

(19)



(11)

EP 3 628 805 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.04.2020 Bulletin 2020/14

(51) Int Cl.:
E05D 3/02 (2006.01)
E05D 5/10 (2006.01)

E05D 7/081 (2006.01)
E05D 5/12 (2006.01)

(21) Application number: 18197638.2

(22) Date of filing: 28.09.2018

(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
Designated Validation States:
KH MA MD TN

(71) Applicant: **SFS Intec Holding AG**
9435 Heerbrugg (CH)

(72) Inventors:

- **IUS, Matia**
33080 Zoppola (PN) (IT)
- **STEFFAN, Mario**
33074 Fontanafredda (PN) (IT)
- **CUSIN, Stefano**
33170 Pordenone (PN) (IT)
- **FERRARI, Matteo**
33170 Pordenone (PN) (IT)
- **PITUSSI, Massimiliano**
33097 Spilimbergo (PN) (IT)

(54) DOOR HINGE

(57) A hinge system comprises a bottom hinge and a top hinge. The bottom hinge includes a (lower) frame part (240) and an (upper) sash part (220), said upper part (220) with a knuckle (226) firmly attached to a upper leaf (221). Said lower part (240) shows an axle pin (245) attached to a lower leaf (241). Said axle pin (245) defines a pivot axis (205) for the hinge. The lower frame part (240) further includes a foot element (248) with a bolt

bearing an external thread interacting with a matching threaded hole in the axle pin (245). Said foot element (248) is thus being adjustable in a direction along the pivot axis (205). This foot element allows for transferring load from the sash or panel directly to a floor underneath instead of solely transffering the load into a frame or wall.

Further is disclosed a method for mounting such a hinge system including respective adjustment steps.

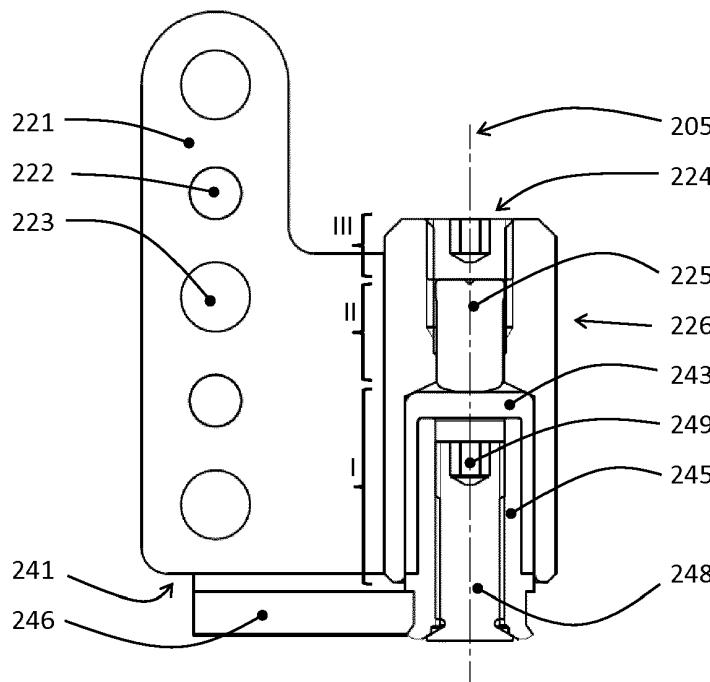


Fig. 6

Description

[0001] The present invention relates to a door hinge system with simplified mounting and adjustment options and an increased carrying capacity.

BACKGROUND AND PRIOR ART

[0002] In order to clarify the technical terms used, the main components shall be referred to in figures 1 (door-frame-wall arrangement) and 2 (hinge).

[0003] A door 10 comprises a panel 11 made usually of a hard, impermeable substance (such as wood or metal) or is composed of a hard (door) frame (or sash) 12 into which glass or screens from various materials have been fitted. A (wall) frame 13 marks the border of an opening 14 in a wall 15 situated on a floor 9. In the current context frame 13 further provides for a well-defined bearing surface or stop surface 16 for the door 10 when closed. In the particular context of this description we contemplate a swiveling motion of a door 10 about a pivot axis 8 relative to the frame 13. Hinges 4, 6 connect the door 10 to the frame 13 and define said pivot axis 8.

[0004] A basic hinge 20 according to figure 2 is usable as top hinge 4 or bottom hinge 6 and includes again at least an upper part 21, a lower part 31 and a pin or bolt 30 to interconnect them. Both parts comprise at least a leaf 22, 32 and a knuckle 23, 33. Leaf 22, 32 as shown are flat bars with through holes and serve to anchor upper and lower part 21, 31 with a frame 13 and door 10 / sash 12 respectively. This anchoring is accomplished by screwing, bolting, welding or otherwise fixedly joining those parts. A knuckle 23, 33 comprises a sleeve 25, 35 with an elongated blind or through hole 24. This hole's diameter is dimensioned such as to accept pin 30 with enough play to allow for a rotational movement around pivot axis 28. Knuckles 23, 33 and pin 30 thus form a joint or tilting joint capable of a swiveling motion around pivot axis 28.

In order to reduce friction in the joint it is known to introduce an additional bearing bush 29 which may allow for an auto-lubrication effect. Said bearing bush 29 is depicted as a thin-walled cylinder or cup-shaped part e.g. from PTFE, Cu-Sn or Pb alloys, slid onto pin 30. The diameter of hole 24 needs to take this into account.

[0005] Basically, upper and lower part 21, 31 could be manufactured symmetrically identical with pin 30 (incl. bearing bush 29) being a separate part. Alternatively pin 30 can be fixedly integrated in lower part 31 (by gluing, welding, caulking or alike) and being joined with upper part 21 during mounting the door 10 to the frame 13 along pivot axis 28 or 8 respectively.

[0006] Door hinges 4, 6 basically are products well known in the art with innumerable variants available. Depending on the application as well as the design- and aesthetic requirements hinge systems have been proposed for doors of varying size / weight as well as with sophisticated mechanisms allowing for adjusting the po-

sition of door 10 relative to its frame 13. A lot of functionality has to be satisfied by hinges and compromises between adjustability, aesthetics and load capacity have often to be accepted. However, such compromises may turn out to become structural weaknesses or significant cost-driver.

DESCRIPTION OF THE INVENTION

[0007] In the following a hinge system with at least two hinges shall be introduced, which is especially suitable for doors of considerable weight, such as doors of safety glass, double glass panels, doors with metal sash (e. g. aluminum), hard wood or combinations thereof. It has features to specifically transmit the load from the door via a hinge part directly to a floor underneath instead of transmitting the load sideways solely into the frame.

[0008] A hinge system, as the term is used herein, comprises at least a bottom hinge and a top hinge. Each hinge again includes a lower and an upper portion or part. The terms upper and lower characterize the orientation of the hinge parts when mounted. Top and bottom also refer to the position of the hinges when properly mounted between a frame and a sash. Sash shall mean any cover or panel, door or window to be pivotally attached to a frame via hinges. A frame shall include the building component as commonly understood in the art, a single post or pillar arranged or to be arranged in a building opening, a wall element or building part itself or any technical equivalents configured to be or become or provide for anchor points for (a) hinge(s).

[0009] The bottom hinge is defined as the one being arranged closer to the floor than the other hinges of the hinge system. All hinges of a hinge system mounted between a sash and a frame eventually share the same pivot axis.

[0010] Besides the purpose of relative orientation of the parts to each other, the terms upper, lower, top, bottom shall not be understood to be technically limiting. In the following, four basic assemblies or hinge parts will be addressed: Top hinge 101 with its upper frame part 120 and lower sash part 140 and bottom hinge 201 with its lower frame part 240 and upper sash part 220. The terms sash and frame indicate where those parts will be mounted to, upper and lower part are in pairs connected via their axle pins 107 and 245 respectively to form a working hinge.

[0011] With a first focus on the hinge to be mounted close to the floor, such a bottom hinge 201 will comprise a (lower) frame part or first part 240 and an upper sash part or second part 220. Upper part 220 comprises a knuckle 226. A knuckle is the part of a joint enclosing or encasing the pivot axle element(s). Knuckle 226 is firmly attached to a upper leaf 221 configured to be mounted to a sash. The lower or frame part 240 comprises an axle pin 245 attached (re-bated, welded or equivalent) to a lower leaf 241 configured to be mounted to a frame. The axle pin 245 defines a pivot axis 205 of the (bottom) hinge

201.

[0012] Importantly, the lower frame part or first part 240 further includes a foot element 248. Basically said foot element includes a bolt with an external thread. That bolt is foreseen to interact with a (respective) matching threaded hole in the axle pin 245, said threaded hole being arranged concentrically around the pivot axis 205 of bottom hinge 201. In other words, the axle pin is essentially a tubular sleeve. The exterior is being used as surface of a bearing and the interior, central, threaded hole acts as an adjustment element for the foot element. The foot element 248 can, by turning the foot element relative to axle pin 245, be adjusted in a direction along the pivot axis 205; it extends from or retracts to the axle pin 245. In order to accomplish said adjustment, the foot element may exhibit a hexagonal or octagonal recess configured to accept an Allen wrench. This force application point 249 is preferably arranged at the top of foot element 248, collinear with pivot axis 205.

[0013] The term "leafs" addresses structural parts construed to become mounting plates between the hinge and frame / sash. For that reason upper leaf 221 as well as lower leaf 241 exhibit mounting holes 223, 242 and/or mounting studs 222. Those are to be used for mounting said respective leaf (hinge part) to a frame suitable for fastening in an opening of a building or to a sash tailored to match said frame.

[0014] For certain door / frame configurations it may be possible to position the swiveling axis / pivot axis close to the frame and sash. Sometimes however, the axis of rotation between door and frame needs to be chosen at a certain distance from the frame / sash / door. In such cases it is useful to include a spacer element to bridge the necessary gap between pivot / axle pin / knuckle and the respective mounting plate or leaf. In this context the term cantilever has been chosen as the structural element to perform this function. Such a cantilever may be an extension of the leaf or can be realized as separate part to be welded / screwed between leaf and pivot / axle pin / knuckle or any other comparable structural element with an equivalent functionality. Cantilever 246 can also be employed to bridge a short distance. For hinge 201 such a cantilever 246 is attached to the lower leaf 241. In the embodiment shown in the figures, the cantilever has been realized as an angled metal strip which conveniently allows to place axle pin 245. This way axle pin 245 and lower leaf 241 are spaced apart in a direction normal to the pivot axis. A man skilled in the art will determine the required dimensions of cantilever 246 based on the geometry of the hinge and the weight of the sash or door panel.

[0015] While the lower frame part 240 of the (bottom) hinge 201 includes axle pin 245, its counterpart, knuckle 226 is arranged at the upper sash part 220. Knuckle 226 exhibits a central through hole oriented concentrically around the pivot axis 205 and comprises at least three longitudinal sections (I, II, III) with varying diameter. Said three sections are determined (defined in size and loca-

tion) by their functionality and can be readily understood in the context of this description and the figures. The central through hole is construed to accommodate various structural parts as described herein, which will occupy most of the available space of said through hole when mounted.

[0016] Said first section (I) is configured as bearing shell by exhibiting a circular bore with an inner diameter selected to accept an axle pin 245 or axle pin 245 with a bushing 243 with sufficient play to allow a smooth rotational movement. This section together with the axle pin thus forms the basic joint.

[0017] The second section (II) exhibits a non-circular cross section and is configured to accept an anti-rotation element 225. This anti-rotation element 225 thus has an outer shape matching said non-circular cross-section and fitting into said space. Preferably the anti-rotation element 225 exhibits a polygonal cross section, by far preferred a hexagonal or octagonal cross section. The purpose and effect of said anti-rotation element is described in more detail below in the description of figure 6.

[0018] The third section (III) exhibits circular inner adjusting threads for accepting a grub screw 224. The upper end of the grub screw 224, pointing axially outward (as viewed from the knuckle body), preferably shows a force application point, e.g. a recess for an Allen wrench.

[0019] As mentioned above, preferably a bushing 243 is arranged between axle pin 245 and knuckle 226's opening in section (I). In a preferred embodiment, the bushing 243 exhibits a cup-shape and is made of bronze or another bearing metal.

[0020] As already mentioned in the beginning of this section, hinge 201 as described above preferably is being used as the bottom hinge in a hinge system. In order to complete this hinge system in its basic configuration at least one further hinge 101 functioning as a top hinge is required. Said (top) hinge 101, similarly to bottom hinge 201 includes a lower sash part or third part 140 and an upper frame part or fourth part 120. They can be described as follows: Lower sash part 140 comprises a knuckle 146 firmly attached to a (lower) leaf 141 to be mounted to a sash. The upper frame part 120 comprises a threaded axle pin 107 construed to be firmly connected to a cantilever 109. Again said axle pin 107 defines a pivot axis .

[0021] Comparable in functionality and effect to bottom hinge 201's cantilever 246, top hinge 101 may also exhibit a cantilever 109. It is on one end attached to an upper leaf 121 and exhibits a threaded mounting hole 127 for the threaded axle pin 107 on the other end, thus axle pin 107 and upper leaf 121 are spaced apart in a direction normal to the pivot axis.

[0022] Placement and fixation of (bottom) axle pin 245 and (top) threaded axle pin 107 differ. As described herein, threaded axle pin 107 is a part detachable from upper frame part / fourth part 120 and it's cantilever 109 respectively. The reason will be readily understood in below's description of mounting a hinge system according to this

invention.

[0023] A hinge system with a bottom hinge 201 and a top hinge 101 as described herein will, in order to have a proper working condition have pivot axis 105 of top hinge 101 arranged collin-early to pivot axis 205 of bottom hinge 201 when both hinges are mounted to a common door / sash system.

[0024] The hinge system with its components can be manufactured from steel, stainless steel, brass or any other metal or equivalently sturdy materials. The dimensions of the parts and components will vary depending on the purpose, sizes of frame and panel and load requirements. Design and decorative elements may be forming part of the hinge system without changing its functionality or deviating from the gist of the present invention.

[0025] A method for mounting a hinge system with a bottom hinge 201 and a top hinge 101 will include a number of steps described in the following. It is to be understood that a man skilled in the art, based on experience, may change the order of some steps or repeat the adjustment steps as needed. Further, certain steps as described in a row hereinafter, may be performed as pre-assemblies / pre-adjustments at the production facility or on site where the building components are to be mounted. All those obvious variations of the process described and claimed herein shall be regarded as equivalents of the process.

[0026] A method for mounting a hinge system as described above will rely on a bottom hinge 201 and (at least) a top hinge 101. It may be necessary to add additional hinges, depending on the weight and size of the building component to be mounted. Those additional hinges may be of the type described as top hinges 101 or could be realized as variants of bottom hinge 201 simply without the foot element 248.

[0027] As a basic step, a panel, a door or a sash to be pivotally mounted relative to a surface such as a frame or wall opening shall be provided. To simplify the description, the term panel shall include all components, parts or elements of all practical materials and shapes that shall be pivotally mounted to another component or part. That other component or part shall be broadly addressed hereinafter (and in the claims) as surface. The surface may be the surface of a frame, a wall opening, a post or any appropriate component a panel shall be connected with via hinges.

[0028] In order to facilitate the overall mounting process, certain elements of the hinges may be assembled or pre-assembled first, such as assembling anti-rotation elements 225, 144 in their respective installation position such as section (II) of knuckle 226, 146 respectively. This assembly may be simple inserting process. As mentioned above, the anti-rotation element has a polygonal outer shape that conforms with the inner shape of section (II) of both knuckles. It is able to slide axially along pivot axis' 205, 105 respectively. In a further step grub screws 224, 145 are being assembled in their respective instal-

lation position of knuckle 226, 146 respectively. This way grub screws 224, 145 are limiting the possible range of movement for the anti-rotation element along pivot axis' 205, 105.

[0029] It makes further sense to mount lower frame part / first part 240 to said surface at a predetermined first position, upper frame part / fourth part 120 to said surface at a predetermined fourth position, upper sash part 220 to the panel at a predetermined second position and lower sash part 140 to the panel at a predetermined third position. This order may be adjusted as necessary. The mounting positions will be defined by both aesthetic and technical requirements. The mounting position of first or lower frame part 240 needs to be chosen such that the useful adjustment track of foot element 248 relative to axle pin 245 / cantilever 246 is sufficient to touch the floor underneath.

[0030] Mounting can be accomplished by screwing (or gluing, welding or other appropriate fixing methods) depending on the materials and needs. Leafs 241, 221, 141, 121 will accordingly be construed to facilitate and support said mounting.

[0031] As a key adjustment step, the foot element 248 will be lowered in a direction to the floor until the foot element touches the floor firmly to allow for a transfer of load applied to the lower hinge part 240 to the floor. Since foot element 248 comprises a bolt with an outer thread, this adjustment can be accomplished by turning the foot element in the thread. This can be done by hand or with the aid of a tool. The tool such as an Allen wrench can be inserted through hollow axle pin 245 to facilitate the turning of the foot element. The pitch of the thread may be chosen such that a self-locking effect is possible in the final position. Alternatively the foot element may be fixed in position by other known means.

[0032] Depending on whether bushings 243, 123 have to be used, they need to be assembled either by sliding them on their respective axle pin or by inserting them into the knuckle at section (III).

[0033] After all components have been assembled as described, the panel can be mounted to the surface by sliding the knuckle 226 of upper sash part 220 of bottom hinge 201 onto axle pin 245. At the same time lower sash part 140 and upper frame part 120 of top hinge 101 shall be aligned along pivot axis 105. Since axle pin 245 allows to transfer the load of the panel directly to the floor via foot element 248 instead of solely transferring it via the hinge into the frame / into the surface, the potential for damaging lower frame part 240 of bottom hinge 201 is vastly reduced. When properly mounted and adjusted, the hinge system will allow for transferring most of the load via foot element 248 essentially vertically to the floor instead of transferring the weight or load laterally or horizontally via the hinges into the surface / into the frame. **[0034]** The inventive concept may thus allow to simplify and downsize the hinges (at least the frame parts 240 and 120) because their main purpose is then to facilitate the pivoting motion and less the transfer of loads.

[0034] After lower sash part 140 and upper frame part 120 of top hinge 101 have been aligned, threaded axle pin 105 may be inserted into threaded mounting hole 127 and knuckle 146. By screwing in threaded axle pin 107 into the threads of threaded mounting hole 127 top hinge 101 is finally assembled. To facilitate the mounting process, a recess for an Allen wrench can be machined on top of axle pin 107.

[0035] Finally, the height of the panel along collinear pivot axis' 105, 205 can be accomplished by adjusting grub screws 224, 145. When the panel is positioned via the hinges to the frame, the anti-rotation element 225, 144 is simultaneously in direct contact with the grub screw and axle pin (or the bushing, as the case may be). The anti-rotation element ensures that the swiveling motion of the panel is not being carried forward to the grub screw, which could otherwise result in an unwanted axial misalignment of the panel over time.

[0036] The hinge system as shown in the figures as well as described in the claims uses a removable / screwable axle pin 107, which facilitates the mounting considerably. Of course a panel can be mounted using a top hinge with an arrangement of knuckle and pin as in bottom hinge 201 (just without foot element 248). Aligning panel and frame is possible albeit more difficult.

DESCRIPTION OF THE FIGURES

[0037]

Figure 1 shows a basic door-frame-wall arrangement.

Figure 2 explains the components of a simple hinge
Figure 3 shows a top hinge 101 of a hinge system with its elements

Figure 4 shows a bottom hinge 201 of a hinge system with its constituents

[0038] Figures 1 and 2 has been referred to in detail above in the introduction.

[0039] Figures 3 and 4 show two hinges forming a hinge system according to the invention. Each of the hinges again has components to be attached to a frame (as fixed part) and to be mounted to a panel (door, window,...) as the swiveling part. In Figure 3 a top hinge 101 is shown comprising basically two subassemblies, lower sash part 140 and upper frame part 120. Upper frame part exhibits a upper leaf 121 with mounting holes 122. A cantilever 109 is arranged under a 90° angle and accommodates a threaded mounting hole.

[0040] Lower sash part 140 again also comprises a leaf (lower leaf 141) exhibiting mounting holes 143 and mounting studs 142 which are foreseen as anchoring aids with the sash / panel / door / window. A knuckle 146 is fixedly attached to lower leaf 141. Sash part 140 further includes an anti-rotation element 144 and a grub screw 145 to be assembled with the knuckle 146.

[0041] When mounted, a threaded axle pin 107 will

connect upper frame part 120 with lower sash part 140 along pivot axis 105. The counterpart for the thread on axle pin 107 will be a threaded mounting hole 127. A bearing bush 123 may be inserted between knuckle 146 and axle pin 107 to reduce friction.

[0042] Figure 4 shows the second part of the hinge system, namely bottom hinge 201. It also comprises two subassemblies, lower frame part 240 and upper sash part 220. Upper sash part exhibits a upper leaf 221 with mounting holes 223 and optionally mounting studs 222. Firmly connected is knuckle 226 with pivot axis 205 extending axially through its essentially cylindrical body. In an exploded view anti- rotation element 225 and grub screw 224 are indicated along pivot axis 205.

[0043] Lower frame part 240 also comprises a leaf (lower leaf 241) exhibiting mounting holes 242 which are foreseen as anchoring aids with the frame. A cantilever 246 is attached to leaf 241, extending away from leaf 241. At the distant end of cantilever 246 there is arranged axle pin 245. Axe pin 245 on the one hand side is construed to accept bushing 243, intended as bearing-interlayer between axle pin 245 and the recess foreseen in knuckle 226. On the other hand axle pin 245 exhibits an threaded hole, arranged centrally around pivot axis 205. This threaded hole is construed to accept a foot element 248. Purpose and functionality have been addressed above.

[0044] When mounted, knuckle 226 will surround bushing 243 and axle pin 245, so lower frame part 240 and upper sash part 220 will together form bottom hinge 201.

[0045] Figure 5 shows a side view on a mounted lower frame part 240 mounted to a frame or wall element 250. The left part shows foot element 248 fully retracted (invisible) while in the right part foot element 248 has been fully deployed to touch the floor space 252 underneath frame part 240. Pivot axis 205 has been marked and also the arrangement of cantilever 246 is visible in side view. Lower frame part 240's counterpart 220 has not been arranged, therefore axle pin 245 can be identified.

[0046] Finally figure 6 shows a frontal view on a bottom hinge 201 with lower frame part 240 and upper sash part 220 with accessories, but without frame or sash. Upper leaf 221 shows mounting studs 222 and mounting holes 223. Lower frame leaf 241 is covered by upper sash leaf 221; however, cantilever 246 can be identified. Cantilever 246 is the bridging element between axle pin 245 and lower frame leaf 241 as explained above. Knuckle 226 is on display as longitudinal cut. Sections I, II, III describe the functional areas of this hinge. Section I with axle pin 245 and bushing 243 form the lower part of the joint / hinge. Foot element 248 is shown fully retracted, but the drawing makes clear, that by turning axle pin 245 via force application point 249 the foot element 248 can be extended towards its dedicated final position. The functionality of axle pin 245 as part of the joint is completely independent. In section II of the knuckle the anti-rotation-element 225 can be seen with grub screw 224 atop. By

screwing in or out grub screw 224, anti-rotation-element 225 will be able to slide up and down. This movement adjusts the distance of lower frame part 240 and upper sahs part 220, in other words it helps to adjust the position of the door along pivot axis 205.

[0047] The features described and disclosed as well as claimed in the claims of this disclosure may be relevant for the invention both individually and in groups as long as technically reasonable and or advantageous. A combination of features not explicitly described or explained does not imply that the combination is impossible or meaningless.

Claims

1. Hinge (201) comprising

- a (lower) frame part or first part (240) and an (upper) sash part or second part (220),
- said upper part (220) comprising a knuckle (226) firmly attached to a upper leaf (221) configured to be mounted to a sash and;
- said lower part (240) comprising an axle pin (245) attached to a lower leaf (241) configured to be mounted to a frame, said axle pin (245) defining a pivot axis (205),

characterized in that

the lower frame part (240) further includes a foot element (248) with a bolt bearing an external thread interacting with a matching threaded hole in the axle pin (245), said threaded hole being arranged concentrically around the pivot axis (205) said foot element (248) thus being adjustable in a direction along the pivot axis (205).

2. Hinge (201) according to claim 1, **characterized in that** the upper leaf (221) as well as the lower leaf (241) exhibit mounting holes (223, 242) and/or mounting studs (222) configured to mounting said respective leaf to a frame suitable for fastening in an opening of a building or to a sash tailored to match said frame.

3. Hinge (201) according to claim 1-2, **characterized in that** the axle pin (245) is attached to the lower leaf (241) via a cantilever (246).

4. Hinge (201) according to claim 1-3, **characterized in that** the knuckle (226) of upper sash part (220) exhibits a central through hole oriented concentrically around the pivot axis (205), said central through hole comprising at least three longitudinal sections (I, II, III) with varying diameter,

- said first section (I) configured as bearing shell by exhibiting a circular bore with an inner diam-

eter selected to accept an axle pin (245) or axle pin (245) with bushing (243) with sufficient play to allow a smooth rotational movement;

- said second section (II) exhibiting a non-circular cross section and being configured to accept an anti-rotation element (225);
- said third section (III) exhibiting circular inner adjusting threads for accepting a grub screw (224)

5. Hinge (201) according to claim 1-4, **characterized in that** the anti-rotation element (225) has a polygonal cross section.

15 6. Hinge (201) according to claim 3, **characterized in that** the cantilever (246) is on one end attached to the lower leaf (241) and carries the axle pin (245) on the other end, thus axle pin (245) and lower leaf (241) are spaced apart in a direction normal to the pivot axis.

20 7. Hinge according to any of the preceding claims, **characterized in that** bushing (243) exhibits a cup-shape and is made of bronze or another bearing metal.

25 8. Hinge (201) according to any of the preceding claims, **characterized in that** said hinge (201) forms a bottom hinge in a hinge system, said hinge system further including a hinge (101) functioning as a top hinge, said hinge (101) comprising a lower sash part or third part (140) and an upper frame part or fourth part (120),

- said lower sash part (140) comprising a knuckle (146) firmly attached to a (lower) leaf (141) to be mounted to a sash and
- said upper frame part (120) comprising a threaded axle pin (107) construed to be firmly connected to a cantilever (109)
- said axle pin (107) defining a pivot axis .

30 9. Hinge system with said bottom hinge (201) and said top hinge (101) according to claim 8, **characterized in that** top hinge's (101) cantilever (109) is on one end attached to an upper leaf (121) and exhibits a threaded mounting hole (127) for the threaded axle pin (107) on the other end, thus axle pin (107) and upper leaf (121) are spaced apart in a direction normal to the pivot axis.

45 10. Hinge system with said bottom hinge (201) and said top hinge (101) according to claims 8 and/or 9, **characterized in that** the pivot axis (105) of top hinge (101) is collinear to the pivot axis (205) of bottom hinge (201) when both hinges are mounted to a common door / sash system.

11. A method for mounting a hinge system according to claim 8 - 10 with a bottom hinge (201) according to claim 1-7 and a top hinge (101), comprising the following steps:

5

- Providing a panel, [a door or a sash] to be pivotally mounted relative to a surface [such as a frame or wall opening]
- Assembling anti-rotation elements (225, 144) in their respective installation position such as 10 section (II) of knuckle (226, 146) respectively
- Assembling grub screws (224, 145) in their respective installation position of knuckle (226, 146) respectively
- Mounting the lower frame part / first part (240) 15 to said surface at a predetermined first position
- Mounting the upper frame part / fourth part (120) to said surface at a predetermined fourth position
- Mounting the upper sash part (220) to the panel 20 at a predetermined second position
- Mounting the lower sash part (140) to the panel at a predetermined third position
- Adjusting the foot element (248) by lowering it in a direction to the floor until the foot element 25 touches the floor firmly to allow for a transfer of load applied to the lower hinge part (240) to the floor
- Mounting the panel to the surface by sliding the knuckle (226) of upper sash part (220) of 30 bottom hinge (201) onto axle pin (245) and concurrently aligning lower sash part (140) and upper frame part (120) of top hinge (101) along pivot axis (105)
- Inserting threaded axle pin 107) into threaded 35 mounting hole (127) and knuckle (146)
- Screwing in threaded axle pin (107) into the threads of threaded mounting hole (127)
- Adjusting the height of the panel along collinear pivot axis (105, 205) by adjusting grub screws 40 (224, 145)

45

50

55

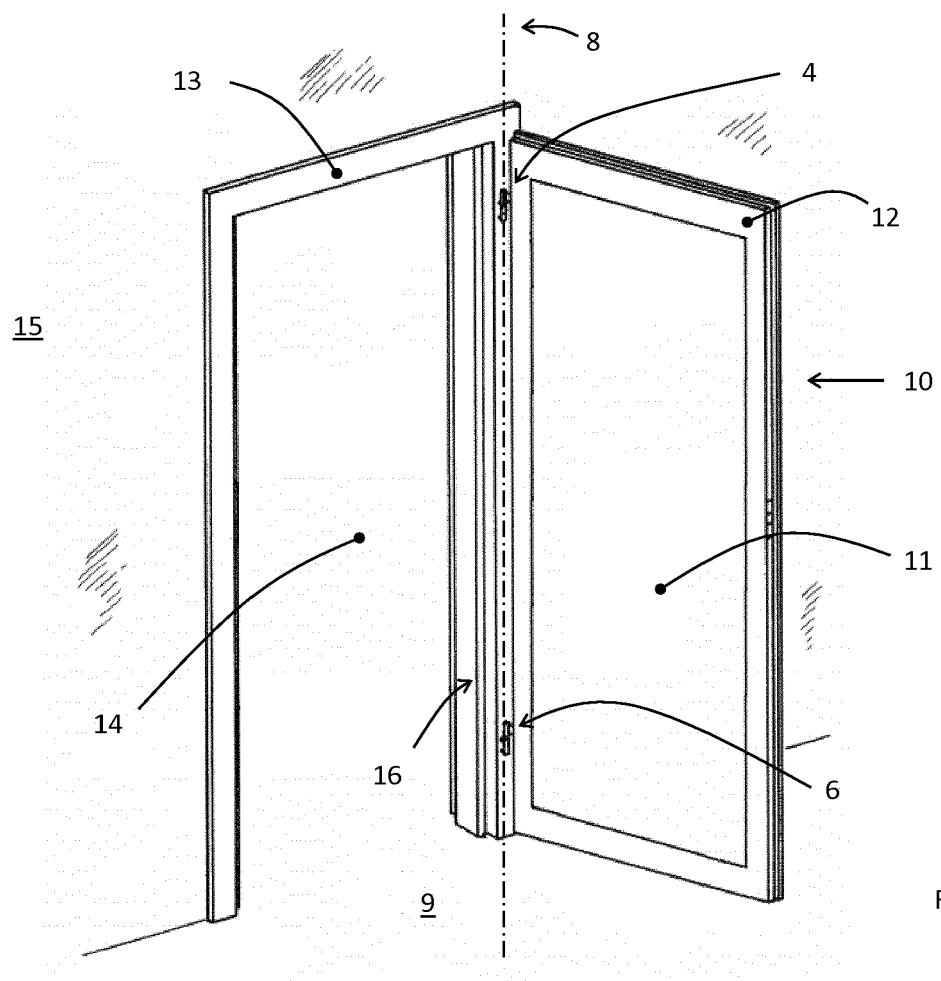


Fig. 1

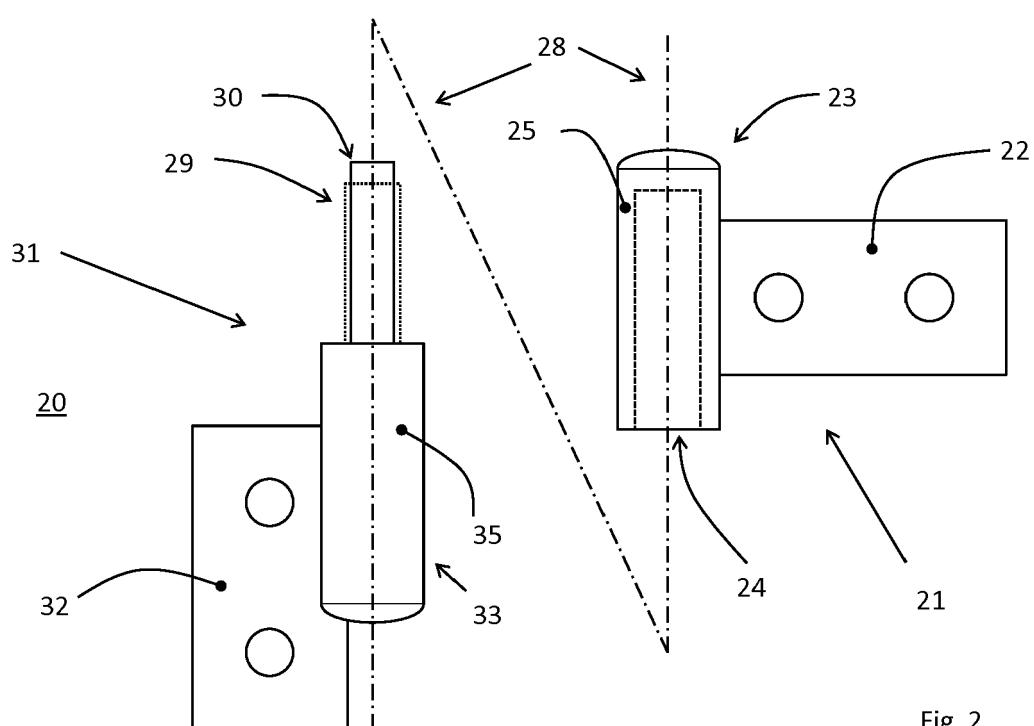


Fig. 2

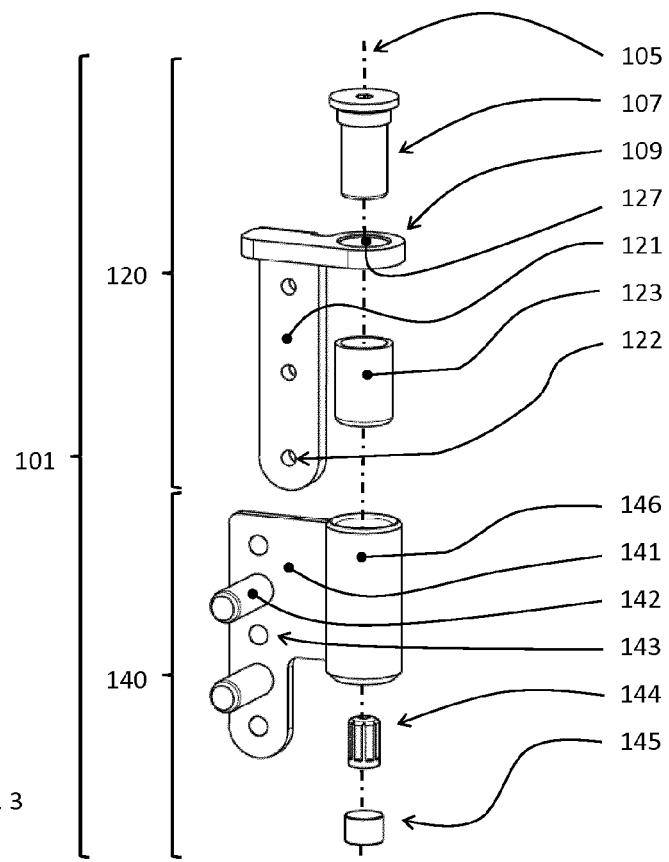


Fig. 3

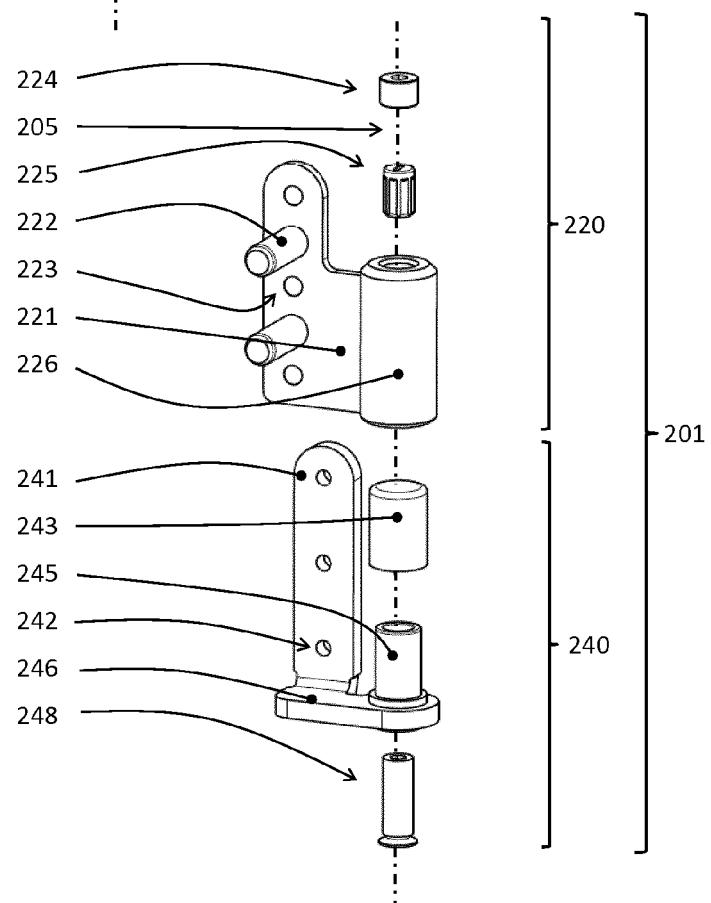


Fig. 4

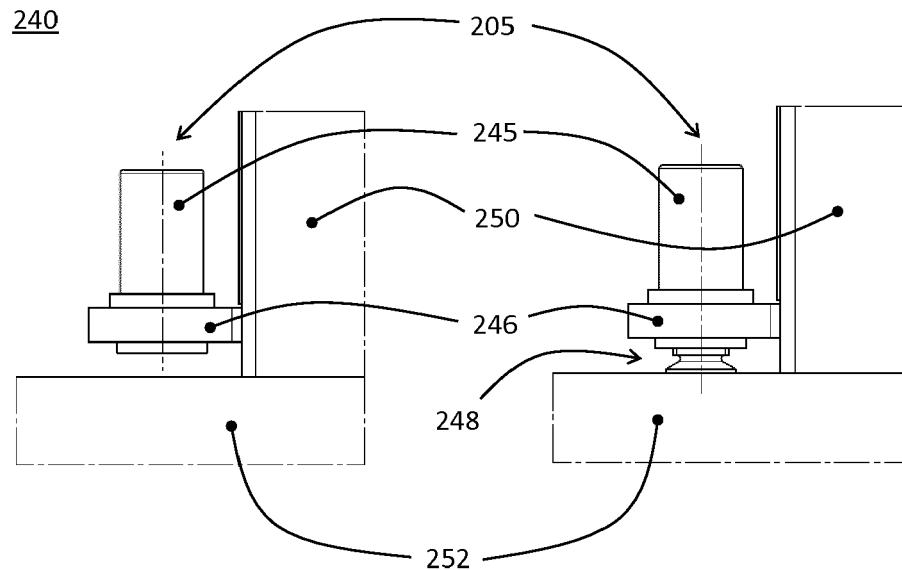


Fig. 5

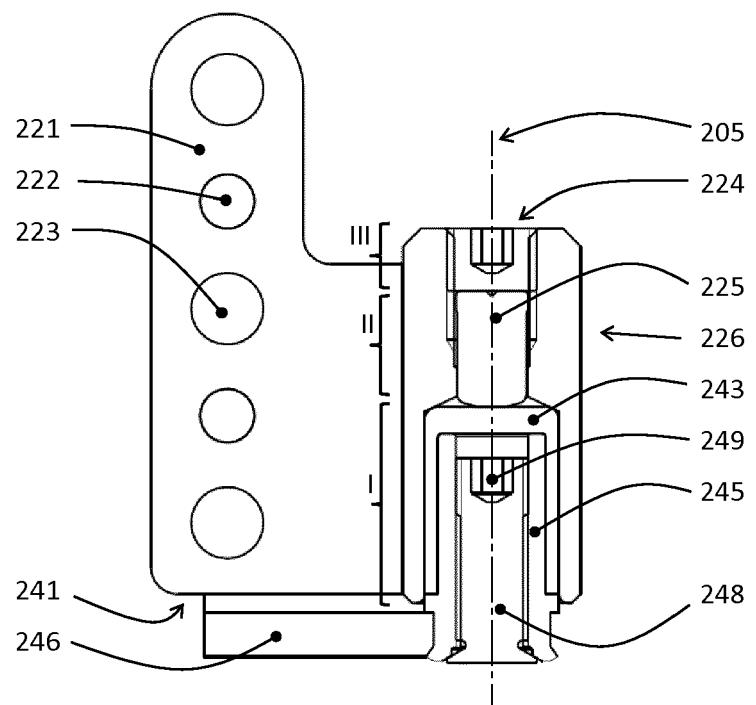


Fig. 6



EUROPEAN SEARCH REPORT

Application Number

EP 18 19 7638

5

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
10 X	EP 2 770 284 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 27 August 2014 (2014-08-27) * paragraphs [0061] - [0068]; figures 4-7 *	1-3, 6, 8, 10 4, 5, 7, 11	INV. E05D3/02 E05D7/081
15 Y	----- FR 2 940 999 A1 (MONIN [FR]) 16 July 2010 (2010-07-16) * page 6, line 1 - page 7, line 2 * * page 8, lines 1-28 * * figures 1-3 *	1-3, 6, 8-10	ADD. E05D5/10 E05D5/12
20 Y	----- WO 03/097974 A2 (BSH BOSCH SIEMENS HAUSGERAETE [DE]; KENTNER WOLFGANG [DE]; LAIBLE KARL) 27 November 2003 (2003-11-27) * pages 4-5; figures 1-4 *	1-3, 6, 8-10	
25 A	----- EP 2 801 775 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 12 November 2014 (2014-11-12) * paragraphs [0040] - [0043], [0049], [0050], [0075] - [0084]; figures 2-7 *	1-3, 6	
30			TECHNICAL FIELDS SEARCHED (IPC)
			E05D
35			
40			
45			
50 3	The present search report has been drawn up for all claims		
55	Place of search The Hague	Date of completion of the search 28 March 2019	Examiner 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			

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

EP 18 19 7638

5 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.

28-03-2019

10	Patent document cited in search report	Publication date		Patent family member(s)	Publication date
15	EP 2770284 A2 27-08-2014	CN EP KR US WO	105074368 A 2770284 A2 20140104640 A 2014232250 A1 2014129781 A1		18-11-2015 27-08-2014 29-08-2014 21-08-2014 28-08-2014
20	FR 2940999 A1 16-07-2010		NONE		
25	WO 03097974 A2 27-11-2003	AU BR CN DE EP EP EP ES ES ES RU WO	2003270246 A1 0310017 A 1653241 A 10221895 A1 1506342 A2 1657389 A1 2211006 A1 2279129 T3 2459467 T3 2496141 T3 2314400 C2 03097974 A2		02-12-2003 15-02-2005 10-08-2005 27-11-2003 16-02-2005 17-05-2006 28-07-2010 16-08-2007 09-05-2014 18-09-2014 10-01-2008 27-11-2003
30	EP 2801775 A2 12-11-2014	EP KR US	2801775 A2 20140132522 A 2014333191 A1		12-11-2014 18-11-2014 13-11-2014
35					
40					
45					
50					
55					