

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.07.2013 Bulletin 2013/30

(51) Int Cl.: **E05B 1/00** (2006.01) **E05B 5/00** (2006.01)

(21) Application number: **13151251.9**

(22) Date of filing: **15.01.2013**

(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

(72) Inventors:

- **Harrison, Peter James**
West Midlands
WS10 7QT (GB)
- **Fletcher, Peter**
West Midlands
WV14 8YT (GB)

(30) Priority: **20.01.2012 GB 201200977**

(71) Applicant: **J. Banks & Co. Limited**
Featherstone, Wolverhampton WV10 7HW (GB)

(74) Representative: **Gee, Steven William**
D.W. & S.W. GEE
1 South Lynn Gardens
London Road
Shipston on Stour
Warwickshire CV36 4ER (GB)

(54) **Operating handle**

(57) This invention relates to an operating handle (20), in particular for a folding/sliding door. The operating handle (20) has a mounting part (22) by which it may be mounted to the folding/sliding door, and a handle part (21) which is connected to a locking mechanism for the door. The handle part is movable relative to the mounting part between a storage position and an operating position, the storage position providing a minimum stack height for the operating handle whereby to minimise the

restriction on opening movement of the folding/sliding door. The handle part is adapted to rotate an operating shaft (25) which is connected to the locking mechanism (26), the handle part (21) in its operating position being rotatable through approximately 360°, during which movement the operating shaft (25) is driven to rotate through an angle which is less than 360°. Accordingly, there is some "lost motion" within the operating handle, and the rotation of the handle part is not required to match that of the operating shaft.

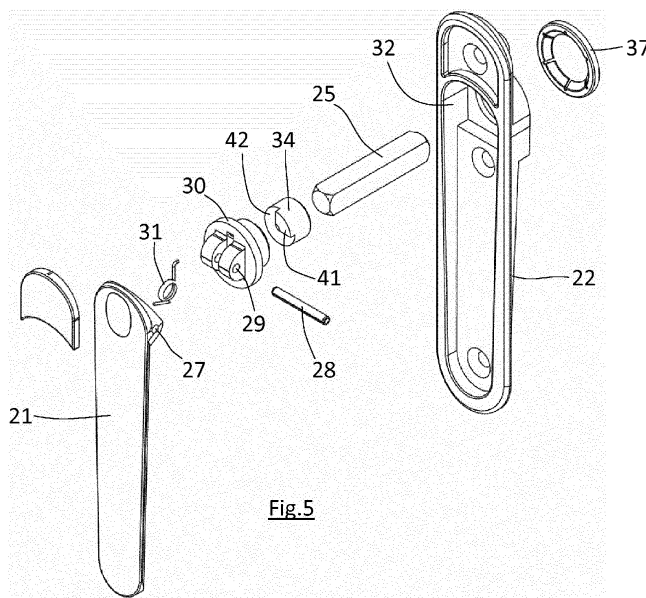


Fig.5

Description

FIELD OF THE INVENTION

[0001] This invention relates to an operating handle, in particular for a folding/sliding door.

[0002] Directional and orientational terms used in this specification, such as "top", "bottom", "height" etc., are used to describe objects in their normal orientation of use, as shown for example in Fig.1.

BACKGROUND TO THE INVENTION

[0003] Folding/sliding doors are a particular type of door and an example is shown in Figs.1 and 2. Figs. 1 and 2 of the accompanying drawings, and the following description thereof, correspond to our copending European patent application 2 213 816.

[0004] A set of door panels 1-3 are located in an opening (not shown) in the wall of a building, the number and size of the panels being chosen to fit the opening. Typically the panels will be of a height to span the distance between the top and bottom of the opening, so that the set of panels comprises the required number of panels arranged side by side to span the width of the opening.

[0005] In Fig.1 three door panels 1,2,3 are shown, though it will be understood that a folding/sliding door can comprise two or more door panels.

[0006] The door panels 1,2,3 each comprise a substantially rigid frame 4 surrounding a glazing panel 5. Respective sets of hinges 6,7 (typically butt hinges as drawn) interconnect each pair of adjacent panels. Each hinge 6 is mounted upon a respective slider 8, the slider 8 being located on one of the two guide rails 9 which are mounted at the top and bottom of the opening (only the guide rail 9 at the bottom of the opening is shown in Figs. 1 and 2), so that the hinges 6 are "captive" in that they are maintained in alignment with the guide rails 9.

[0007] The hinges 7 which interconnect the panels 2 and 3 on the other hand do not have a slider, and the hinges 7 are therefore "free" in that they can be moved away from the guide rails 9 as shown.

[0008] The set of door panels for a particular opening are constructed with alternating captive hinges 6 and free hinges 7.

[0009] The panel 1 in this embodiment is designed to be connected (by a set of free hinges 7) to another panel (not shown, but similar to panel 2), but in alternative embodiments it can carry locking means whereby it may be locked to the end panel of another folding/sliding door which spans another part of the opening. The panel 3 may be connected (by a set of captive hinges 6) to another panel (similar to panel 2) if desired, or it may be secured to an adjacent wall.

[0010] As shown in Fig.2, the alternating arrangement of captive and free hinges 6,7 which are typical of a folding/sliding door allows the door panels 1,2,3 to be hinged relative to one another in "concertina" fashion.

[0011] Folding/sliding doors have the particular advantage that they maximise the size of the opening which is available for ventilation or access. A set of patio doors, for example, will typically comprise one fixed panel and one sliding panel. Since only the sliding panel is movable a fully-opened set of patio doors can provide slightly less than half of the opening for ventilation or access. A folding/sliding door on the other hand can usually provide almost all of the opening for ventilation or access.

[0012] Accordingly, folding/sliding doors are particularly beneficial for buildings containing private swimming pools for example, and also for restaurants having indoor and outdoor areas which can be separated when desired by closing the doors, or combined into substantially a single area when the doors are opened.

[0013] It is typical to have a locking means whereby each of the freely-hinged junctions can be secured to the guide rails 9 when the folding/sliding door is closed. The locking means will typically comprise an operating handle mounted on the surface of a door panel and a locking mechanism mounted inside the profile of the door panel, these components being located adjacent to a free hinge 7. The locking mechanism is typically in the form of an espagnolette gearbox, the gearbox engaging shoot bolts which can be driven into keepers located upon the top and bottom guide rails 9. Providing an independent locking means at every freely-hinged junction maximises the security afforded by the closed folding/sliding door, and also allows the folding/sliding door to be partially opened in the event that full access or ventilation through the opening is not required.

[0014] It is also typical to locate a draught seal upon the top and bottom rail 9, the draught seal being compressed when the folding/sliding door is closed.

[0015] As will be seen from Fig.2 the space which is available for the operating handle 10 when the folding/sliding door is opened is relatively small, and so the operating handle 10 has a minimum "stack height", i.e. it projects the minimum possible distance from the door panel 2 upon which it is mounted, consistent with the ability of the user to be able to grasp the operating handle.

[0016] When the stack height is minimised, however, the user can only grasp the operating handle 10 by the fingertips, and this is not enough to allow the user to rotate the handle and operate the locking mechanism. Accordingly, the handle 10 is designed to pivot about a mounting pin (not shown), so that when the folding/sliding door has been partially closed the user is able to pivot the handle 10 outwardly sufficiently so that a full grip upon the handle 10 may be obtained. In known operating handles of this type the handle 10 is resiliently biased towards its retracted position as shown.

[0017] It has been recognised that whilst a pivotable handle 10 such as that shown will permit the user to operate the locking mechanism it is not always sufficiently strong to allow the user also to compress the draught seals, and it may be necessary to fit an additional grab handle such as the grab handle 11 which the operator

can grasp with one hand in order to pull the freely-hinged junction towards the guide rails 9 and compress the draught seals whilst with the other hand the user can grasp and rotate the operating handle 10 so as to operate the locking mechanism.

[0018] Most of the locking mechanisms which are used on folding/sliding doors require approximately 180° of rotation in order to move between their locked condition and their unlocked condition (i.e. to move the shoot bolts between their retracted and extended positions. Thus, much of the locking componentry is standardised for use with many types of doors and windows, including folding/sliding doors, and 180° of rotation is (almost) standard for such componentry.

[0019] It will be understood that when the door is opened the locking mechanism is necessarily unlocked, and so the operating handle 10 will be rotated to a position approximately 180° from that shown in Fig. 1. Minimising the stack height of the operating handle 10 when the folding/sliding doors are unlocked and opened is therefore highly advantageous.

[0020] Even with the reduced stack height of a pivotable operating handle, this component often provides the limit to opening movement of the folding/sliding door. It will be appreciated from Fig. 2 that when the folding/sliding door is opened the operating handle 10 lies between facing frame parts of the door panels 2 and 3. Whilst it is intended that when the folding/sliding door is opened the door panels 2 and 3 will lie parallel so that access through the opening is maximised, the operating handle 10 will often foul the door panel 3 before the panels 2 and 3 become parallel. This problem is exacerbated by the (necessary) positioning of the operating handle 10 close to the axis of the free hinges 7, each millimetre of additional stack height of the operating handle 10 often being translated into a gap between the panels 2 and 3 of several centimetres at the guide rails.

DISCLOSURE OF THE PRIOR ART

[0021] Our copending European patent application 2 213 816 provides an operating handle which is movable between an operating position and a storage position. The stack height of the operating handle in its storage position is very small, so that this disclosure provides an operating handle for a folding/sliding door which can maximise the opening provided. Also, the operating handle is "T-shaped", and the operating handle can move to its storage position (with the minimum stack height) in both the locked and unlocked conditions, despite these positions being 180° apart.

[0022] Despite the advantages of the operating handle of EP 2 213 816, there is a need for an operating handle for a folding/sliding door which can share the advantages in terms of very low stack height, and yet is mechanically simpler, providing advantages in terms of manufacturing complexity and cost.

SUMMARY OF THE INVENTION

[0023] It is therefore an object of the present invention to provide an operating handle which has a minimum stack height in both the locked and unlocked conditions. It will be appreciated from the foregoing discussion that the stack height is a significant feature for the operating handle of a folding/sliding door, and the present invention has been designed primarily for such applications. It will be understood, however, that the operating handle could be used in other applications.

[0024] According to the invention there is provided an operating handle having a mounting part and a handle part, the handle part being mounted upon the mounting part, the handle part being movable relative to the mounting part between a storage position and an operating position, the handle part being adapted to rotate an operating shaft whereby in use the operating handle can actuate a locking mechanism, the handle part being rotatable through an operating angle relative to the mounting part, rotation of the handle part in use driving the operating shaft to rotate through a drive angle, characterised in that the drive angle is less than the operating angle.

[0025] It is appreciated that the handle parts of many operating handles drive the operating shaft to rotate through an angle which is slightly smaller than the angular rotation of the handle part, by virtue of manufacturing tolerances of the components and the resulting freedom of movement between interconnecting and engaging components. The present invention is not directed to such "accidental" differences between the operating angle and the drive angle, but rather purposely provides a range of lost motion between the handle part and the operating shaft. The difference between the operating angle and the drive angle in the present invention is purposely far greater than the difference which would arise due to manufacturing tolerances.

[0026] Preferably, the operating angle is approximately 360°, so that the handle part can be rotated through a substantially complete rotation during use. Preferably also the drive angle is approximately 180°, such a drive angle being suitable for actuating many of the known locking mechanisms with which the operating handle will be used. Accordingly, in preferable embodiments the lost motion corresponds to an angle of approximately 180°, and the handle part rotates through an angle which is substantially double that of the operating shaft (during both the locking and the unlocking movements). In other embodiments the lost motion can be smaller (for example approximately 90°), or larger (for example 270°) depending upon the drive angle required to actuate the locking mechanism, and the desired operating angle.

[0027] The ability to rotate the handle part through approximately 360° enables the handle part to have the same orientation relative to the mounting part in the locked and unlocked conditions of the locking mechanism. This in turn permits the handle part to have only a

single storage position, which can be adopted whether the locking mechanism is locked or unlocked.

[0028] It will be understood that the storage position of the handle part provides the lowest stack height for the operating handle. The storage position also provides the least obtrusive position (or alternatively stated the most aesthetically pleasing position) for the handle part. When used with a folding sliding door it is desirable that the handle part adopt the storage position when the folding sliding door is closed (and locked), notwithstanding the fact that the stack height is not an important criterion when the folding sliding door is closed.

[0029] The references herein to angles being "approximate" reflects the fact that manufacturing tolerances will typically result in a few degrees of "play" or "freedom" between the handle part and the mounting part (for example), without any detriment to the function of the operating handle. As one example, the operating handle may be able to rotate through an operating angle which is a few degrees less than 360° and still require only one storage position for its locked and unlocked configurations. As another example, a locking mechanism which is designed to require rotation of its operating shaft through 180° will still be actuated effectively by an operating shaft which rotates through a drive angle which is a few degrees less than 180°.

[0030] Preferably, the handle part is mounted to pivot between its storage and operating positions. Ideally the pivot axis is substantially perpendicular to the longitudinal axis of the operating shaft, and is also substantially perpendicular to the longitudinal axis of the handle part. Ideally also the pivot axis lies along the longitudinal axis of the operating shaft.

[0031] Ideally, the handle part projects to both sides of its pivot axis. Preferably, the handle part projects significantly farther from the pivot axis in one direction than in the opposed direction, whereby the handle part has a short side and a long side. This enables the user to press the short side of the handle part (to one side of the pivot axis) in order to lift the long side of the handle part (to the other side of the pivot axis), whereupon the long side of the handle part can be grasped and manipulated.

[0032] Since the handle part is preferably rotated through an operating angle of approximately 360° during its movement from the locking to the unlocking positions, the same procedure for lifting and manipulating the handle part can be used during the locking and unlocking procedures.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] The invention will now be described in more detail, by way of example, with reference to the accompanying drawings, in which:

Fig.1 shows a perspective view of a prior art folding/sliding door in the almost closed position;

Fig.2 shows a plan view of the folding/sliding door of Fig.1 in the almost fully-opened position;

Fig.3 shows a perspective view from the front of the operating handle of the present invention;

Fig.4 shows an exploded perspective view from the rear of the operating handle;

Fig.5 shows an exploded perspective view from the front of the operating handle;

Fig.6 shows a perspective view of the operating handle in the storage position, connected to a locking mechanism in the unlocked condition;

Fig.7 shows a view similar to that of Fig.6, but with the handle part in the operating position;

Fig.8 shows a position similar to that of Fig.7, but with the handle part rotated through approximately 180°;

Fig.9 shows a position similar to that of Fig.8, but with the handle part rotated through approximately a further 180°.

Figs.10a-e show a part of the operating handle in various stages of operation; and

Fig.11 shows a sectional view through a part of a folding/sliding door fitted with the operating handle.

DETAILED DESCRIPTION

[0034] A description of Figs. 1 and 2 is provided above and will not be repeated here.

[0035] The operating handle 20 according to the present invention is shown in most detail in Figs. 3-5. The operating handle has a handle part 21 and a mounting part 22, the handle part being movable relative to the mounting part as described below. The mounting part 22 has three fixing holes 23 which can receive fixings (not shown) by which the mounting part 22 may be secured into a rebated or recessed part of the frame 24 of a chosen panel of the folding/sliding door (see Fig.11).

[0036] The operating handle 20 is connected to an operating shaft 25 which is of standard form and is designed to cooperate with a correspondingly-formed opening in the locking mechanism or gearbox 26 (see Fig.6), in known fashion. In some embodiments the operating shaft

is secured to the operating handle by the manufacturer and is mounted to the folding/sliding door with the operating handle; alternatively, the operating shaft is provided separately from the operating handle, and is fitted to the locking mechanism and to the operating handle by the installer.

[0037] The handle part 21 of the operating handle 20 has two aligned holes 27 which can accommodate a pivot pin 28, the pivot pin 28 also passing through aligned holes 29 in a drive bracket 30. The pivot pin 29 provides a small range of angular pivoting movement for the handle part 21 relative to the mounting part 22, specifically between the storage position shown in Figs.3 and 6 and the operating position shown in Fig.7. A biasing spring 31 surrounds a part of the pivot pin 28 and biases the handle part 21 towards its storage position.

[0038] The handle part 21 projects to both sides of the pivot axis A-A defined by the holes 27, i.e. the handle part 21 extends both above and below the pivot axis A-A in the orientation of Fig.4. The handle part 21 has a short side above the pivot axis A-A in the orientation of Fig.4, and a long side below the pivot axis. This enables a user to lift the long side of the handle part 21 by pressing the short side into the recess 32 of the mounting part 22. It is therefore not necessary to extend the mounting part to include a finger recess or the like by which the handle part can be lifted, and as shown in Fig.3 in particular, the mounting part 22 can closely surround the handle part 21, which is aesthetically pleasing.

[0039] As most clearly seen in Fig.4, the drive bracket 30 has a collar 33 which can accommodate a drive member 34, the drive member 34 being a sliding fit within the collar 33. The drive member 34 has a square recess 35 which is designed to accommodate an end of the operating shaft 25. The drive bracket 30 and the drive member 34 are located in the recess 32 of the mounting part 22, and overlie a hole 36 through which the operating shaft 25 projects. A securing collar 37 is designed to fit over the projecting operating shaft 25 and retain the drive bracket 30 and drive member 34 within the recess 32.

[0040] It will therefore be understood that in the assembled operating handle 20, the user can press the short side of the handle part 21 whereby to move the handle part 21 from its storage position of Figs. 3 and 6 to its operating position of Fig.7, the handle part 21 pivoting about the pivot axis A-A. The handle part 21 can subsequently be rotated about the axis of the operating shaft, rotation of the handle part 21 being communicated by way of the drive bracket 30 and the drive member 34 to the operating shaft 25, and consequently to the gearbox 26.

[0041] Importantly, however, the drive bracket 30 has a drive element 40 and the drive member 34 has a driven element 41, the drive element 40 and the driven element 41 comprising interengaging formations which provide some lost motion between the handle part 21 and the operating shaft 25. Specifically, within the collar 33 of the drive bracket 30 there is located a quadrant formation 40

(see Fig.4), and the drive member 34 has a similar quadrant formation 41 (see Fig.5). When the drive member 34 is assembled with the drive bracket 30, the quadrant formation 41 lies alongside the quadrant formation 40, as shown in Figs. 10a-10e (which show sectional views through the drive bracket 30 and the formation 41 of the drive member 34). Alternatively stated, in the assembled condition the quadrant formation 40 lies within the region 42 of the drive member 34, and the quadrant formation 41 lies within the well 43 of the drive bracket 30.

[0042] The sequence of operations as the operating handle 20 moves the gearbox 26 from an unlocked condition to a locked condition is shown in Figs. 7-9, and a corresponding sequence of movements of the drive member and drive bracket are shown in Figs. 10a-e.

[0043] Fig.7 represents the unlocked condition of the gearbox 26, as is evident from the retracted position of the shoot bolts 44. Fig.7 therefore represents the gearbox as would be the case in a partially opened folding/sliding door. The first stage in the sequence of operations is to lift the handle part 21 to the operating position as shown.

[0044] The handle part is then rotated through approximately 180° to the position of Fig.8. This movement is also shown in Figs. 10a-10c, the drive bracket 30 being driven to rotate (anticlockwise as drawn) by the handle part 21. Fig.10b represents the 90° position, and is included to better demonstrate that during this part of the movement the formation 40 does not engage the formation 41, and instead the formation 40 moves within the region 42 (and the formation 41 lies within the well 43), so that the drive bracket 30 does not move the drive member 34. Thus, the region 43 spans an arc of 270°, of which only 90° is occupied by the formation 41, and similarly for region 42 and the formation 40. The handle part 21, and therefore the drive bracket 30, can therefore be rotated anticlockwise from the 0° position of Fig.10a, past the 90° position of Fig.10b, and into the 180° position of Fig. 10c, before the leading edge 45 of the formation 40 engages the edge 46 of the formation 41.

[0045] Since there is no rotation of the drive member 34 during the first 180° of rotation of the handle part 21, there is correspondingly no rotation of the operating shaft 25, nor any consequential movement of the shoot bolts 44.

[0046] Continued rotation of the handle part 21 from the position of Fig. 8 to the position of Fig. 9 is accompanied by corresponding movement of the drive member 34, i.e. during the next 180° of rotation the leading edge 45 of the formation 40 remains in contact with the edge 46 of the formation 41, and the drive bracket 30 and the drive member 34 rotate together as shown in Figs. 10c-10e. Rotation of the drive member 34 causes corresponding rotation of the operating shaft 25, and consequent extension of the shoot bolts 44.

[0047] Fig.9 therefore represents the locked condition of the gearbox, and since the handle part 21 has moved through a total operating angle of 360° it can be released to return to its storage position. Thus, as shown by com-

paring Fig. 10a with Fig. 10e, the drive bracket 30 (and therefore the handle part 21) has moved through 360°, whereas the formation 41, and therefore the drive member 34 and the operating shaft 25, has moved through the drive angle of 180°.

[0048] It will be understood that reversing the sequence of operations will result in a similar "lost motion" effect, with the handle part 21 being rotated (clockwise as viewed from the position of Figs. 10e) through 180° before the edge 47 of the formation 40 engages the edge 48 of the formation 41 and rotation of the drive bracket 30 causes the drive member 34 to rotate. It will be understood that in the sequence which reverses the operation described above, the Fig.8 position will be altered since the shoot bolts 44 will still be extended for that handle position.

[0049] Clearly, different embodiments of the invention can provide different drive angles depending upon the rotation of the operating shaft which is required for actuation of the locking mechanism or gearbox. Different embodiments can also provide different operating angles if it is desired to rotate the handle part through angles other than approximately 360°. The arc of lost motion for a particular embodiment will be determined by the difference between the operating angle and the drive angle, and different arcs of lost motion can be provided by varying the angular extent of the formations 40,41 (specifically by varying the angle between the edges 45 and 47 of the formation 40, and the angle between the edges 46 and 48 of the formation 41).

[0050] It is a valuable feature of the invention that the handle part 21 cannot move to the storage position whilst it is in its "180° position" shown in Fig.8, i.e. in that position the handle part 21 engages the mounting part 22 which limits the pivoting movement of the handle part 21 about its pivot axis A-A. This enables the user to lock and unlock the folding/sliding door in two stages of operation. Initially, the user can lift the handle part and rotate it through approximately 180°, such movement requiring very little force and typically requiring only finger pressure upon the handle part 21. The user can if desired then release his or her grip upon the handle part 21 whilst the operating handle is in the Fig.8 position, and take a firmer grip (perhaps with two hands if the user is a child for example) before completing the rotation of the handle part 21 (during which rotation the shoot bolts are moved and the force required is increased).

[0051] It will be understood that in an alternative embodiment the formation 41 can be formed into the end of the operating shaft, so that the operating shaft engages the drive bracket directly and a separate drive member is not required.

[0052] Fig.11 demonstrates that the operating handle 20 can provide a minimum stack height, and in particular a stack height which is less than the spacing S caused by the hinges 7 (which may be around 5 mm for example). As such, the panels of the folding/sliding door can have a minimum spacing at the guide rails 9. It will be under-

stood that alternative hinges could be used to reduce the spacing S, and in such cases the operating handle 20 could be further rebated into the frame 24, perhaps becoming flush with the surface of the frame if desired.

Claims

1. An operating handle (20) having a mounting part (22) and a handle part (21), the handle part being mounted upon the mounting part, the handle part being movable relative to the mounting part between a storage position and an operating position, the handle part being adapted to rotate an operating shaft (25) whereby in use the operating handle can actuate a locking mechanism (26), the handle part (21) in its operating position being rotatable through an operating angle relative to the mounting part (22), rotation of the handle part in use driving the operating shaft (25) to rotate through a drive angle, **characterised in that** the drive angle is smaller than the operating angle.
2. An operating handle (20) according to claim 1 in which the operating angle is approximately 360°.
3. An operating handle (20) according to claim 1 or claim 2 in which the drive angle is approximately 180°.
4. An operating handle (20) according to any one of claims 1-3 having a drive element (40) and a driven element (41), the drive element (40) and the driven element (41) being engageable whereby to communicate rotation of the handle part (21) to the operating shaft (25).
5. An operating handle (20) according to claim 4 in which the drive element (40) has a first edge (45) and a second edge (47), the angle between the first edge (45) and the second edge (47) defining the angular extent of the drive element (40), and in which the driven element (41) has a first edge (46) and a second edge (48), the angle between the first edge (46) and the second edge (48) defining the angular extent of the driven element (41), the sum of the angular extent of the drive element (40) and the angular extent of the driven element (41) being less than 360°.
6. An operating handle (20) according to claim 5 in which the sum of the angular extent of the drive element (40) and the angular extent of the driven element (41) is approximately 180°.
7. An operating handle (20) according to claim 6 in which the angular extent of the drive element (40) is approximately 90°, and in which the angular extent

of the driven element (41) is approximately 90°.

8. An operating handle (20) according to any one of claims 1-7 in which the handle part (21) is mounted to pivot between its storage and operating positions about a pivot axis A-A. 5
9. An operating handle (20) according to claim 8 in which the pivot axis (A-A) is substantially perpendicular to the longitudinal axis of the operating shaft (25). 10
10. An operating handle (20) according to claim 8 or claim 9 in which the pivot axis (A-A) is substantially perpendicular to the longitudinal axis of the handle part (21). 15
11. An operating handle (20) according to any one of claims 8-10 in which the handle part (21) projects to both sides of the pivot axis (A-A). 20
12. An operating handle (20) according to claim 11 in which the handle part (21) projects beyond the pivot axis (A-A) further in one direction than in the opposing direction. 25
13. An operating handle (20) according to any one of claims 1-12 in which the handle part (21) is resiliently biased towards its storage position. 30
14. An operating handle (20) according to any one of claims 1-13 in which the operating angle comprises a first operating sector and a second operating sector, movement of the handle part (21) through the first operating sector in use causing no movement of the operating shaft (25), movement of the handle part (21) through the second operating sector in use causing corresponding rotation of the operating shaft (25). 35
40
15. An operating handle (20) according to claim 14 in which, in use, the handle part is moved through its first operating sector before it is moved through its second operating sector. 45

50

55

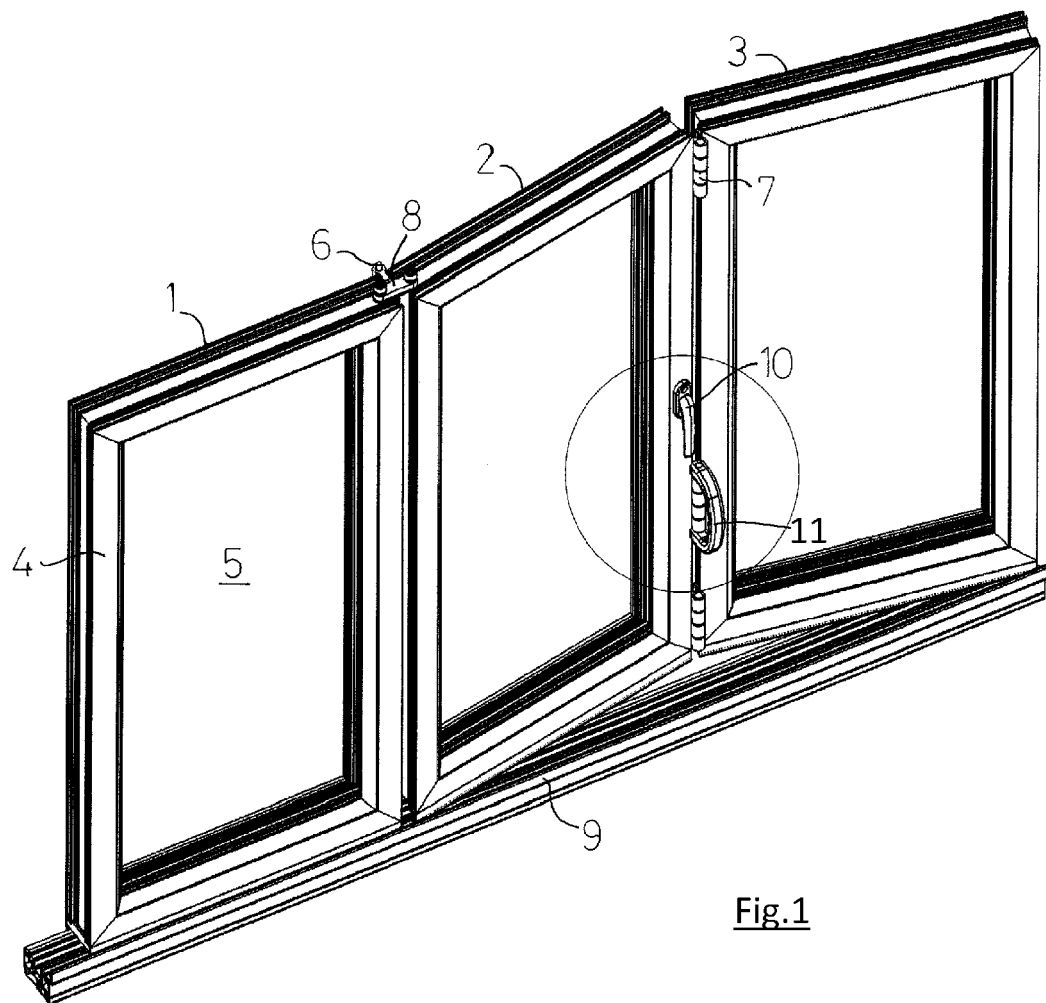
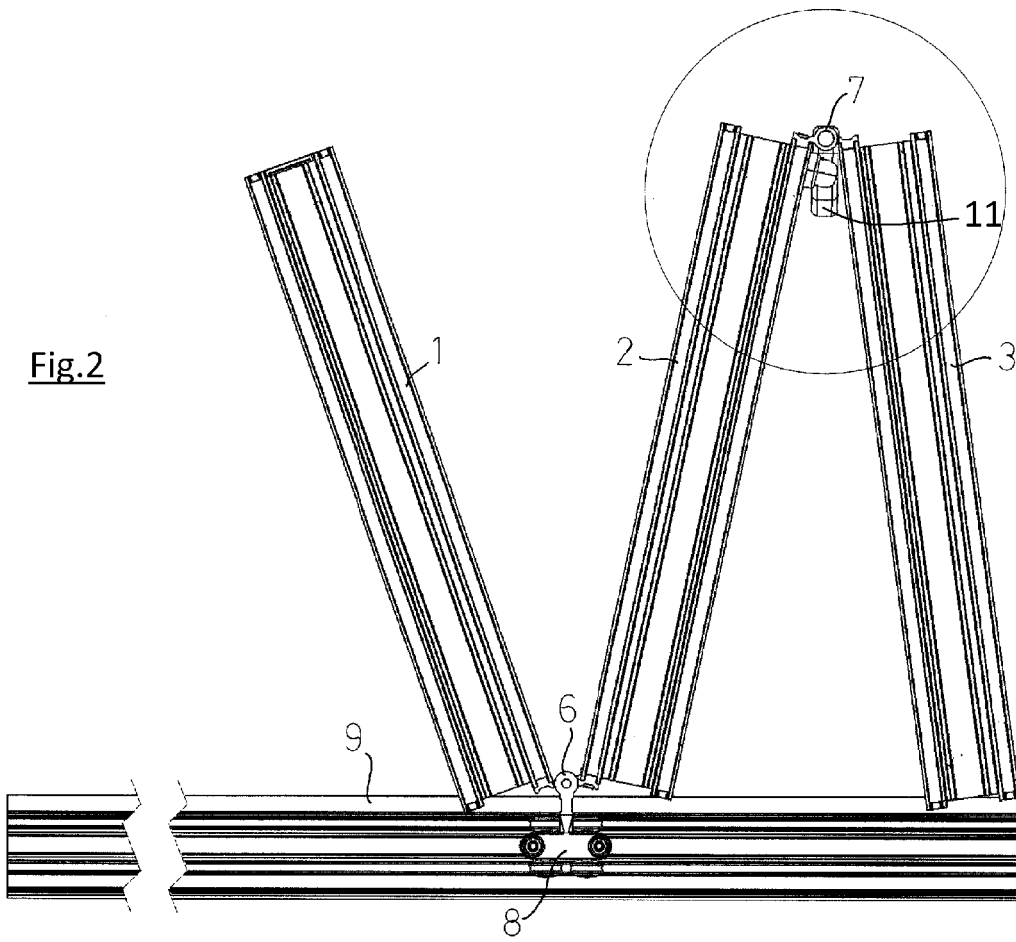


Fig.1

Fig.2



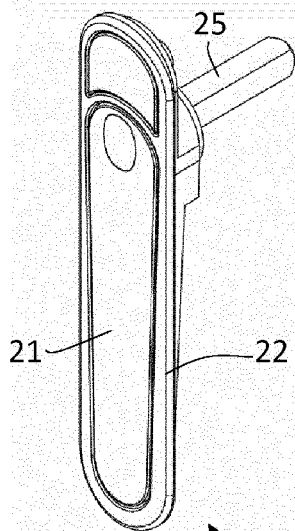


Fig.3

20

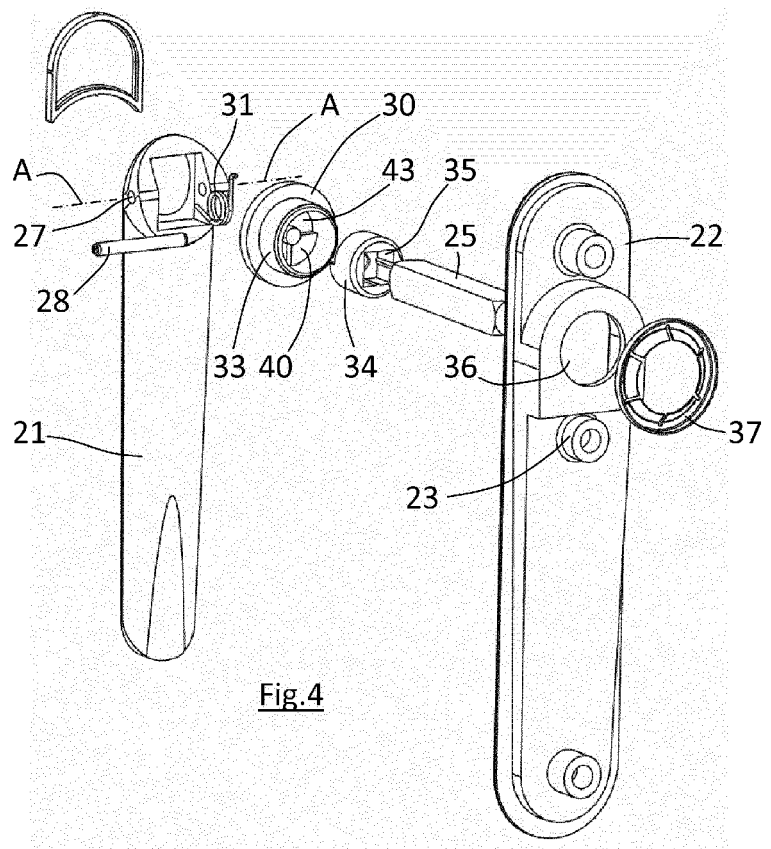


Fig.4

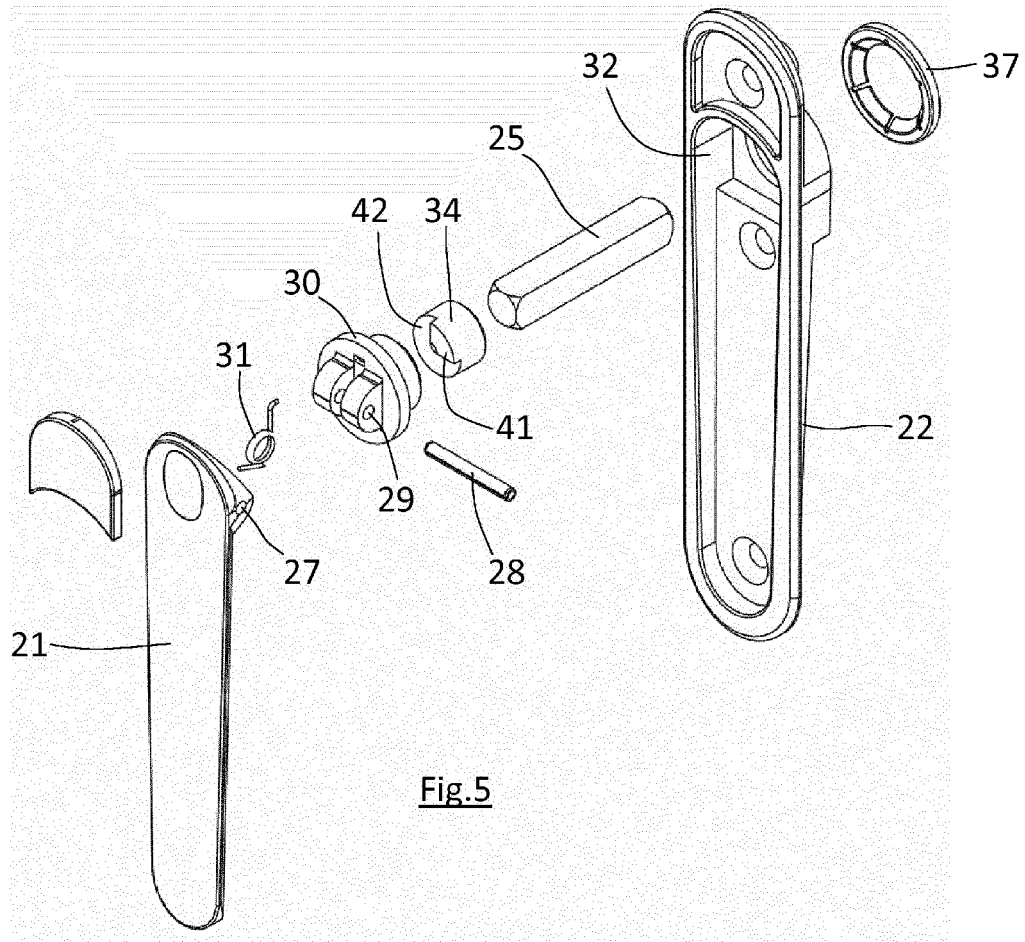
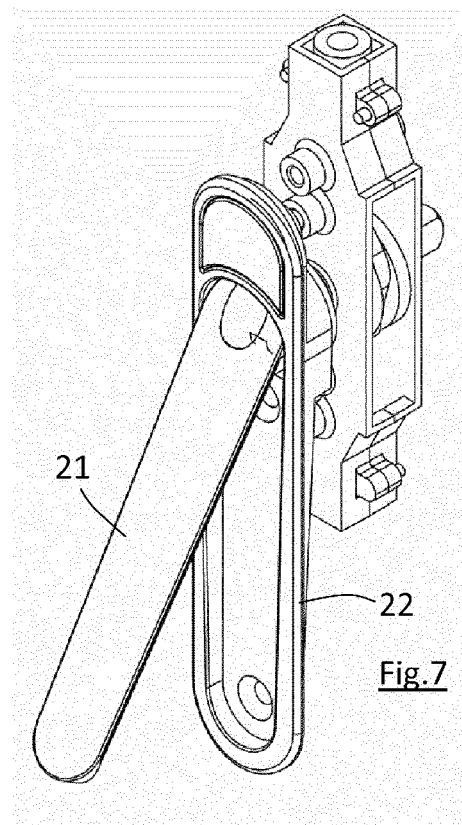
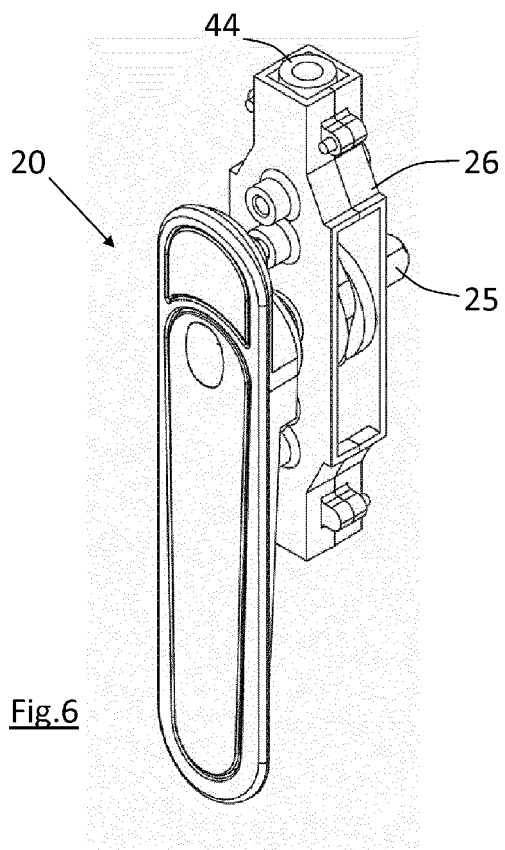
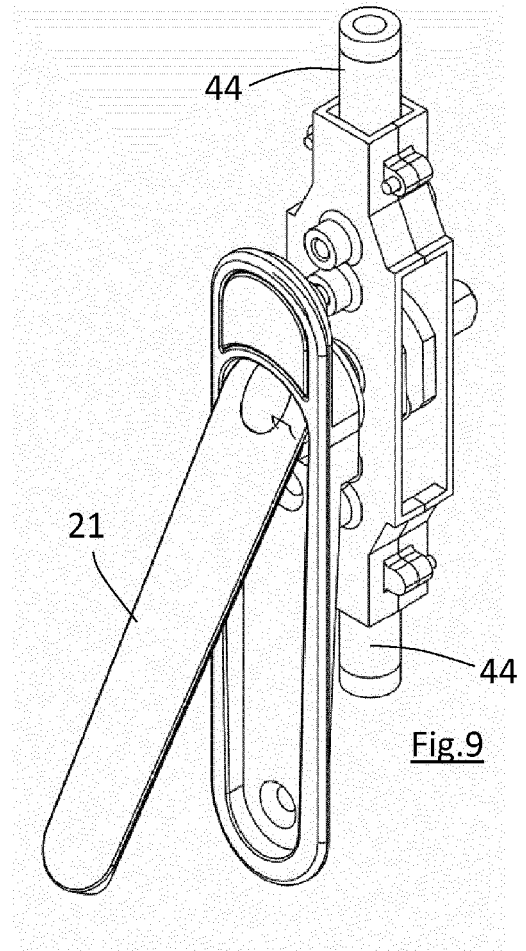
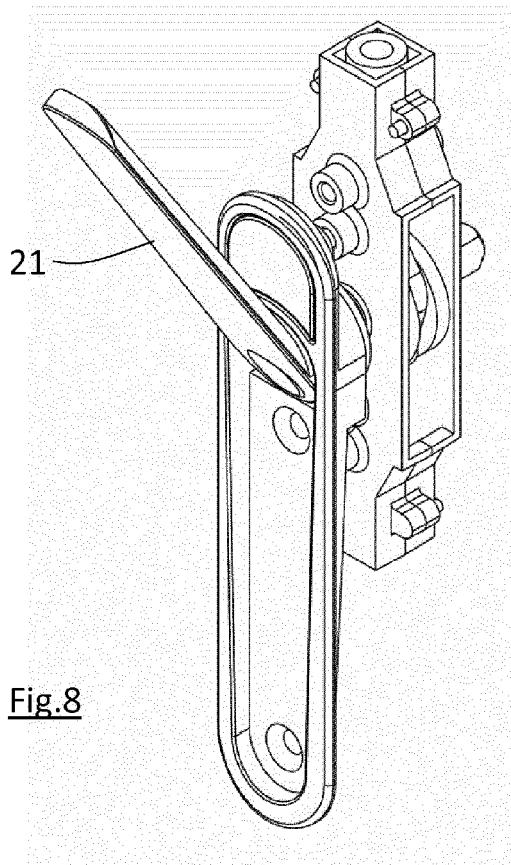
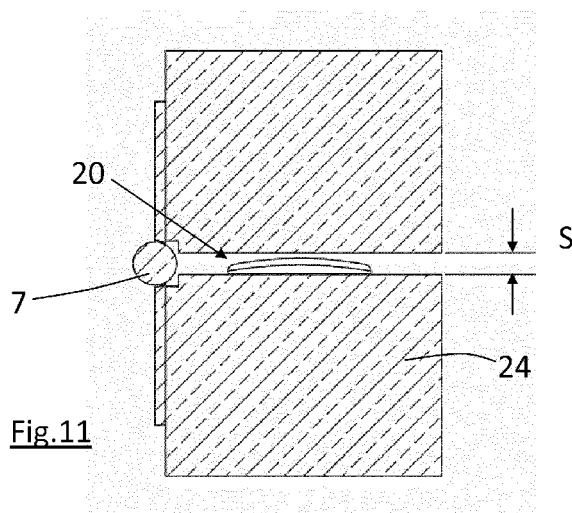
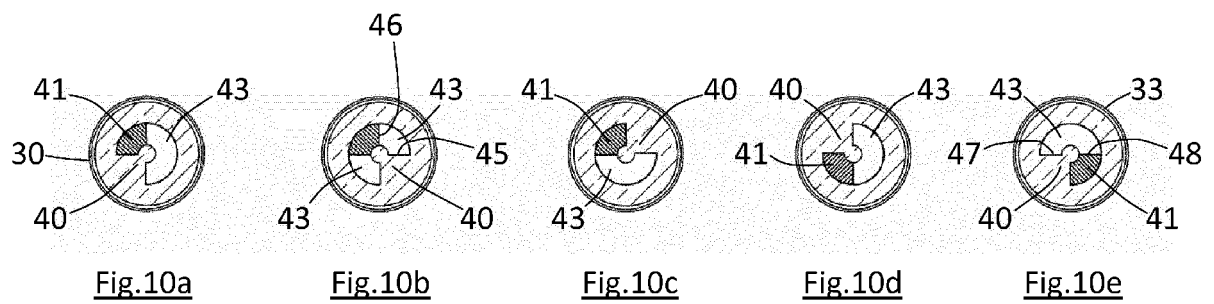


Fig.5







REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- EP 2213816 A [0003] [0021] [0022]