

PATENT SPECIFICATION (11)

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(21) Application No. 14142/77 (22) Filed 4 April 1977

(19)

(31) Convention Application No. 51/041 105

(32) Filed 3 April 1976 in

(33) Japan (JP)

(44) Complete Specification published 13 Feb. 1980

(51) INT. CL.³ E05C 3/06

(52) Index at acceptance

E2A 103 109 AR



(54) BOLT 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:—

The present invention relates to a bolt assembly for use on a frame member of a window sash or door.

According to the invention, there is provided a bolt assembly comprising a support frame, a drive shaft rotatably mounted on the support frame and displaceable axially therein, movable and fixed engagement means on the shaft and support frame respectively for retaining the shaft against rotation, which engagement means are releasable to permit rotation of the shaft upon axial displacement of the shaft, and a dead bolt driveably coupled with the shaft and movable by rotation of the shaft between a projecting bolting position and a retracted release position.

Preferably a bolt-driving unit is provided comprising a casing having means for being attached to the closure frame member, the casing having a bore and the fixed engagement means; a handle having a cylinder shaft rotatably disposed in the bore; and a driver torque bar having one end mounted coaxially in the cylinder shaft for corotation therewith and axial movement therein, the driver torque bar having a driver on the opposite end, the driver being normally held in a position in which the driver engages the fixed engagement means, and the driver being shiftable out of engagement with the fixed engagement means into driving engagement with the said drive shaft upon axial movement of the driver torque bar towards the drive shaft.

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

Figure 1 is a top plan view, partly cut away, of a bolt assembly constructed in accordance with one embodiment of the invention, the assembly being installed on a frame member;

Figure 2 is a view similar to Figure 1 but showing the parts in a position ready for actuation; and

Figure 3 is an enlarged perspective view, with parts broken away, of a central portion of the bolt assembly shown in Figures 1 and 2.

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

In Figures 1 and 2, the dead bolt unit 11 comprises a support frame 14 of a generally channel-shaped cross-section having a pair of spaced walls 15, 16 and a bottom wall 17 interconnecting the spaced walls 15, 16, a shaft 18 of a square cross-section extending across and through the spaced walls 15, 16, and a dead bolt 19 mounted at one end on the shaft 18 and extending radially from the shaft 18 or in a direction substantially perpendicularly to a longitudinal axis of the shaft 18. The shaft 18 has both ends 20, 21 projecting beyond the spaced walls 15, 16, respectively, the shaft 18 having a pair of spaced square flanges 22, 23 which are located adjacent to the ends 20, 21, respectively, and slidably fitted in a pair of aligned square holes 24, 25, respectively, in the spaced walls 15, 16, as best shown in Figure 3. Thus, when the flanges 22, 23 are disposed in the holes 24, 25, or in substantial alignment with the walls 15, 16, the shaft 18 is prevented from being turned about its longitudinal axis. With the shaft 18 displaced axially for disengagement of the flanges 22, 23 from the walls 15, 16, the dead bolt 19 is pivotable or angularly movable substantially 90° between a first or withdrawn position in which the bolt 19 is retracted within the support frame 14 and a second or projecting position in which the bolt 19 has the opposite free end projecting outwardly from the support frame 14, the first position being indicated by the solid lines and the second position by the broken lines (Figure 2). The dead bolt 19 has a square opening 26 in

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which a pair of spaced square plates 27, 28 are disposed for sliding movement toward and away from each other within the opening 26, the plates 27, 28 being snugly fitted in the opening 26 for driving engagement with the dead bolt 19. The square plates 27, 28 have a pair of central square apertures 29, 30 respectively, through which the shaft 18 slidably extends, the shaft 18 being snugly fitted in the apertures 29, 30 for driving engagement with the plates 27, 28. With this arrangement, revolution of the shaft 18 causes swinging movement of the dead bolt 19 via the plates 27, 28. Further, the arrangement allows the plates 27, 28 to move relatively to the shaft 18 and to the bolt 19 in a direction parallel to the axis of the shaft 18. A compression coil spring 31 is disposed around the shaft 18 between the spaced plates 27, 28 and normally biases the plates 27, 28 apart into engagement with the spaced walls 15, 16, respectively. With the plates 27, 28 thus pressed resiliently against the walls 15, 16, the flanges 22, 23 are normally held in the holes 24, 25, respectively, against displacement. The spaced walls 15, 16 have a pair of attachment flanges 32, 33, respectively, located remotely from the bottom wall 17, the flanges 32, 33 having attachment screw holes (not shown).

A flat spring 34 is mounted on the bottom wall 17 and acts on the dead bolt 19 for maintaining it in the first position against rattling movement or in the second position against gravity.

The bolt-driving unit 12 comprises a substantially circular casing 35 having a central bore 36 and a counterbore 37, an operator handle 38 having on one end a cylindrical handle 39 rotatably disposed in the bore 36 and a central slot 40 of a square cross-section defined coaxially in the shaft 39, and a driver torque bar or spindle 41 of a square cross-section having one end axially slidably received in the slot 40, the torque bar 41 being fitted in the slot 40 for co-rotation with the handle shaft 39. The handle shaft 39 has on its free end an annular plate 42 which is held slidably against the bottom of the counterbore 37. Thus, the handle shaft 39 is axially immovable or retained against removal once mounted in the casing 35. The casing 35 has a pair of upper and lower attachment flanges (not shown).

Another annular plate 43 is attached to the end of the casing 35 in which the counterbore 37 is provided, the annular plate 43 having a portion in the form of a sleeve 44 directed away from and extending coaxially with the central bore 36. The sleeve 44 has on its free end a wall 45 with a flanged edge 46 bounding a central square aperture 47. The driver torque bar 41 extends through the aperture 47, and has on the opposite free end a driver 48 having a flange 49 that defines a square recess 50. The square recess 50 opens away from the

driver torque bar 41 and is substantially co-extensive in cross-section with the shaft 18. The driver 48 has a square contour that can provide a sliding fit between the driver 48 and the flanged edge 46 of the end wall 45. Thus, the driver 48 is slidable into and out of the central aperture 47 in a direction of the axis of the torque bar 41, but is retained against rotation when positioned in the aperture 47.

A retainer flange 51 is fixed to the torque bar 41 and confined within the unit 12 to capture the torque bar 41 in the unit 12. A compression coil spring 52 is disposed around the torque bar 41, the spring 52 acting between the flanged edge 46 and the retainer flange 51 to normally bias the torque bar 41 away from the shaft 18, or the driver 48 into engagement with the flanged edge 46 that serves as fixed engaging means.

To shift the driver torque bar 41 axially toward the shaft 18, a push button 53 is housed in the handle 38 in coaxial relation with the torque bar 41, the push button 53 having a flange 54 trapped in a bore 55 in the handle 38 by means of a rim 56. The push button 53 is hollow and contains a compression coil spring 57 acting between the bottom of the hollow push button 53 and the end of the torque bar 41 projecting into the bore 55. The spring 57 normally biases the push button 53 away from the torque bar 41 into engagement with the rim 56. The spring 57 also serves to counteract the biasing force from the spring 52, thereby keeping the driver torque bar 41 in an equilibrated position in which the driver 48 engages the flanged edge 46 of the end wall 45. A key-actuated cylinder lock 58 is mounted in the handle 38 and has a retractable stop 59 which upon actuation of the lock 58 projects into the bore 55 for locking engagement with the flange 54 of the push button 53 to arrest its movement toward the driver torque bar 41.

Another bolt-driving unit 60 having a thumb turn knob 61 may also be provided on the stile 13, the unit 60 having a driver torque bar or spindle 62 having a free end which is so shaped as to fit over the end 21 of the shaft 18 for driving engagement therewith. For manipulation of the bolt-driving unit 60, the thumb turn knob 61 is pushed toward the stile 13 to cause the free end of the bar 62 to engage the end 21 of the shaft 18. The thumb turn knob 61 is further pushed to displace the shaft 18 axially toward the unit 12 until the flanges 22, 23 on the shaft 18 disengage from the walls 15, 16, respectively. Then, the thumb turn knob 61 can be turned to actuate the dead bolt 19 independently of the other bolt-driving unit 12.

The stile 13 includes a pair of spaced plates 63, 64 having a pair of attachment openings 65, 66 respectively, and a side plate 67 interconnecting the spaced plate 63, 64 and having an attachment opening 68. When the

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window sash or door is closed, the side plate 67 faces a side jamb (not shown) that partly defines an opening in which the window sash or door is mounted. The side jamb has a recess into which the dead bolt 19 can project for locking the window sash or door.

For assembling the bolt assembly 10, the bolt unit 11 is first inserted in the opening 68 in the side plate 67 until the attachment flanges 32, 33 are held against the side plate 67. The attachment flanges 32, 33 are secured to the side plate 67 by means of screws (not shown) extending through the attachment screw holes into the side plate 67. Then, the bolt-driving units 12, 60 are installed on the stile 13, with the sleeve 44 inserted in the opening 65 and the sleeve 69 of the unit 60 in the opening 66. The units 12, 60 are fixed to the stile 13 by means of screws (not shown). The attachment openings 65, 66 are held in mutual registry such that the bolt-driving units 12, 60 upon installation have their driver torque bars 41, 62 aligned with each other and with the shaft 18 of the bolt unit 11 that has been mounted in place.

Usually, the bolt-driving unit 12 is mounted on the inner side of the door or sash, and the bolt-driving unit 60 on the outer side thereof. For normal bolting or unbolting operation, the cylinder lock 58 is key-operated to withdraw the stop 59 from the bore 55, and the push button 53 is pushed into end-to-end engagement with the torque bar 41. The push button 53 is further pushed to allow the driver 48 to move out of engagement with the edge 46 into engagement with the end 20 of the shaft 18 against the force from the spring 52. Continued pushing of the button 53 is effected to displace the shaft 18 axially toward the unit 60 until the flanges 22, 23 disengage from the walls 15, 16, respectively, against the force from the springs 31 and 52. Then, while the push button 53 is pressed, the handle 38 is pivoted for 90° angular movement to actuate the dead bolt 19. After actuation of the dead bolt 19, the push button 53 is released to thereby allow the driver torque bar 41 to return under the bias of the spring 52 to its original position, and the shaft 18 to return under the bias of the spring 31, whereupon the flanges 22, 23 engage the walls 15, 16, respectively, again, and the driver 48 engages the sleeve edge 46 again. Thus, manipulation of the operator handle 38 can be prevented unless the push button 53 is actuated. Further, the dead bolt 19 is retained against pivotal movement from its bolted or unbolted position. When it is required to lock or unlock the window sash or door from the outside thereof as in case of emergency, the knob 61 is pushed as it is turned 90°, in the manner described, to operate the dead bolt 19.

Unitized for compactness, the bolt unit 11 and the bolt-driving unit 12 can be in-

stalled separately with maximum ease, and no special machining other than drilling is needed on the frame member 13.

WHAT WE CLAIM IS:—

1. A bolt assembly comprising a support frame, a drive shaft rotatably mounted on the support frame and displaceable axially therein, movable and fixed engagement means on the shaft and support frame respectively for retaining the shaft against rotation, which engagement means are releasable to permit rotation of the shaft upon axial displacement of the shaft, and a dead bolt driveably coupled with the shaft and movable by rotation of the shaft between a projecting bolting position and a retracted release position.

2. An assembly according to Claim 1 wherein a bolt-driving unit is provided comprising a casing having means for being attached to the closure frame member, the casing having a bore and the fixed engagement means; a handle having a cylinder shaft rotatably disposed in the bore; and a driver torque bar having one end mounted coaxially in the cylinder shaft for corotation therewith and axial movement therein, the driver torque bar having a driver on the opposite end, the driver being normally held in a position in which the driver engages the fixed engagement means, and the driver being shiftable out of engagement with the fixed engagement means into driving engagement with the said drive shaft upon axial movement of the driver torque bar towards the drive shaft.

3. An assembly according to claim 2, wherein the driver shaft and the driver are of square cross-section, and the driver has a square recess in which one end of the driver shaft can fit.

4. An assembly according to claim 2 or 3, wherein spring means are provided around the driver torque bar, the spring means normally urging the driver into engagement with the fixed engagement means.

5. An assembly according to claim 4, wherein the casing includes a sleeve having the fixed engagement means on one end, the driver torque bar having a fixed retainer flange, and the spring means comprising a compression coil spring disposed between the fixed engagement means and the fixed retainer flange.

6. An assembly according to claim 5, wherein the sleeve has an end wall at its said one end, and the fixed engagement means comprises an edge of the said end wall which defines a square opening in which the driver is slidably fitted.

7. An assembly according to any one of Claims 2 to 6, wherein the support frame includes a pair of spaced walls and a wall interconnecting the spaced walls, the spaced walls having a pair of aligned square holes



window sash or door is closed, the side plate 67 faces a side jamb (not shown) that partly defines an opening in which the window sash or door is mounted. The side jamb has a recess into which the dead bolt 19 can project for locking the window sash or door.

For assembling the bolt assembly 10, the bolt unit 11 is first inserted in the opening 68 in the side plate 67 until the attachment flanges 32, 33 are held against the side plate 67. The attachment flanges 32, 33 are secured to the side plate 67 by means of screws (not shown) extending through the attachment screw holes into the side plate 67. Then, the bolt-driving units 12, 60 are installed on the stile 13, with the sleeve 44 inserted in the opening 65 and the sleeve 69 of the unit 60 in the opening 66. The units 12, 60 are fixed to the stile 13 by means of screws (not shown).

The attachment openings 65, 66 are held in mutual registry such that the bolt-driving units 12, 60 upon installation have their driver torque bars 41, 62 aligned with each other and with the shaft 18 of the bolt unit 11 that has been mounted in place.

Usually, the bolt-driving unit 12 is mounted on the inner side of the door or sash, and the bolt-driving unit 60 on the outer side thereof. For normal bolting or unbolting operation, the cylinder lock 58 is key-operated to withdraw the stop 59 from the bore 55, and the push button 53 is pushed into end-to-end engagement with the torque bar 41. The push button 53 is further pushed to allow the driver 48 to move out of engagement with the edge 46 into engagement with the end 20 of the shaft 18 against the force from the spring 52. Continued pushing of the button 53 is effected to displace the shaft 18 axially toward the unit 60 until the flanges 22, 23 disengage from the walls 15, 16, respectively, against the force from the springs 31 and 52. Then, while the push button 53 is pressed, the handle 38 is pivoted for 90° angular movement to actuate the dead bolt 19. After actuation of the dead bolt 19, the push button 53 is released to thereby allow the driver torque bar 41 to return under the bias of the spring 52 to its original position, and the shaft 18 to return under the bias of the spring 31, whereupon the flanges 22, 23 engage the walls 15, 16, respectively, again, and the driver 48 engages the sleeve edge 46 again. Thus, manipulation of the operator handle 38 can be prevented unless the push button 53 is actuated. Further, the dead bolt 19 is retained against pivotal movement from its bolted or unbolted position. When it is required to lock or unlock the window sash or door from the outside thereof as in case of emergency, the knob 61 is pushed as it is turned 90°, in the manner described, to operate the dead bolt 19.

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stalled separately with maximum ease, and no special machining other than drilling is needed on the frame member 13.

WHAT WE CLAIM IS:—

1. A bolt assembly comprising a support frame, a drive shaft rotatably mounted on the support frame and displaceable axially therein, movable and fixed engagement means on the shaft and support frame respectively for retaining the shaft against rotation, which engagement means are releasable to permit rotation of the shaft upon axial displacement of the shaft, and a dead bolt driveably coupled with the shaft and movable by rotation of the shaft between a projecting bolting position and a retracted release position.

2. An assembly according to Claim 1 wherein a bolt-driving unit is provided comprising a casing having means for being attached to the closure frame member, the casing having a bore and the fixed engagement means; a handle having a cylinder shaft rotatably disposed in the bore; and a driver torque bar having one end mounted coaxially in the cylinder shaft for corotation therewith and axial movement therein, the driver torque bar having a driver on the opposite end, the driver being normally held in a position in which the driver engages the fixed engagement means, and the driver being shiftable out of engagement with the fixed engagement means into driving engagement with the said drive shaft upon axial movement of the driver torque bar towards the drive shaft.

3. An assembly according to claim 2, wherein the driver shaft and the driver are of square cross-section, and the driver has a square recess in which one end of the driver shaft can fit.

4. An assembly according to claim 2 or 3, wherein spring means are provided around the driver torque bar, the spring means normally urging the driver into engagement with the fixed engagement means.

5. An assembly according to claim 4, wherein the casing includes a sleeve having the fixed engagement means on one end, the driver torque bar having a fixed retainer flange, and the spring means comprising a compression coil spring disposed between the fixed engagement means and the fixed retainer flange.

6. An assembly according to claim 5, wherein the sleeve has an end wall at its said one end, and the fixed engagement means comprises an edge of the said end wall which defines a square opening in which the driver is slidably fitted.

7. An assembly according to any one of Claims 2 to 6, wherein the support frame includes a pair of spaced walls and a wall interconnecting the spaced walls, the spaced walls having a pair of aligned square holes

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through which the drive shaft extends, and the engagement means comprises a pair of spaced square flanges on the shaft which can slidably fit in the holes, respectively.

- 5 8. An assembly according to claim 7, wherein the dead bolt has a square opening through its end coupled to the drive shaft by means of a pair of square plates slidably disposed within said square opening in the
10 dead bolt, and a spring is disposed around the shaft and normally biases the plates apart into engagement with the spaced walls.

- 15 9. An assembly according to Claim 7 or 8, wherein a spring acts between the inter-connecting wall and the dead bolt for maintaining the dead bolt in one of its two said positions.

10. An assembly according to any one of Claims 2 to 9, wherein means retained in the

handle are provided for pushing the driver 20 torque bar axially towards said shaft.

11. An assembly according to Claim 10, wherein the pushing means comprises a push button coaxial with the torque bar, the push button being movable axially of the said 25 torque bar and, upon actuation, held in end-to-end engagement with the torque bar, there being a spring acting between the torque bar and push button to normally bias them apart.

12. A bolt assembly substantially as 30 herein described with reference to the drawings.

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Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1980.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY,
from which copies may be obtained.