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(54) **Operating handle for a folding/sliding door**

(57) This invention relates to an operating handle for a folding/sliding door. A The operating handle has a mounting part (26) adapted for fixing to a part (4) of the folding/sliding door in use, and a handle part (22, 24) which is movably mounted upon the mounting part. The mounting part has a mounting surface (46) and the handle part having a handle surface (48), the mounting surface and the handle surface facing one another and defining a handle interface (50) therebetween. The operating handle has a key-operated lock assembly (54) having a projection which in a secured condition crosses the handle interface and prevents movement of the handle surface relative to the mounting surface, and a released condition in which it does not cross the handle interface and allows movement of the handle surface relative to the mounting surface, the projection in the released condition being located in the mounting part (26).

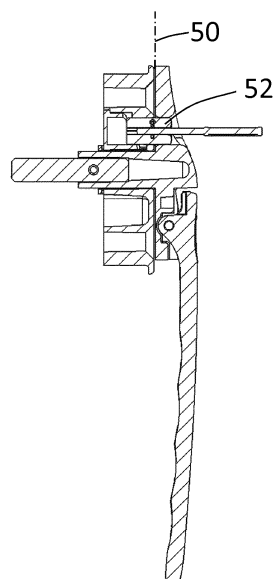


Fig. 16

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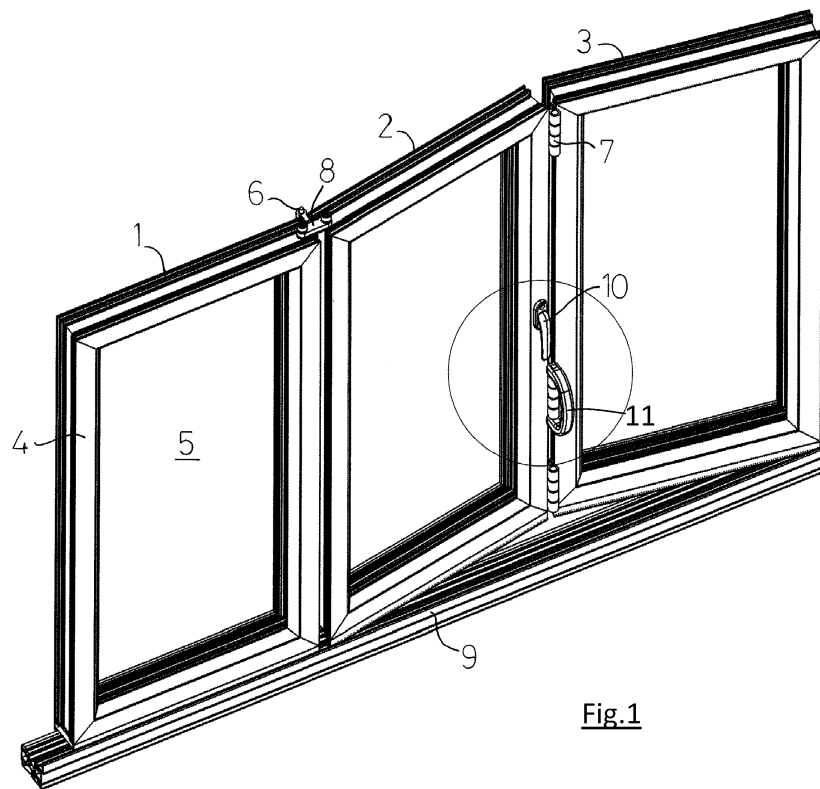


Fig. 1

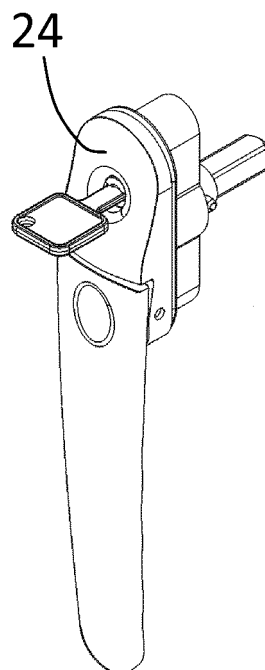


Fig. 7

Description

FIELD OF THE INVENTION

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

[0002] Directional and orientational terms used in this specification, such as "top", "bottom", "height" etc., are used to describe the components 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 usually only grasp the operating handle 10 by his or her fingertips, and this is often not a strong enough grip to allow the user to rotate the handle and operate the locking mechanism. Accordingly, the handle 10 is typically 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] Figs. 1 and 2 also show a grab handle 11 which is typical of many folding/sliding doors, the grab handle 11 often being required to allow the user to provide sufficient force to compress the draught seals as the door is closed.

[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 (even for those folding/sliding doors utilising a grab handle 11). It will be appreciated from Fig.2 that when the folding/sliding door is opened the operating handle 10 and grab handle 11 lie 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.

[0021] Espagnolette gearboxes of the type used in folding/sliding doors are generally referred to herein as a "locking mechanism" because they restrict unwanted opening movement of the folding/sliding door. In particular, since access to the operating handle 10 cannot be obtained from outside of the property when the folding/sliding door is closed, the folding/sliding door is relatively secure. However, if access can be gained to the operating handle 10, there is no impediment to actuation of the locking mechanism and opening of the folding/sliding door.

[0022] Many users require additional security for a folding/sliding door, i.e. they require the operating handle, or the locking mechanism, to be further secured by the use of a removable key. If such additional security were to be provided, the folding/sliding door could not be opened even from inside the building unless the correct key is available. Many opening windows also have locking mechanisms in the form of espagnolette mechanisms, and further security is routinely provided by way of a lockable operating handle. Typically, a key-operated lock assembly is mounted within the handle and has a locking peg which can project into the fixed mounting bracket of the handle. When the locking peg projects into the mount-

ing bracket the operating handle is secured and cannot be rotated and so the espagnolette gearbox cannot be actuated. Such an arrangement therefore has a locking mechanism comprising the espagnolette gearbox and its associated shoot bolts which can prevent opening movement of the window, and an additional lock assembly which can prevent rotation of the operating handle (and consequent actuation of the espagnolette gearbox). Since operation of the lock assembly requires the insertion of the correct key, the security afforded to the opening window is increased.

[0023] The manufacturers (and users) of folding/sliding doors also desire additional security. It is not, however, possible to fit an existing operating handle with its lock assembly to a folding/sliding door without an unacceptable increase in the stack height of the operating handle. Accordingly, the manufacturers and users of folding/sliding doors are required to do without additional security, or to fit additional locks which directly secure the panels to the rails. The additional locks are, however, unsightly and are therefore not acceptable to all users.

[0024] There is therefore a requirement for an operating handle for a folding/sliding door which has a small stack height and yet is securable by a key whereby the espagnolette mechanism cannot be actuated without the insertion of the correct key. Ideally the key-securable operating handle has a stack height no greater than a conventional (non-lockable) operating handle for a folding/sliding door.

SUMMARY OF THE INVENTION

[0025] It is an object of the present invention to provide an operating handle for a folding/sliding door which is securable by way of a key and which has a small stack height in both its secured and released conditions.

[0026] According to the invention there is provided an operating handle for a folding/sliding door, the operating handle having a mounting part adapted for fixing to a part of the folding/sliding door in use, and a handle part which is movably mounted upon the mounting part, the mounting part having a mounting surface, the handle part having a handle surface, the mounting surface and the handle surface facing one another and defining a handle interface therebetween, the operating handle having a lock assembly, the lock assembly having a projection which in the secured condition crosses the handle interface and thereby prevents movement of the handle surface relative to the mounting surface, and in the released condition does not cross the handle interface so that the handle surface can move relative to the mounting surface, the projection in the released condition being located within the mounting part.

[0027] Therefore, unlike a conventional lockable operating handle for an opening window in which the projecting peg is withdrawn into the handle part in the released condition, with the present invention the projection is withdrawn into the mounting part. This has two significant

advantages. Firstly, in an operating handle for a folding/sliding door, the space available within the handle part is much reduced because of the requirement to minimise the stack height. There is, however, sufficient room for a lock assembly in the mounting part, which in the assembled folding/sliding door is located within the frame profile where more space is available.

[0028] Secondly, the key is inserted into the lock assembly through the handle part and into the mounting part, and therefore also crosses the handle interface. The key must therefore be removed from the (released) lock assembly before the handle part can be moved relative to the mounting part. This avoids the potential problem that a non-removed key fouls an adjacent panel as the folding/sliding door is opened, which might damage the panel and/or the key.

[0029] In known fashion, the handle part preferably carries an operating shaft, typically of square cross-section, which is adapted to engage a locking mechanism such as an espagnolette mechanism. It will be understood that most espagnolette mechanisms are actuated by way of the rotation of a square operating shaft; providing such a shaft allows the operating handle to be fitted to substantially all of the espagnolette mechanisms which may be fitted to the folding/sliding door. The invention does not therefore require the use of any particular form or design of locking mechanism. Similarly, the mounting part will carry fixing holes of a standard size and separation, so as to be fittable to a (standard) locking mechanism.

[0030] The handle part preferably comprises a first part and a second part, the second part being movable relative to the first part between a storage position and an operating position. This allows the operating handle to have a minimum stack height in its storage position and yet does not compromise the lock assembly. Desirably, the first part has an opening through which the key may be inserted into the lock assembly and the second part is elongated to provide the hand-grip for the user. Only the second part is required to be movable between a storage position and an operating position.

[0031] Preferably, the lock assembly has a generally circular cross-section and can rotate within a generally circular recess in the mounting part. Preferably also, the lock assembly has a tab which projects from its periphery and which is located within an inclined groove in the wall of the recess. Rotation of the lock assembly within the recess therefore causes the lock assembly to move longitudinally, i.e. towards and away from the handle part (and in particular to move between positions in which it crosses and does not cross the handle interface, respectively) as the tab moves along the inclined groove.

[0032] Desirably, the inclined groove is helical, and preferably extends for slightly more than 180°, i.e. slightly greater than half the circumference of the recess. The lock assembly can therefore be rotated by way of the key through approximately 180° between its secured and released conditions.

[0033] The lock assembly also has at least one lock plate (or lock disc) which can project from its periphery into a lock opening in the wall of the recess. The lock plate is biased outwardly of the body of the lock assembly by way of a spring or the like. Insertion of the correct key causes the lock plate to be withdrawn from the lock opening and permits rotation of the lock assembly within the recess.

10 BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0034] 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;
- 20 Fig.2 shows a plan view of the folding/sliding door of Fig.1 in the almost fully-opened position;
- Fig.3 shows a sectional view through a part of a (substantially fully open) folding/sliding door fitted with the operating handle of the present invention;
- 25 Fig.4 shows a front view of the operating handle of the present invention;
- Fig.5 shows a side view of the operating handle;
- Fig.6 shows an exploded perspective view of the operating handle;
- 30 Figs.7-12 show the sequence of operations of the operating handle, with Fig.7 showing a perspective view of the operating handle as the key is rotated to release the handle;
- 35 Fig.8 shows a view similar to that of Fig.7, but with the key removed from the released operating handle;
- Fig.9 shows a view similar to that of Fig.8, but with the second part of the operating handle moved from its storage position to its operative position;
- 40 Fig.10 shows a position similar to that of Fig.9, but with the operating handle rotated through 90°;
- 45 Fig.11 shows a position similar to that of Fig.10, but with the operating handle rotated through a further 90°;
- Fig.12 shows a position similar to that of Fig.11, but with the second part of the operating handle moved back to its storage position;
- 50 Fig.13 shows an exploded view of the mounting part of the operating handle, partly in section;
- Fig.14 shows a sectional view of the mounting part;
- 55 Fig.15 shows another sectional view of the mounting part;
- Fig.16 shows a sectional view through the operating handle, in the secured condition; and

Fig.17 shows a view as Fig. 16 in the released condition.

DETAILED DESCRIPTION

[0035] A description of Figs. 1 and 2 is provided above and will not be repeated here.

[0036] Fig.3 shows a part of a folding/sliding door fitted with an operating handle 20 according to the present invention. In known fashion, the operating handle 20 is located adjacent to the free hinge 7, which in this embodiment is a butt hinge as is typical of folding/sliding doors. It will be observed that the stack height h of the operating handle 20 (in the storage condition shown) is smaller than the separation of the panels caused by the butt hinge 7, so that the operating handle 20 allows full opening movement of the folding/sliding door (in fact in this embodiment the panels could be moved slightly beyond their parallel positions shown).

[0037] The operating handle 20 is shown in most detail in Figs. 4-6. The operating handle has a first handle part 22, a second handle part 24 and a mounting part 26. The first handle part 22 is mounted to the second handle part by way of a pivot pin 30, so that the first handle part can move between its storage position (shown in Figs. 4, 5, 7, 8 and 12) in which it has its minimum stack height h, and its operative position (shown in Figs. 9-11) in which the user can pass his or her fingers therearound in order to obtain the necessary grip during use. Though not shown in the drawings, a torsion spring is located around the pivot pin 30 so as to bias the first handle part 22 to its storage position.

[0038] The second handle part 24 has a boss 32 of substantially circular cross-section, which can locate into a substantially circular well 34 in the mounting part 26. The boss is deeper than the well 34 and a holding pin 36 is inserted into the hole 38 through the boss 32 so as to hold the second handle part 24 to the mounting part 26 (see Fig.5). The holding pin 36 also passes through a hole 40 in the operating shaft 42 so as to secure the operating shaft to the second handle part 24. When so assembled, the first and second handle parts 22, 24 can be rotated relative to the mounting part 26, and their rotation drives the operating shaft 42 also to rotate.

[0039] It will be understood that in an assembled folding/sliding door the operating shaft 42 is located in a corresponding square opening of a locking mechanism such as an espagnolette gearbox (not shown). The locking mechanism is configured to permit approximately 180° of rotation of the operating shaft 42 between the locked and unlocked conditions of the locking mechanism. The operating handle 20 therefore does not need to provide any restriction to the rotation of the first and second handle parts 22,24, but if desired in other embodiments the mounting part 26 can have stops or the like to limit the rotation of the handle parts.

[0040] The mounting part 26 has two fixing holes 44 which can receive fixings (not shown) by which the

mounting part 26 may be fixed into a rebated or recessed part of the frame 4 of a chosen panel of the folding/sliding door, in known fashion. The size and separation of the fixing holes (in relation to the position of the operating shaft 42) are of standard dimensions so that the operating handle 20 can be mounted to any of the available standardised locking mechanisms located within the profile of the frame 4.

[0041] In the embodiment shown the operating shaft 42 is assembled to the remainder of the second handle part 24 by the manufacturer and is mounted to the folding/sliding door with the operating handle 20; in an alternative embodiment the operating shaft is provided separately from the remainder of the operating handle, and is fitted by the folding/sliding door installer.

[0042] It will be seen from Fig.3 that the mounting surface 46 of the mounting part 26 is substantially flush with the surface of the panel 4 to which it is mounted. The underside of the second handle part 24 has a handle surface 48 which faces the mounting surface 46. The mounting surface 46 and the handle surface 48 together define a handle interface 50 which lies upon the plane I-I of Fig.5. Fig.5 shows the handle surface 48 and the mounting surface 46 in (sliding) engagement, but it will be understood that there could be a small gap between these surfaces.

[0043] Adjacent to the well 34 the mounting part 26 has a recess 52 which accommodates a lock assembly 54. As better seen in Fig.13, the lock assembly 54 is of generally circular cross-section but has a permanently projecting tab 56. The tab 56 locates into a helical groove 58 (Figs. 14,15) formed into the wall of the recess 52.

[0044] The top edge (as viewed in Fig.14) of the helical groove 58 is provided by an inclined step 60 and the bottom edge of the helical groove 58 is provided by the correspondingly inclined top edge 62 of an insert 64. As shown in Figs. 14 and 15, the insert 64 is fixed to the remainder of the mounting part 26 during manufacture, and thereby retains the lock assembly 54.

[0045] The lock assembly 54 has a single lock plate 66 which projects through a slot 68 in the periphery of the body of the lock assembly 54. In the assembled operating handle 20, the lock plate 66 can project into the lock opening 70 of the recess 52 (in the embodiment shown there are two openings located to opposing sides of the recess 52, but it will be understood that only one of those openings is required in practice).

[0046] In known fashion, insertion of the correct key 72 into the key slot 74 of the lock assembly 54, and consequently into the opening 76 within the lock plate 66, causes the lock plate 66 to be withdrawn from the lock opening 70, thereby permitting rotation of the lock assembly 54 by way of the key 72.

[0047] As is made clear by Fig. 16, in the secured condition of the operating handle 20 the body of the lock assembly 54 lies across the handle interface 50. Since the lock assembly 54 engages both of the mounting part 26 and the second handle part 24, rotation of the second

handle part 24 is prevented. It will be understood that in this position, absent the key 72, the lock plate 66 will project into the lock opening 70 so that rotation of the handle parts 22, 24 without insertion of the correct key is prevented.

[0048] If, however, the correct key is inserted, the lock plate 66 is withdrawn from the lock opening 70. The key 72 can then be rotated through approximately 180° from the position of Fig. 16, during which the lock assembly 54 similarly rotates within the recess 52. The tab 56 moves along (down in the orientation of Fig. 15) the helical groove 58 so that the lock assembly 54 also moves down, away from the second handle part 24. It is arranged that the lock assembly 54 clears the handle interface 50 in the released condition as shown in Fig. 17.

[0049] As is clear from Fig. 17, however, the key 72 still crosses the handle interface 50 so that the handle parts 22, 24 cannot be rotated (by more than a few degrees) until the key 72 has been removed. It will be understood that as the key 72 is removed from the lock assembly, the lock plate 66 is caused to project from the body of the lock assembly 54. A second lock opening 78 (Fig. 14) is provided to accommodate the lock plate 66 when the key is removed, the second lock opening 78 being an extension of the helical groove 58 in this embodiment.

[0050] The lock opening 70 and the second lock opening 78 are necessarily located to opposing sides of the recess 52 to accommodate the approximately 180° rotation of the lock assembly 54 as it moves between its two extreme positions.

[0051] The sequence of operations, starting from the released operating handle position of Fig. 17, is described in relation to Figs. 7-12. The key 72 is first removed as shown in Fig. 8. This causes the lock plate 66 to project into the second lock opening 74 and hold the lock assembly 54 in the position in which it does not cross the interface 50.

[0052] The user then grips the first handle part 22 with his or her fingertips, and lifts the first handle part into its operative position as shown in Fig. 9. The first and second handle parts 22, 24 are then rotated together through approximately 180°, which rotation is transmitted to the locking mechanism by way of the operating shaft 42, as shown in Figs. 10 and 11. Finally, the first handle part 22 is allowed to return to its storage position under the influence of its biasing spring. The locking mechanism of the folding/sliding door has therefore been unlocked and the folding/sliding door panel can be opened.

[0053] The sequence of operations to lock the folding/sliding door, and subsequently to secure the operating handle 20, is the reverse of the sequence of operations described.

[0054] These figures show that the key 72 has a simple form, in this embodiment being required to fit into the keyhole in the lock assembly 54 and withdraw the single lock plate 66 by the correct distance. It will be understood that the security can be increased by providing two or more lock plates, as desired.

Claims

1. An operating handle (20) for a folding/sliding door, the operating handle having a mounting part (26) adapted for fixing to a part (4) of the folding/sliding door in use, and a handle part (22, 24) which is movably mounted upon the mounting part, the mounting part having a mounting surface (46), the handle part having a handle surface (48), the mounting surface and the handle surface facing one another and defining a handle interface (50) therebetween, the operating handle having a key-operated lock assembly (54), the lock assembly having a projection which in a secured condition crosses the handle interface, and which in a released condition does not cross the handle interface, the projection in the released condition being located in the mounting part (26).
2. An operating handle for a folding/sliding door according to claim 1 in which the projection is a part of the body of the lock assembly (54).
3. An operating handle for a folding/sliding door according to claim 1 or claim 2 in which the handle part comprises a first part (24) and a second part (22), the second part being movable relative to the first part between a storage position and an operating position.
4. An operating handle for a folding/sliding door according to claim 3 in which the first part (24) has an opening through which a key (72) may be inserted into the lock assembly (54).
5. An operating handle for a folding/sliding door according to claim 3 or claim 4 in which the second part (22) is elongated to provide a hand-grip.
6. An operating handle for a folding/sliding door according to any one of claims 1-5 in which the lock assembly (54) has a generally circular cross-section and is located within a generally circular recess (52) in the mounting part (26).
7. An operating handle for a folding/sliding door according to claim 6 in which the lock assembly (54) is adapted to move longitudinally within the recess (52).
8. An operating handle for a folding/sliding door according to claim 7 in which the lock assembly (54) moves longitudinally between its secured condition and its released condition.
9. An operating handle for a folding/sliding door according to any one of claims 6-8 in which the lock assembly (54) has a projecting tab (56) which is located within an inclined groove (58) in the wall of the recess

(52).

10. An operating handle for a folding/sliding door according to claim 9 in which the inclined groove is helical. 5
11. An operating handle for a folding/sliding door according to claim 9 or claim 10 in which the inclined groove extends for more than half the circumference of the recess (52). 10
12. An operating handle for a folding/sliding door according to any one of claims 9-11 in which one edge of the inclined groove is provided by an insert (64) of the mounting part (26). 15
13. An operating handle for a folding/sliding door according to any one of claims 1-12 in which the lock assembly (54) can be rotated through approximately 180° between its secured and released conditions. 20
14. An operating handle for a folding/sliding door according to any one of claims 1-13 in which the lock assembly (54) has at least one lock plate (66) which can project into a lock opening (70, 78) in a wall of the recess (52). 25
15. An operating handle for a folding/sliding door according to claim 14 in which the lock plate is resiliently biased outwardly of the body of the lock assembly (54). 30

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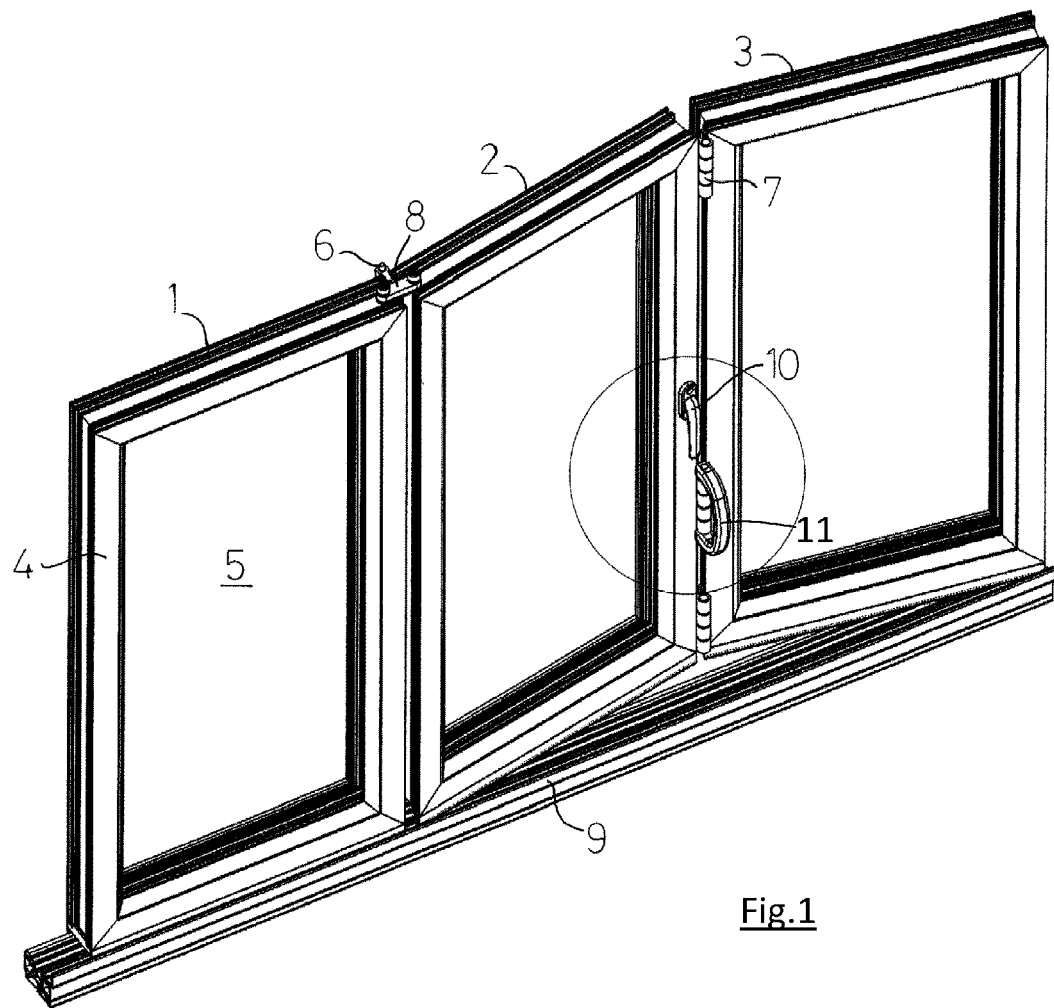
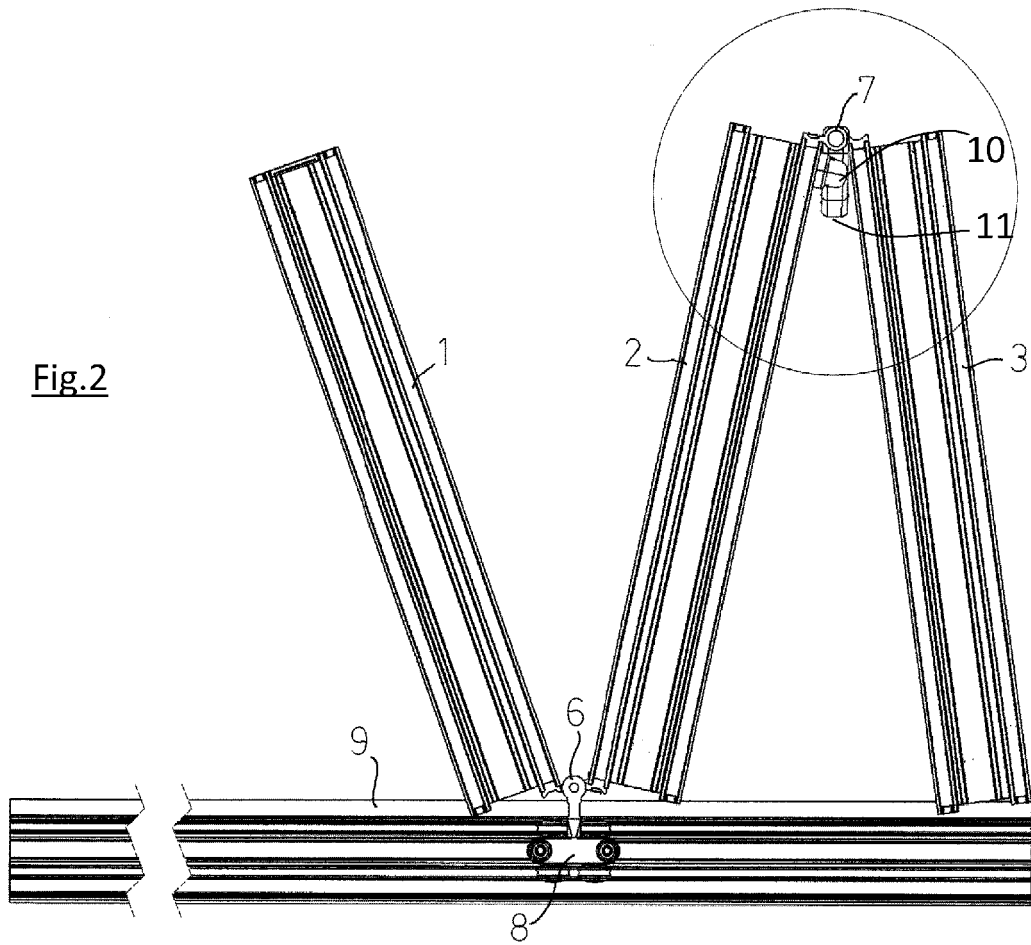
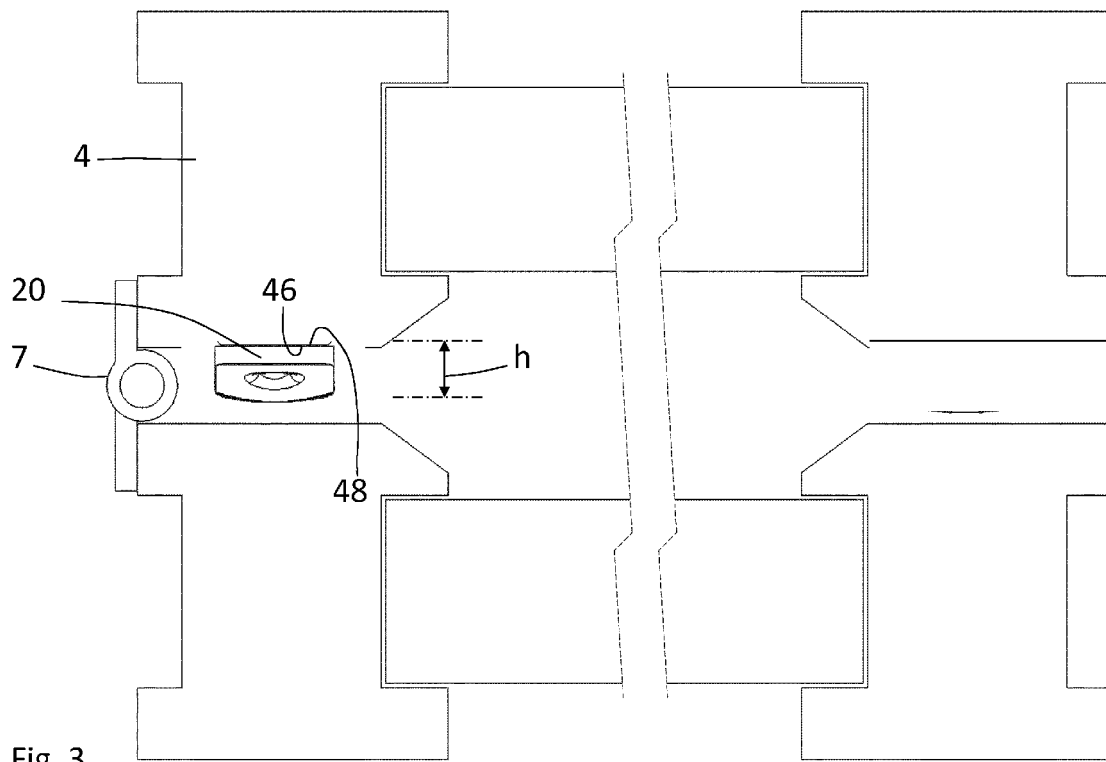


Fig.1

Fig.2





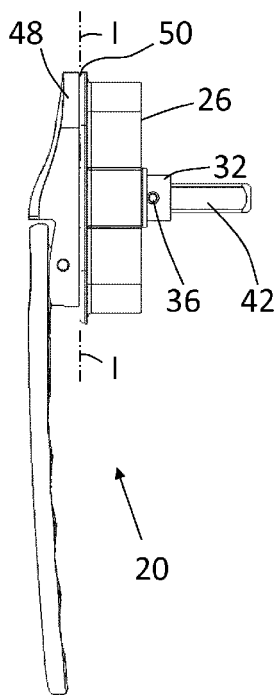


Fig. 5

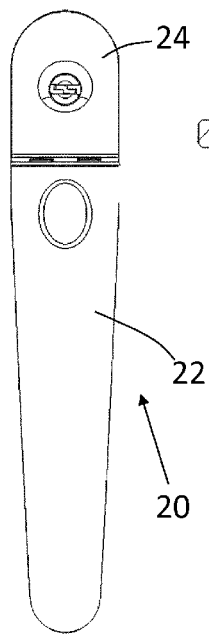


Fig. 4

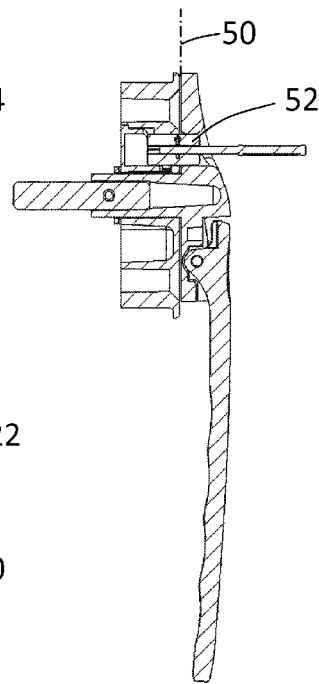


Fig. 16

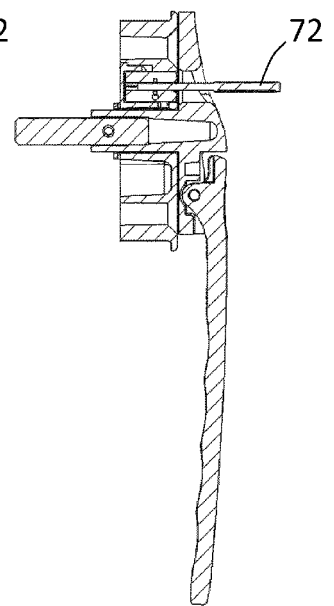
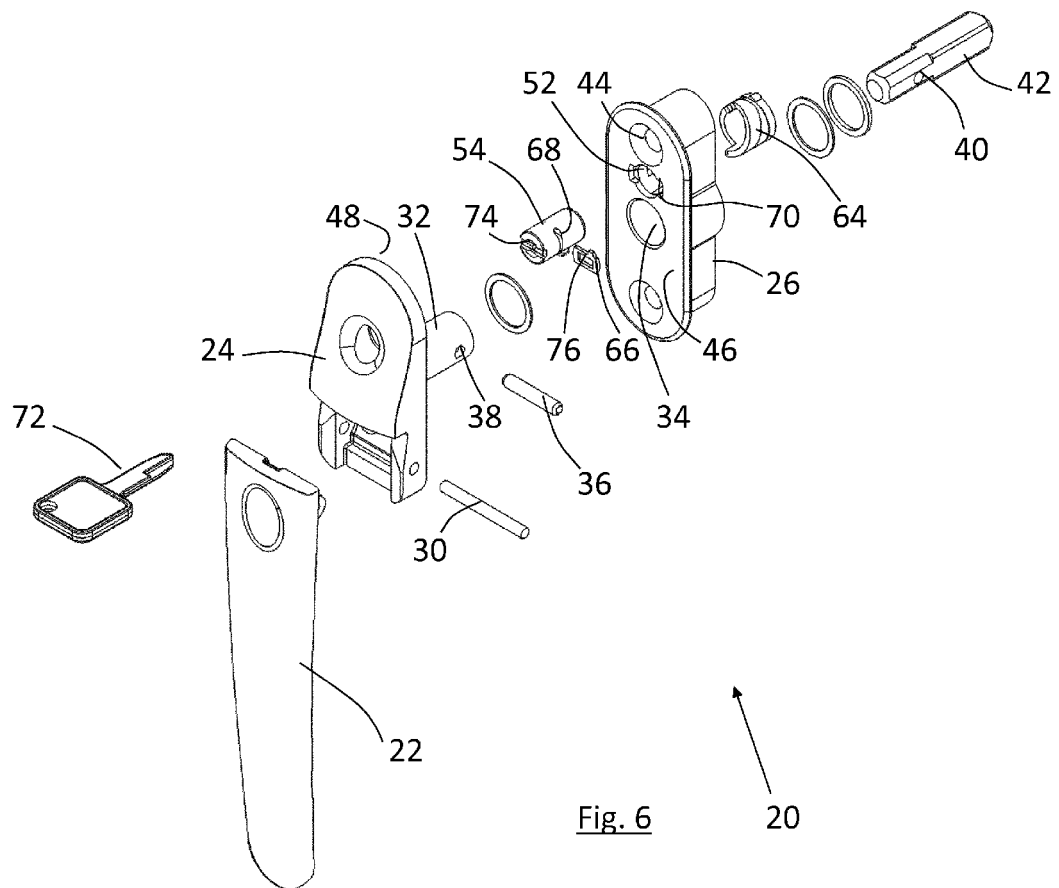
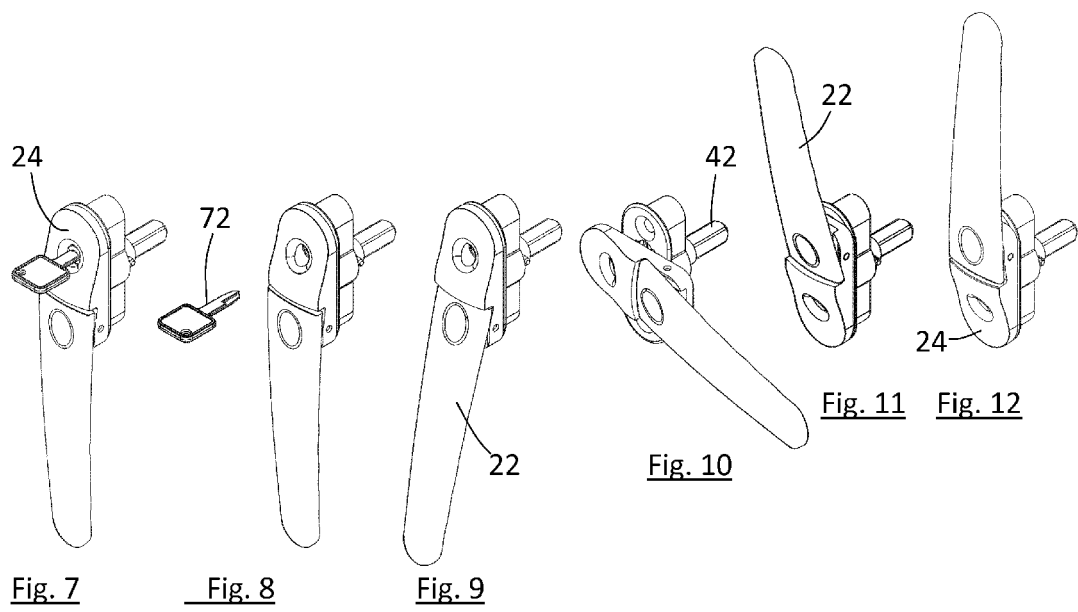
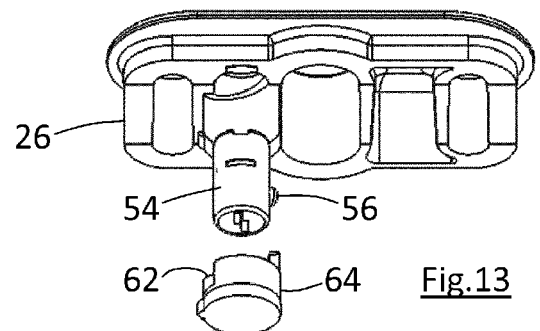
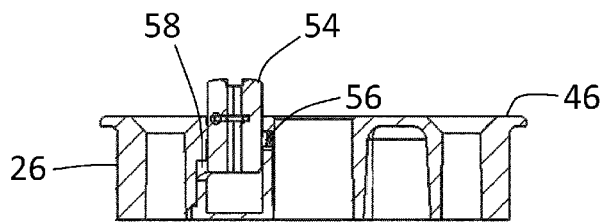
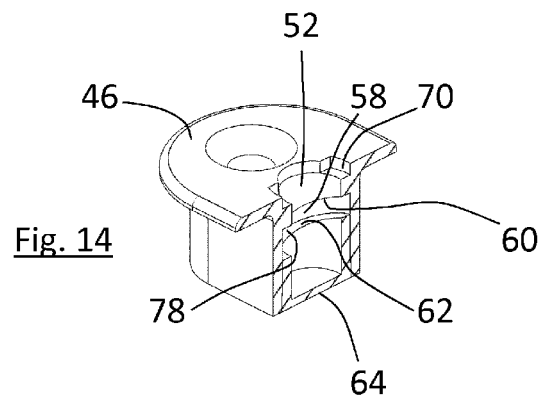


Fig. 17









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