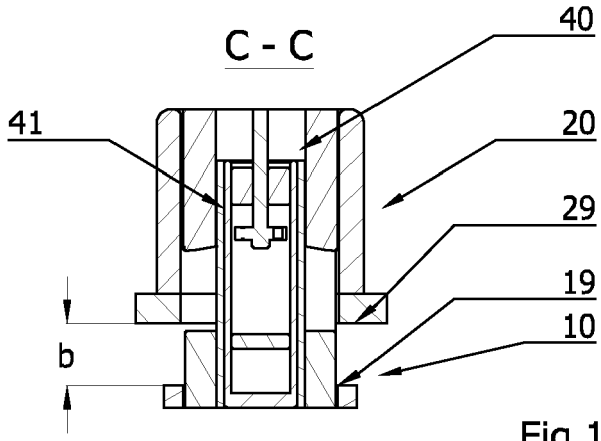
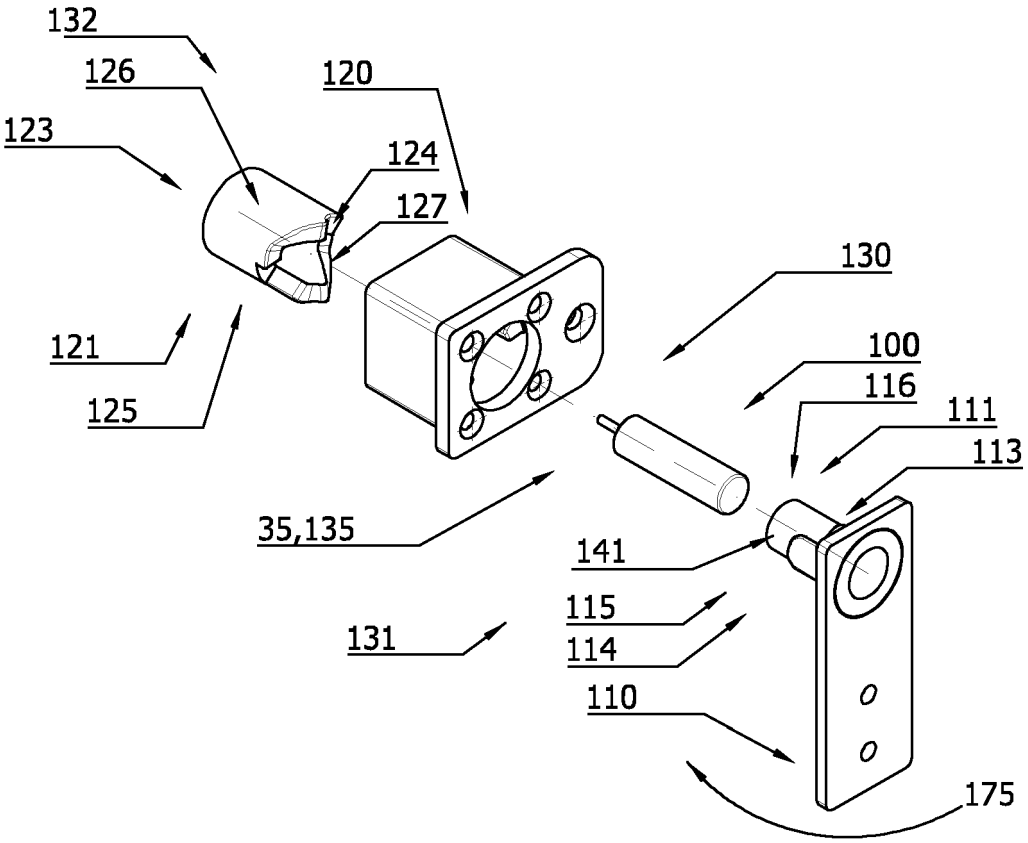


Fig.10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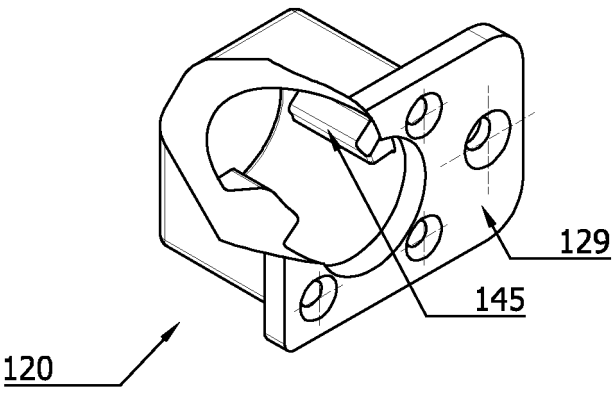
114
110
175

Fig.11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145
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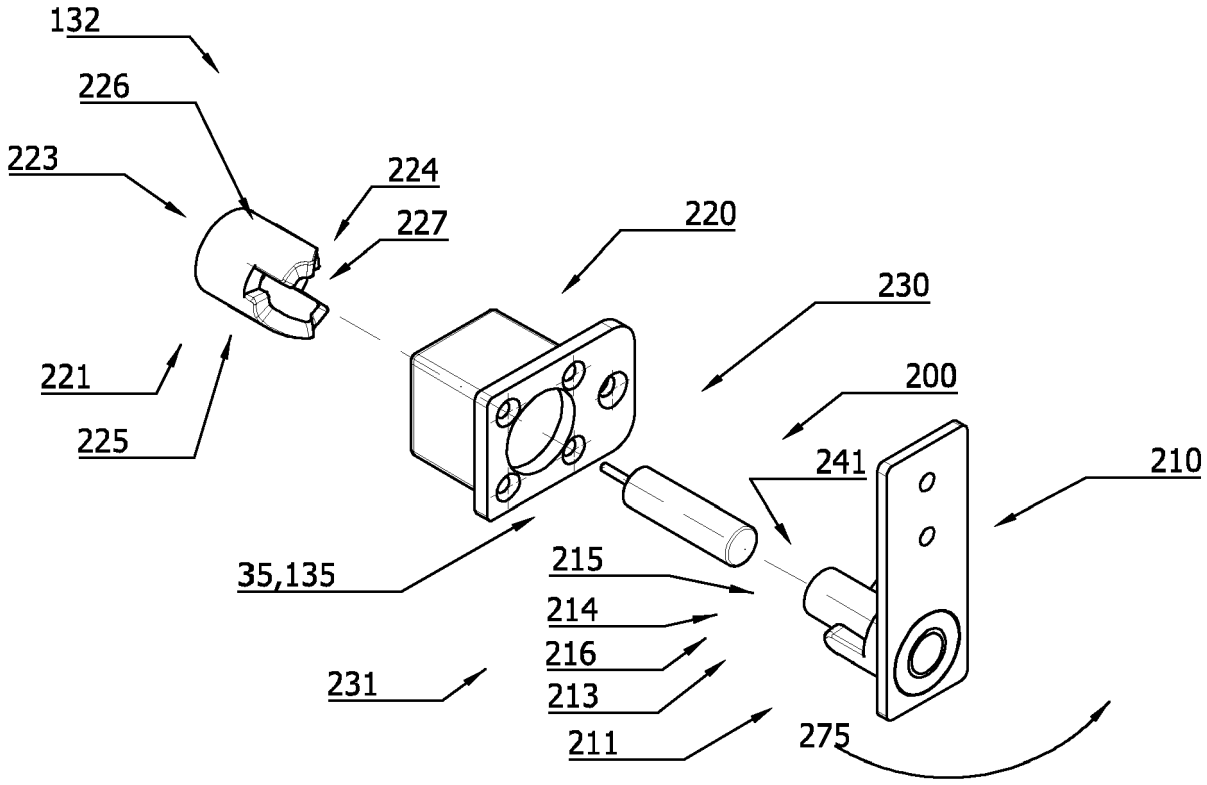
Fig.12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213
211
275

Fig.13

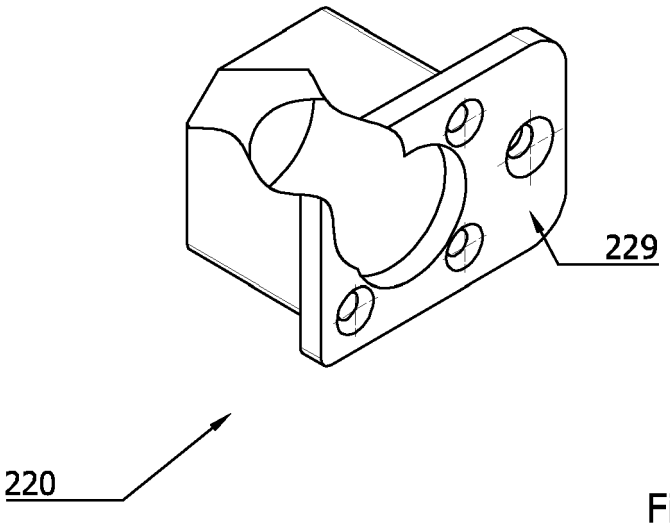
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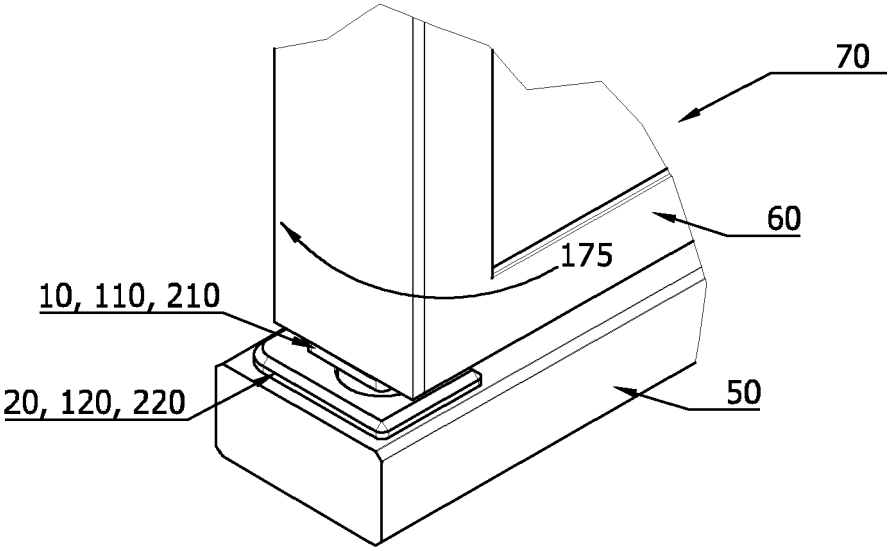
Fig.14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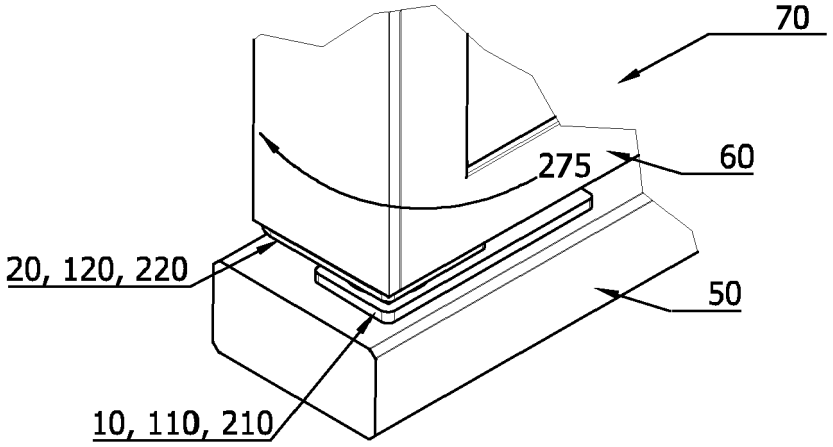
20, 120, 220
50

Fig.15


70
275
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20, 120, 220
50
10, 110, 210

Fig.16

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EUROPEAN SEARCH REPORT

Application Number
EP 20 18 3839

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A	JP 2018 009380 A (KYOEI KANAMONO SEISAKUSHO KK) 18 January 2018 (2018-01-18) * the whole document *	1-5	INV. E05F3/20 E05F1/04 E05F1/06
A	EP 2 803 799 A2 (KERMI GMBH [DE]) 19 November 2014 (2014-11-19) * paragraph [0015] - paragraph [0018]; figures 4-6 *	1	
A	FR 3 023 866 A1 (AFKOR NV [BE]) 22 January 2016 (2016-01-22) * the whole document *	1	
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			TECHNICAL FIELDS SEARCHED (IPC) E05F E05G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	28 October 2020	Ansel, Yannick

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28-10-2020

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- MX 2018010668 A1 **[0004]**
- US 20190040667 A1 **[0005]**