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(54) **HINGE ASSEMBLY**

(57) A hinge assembly for mounting a sash in a window frame in a top hung arrangement comprises a top bracket assembly and a support arm assembly. The top bracket assembly comprises a frame bracket (100) for attaching to a frame and a sash bracket (200) for attaching to a sash. The sash bracket (200) is releasably connectable to the frame bracket (100). The support arm assembly comprises a frame mounting part (300) for attaching to the frame and a sash mounting part (400) for attaching to the sash. The sash mounting part (400) comprising a pivotable support arm (402) and a friction connector (420). The pivotable support arm (402) is configured to be releasably connected to the frame mounting part (300). The pivoting of the support arm (402) is restricted by the friction connector (420).

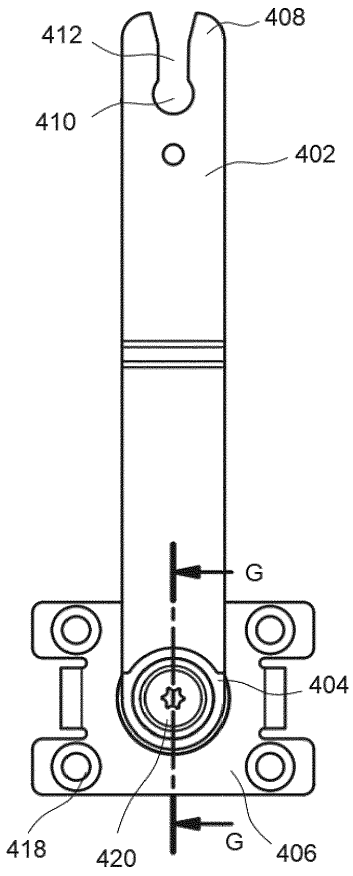

Fig. 12

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Description

[0001] The present invention relates to a hinge assembly for a window, in particular a fitting assembly for a top-hung window.

[0002] A conventional fitting assembly for a top-hung window may comprise a first bracket that is attached to an upper end of a sash frame and a second bracket that is attached to an upper end of the window frame. A connector between the first and second brackets may permit the first bracket to pivot relative to the second bracket, so that the window may be opened by pivoting the sash. A support arm may be provided between the sash frame and the window frame, and a locking means may be provided to retain the sash in an open position relative to the frame.

[0003] Difficulties arise in fitting conventional windows in that it may be difficult to attach the sash to the frame and remove the sash from the frame in situ, after the frame has been attached to a building.

[0004] According to the present invention there is provided an apparatus and method as set forth in the appended claims. Other features of the invention will be apparent from the dependent claims, and the description which follows.

[0005] According to an aspect, there is provided a hinge assembly for mounting a sash in a window frame in a top hung arrangement, the hinge assembly comprising a top bracket assembly and a support arm assembly, wherein the top bracket assembly comprises a frame bracket for attaching to a frame and a sash bracket for attaching to a sash, the sash bracket being releasably connectable to the frame bracket, and wherein the support arm assembly comprises a frame mounting part for attaching to the frame and a sash mounting part for attaching to the sash, the sash mounting part comprising a pivotable support arm and a friction connector, wherein the pivotable support arm is configured to be releasably connected to the frame mounting part, and wherein the pivoting of the support arm is restricted by the friction connector.

[0006] The hinge assembly may allow a sash to be easily mounted and removed from a window frame, without specialist tools, by the releasable connection between the frame bracket and sash bracket of the top bracket assembly, and the releasable connection between the support arm and the frame mounting part.

[0007] The friction connector may permit the support arm to pivot when sufficient force is applied, when opening or closing a window, but may retain the support arm in a fixed position when the sufficient force is not applied, thereby allowing the window to remain in a desired open configuration.

[0008] The friction connector may comprise a friction ring and a friction cone. The friction ring and the friction cone may be provided coaxially. The friction cone may be provided within the friction ring. The friction cone may be prevented from rotating relative to the support arm and may be configured to rotate relative to the friction ring when the support arm is pivoted. A surface of the friction cone may contact a first friction surface of the friction ring. Friction may be generated between the surface of the friction cone and the first friction surface, which may restrict rotation between the friction cone and the friction ring, thereby restricting the pivoting of the support arm. The first friction surface may be the inner surface of the friction ring. The surface of the friction cone which contacts the first friction surface may be an outer surface of the friction cone.

[0009] The friction connector may comprise a tap screw. The tap screw may be configured to adjust an axial position of the friction cone relative to the friction ring. This may adjust the friction between the friction ring and the friction cone.

[0010] The inner surface of the friction ring may each be cone-shaped. This may increase the surface area of contact between the friction cone and the friction ring, which may increase the friction between the friction cone and the friction ring.

[0011] The friction ring may comprise a second friction surface. The second friction surface may be configured to contact a surface of the support arm, and pivoting of the support arm relative to the friction ring may be restricted by friction generated between the surface of the support arm and the second friction surface. The second friction surface may be provided on an upper lip of the friction ring, on which the support arm may be provided.

[0012] The frame mounting part may comprise a height adjustment means for adjusting a height of the support arm relative to the frame mounting part when the support arm is connected to the frame mounting part. This may allow a fine adjustment of the positioning of the support arm, which may improve the fit between the sash and the window.

[0013] The frame mounting part may comprise a connector for coupling to the support arm and a base plate for attaching to a frame. The connector may be configured to move relative to the base plate to adjust the height of the connector, which may allow the height of the support arm to be adjusted relative to the frame mounting part.

[0014] The frame mounting part may comprise a slidable plate which may be configured to slide relative to the base plate. The connector may be fixed to the slidable plate.

[0015] The frame mounting part may comprise an eccentric screw for moving the slidable plate relative to the base plate. Rotation of the eccentric screw may cause the slidable plate to slide relative to the base plate.

[0016] The height adjustment means may comprise a scale and marker, which may provide a visual indicator to the operator of the height adjustment of the slidable plate relative to the base plate. The marker may be provided on the eccentric screw, and the scale portion may comprise markers provided around the periphery of the head of the eccentric screw.

[0017] The base plate may comprise an indicating portion. The indicating portion may be visible to the operator when the frame mounting part is mounted to a window frame and may indicates the direction that the height adjusting screw should be rotated, in order to move the slidable plate upwards or downwards.

[0018] The connector may be a tap screw. The tap screw may be configured to project from the base plate. The base plate may comprise an opening, and the tap screw may be configured to project through the opening from the slidable plate. The opening may be elongate. A length of the opening may be greater than a length of a head of the tap screw. This may allow the tap screw to move along the length of the opening, when the height of the tap screw is adjusted.

[0019] The tap screw may project at an oblique angle from the base plate and slidable plate. This may allow the tap screw to be easily connected to the support arm.

[0020] The tap screw may comprise a body portion. A diameter of the head may be greater diameterthan a diameter of the body portion. The body portion may be configured to be received in a bore in the support arm. The body portion may be rotatable within the bore, to allow the support arm to pivot relative to the frame mounting part.

[0021] The support arm may comprise a channel extending from an end of the support arm to the bore, for coupling and uncoupling the support arm from the tap screw. When connecting the support arm to the tap screw, the body of the tap screw may pass along the channel into the bore. This may allow the support arm to be connected and disconnected from the frame mounting part.

[0022] The head may comprise at least one projection. The at least one projection may project radially from the head. The head may comprise two projections, wherein each projection projects radially from the head and the first and second projections project from opposite sides of the head so they are collinear.

[0023] The support arm may comprise a recessed region around the bore and the channel. The width of the recessed region around the channel may correspond to the diameter of the head. The width of the recessed region around the bore may correspond to the width from one end of the projection to the other end of the projection. The tap screw may be rotatable between a first position, wherein the projections are substantially perpendicular to the channel, and a second position, wherein the projections align with the channel. When the tap screw is provided in the second position, the body portion of the tap screw may pass along the channel, with the head passing along the recessed portion around the channel. When the tap screw is received in the bore and provided in the first position, the projections on the head of the tap screw may retain the tap screw within the bore, because width between the ends of the two projections is greater than the width of the recessed region around the channel. The tap screw may thereby be releasably locked to the support arm.

[0024] The support arm assembly may comprise a cap that is configured to be applied over an end region of the support arm, around the bore and recessed region. The cap may be attachable to and detachable from the support arm. The cap may be configured to prevent the tap screw from rotating from the first position, when the cap is attached to the support arm and the tap screw is provided in the bore.

[0025] The frame bracket may comprise a rail and the sash bracket may comprise a sash mount attachable to a sash and a slider, the slider being pivotably connected to the sash mount and being receivable within the rail to slide along the rail.

[0026] The frame bracket may comprise a latch, wherein the latch is configured to releasably lock the slider within the rail. The latch may be movable between an open position and a locking position, wherein in the open position, a lower end of the rail is open, and in the locking position, the lower end of the rail is closed by the latch, to lock the slider in the rail. The slider being receivable within the rail and the latch being configured to releasably lock the slider within the rail may allow the sash bracket to be easily connected and disconnected to the frame bracket.

[0027] The latch may be biased to a locking position by a spring. This may allow the latch to easily lock the slider within the rail.

[0028] The rail may comprise a rear surface, and inner side wall and an outer side wall. The slider may be receivable in the rail, between the inner and outer side walls. The outer side wall may be provided at an acute angle relative to the rear surface of the rail, such that the outer side wall may not be parallel to the inner side wall. The slider may be correspondingly shaped. This may help to retain the slider within the rail.

[0029] An angle between the rear surface of the rail and the inner side wall may be obtuse. The rear surface of the rail may thereby be sloped. The slider may be correspondingly shaped. This may help to retain the slider within the rail.

[0030] According to another aspect, there is provided a top bracket assembly for a window comprising a frame bracket and a sash bracket, wherein the frame bracket comprises a rail and a latch and the sash bracket comprises a mounting part and a slider, the slider pivotably connected to the mounting part, wherein the slider is releasably receivable in the rail.

[0031] The top bracket assembly may include any or any combination of the features described above in relation to the top bracket assembly of the first aspect.

[0032] According to another aspect, there is provided a the support arm assembly for a window comprising a frame mounting part for attaching to the frame and a sash mounting part for attaching to a sash, the sash mounting part comprising a pivotable support arm and a friction connector, wherein the pivotable support arm is configured to be releasably connected to the frame mounting

part, and wherein the pivoting of the support arm is restricted by the friction connector.

[0033] The support arm assembly may include any or any combination of the features described above in relation to the support arm assembly of the first aspect.

[0034] Although a few preferred embodiments of the present invention have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications might be made without departing from the scope of the invention, as defined in the appended claims.

[0035] For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example only, to the accompanying diagrammatic drawings in which:

Figure 1 shows a frame bracket of the top bracket assembly;

Figure 2 shows an exploded view of the frame bracket;

Figure 3 shows a section view of the frame bracket along the plane A-A shown in figure 1;

Figure 4 shows a sash bracket of the top bracket assembly;

Figure 5 shows a side view of the sash bracket;

Figure 6 shows an exploded view of the sash bracket;

Figure 7 shows a top view of the sash bracket;

Figure 8 shows a top view of a frame mounting part of the support arm assembly;

Figure 9 shows an exploded view of the frame mounting part;

Figure 10 shows a section view of the frame mounting part along plane E-E of figure 8;

Figure 11 shows another section view of the frame mounting part along plane F-F of figure 8;

Figure 12 shows a top view of a sash mounting part of the support arm assembly;

Figure 13 shows an exploded view of the sash mounting part;

Figure 14 shows a section view of the sash mounting part along plane G-G of figure 12;

Figures 15A, 15B, 15C and 15D illustrate the mounting of the sash mounting part to the frame mounting part;

[0036] A hinge assembly comprises a top bracket assembly and a support arm assembly. A first hinge assembly may be provided on one side of a top hung window and a second hinge assembly may be provided on a second side of the top hung window.

[0037] The top bracket assembly comprises a frame bracket 100 and a sash bracket 200.

[0038] The frame bracket 100 is configured to be attached to a top portion of a window frame. The frame bracket 100, shown in figures 1 to 3, comprises a plate 102 which is configured to be attached to the window frame. The plate 102 comprises a rail 104 which runs from a bottom of the plate 102 to a top of the plate 102. As shown in figure 2, the rail 104 is provided as a recessed portion of the plate 102, with side walls 106, 108.

[0039] An upper end 110 of the rail 104 is open, whilst a lower end 112 of the rail 104 is closable by a latch 114. The latch 114 is pivotably mounted to the plate 102, towards a bottom end of the plate 102 by a rivet 116. The frame bracket 100 comprises a spring 118 configured to bias the latch 114 to a closed position, wherein the latch 114 extends at least partially across the width of the rail 104. Applying a force to the latch 114 in an upwards direction B allows the latch 114 to pivot to an open position, wherein the lower end 112 of the rail 104 is open.

[0040] The side walls 106, 108 of the rail 104 comprise a slot 120, through which the latch 114 may extend across at least part of the width of the rail 104. The slot 120 may allow the latch 114 to pivot between the closed position and the open position.

[0041] The plate 102 comprises openings 124 for attaching the frame bracket 100 to a window frame, for example by receiving screws to attach the plate 102 to the window frame.

[0042] The sash bracket 200, shown in figures 4 to 7, comprises a sash mount 202 and a slider unit 204. The slider unit 204 is pivotably connected to the sash mount 202.

[0043] The sash mount 202 is configured to be attached to a window sash. As shown in figure 5, the sash mount 202 comprises a first plate portion 206 configured to be attached to an upper side of a window sash, and a second plate portion 208 extending substantially perpendicularly from the first plate portion and configured to be attached to a side of the window sash.

[0044] The slider unit 204 comprises a pivot post 210 and a slider 212. The pivot post 210 extends through openings 214 in the sash mount 202 and is pivotably connected to the sash mount 202.

[0045] The slider 212 is configured to lie adjacent the second plate portion 208 and pivot relative to the second plate portion 208 in a plane parallel to the second plate portion 208.

[0046] The width of the slider 212 corresponds to the width of the rail 104, so that the slider 212 can slide along the rail 104 as the window is opened and closed.

[0047] The sash bracket 200 comprises a spring 216 and spring clips 217. The spring 216 and spring clips 217 are configured to retain the pivot post 210 to the sash mount 202. The spring 216 allows some movement of the slider unit 204 in an axial direction C. When a sash bracket 200 is mounted to both sides of the sash, the spring 216 of each sash bracket 200 helps to maintain the sash centrally within the frame in the axial direction. The spring 216 and spring clips 217 can be easily fitted to the pivot post 210 and sash mount 202 by simply clicking into place through an opening in the sash mount 202.

[0048] The method of connecting the sash bracket 200 to the frame bracket will now be described. Firstly, the sash bracket is positioned so that the slider 212 is aligned with the lower end of the rail 104. In this position, the latch 114 is biased to the bottom position.

[0049] The sash is then lifted relative to the frame, which pushes the slider 212 against the latch 214. The latch 214 pivots under the pushing force of the slider 212, allowing the slider 212 to slide upwards on the rail 104, past the latch 114. When the slider 212 passes the latch 114, the latch 114 returns to the bottom position under the bias of the spring 118. The latch thereby retains the slider 212 on the rail 104. As the latch 114 is biased back to the closed position, it may make a clicking sound, which may give an operator the indication that the slider 212 is now retained on the rail 104.

[0050] To remove the sash bracket 200 from the frame bracket 100, the sash bracket 200 is lifted so that the slider 212 is positioned above the latch 114, and the latch 114 is then pivoted upwards to the open position by an operator, for example using a screwdriver. The slider 212 can then slide out from the lower end of the rail 104 so that the sash bracket 200 is separated from the frame bracket 100.

[0051] Figure 7 shows a top view of the sash bracket 200 The slider 212 is shaped to be provided within the rail 104. The outer surface 218 of the slider 212 is sloped, such that its depth in the axial direction C increases from a front side of the slider 212 to a rear side 220 of the slider 212. The rail 104 is correspondingly sloped, as shown in figure 3. The sloped outer surface 218 of the slider 212 and the corresponding shape of the rail 104 may retain the slider 212 within the rail 104 by preventing the slider 212 from dropping out of the rail 104 in the direction D from the front of the slider 212 to the rear of the slider 214.

[0052] As shown in figure 7, the rear side 220 of the slider 212 comprises a recess 221, such that a width of the slider 212 at the outer surface 218 is greater than the width of the slider 212 at an end towards the pivot post 210. The outer side surface 108 of the plate 102 is correspondingly shaped, with a hooked portion 109, as shown in figure 3. The hooked portion 109 may be receivable in the recess 221 and may prevent the slider from dropping out of the rail 104 in the axial direction C.

[0053] In use, when the sash bracket 200 is coupled to the frame bracket, opening or closing a window causes the slider unit 204 to pivot relative to the sash mount 202, and the slider 212 moves up or down in the rail.

[0054] The support arm assembly comprises a frame mounting part 300 and a sash mounting part 400.

[0055] The frame mounting part 300, shown in figures 8-11 comprises a base plate 302 and a tap screw 304 for pivotably connecting to an arm 402 of the sash mounting part 400. The base plate 302 is configured to be attached to the window frame, and the tap screw 304 is configured to project from a surface of the base plate 302. As shown in figure 11, the tap screw 304 is configured to project from the surface of the base plate 302 at an oblique angle relative to the surface of the base plate 302.

[0056] The tap screw 304 comprises a head 306 and a body portion 308, the head 306 having a greater diameter than the body portion 308. The head 306 comprises two projections 310, 312, for releasably locking the support arm 402 to the frame mounting part 300. The first and second projections 310, 312 project substantially perpendicularly from opposite sides of the tap screw head 304, so that the projections are on the same longitudinal axis.

[0057] As shown in figures 12 and 13, the support arm 402 comprises a first end 404 pivotably connected to a sash mounting plate 406. Towards a second end 408 of the support arm 402 there is provided a bore 410 extending through the support arm 402 from a front surface of the support arm to a rear surface of the support arm 402. A channel 412 extends from the bore 410 to the second end 408 of the support arm 402, forming two prong-shaped end portions at the second end 408 of the support arm 402 on either side of the channel 412.

[0058] Figures 15A-15D illustrate how the support arm 402 is connected to the frame mounting part 300. As shown in figure 15A, the second end 408 of the support arm 402 is positioned adjacent the tap screw 304, and the tap screw 304 is rotated, so that the projections 310, 312 are aligned with the longitudinal axis of the support arm 402.

[0059] The support arm 402 is then positioned onto the tap screw 304 by inserting the support arm 402 onto the tap screw 304 so that the body 308 of the tap screw passes through the channel 412 and into the bore 410, as shown in figure 15B.

[0060] The support arm 402 comprises a recessed region 414 in the front surface of the support arm 402, around the channel 412 and the bore 410. As the tap screw 304 passes through the channel 412, the head 306 of the tap screw 304 passes along the recessed region 414 around the channel 412. As shown in figures 15A and 15B, the recessed region 414 around the bore 410 comprises a larger diameter region and a smaller diameter region. In the smaller diameter region, the width of the recessed region 414 corresponds to the diameter of the tap screw 304. In the larger diameter region, the width of the recessed region 414 corresponds to the width between the distal ends of the projections 310, 312 of

the tap screw 304.

[0061] The shape of the recessed region 414 limits the rotation of the tap screw 304 relative to the support arm 402. The tap screw 304 can be rotated in a first rotation direction from the position in which the projections 310, 312 align with the longitudinal axis of the support arm 402, as shown in figure 15B, to a position in which the projections 310, 312 abut an edge of the recessed region 414, as shown in figure 15C.

[0062] When the tap screw 304 is rotated into the position in which the projections 310, 312 abut edges of the recessed region 414, as shown in figure 15C, the projections 310, 312 prevent the arm 402 from being removed from the frame mounting part 300. The projections 310, 312 thereby provide a primary locking means for locking the support arm 402 to the frame mounting part 300.

[0063] The sash mounting part 400 comprises a removable cap 416. The cap 416 may be applied to the top surface of the arm 402, over the bore 410 and the tap screw 304, as shown in figure 15D. The cap 416 is configured to retain the tap screw 304 in the locking position shown in figure 15C. The cap 416 thereby provides a secondary locking means for locking the support arm 402 to the frame mounting part 300. The cap 416 is configured to prevent the tap screw 304 from rotating relative to the arm 402, so that when the arm 402 pivots, the tap screw 304 rotates with the arm 402. The arm 402 may thereby pivot relative to the base plate 302 of the frame mounting part 300 by the rotation of the tap screw 304.

[0064] The frame mounting part 300 comprises a height adjustment means. As shown in figures 9-11, the frame mounting part 300 comprises a slidable plate 314 provided behind the base plate 302. The slidable plate 314 lies in a plane substantially parallel to the base plate 302 and is configured to slide up and down relative to the base plate 302 within the plane parallel to the base plate 302.

[0065] The tap screw 304 extends through an aperture 316 in the base plate 302 and is fixed relative to the slidable plate 314 so that movement of the slidable plate 314 relative to the base plate 302 causes the tap screw 314 to move relative to the base plate 302, thereby adjusting the height of the support arm. The aperture 316 in the base plate 302 is elongate relative to the diameter of the body 308 of the tap screw 304, as shown in figures 8 and 9, to permit the tap screw 304 to move relative to the base plate 302.

[0066] The height adjustment means is configured to move the tap screw 304 up and down relative to the base plate over a range of approximately 4mm. In other examples, the height adjustment means may be configured to move the tap screw 304 up and down over other ranges, up to for example 10 mm. The height adjustment means may improve the fit of the support arm assembly 30 on a window, because it may allow a fine adjustment of the relative positions of the tap screw 304 that releasably connects to the support arm 402, and the sash mounting plate 406 to which the support arm is attached.

[0067] The height adjustment means comprises a height adjusting screw 318, shown in figures 8-10. The height adjustment screw 318 is an eccentric tap screw which is received in a height adjustment tap 319. The height adjustment screw 318 extends through the base plate 302 and is connected to the slidable plate 314 such that rotation of the height adjustment screw in a first direction causes the height of the slidable plate 314 to slide upwards relative to the base plate 302. Rotation of the height adjustment screw 318 in a second direction opposite to the first direction causes the slidable plate 314 to slide downwards relative to the base plate 302.

[0068] The height adjustment screw comprises a head 320 having a marker 322, and the base plate 302 comprises a scale portion 324. The scale portion 324 comprises markers that are provided around the periphery of the head 320 of the height adjustment screw 318. When the frame mounting part 300 is mounted to a window frame, the marker 322 and scale portion 324 will be visible to an operator and so the frame mounting part 300 can provide a visual indicator to the operator of the height adjustment.

[0069] In addition, the base plate 302 comprises an indicating portion 326. The indicating portion 326 is visible to the operator when the frame mounting part is mounted to a window frame. The indicating portion 326 indicates the direction that the height adjusting screw 318 should be rotated, in order to move the slidable plate 314 upwards or downwards.

[0070] The sash mounting part 400 comprises the support arm 402 and a sash mounting plate 406. The sash mounting plate 406 is configured to be fitted to a sash. The sash mounting plate 406 comprises openings 418 for receiving fixings to attach the sash mounting plate 406 to the sash. The first end 404 of the support arm 402 is pivotably connected to the sash mounting pate 406.

[0071] The support arm 402 is pivotably connected to the plate by a friction connector 420, shown in figures 13 and 14. The friction connector 420 comprises a friction tap screw 422, an outer ring 424, a friction ring 426, an inner ring 428 and a friction cone 430. The friction tap screw 422 is provided within the inner ring 428, the friction cone is provided around the inner ring 428, the friction ring 426 is provided around the friction cone 430, and the outer ring 424 is provided around the friction ring 426, such that the friction tap screw 422, inner ring 428, friction cone 430, friction ring 426 and outer ring 424 are coaxial. The outer ring 424 and friction ring 426 are fixed relative to the sash mounting plate 406, whilst the inner ring 428 and friction cone are prevented from rotating relative to the support arm 402, so that when the support arm 402 pivots, the inner ring 428 and friction cone 430 are rotated relative to the friction ring 426. The friction cone 430 is cone-shaped and received in a bottom end of the friction ring 26. The interior of the friction ring 26 is correspondingly shaped. The bore in the friction ring 426 may increase in radius from a top of the friction ring towards a lower end of the friction ring, so that the inner surface of

the friction ring is cone-shaped. The friction cone is configured to push against the interior surface of the friction ring 26, thereby creating friction between the friction cone and the friction ring.

[0072] The friction between the friction cone 430 and the friction ring 426 can be increased or decreased by sliding the friction cone 430 up or down relative to the friction ring 426. This may adjust the area of the friction cone 430 in contact with the inner surface of the friction ring 426 and may adjust the amount by which the friction cone 430 pushes against the inner surface of the friction ring 428. When the friction tap screw 422 is rotated in a first direction, the friction ring 428 rotates and slides the friction cone 430 upwards, towards the mounting plate 406, to increase the friction between the friction cone 430 and the friction ring 426.

[0073] The friction cone 430 pushes against friction ring 426, creating friction between the friction cone 430 and the friction ring 426. The friction ring 426 is fixed relative to the plate, and so rotation of the arm 402 relative to the plate will be limited by the friction between the friction cone 430 and the friction ring 426.

[0074] The friction ring 426 comprises an upper lip 436. The upper lip 436 projects around the periphery of the upper end of the friction ring 426. The support arm 402 is configured to rest on a surface of the upper lip 436. Friction is created between the support arm 402 and the surface of the upper lip 436. Rotation of the arm 402 relative to the sash mounting plate 406 is therefore limited by the friction between the support arm and the upper lip of the friction ring.

[0075] The friction connector 420 can limit the pivoting motion of the arm 402 relative to the sash mounting plate 406, so that in use, the friction connector 420 can retain the arm 402 at a desired position, thereby maintaining the window in a desired open position.

[0076] The complementary shapes of the inner surface of the friction ring 427 and the outer surface of the friction cone 430 may increase the contact area between the friction ring 426 and the friction cone 430, thereby increasing the friction between these components.

[0077] As shown in figure 14, the friction ring 426, inner ring 428, outer ring 424 and friction cone 430 extend behind the sash mounting plate 406, such that when the sash mounting plate 406 is mounted to a sash, these parts of the friction connector 420 are not visible to the operator. Any dust generated by the friction connector 420 may therefore not be visible on the sash throughout the lifetime of the hinge assembly.

[0078] The hinge assembly may be used for a variety of windows having differing widths and heights, with the length of the support arm being set accordingly. The other components of the hinge assembly may remain the same for use with windows of different sizes, with only the length of the arm being different. This may provide the advantage of improving manufacture. In addition, the hinge assembly may be suitable for use with low height windows, for example those with an external dimension of the frame of 282 mm.

[0079] The hinge assembly can allow a sash to be mounted to a window without requiring any specialist tools, because the slider of the sash bracket can simply slide into the rail of the frame bracket, and the support arm slides onto the tap screw of the frame mounting part, the tap screw is rotated and the cap is applied. The hinge assembly also allows a sash to be removed easily from a window, by removing the cap, rotating the tap screw so that the arm can slide off the frame mounting part, moving the latch of the frame bracket upwards against the bias of the spring, and sliding the slider of the sash bracket out of the rail of the frame bracket. This may greatly reduce a burden on an operator in mounting and removing a sash from a frame in a top-hung window.

[0080] Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

[0081] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0082] Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

[0083] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A hinge assembly for mounting a sash in a window frame in a top hung arrangement, the hinge assembly comprising a top bracket assembly and a support arm assembly,
   wherein the top bracket assembly comprises a frame bracket for attaching to a frame and a sash bracket for attaching to a sash, the frame bracket and the sash bracket being releasably connectable, and
   wherein the support arm assembly comprises a frame mounting part for attaching to the frame and a sash mounting part for attaching to the sash, the sash mounting part comprising a pivotable support arm and a friction connector,

wherein the pivotable support arm is configured to be releasably connected to the frame mounting part, and wherein the pivoting of the support arm is restricted by the friction connector.

2. The hinge assembly according to claim 1, wherein friction connector comprises a friction ring and a friction cone, wherein the friction cone is provided coaxially with the friction ring and wherein the friction cone is configured to rotate relative to the friction ring when the support arm is pivoted, wherein a surface of the friction cone contacts a first friction surface of the friction ring, and wherein the contact between the friction cone and the first friction surface generates friction to restrict the pivoting of the support arm.

3. The hinge assembly according to claim 2, wherein the friction connector comprises a tap screw, wherein rotation of the tap screw adjusts an axial position of the friction cone relative to the friction ring, to adjust the friction between the friction cone and the friction ring.

4. The hinge assembly according to claim 2 or claim 3, wherein the friction cone is cone-shaped and the friction ring comprises a cone-shaped inner surface.

5. The hinge assembly according to any of claims 2 to 4, wherein the friction ring comprises a second friction surface, wherein the second friction surface is configured to contact a surface of the support arm, wherein pivoting the support arm generates friction between the support arm and the second friction surface to restrict the pivoting of the support arm.

6. The hinge assembly according to any preceding claim, wherein the frame mounting part comprises a height adjustment means for adjusting a height of the support arm relative to the frame mounting part when the support arm is connected to the frame mounting part.

7. The hinge assembly according to claim 6, wherein the frame mounting part comprises a connector for coupling to the support arm and a base plate for attaching to a frame, wherein the connector may be configured to move relative to the base plate to adjust the height of the support arm.

8. The hinge assembly according to claim 7, wherein the frame mounting part comprises a slidable plate which is configured to slide relative to the base plate, wherein the connector is fixed to a slidable plate.

9. The hinge assembly according to claim 8, wherein the frame mounting part comprises an eccentric screw, wherein rotation of the eccentric screw causes the slidable plate to move relative to the base plate.

10. The hinge assembly according to any of claims 7 to 9, wherein the connector is a tap screw configured to project from the base plate, the tap screw comprising a head and a body portion, the head having a greater diameter than the body portion, and wherein the body is configured to be received in a bore in the support arm, wherein the support arm comprises a channel extending from an end of the support arm to the bore, for coupling and uncoupling the support arm from the tap screw.

11. The hinge assembly according to claim 10, wherein the head comprises at least one projection receivable in a recessed portion of the support arm provided around the bore, wherein when the tap screw is rotated to a first position, the projection is provided in the recessed portion to lock the support arm to the tap screw.

12. The hinge assembly according to claim 11, wherein the support arm assembly further comprises a cap, wherein the cap is attachable to and detachable from the support arm and tap screw when the tap screw is provided in the bore and rotated to the first position, wherein the cap is configured to prevent the tap screw from rotating from the first position.

13. The hinge assembly according to any preceding claim, wherein the frame bracket comprises a rail and the sash bracket comprises a sash mount attachable to a sash and a slider, the slider being pivotably connected to the sash mount and being receivable within the rail and configured to slide along the rail.

14. The hinge assembly according to claim 13, wherein the frame bracket comprises a latch that is configured to move between an open position and a locking position, wherein in the open position, a lower end of the rail is open, and in the locking position, the lower end of the rail is closed by the latch to lock the slider in the rail, wherein the latch is biased to a locking position.

15. The hinge assembly according to claim 13 or claim 14, wherein the rail comprises a rear surface and inner and outer side walls, wherein a least one of inner and outer side walls is provided at an oblique angle relative to the rear surface, for retaining the slider in the rail.

Amended claims in accordance with Rule 137(2) EPC.

1. A hinge assembly for mounting a sash in a window

frame in a top hung arrangement, the hinge assembly comprising a top bracket assembly and a support arm assembly,
wherein the top bracket assembly comprises a frame bracket (100) for attaching to a frame and a sash bracket (200) for attaching to a sash, the frame bracket (100) and the sash bracket (200) being releasably connectable, and
wherein the support arm assembly comprises a frame mounting part (300) for attaching to the frame and a sash mounting part (400) for attaching to the sash, the sash mounting part (400) comprising a pivotable support arm (402) and a friction connector (420),
characterised in that the pivotable support arm (402) is configured to be releasably connected to the frame mounting part (400), and wherein the pivoting of the support arm (402) is restricted by the friction connector (420).

2. The hinge assembly according to claim 1, wherein friction connector (420) comprises a friction ring (426) and a friction cone (430) , wherein the friction cone (430) is provided coaxially with the friction ring (426) and wherein the friction cone (430) is configured to rotate relative to the friction ring (426) when the support arm (402) is pivoted, wherein a surface of the friction cone (430) contacts a first friction surface of the friction ring (426), and wherein the contact between the friction cone (430) and the first friction surface generates friction to restrict the pivoting of the support arm (402).

3. The hinge assembly according to claim 2, wherein the friction connector (420) comprises a tap screw (422), wherein rotation of the tap screw (422) adjusts an axial position of the friction cone (430) relative to the friction ring (426), to adjust the friction between the friction cone (430) and the friction ring (426).

4. The hinge assembly according to claim 2 or claim 3, wherein the friction cone (430) is cone-shaped and the friction ring (426) comprises a cone-shaped inner surface.

5. The hinge assembly according to any of claims 2 to 4, wherein the friction ring (426) comprises a second friction surface, wherein the second friction surface is configured to contact a surface of the support arm (402), wherein pivoting the support arm (402) generates friction between the support arm (402) and the second friction surface to restrict the pivoting of the support arm (402).

6. The hinge assembly according to any preceding claim, wherein the frame mounting part (300) comprises a height adjustment means for adjusting a height of the support arm (402) relative to the frame mounting part (300) when the support arm (402) is connected to the frame mounting part (300).

7. The hinge assembly according to claim 6, wherein the frame mounting part (300) comprises a connector for coupling to the support arm (402) and a base plate (302) for attaching to a frame, wherein the connector may be configured to move relative to the base plate (302) to adjust the height of the support arm.

8. The hinge assembly according to claim 7, wherein the frame mounting part (300) comprises a slidable plate (314) which is configured to slide relative to the base plate (302), wherein the connector is fixed to a slidable plate (314).

9. The hinge assembly according to claim 8, wherein the frame mounting part comprises an eccentric screw (318), wherein rotation of the eccentric screw (318)causes the slidable plate (314) to move relative to the base plate (302).

10. The hinge assembly according to any of claims 7 to 9, wherein the connector is a tap screw (304) configured to project from the base plate (302), the tap screw (304) comprising a head (306) and a body portion (308), the head (306) having a greater diameter than the body portion (308), and wherein the body (308) is configured to be received in a bore (410) in the support arm (402), wherein the support arm (402) comprises a channel (412) extending from an end of the support arm (402) to the bore (410), for coupling and uncoupling the support arm (402) from the tap screw (304).

11. The hinge assembly according to claim 10, wherein the head (306) comprises at least one projection (310, 312) receivable in a recessed portion (414) of the support arm (402) provided around the bore (410), wherein when the tap screw (304) is rotated to a first position, the projection (301, 312) is provided in the recessed portion (414) to lock the support arm (402) to the tap screw (304).

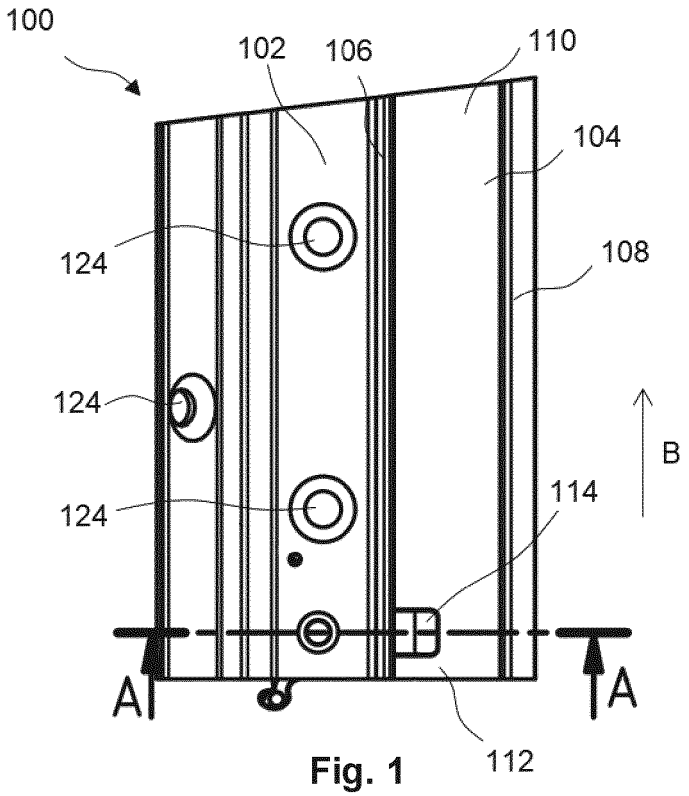
12. The hinge assembly according to claim 11, wherein the support arm assembly further comprises a cap (416), wherein the cap (416) is attachable to and detachable from the support arm (402) and tap screw (304) when the tap screw (304) is provided in the bore (410) and rotated to the first position, wherein the cap (416) is configured to prevent the tap screw (304) from rotating from the first position.

13. The hinge assembly according to any preceding claim, wherein the frame bracket (100) comprises a rail (104) and the sash bracket (200) comprises a sash mount (202) attachable to a sash and a slider

(212), the slider (212) being pivotably connected to the sash mount (202) and being receivable within the rail (104) and configured to slide along the rail (104).

14. The hinge assembly according to claim 13, wherein the frame bracket (100) comprises a latch (114) that is configured to move between an open position and a locking position, wherein in the open position, a lower end (112) of the rail (104) is open, and in the locking position, the lower end (112) of the rail (104) is closed by the latch (114) to lock the slider (212) in the rail (104), wherein the latch (114) is biased to a locking position.

15. The hinge assembly according to claim 13 or claim 14, wherein the rail (104) comprises a rear surface and inner and outer side walls (106, 108), wherein a least one of inner and outer side walls (106, 108) is provided at an oblique angle relative to the rear surface, for retaining the slider (212) in the rail (104).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110
104
124
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B
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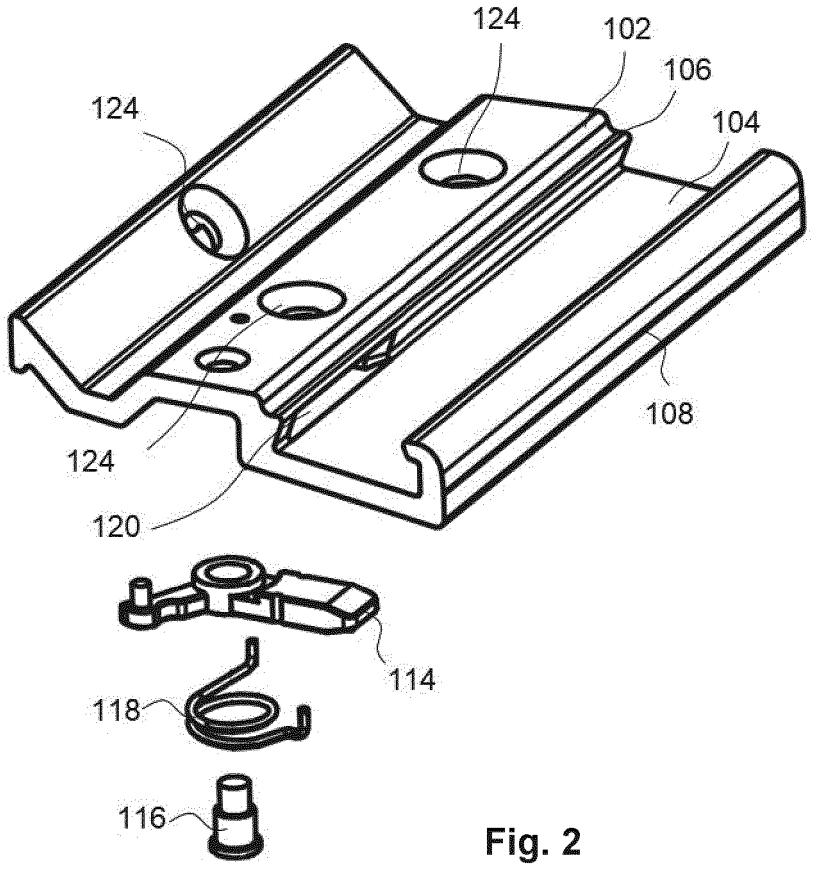
114
A
A
112

Fig. 1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106
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104
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114
118
116

Fig. 2

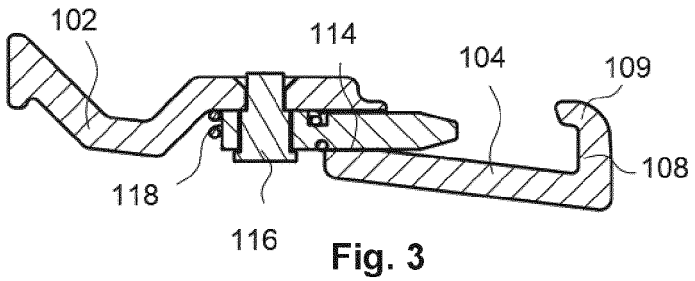


Fig. 3

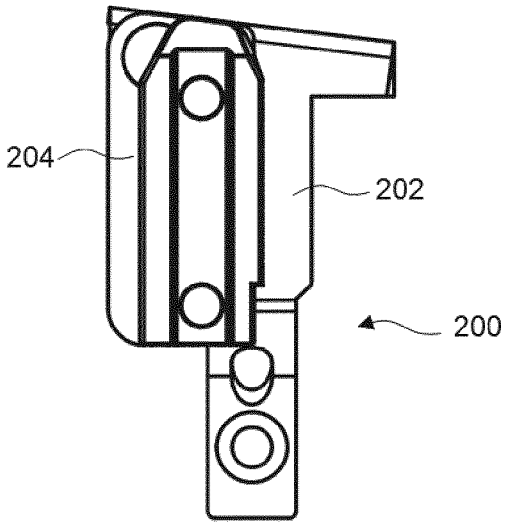


Fig. 4

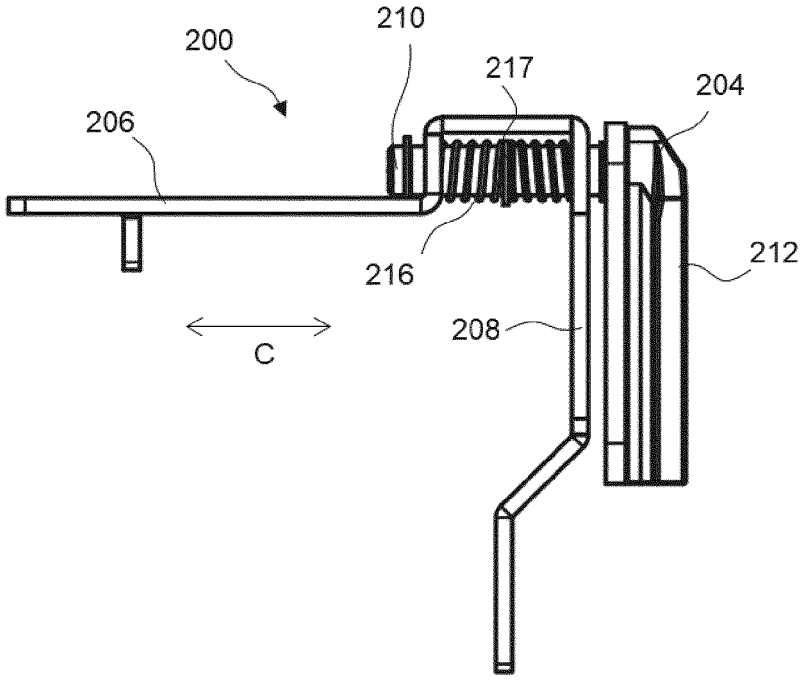


Fig. 5

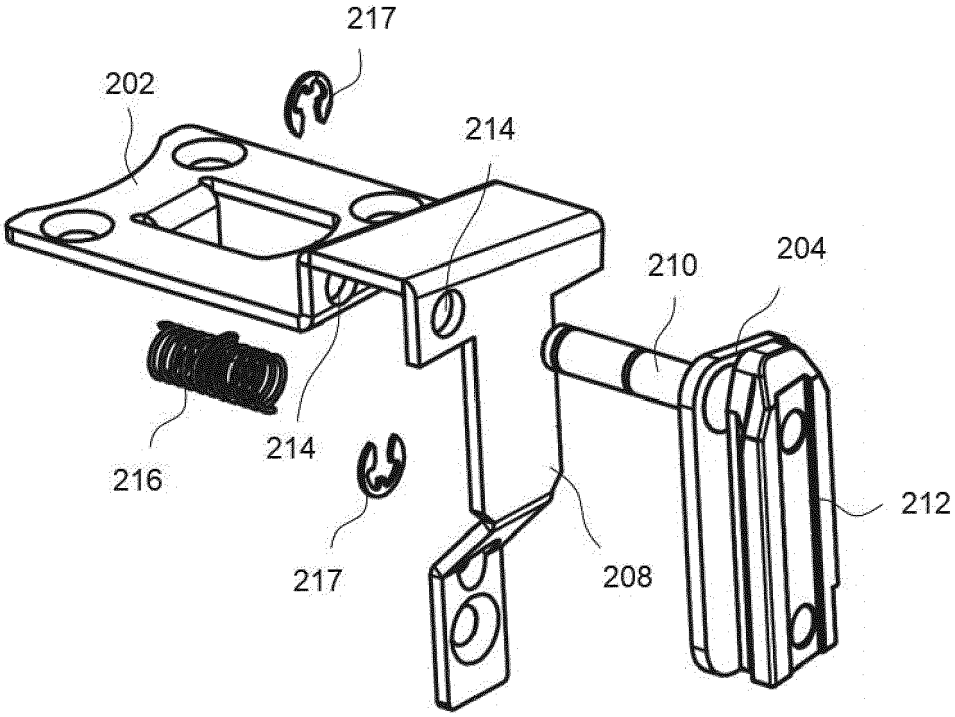


Fig. 6

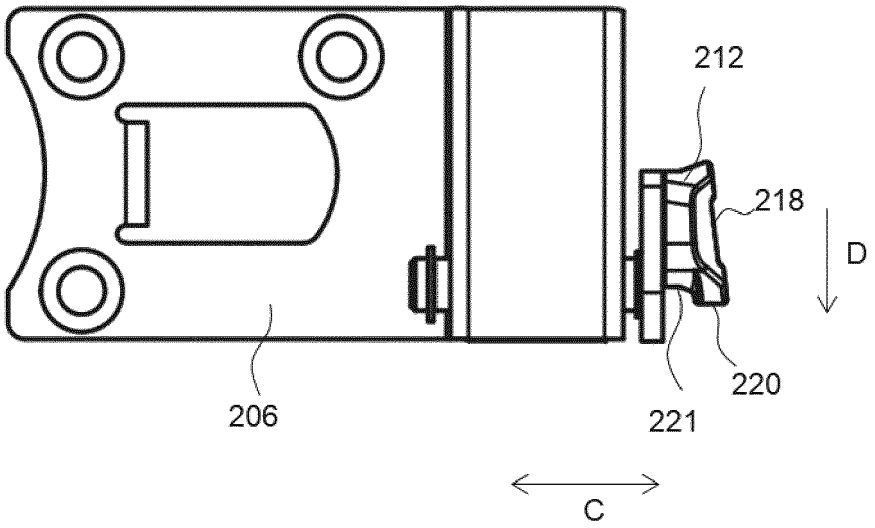
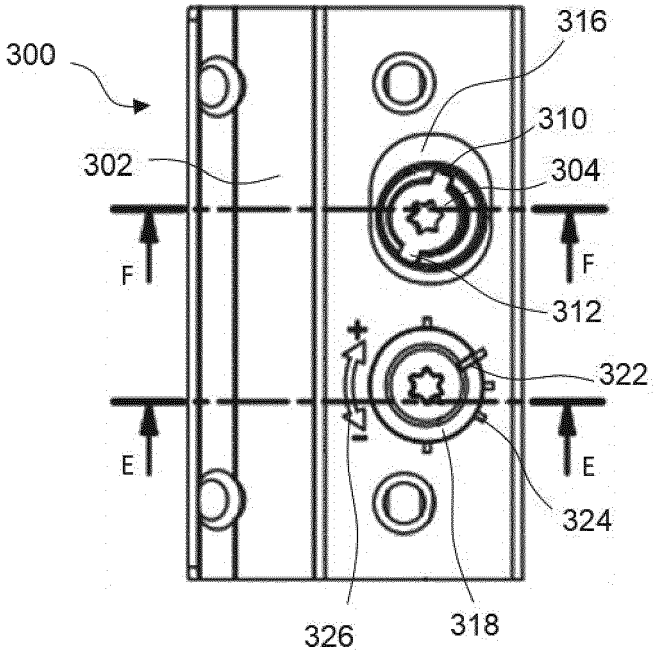


Fig. 7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302
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312
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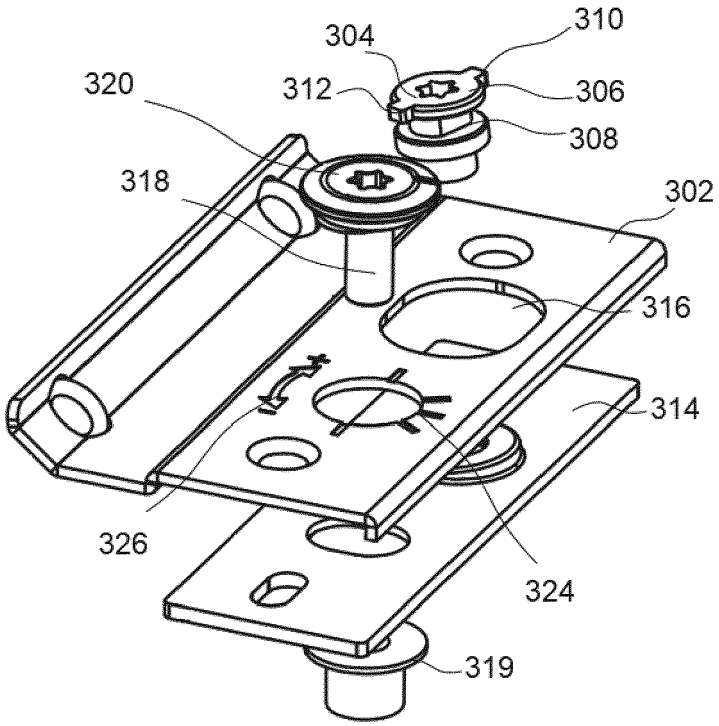
324
326
318

Fig. 8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306
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318
302
316
314
326
324
319

Fig. 9

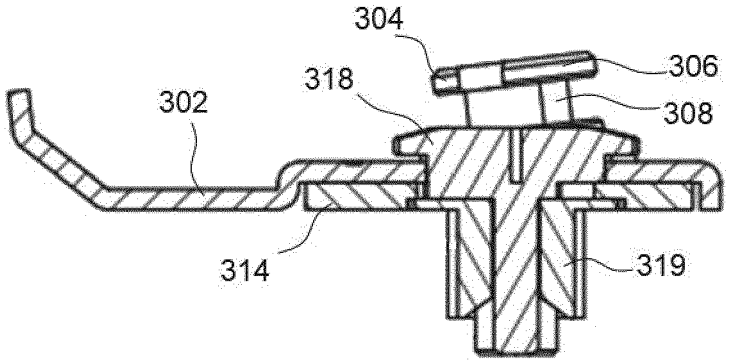

Fig. 10

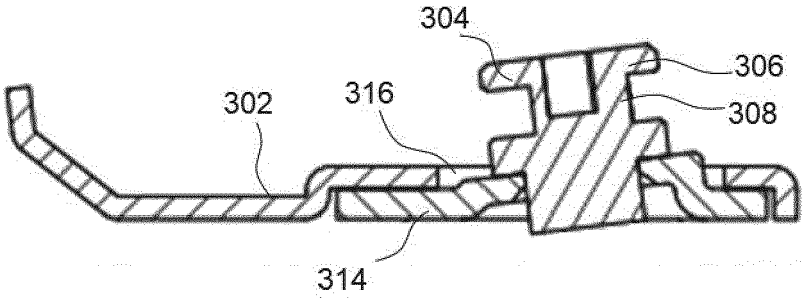

Fig. 11

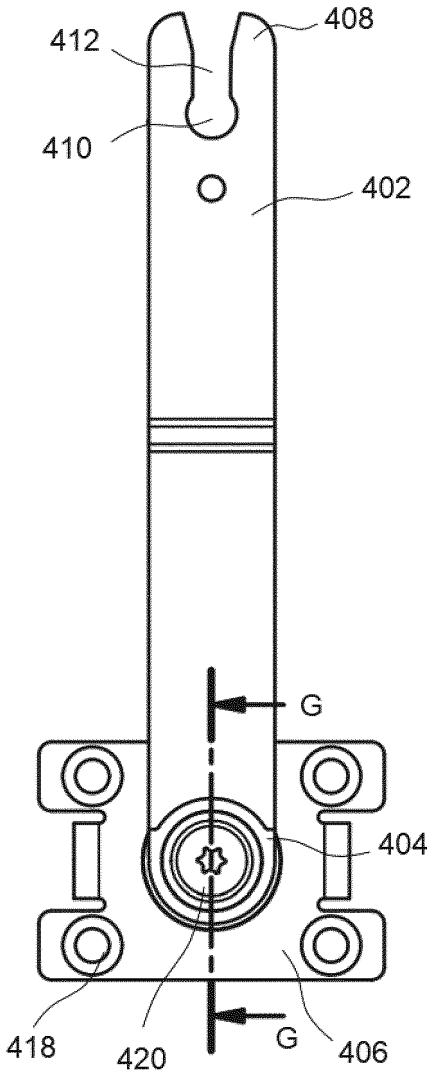

Fig. 12

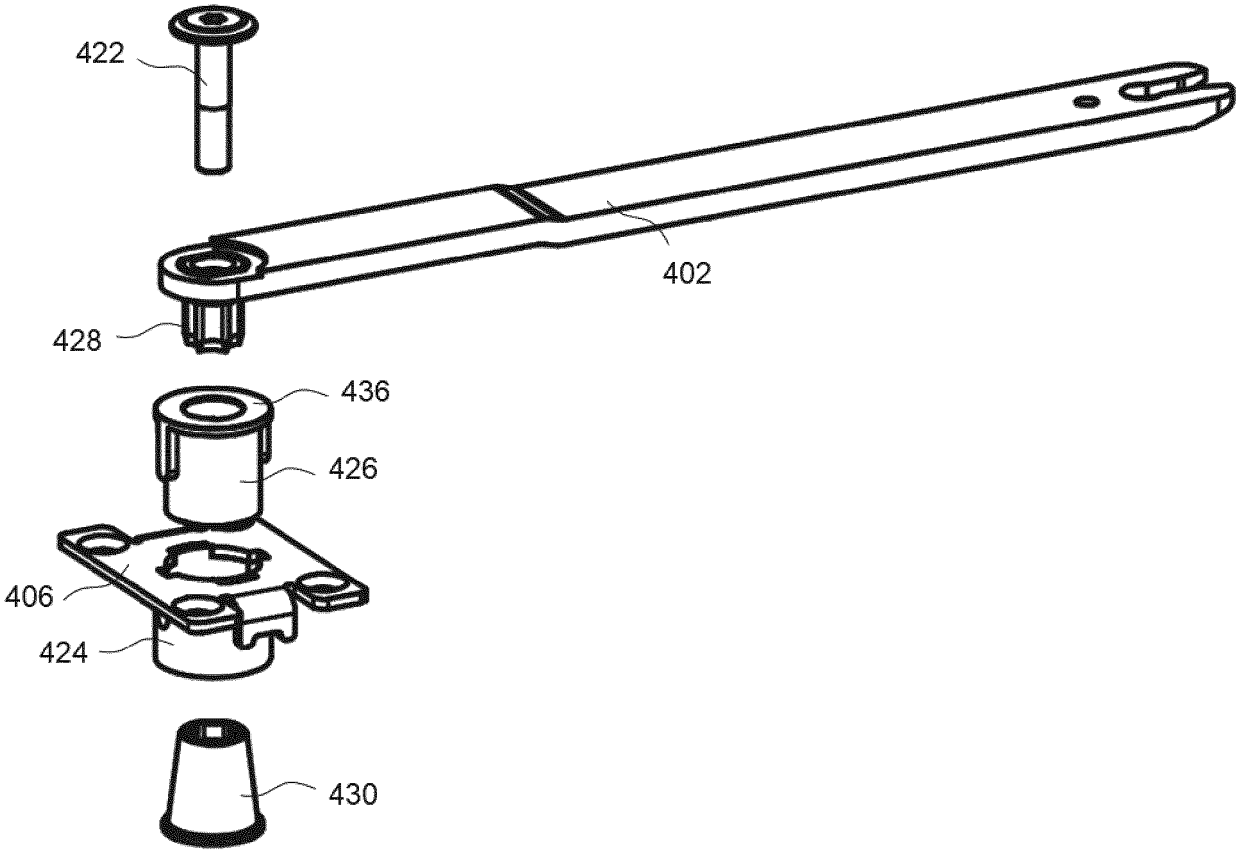

Fig. 13

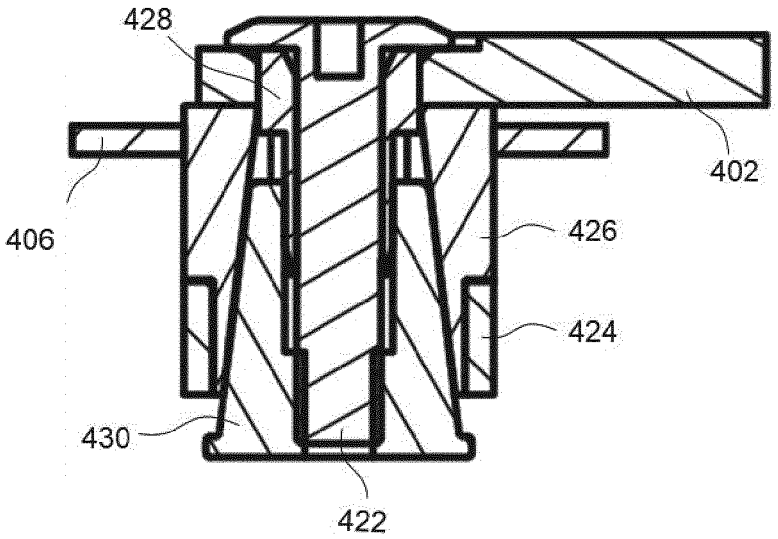

Fig. 14

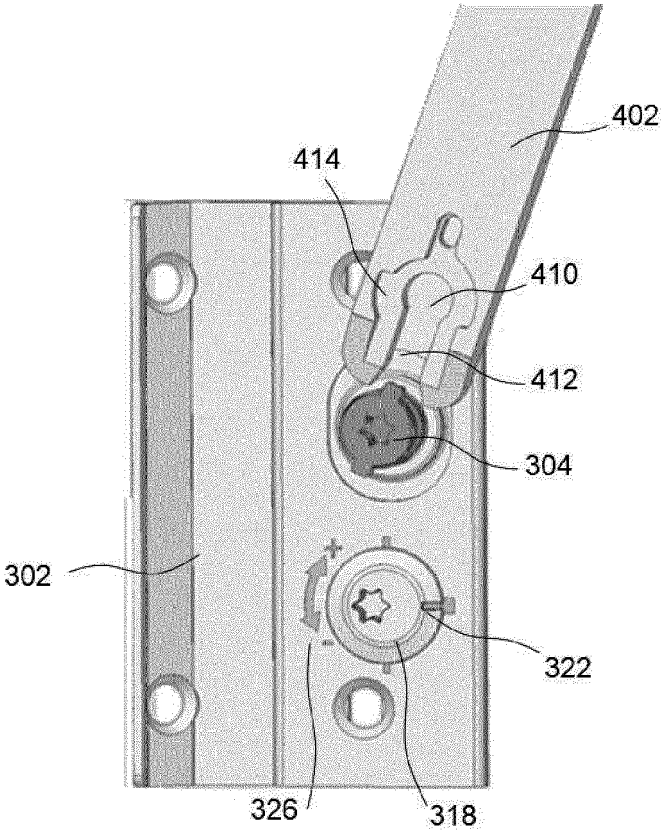

Fig. 15A

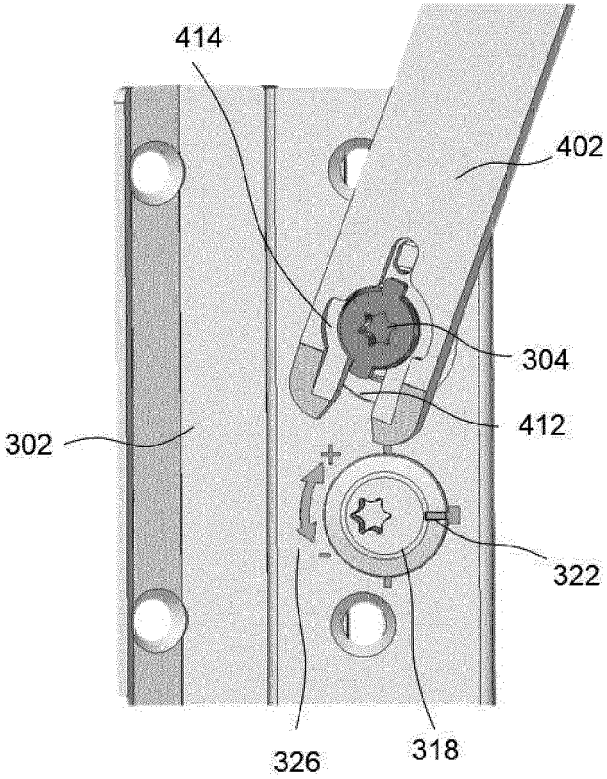

Fig. 15B

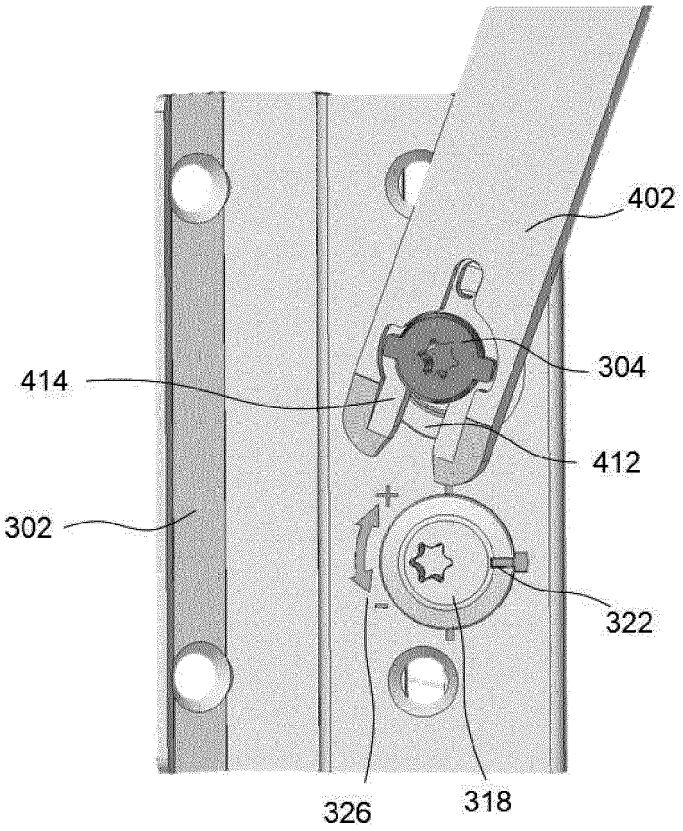

Fig. 15C

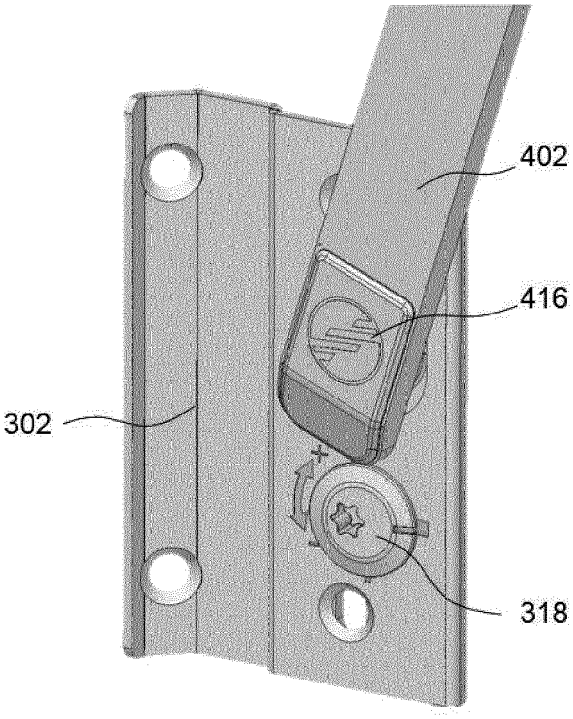

Fig. 15D

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EUROPEAN SEARCH REPORT

Application Number
EP 20 19 0954

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 Y A	EP 2 326 782 A1 (VKR HOLDING AS [DK]) 1 June 2011 (2011-06-01) * paragraph [0016] - paragraph [0021] * * figures 1-8 *	1 2,4,13 3,5-12, 14,15	INV. E05D7/10 E05D7/12 E05D11/08 E05D15/44 E05D15/46
Y	GB 2 148 384 A (HARDWARE & SYSTEMS PATENTS LTD) 30 May 1985 (1985-05-30) * page 1, line 107 - line 129 * * figures 1-4 *	2,4	
Y	EP 2 157 265 A1 (VKR HOLDING AS) 24 February 2010 (2010-02-24) * paragraph [0030] * * figures 1-4 *	13	

TECHNICAL FIELDS SEARCHED (IPC)

E05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 January 2021	Prieto, Daniel

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 20 19 0954

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18-01-2021

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EP 2326782 A1	01-06-2011	DK 2326782 T3	22-09-2014
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EP 2157265 A1	24-02-2010	NONE	

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