

PATENT SPECIFICATION

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- (21) Application No. 12544/77 (22) Filed 24 March 1977
 (31) Convention Application No. 51/033 955 (32) Filed 26 March 1976 in
 (33) Japan (JP)
 (44) Complete Specification published 26 March 1980
 (51) INT. CL.³ E05C 3/10
 (52) Index at acceptance
 E2A 103 104 109 420 421 AR

(19)



(54) FASTENING ASSEMBLY

(71) We, YOSHIDA KOGYO K.K., a corporation duly organized under the laws of Japan and existing at No. 1, Kanda Izumicho, Chiyoda-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The present invention relates to a fastening assembly for use on a frame member of a window casement or door.

The present invention seeks to provide a fastening assembly capable of having a relatively compact and relatively easily assemblable mechanism.

According to the invention, there is provided a fastening assembly comprising a bolt support frame for attachment to one part of a closure, the support frame carrying a hollow rotatable shaft, a bolt mounted on the hollow shaft for angular movement therewith between a retracted and an extended position and a bolt operating unit including a casing for attachment to said one part of a closure, a driver torque bar mounted for rotation and axial movement in the casing and manual operating means for rotating the driver torque bar, the driver torque bar being insertable at one end into the hollow rotatable shaft for turning the hollow rotatable shaft to actuate the bolt.

The invention will now be described in greater detail, by way of example, with reference to the drawings, in which:—

Figure 1 is an exploded perspective view, with parts broken away, of a fastening assembly constructed in accordance with the present invention;

Figure 2 is an exploded top plan view, with parts broken away and on a reduced scale, of the fastening assembly just before installation on a frame member;

Figure 3 is a top plan view, partly cut

away, of the fastening assembly when it is assembled and ready for actuation by a first bolt-driving unit; and

Figure 4 is a view similar to Figure 3 but showing the fastening assembly when it can be actuated by a second bolt-driving unit.

The principles of the present invention are particularly useful when embodied in a fastening assembly such as shown in Figure 1, generally indicated by the numeral 10. The assembly 10 broadly comprises a bolt unit 11, a first bolt-driving unit 12, and a second bolt-driving unit 13, these units when assembled together being installed, for example, on a vertical frame member or stile 14 (Figure 2) of a swinging window casement or door.

In Figures 1 and 2, the bolt unit 11 comprises a support frame 15 of a generally channel-shaped cross-section having a pair of spaced walls 16, 17 and a bottom wall 18 interconnecting the spaced walls 16, 17, a hollow shaft 19 of a square cross-section extending across and through the spaced walls 16, 17 and having both ends 20, 21 supported rotatably in a pair of circular holes 22, 23 in the spaced walls 16, 17, respectively, and a bolt 24 fixed at one end to the hollow shaft 19 extending radially from the hollow shaft 19 or in a direction substantially perpendicularly to a longitudinal axis of the shaft 19. The bolt 24 is pivotable or angularly movable substantially 90° between a first or withdrawn position in which the bolt 24 is retracted within the support frame 15, the first position being indicated by the solid lines and the second position by the broken lines. The spaced walls 16, 17 have a pair of attachment flanges 25, 26, respectively, located re-

motely from the bottom wall 18, the flanges 25, 26 having screw holes 27.

A flat spring 28 is mounted on the bottom wall 18 and acts on the bolt 24 for maintaining it in the first position against rattling movement or in the second position against gravity. A pin member 29 is disposed axially slidably in the hollow shaft 19 and has a length dimensioned so as to allow the first and second bolt-driving units 12, 13 to be manipulated independently of each other as will be described later.

The first bolt-driving unit 12 comprises a substantially circular casing 30 having a central bore 31 and a counter-bore 32, an operator handle 33 having on one end a cylinder shaft 34 rotatably disposed in the bore 31 and a central slot 35 of a square cross-section defined coaxially in the shaft 34, and a first driver torque bar or spindle 36 of a square cross-section having one end axially slidably received in the slot 35, the torque bar 36 being fitted in the slot 35 for corotation with the cylinder shaft 34. The shaft 34 has on its free end an annular plate 48 which is held slidably against the bottom of the counterbore 32. Thus, the shaft 34 is axially immovable or retained against removal once mounted in the casing 30. For attachment of the annular plate 48, the shaft 34 has an annular groove 37 and an annular lip 38 which is initially directed in parallel with a longitudinal axis of the shaft 34 to thereby open one side of the groove 37. After insertion of the shaft 34 in the bore 31, the annular plate 48 is placed on the bottom of the counterbore 32 and is located in the groove 37. Then, the annular lip 38 is deformed so as to complete the annular groove 37 or grip the annular plate 48 in place. The casing 30 has an upper attachment flange 39 with a screw hole 40 and a similar lower attachment flange (not shown).

Another annular plate 41 is attached to the end of the casing 30 in which the counterbore 32 is provided, the annular plate 41 having a central opening 42 positioned coaxially with the slot 35. The annular plate 41 supports thereon a sleeve 43 directed away from and extending coaxially with the central bore 31, the sleeve 43 having on its free end a wall 44 with a central aperture 45. The driver torque bar 36 extends through the opening 42 and the aperture 45, and has the opposite free end projecting beyond the end wall 44 of the sleeve 43. A retainer flange 46 is fixed to the torque bar 36 and confined within the sleeve 43 to capture the torque bar 36 in the unit 12. A compression coil spring 47 is disposed around the torque bar 36, the spring 47 acting between the

annular plate 41 and the retainer flange 46 to normally bias the torque bar 36 away from the handle shaft 34. The retainer flange 46 is urged against the end wall 44 under the force from the spring 47.

The second bolt-driving unit 13 comprises a hollow housing 50 including a first sleeve 51 and a second sleeve 52 coaxial with the first sleeve 50, a knob or thumb turn 53, and a second driver torque bar or spindle 54 extending through the sleeves 51, 52. Between the first and second sleeves 51, 52, there is provided an attachment flange 55 having a central hole 56 through which the torque bar 54 extends. The torque bar 54 is of a square cross-section and has a fixed cylinder 57 mounted in the second sleeve 52 for rotation and axial sliding movement therein. The driver torque bars 36, 54 are so sized in cross-section that they can slidably fit in the hollow shaft 19 for driving engagement therewith. The torque bar 54 includes a coaxial spindle 58 extending through the first sleeve 51 and having one end fixed to the knob 53 for corotation therewith. The knob 53 has a hollow cylinder 59 bounding an annular depression 60 which receives the first sleeve 51 slidably. The knob 53 can be moved toward and away from the housing 50 with the sleeve 51 slidable in the depression 60 for guiding the movement of the knob 53. A compression coil spring 61 is provided around the spindle 58 and acts between the flange 55 and the knob 53 to normally bias the knob 53 away from the housing 50. With the spring 61 expanded, the cylinder 57 has its inner end pressed against the marginal edge of the flange 55 that defines the hole 56, and the driver torque bar 54 has its free end projecting beyond the end of the second sleeve 52.

As best shown in Figure 2, the stile 14 includes a pair of spaced plates 62, 63 having a pair of attachment openings 64, 65, respectively, and a side plate 66 interconnecting the spaced plate 62, 63 and having an attachment opening 67. When the window casement or door is closed, the side plate 66 faces a side jamb (not shown) that partly defines an opening in which the window casement or door is mounted. The side jamb has a recess into which the bolt 24 can project for locking the window casement or door.

For assembling the assembly 10, the bolt unit 11 is first inserted into the opening 67 in the side plate 66 until the attachment flanges 25, 26 are held against the side plate 66. The attachment flanges 25, 26 are secured to the side plate 66 by means of screws (not shown) extending through the screw holes 27 into the side plate 66.

Then, the first and second bolt-driving units 12, 13 are installed on the stile 14, with the sleeve 43 inserted in the opening 64 and the sleeve 52 in the opening 65. The units 12, 13 are fixed to the stile 14 by means of screws (not shown).

As shown in Figures 3 and 4, the attachment openings 64, 65 are held in mutual registry such that the first and second bolt-driving units 12, 13, upon installation, have their driver torque bars 36, 54 aligned with each other and with the hollow shaft 19 of the bolt unit 11 that has been mounted in place. The first driver torque bar 36 is of such a length that, when the bar 36 fully projects under the bias of the spring 47, the free end thereof is inserted in the hollow shaft 19 from the end 20. On the other hand, the second driver torque bar 54 has its free end located outwardly of but lying substantially flush with the end 21 of the hollow shaft 19, when the bar 54 is fully retracted under the force of the spring 61. The pin member 29 is located between the distal ends of the first and second driver torque bars 36, 54 in endwise engagement therewith. With the parts held in the position of Figure 3, or the knob 53 withdrawn, therefore, the pin member 29 has one end lying substantially flush with the end 21 of the hollow shaft 19. When the knob 53 is pushed toward the housing 50 against the bias of the spring 61, the free end of the torque bar 54 is inserted into the hollow shaft 19 to displace the pin member 29 axially, and upon full insertion of the torque bar 54, the pin member 29 has the other end lying substantially flush with the end 20 of the hollow shaft 19. At this time, the pin member 29 displaces the distal end of the driver torque bar 36 out of the hollow shaft 19, as shown in Figure 4.

Usually, the first bolt-driving unit 12 is mounted on the inner side of the door or sash, and the second bolt-driving unit 13 on the outer side thereof. For normal fastening or unfastening operation, the handle 33 is pivoted for 90° angular movement to actuate the bolt 24. Since the knob 53 is in the retracted position, the second driver torque bar 54 is held out of engagement with the hollow shaft 19. Thus, the first bolt-driving unit 12 can be operated independently of the second bolt-driving unit 13. When it is required to lock or unlock the window sash or door from the outside thereof as in case of emergency, the knob 53 is pushed until the second driver torque bar 54 enables the pin member 29 to force the end of the first driver torque bar 36 out of the hollow shaft 19. With the second driver torque bar 54 engaging with the hollow shaft 19

and the first driver torque bar 36 disengaging from the hollow shaft 19, the knob 53 is turned 90° to operate the bolt 24 independently of the first bolt-driving unit 12.

Unitized for compactness, the first and second bolt-driving units 12, 13, and bolt unit 11 can be installed separately with maximum ease, and no special machining other than drilling is needed on the frame member 14. Furthermore, a choice is available of various combinations between the bolt unit 11, the first and second bolt-driving units 12, 13 for a wide range of applications. The second bolt-driving unit 13 can be used as an emergency control over windows from the outside thereof for the rescue of room occupants as in the case of fire. The unit 13 is particularly useful when installed on the windows to which public has no access from the outside, such as those of a multistory building.

WHAT WE CLAIM IS:—

1. A fastening assembly comprising a bolt support frame for attachment to one part of a closure, the support frame carrying a hollow rotatable shaft, a bolt mounted on the hollow shaft for angular movement therewith between a retracted and an extended position and a bolt operating unit including a casing for attachment to said one part of a closure, a driver torque bar mounted for rotation and axial movement in the casing and manual operating means for rotating the driver torque bar, the driver torque bar being insertable at one end into the hollow rotatable shaft for turning the hollow rotatable shaft to actuate the bolt.

2. An assembly according to claim 1, wherein the casing has a bore therein, the manual operating means is a handle having a shaft rotatably disposed in the bore and the driver torque bar has its other end mounted co-axially in the handle shaft for rotation therewith.

3. An assembly according to claim 2, wherein a further spring is provided normally urging the driver torque bar into engagement with the hollow rotatable shaft.

4. An assembly according to claim 1, wherein the casing is a hollow housing including a sleeve, the manual operating means is a knob having an annular depression which receives the sleeve slidably therein for guiding the movement of the knob towards and away from the housing and the driver torque bar extends through the sleeve and is mounted, at its end away from the hollow rotatable shaft, in the knob for rotation therewith.

5. An assembly according to Claim 4, wherein a further spring is provided normally urging said driver torque bar out of engagement with said hollow shaft.



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6. An assembly according to Claim 1, wherein two bolt operating units are provided, one on each side of the bolt support frame, one bolt operating unit being 3 in accordance with claim 2 or 3 and the second bolt operating unit being in accordance with claim 4 or 5.

7. An assembly according to claim 6, wherein a pin member is disposed axially 10 slidably in the hollow rotatable shaft and located between the said one end of the driver torque bars in endwise engagement therewith, the pin member being such as to displace the said one end of the driver 15 torque bar of the first bolt operating unit out of engagement with the hollow rotatable shaft when the said one end of the driver torque bar of the second bolt operating unit is inserted into the hollow rotatable shaft by movement of the knob towards the housing. 20

8. An assembly according to any one

of claims 1 to 7 wherein the hollow rotatable shaft and driver torque bar(s) are of square cross-section. 25

9. An assembly according to any one of claims 1 to 8, wherein the support frame includes a pair of spaced walls and a connecting wall interconnecting said spaced walls, and said hollow shaft extends across and through the spaced walls.

10. An assembly according to claim 9 wherein a spring is provided acting between the connecting wall and the bolt for maintaining the bolt in its retracted and 35 extended positions.

11. A fastening assembly substantially as herein described with reference to the drawings.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1977.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.



Then, the first and second bolt-driving units 12, 13 are installed on the stile 14, with the sleeve 43 inserted in the opening 64 and the sleeve 52 in the opening 65.

5 The units 12, 13 are fixed to the stile 14 by means of screws (not shown).

As shown in Figures 3 and 4, the attachment openings 64, 65 are held in mutual registry such that the first and second bolt-driving units 12, 13, upon installation, have their driver torque bars 36, 54 aligned with each other and with the hollow shaft 19 of the bolt unit 11 that has been mounted in place. The first driver torque bar 36 is of such a length that, when the bar 36 fully projects under the bias of the spring 47, the free end thereof is inserted in the hollow shaft 19 from the end 20. On the other hand, the second driver torque bar 54 has its free end located outwardly of but lying substantially flush with the end 21 of the hollow shaft 19, when the bar 54 is fully retracted under the force of the spring 61. The pin member 29 is located between the distal ends of the first and second driver torque bars 36, 54 in endwise engagement therewith. With the parts held in the position of Figure 3, or the knob 53 withdrawn, therefore, the pin member 29 has one end lying substantially flush with the end 21 of the hollow shaft 19. When the knob 53 is pushed toward the housing 50 against the bias of the spring 61, the free end of the torque bar 54 is inserted into the hollow shaft 19 to displace the pin member 29 axially, and upon full insertion of the torque bar 54, the pin member 29 has the other end lying substantially flush with the end 20 of the hollow shaft 19. At this time, the pin member 29 displaces the distal end of the driver torque bar 36 out of the hollow shaft 19, as shown in Figure 4.

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and the first driver torque bar 36 disengaging from the hollow shaft 19, the knob 53 is turned 90° to operate the bolt 24 independently of the first bolt-driving unit 12.

Unitized for compactness, the first and second bolt-driving units 12, 13, and bolt unit 11 can be installed separately with maximum ease, and no special machining other than drilling is needed on the frame member 14. Furthermore, a choice is available of various combinations between the bolt unit 11, the first and second bolt-driving units 12, 13 for a wide range of applications. The second bolt-driving unit 13 can be used as an emergency control over windows from the outside thereof for the rescue of room occupants as in the case of fire. The unit 13 is particularly useful when installed on the windows to which public has no access from the outside, such as those of a multistory building.

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3. An assembly according to claim 2, wherein a further spring is provided normally urging the driver torque bar into engagement with the hollow rotatable shaft.

4. An assembly according to claim 1, wherein the casing is a hollow housing including a sleeve, the manual operating means is a knob having an annular depression which receives the sleeve slidably therein for guiding the movement of the knob towards and away from the housing and the driver torque bar extends through the sleeve and is mounted, at its end away from the hollow rotatable shaft, in the knob for rotation therewith.

5. An assembly according to Claim 4, wherein a further spring is provided normally urging said driver torque bar out of engagement with said hollow shaft.