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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in Fastenings for Doors and the like

I, YOSHITAKA NAKANISHI, No. 644, 1-chome, Yawata-machi, Ichikawa-shi, Chiba-ken, Japan, a Japanese subject, do hereby declare the invention, for which I pray that a patent may be granted to me, 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 improved fastenings to be fixed to a window or door of a structure or a sliding window or sliding door, of furniture such as a book shelf or a chest or drawers.

An object of the present invention is to provide an improved fastening which is convenient to use, and by which fastening and release can be automatically effected as a result of a single knob pushing or turning operation.

Another object of the present invention is to provide a handy fastening which is simple in structure requiring little material and no special technique to handle and which can be made simply and at low cost.

According to the invention there is provided a fastening comprising a cylinder, a rod slidable and rotatable in the cylinder, a boss projecting from the rod, a pretwisted spring being connected at one end to the cylinder and at the other end to the rod, and a cam slot in the cylinder wall for guiding the boss on the rod, the boss extending into the cam slot.

A more comprehensive understanding of the present invention will be obtainable from the following description with reference to the attached drawings.

Figure 1 represents a partial perspective view illustrating the position in which the fastening of the present invention is fixed to the sliding windows. Unless specifically stated the subsequent figures are shown on an enlarged scale with respect to Fig. 1. Fig. 2 indicates a longitudinal partial cross section of the fastening of Fig. 1. Figures 3a and 3b show the fastener and its housing respectively. Fig. 4 shows a side view of a cylinder, Fig. 5 shows

a perspective view of the housing partly broken away. Figures 6 and 7 show a longitudinal cross-section of the ends of the cylinder. Fig. 8 shows a longitudinal side view of a fastener and its housing partly in section. Fig. 9 shows a longitudinal side view of a fastener partly in section. Fig. 10 is a cross section along line X—X of Fig. 9, Fig. 11 is a cross section along line XI—XI of Fig. 9, Fig. 12 shows one end of the rod and the housing, Fig. 13 shows a hinged door fitted with the fastening, Figures 14a and 14b show one end of the rod and the housing.

As exemplified in Figures 1 and 2 a fastening embodying the present invention is mounted on a sliding window. Window sashes 1 and 2 are mounted to slide on the rails 3 and 4 and the rod cylinder 6 is fixed with screws 7, to the vertical frame 5 of the inner sash while the housing 9 is fixed with screws 10, to the vertical frame 8 of the outer sash.

Referring to Fig. 2 the rod cylinder 6 has a flange 11 at its front end (the right side of Fig. 2) and is provided with hole 12, the aforesaid flange 11 being covered by a front cover plate 15, provided with a projecting sleeve 14, and the cylinder is fixed to the vertical frame 5, of the inner sash by screws 7, through tapped holes 16.

The rod 17, is inserted into the cylinder 6 through the sleeve 14, and hole 12, the inner end of the rod is provided with two projecting retaining pins 27, and a knob 18, is fixed to the outer end of the rod. Within the cylinder, the rod 17 is equipped with a helical spring 19 and one end 20 of said spring 19 is inserted into a hole provided on the cylinder end whereas the other end 21 is fixed to the rod 17 after twisting the spring 19. By means of this spring 19, the rod 17 is caused to slide in a return direction (to the right in Fig. 2) and at the same time, by means of the above mentioned twist, the rod 17 is urged to turn clockwise.

Though a variety of devices are available

[Price 4s. 6d.]

as a means to guide the translation and rotation of the rod 17, a cam device is employed. As illustrated in Figures 3a and 3b, an L-shaped cam slot 24 consisting of a slot 22 in the axial direction and a slot 23 in the circumferential direction is provided in the wall of cylinder 6 and a boss 25 which consists of a screw pin is screwed into the periphery of rod 17. The top end of this boss 25 is located in the cam slot 24 so that it is free to slide. Movement of the rod 17 against the action of the spring 19 as well as the return movement due to the compressive reaction force of spring 19 is guided by the boss moving along the slot 22. The torsion of the spring rotates the rod and the boss 19 is guided along the slot 23.

The housing 9 of the box type is illustrated in Figures 2 and 3, and is provided with a hole 13 in the middle of the front plate and is fixed to the inner vertical frame 8 with screws 10 through tapped holes 26.

If, the knob 18 is pushed by finger tip, in the direction of the arrow marked in Fig. 2, the rod 17 will be guided in the direction of the slot 22 and the boss 25 will slide in the slot 22, compressing the spring 19 and pushing the end of the rod into the hole 13 of the housing 9. When the boss 25 reaches the entrance of slot 23, the rod 17 being under torsional reaction of the spring 19 and guided by the boss 25 sliding in the slot 23 rotates in the direction (clockwise) of the slot 23, rotating the retaining pins 27 behind the hole 13. When the boss 25 is pressed against the end of slot 23 due to the above mentioned torsional reaction, the rod 17 is maintained by the action of the spring in this position, thus bringing about a latching condition.

To release the fastening, the knob 18 is turned anticlockwise, then the rod 17 rotates anticlockwise the boss 25 sliding in the slot 23 in a direction opposite to the previous movement. In this case the spring 19 is automatically twisted and tends to return to the original condition and when the boss 25 reaches the entrance to slot 22, the rod 17 is sprung forward automatically along the slot 22 by the compressed spring 19, thus withdrawing the retaining pins 27 from the hole 13 and bringing about a released condition. The spring 19 serves the purpose of urging the rod 17 towards the direction of return (to the right in Fig. 2) and at the same time, by means of the torsional force, urging the rod 17 in such way that it turns clockwise.

The fastening may be so designed that the cam slot 24 is provided in an inclined direction such as the slot 22 shows in Fig. 4. If designed in this way, when the boss 25 slides in the slot 22 and the rod 17 advances, the spring 19 is further twisted and thereby increases the torsion to move the boss in the slot 23.

It is also possible to provide on the back of the housing 9, as illustrated in Fig. 5, the

slant plates 42 on the circumference of the hole 13 so that in case of insertion and turning of the rod 17, the retaining pins 27 slide on the surface of the slant plates 42, thus pressing the rod 17 against housing 9. It is also practicable to design the front plate 15 of cylinder 6 in such manner that the flange 11, after having been fixed with screws 7, is further fixed with bonding agent 43 as illustrated in Fig. 6 or, as illustrated in Fig. 7, the edge 44 of front plate 15 is, for instance, curled in the form of an arc and the edge 45 of flange 11 too is correspondingly rounded and the edge 44 is fitted over edge 45.

Next, another embodiment of the present invention is described.

The fastening shown in Fig. 8 of the two-step type, in which the slot 24¹ is modified in such a way that slots 22¹, 23¹ are further extended to slots 22a, 23a to form a zigzag and on the back of the housing 9, a plate 9a has an additional hole 13a.

If, the knob 18 is pushed and the rod 17 is projected, the boss 25 slides from slot 22b to slot 23¹ and the retaining pin 27 is inserted into the hole 13 in the same manner as described above, thus completing the first step of fastening. If the rod 17 is then further projected, the boss 25 moves from slot 22a to slot 23a and the retaining pin 27 is inserted into the next hole 13a, thus completing the second step of fastening. In the case of releasing, the knob 18 is turned anticlockwise in two steps.

The fastening illustrated in Fig. 9 is so designed that the spring 19 acts to urge the rod 17 inwardly.

The spring 19 is in front of the boss 25. The knob 18 is not fixed to the rod 17 and a guide groove 28, having an opening equivalent to about twice the width of the arm slot 24 is provided at the end of rod and the end of screw pin 29 screwed into the knob 18 projects into the guide groove 28 so that the knob 18 can rotate within the limits of the guide groove. A projecting stop pin 30 is provided at the end of the sleeve 14 of the cam plate 15 and on the inner face of tubular part 31 of knob 18, a guide groove 32 having an opening a little wider than the cam slot 24 is formed. The positional relationship between the screw pin 29 and stop pin 30 is so designed that the screw pin 29 can reach an intermediate position (indicated in dotted lines) in the guide groove 28 as illustrated in Fig. 10 so that when the knob 18 is turned anticlockwise (arrow mark in Fig. 10) and the stop pin 30 enters into guide groove 32, the rod 17 can rotate from that position to the end of slot 23.

Accordingly, if starting with the stop pin 30 contacting the end of knob 18 holds the rod 17 at its withdrawn position, the knob 18 is turned anticlockwise, causing the stop pin 30 to reach the entrance of groove 32, and

the knob 18 is released. Then the rod 17 is urged by the spring 19 to move forward, the stop pin 30 then enters into the guide groove 32, rotates and effects latching in the same manner as in the case of preceding example. To release the latch, the knob 18 is turned anti-clockwise and when the boss 25 escapes from slot 23, the knob is pulled to withdraw the rod 17 and when the stop pin 30 escapes from the guide groove 32, the knob 18 is turned clockwise and the end of the knob's tubular section 31 is pressed against the above mentioned stop pin 30, thus maintaining the withdrawn position.

The rod 17 may not be equipped with a retaining pin 27 as illustrated in Fig. 12.

The present invention is also applicable in the form of a fastening such as for hinged door leaves of a book shelf. In this case, the retaining pins 27 of the respective fastenings described in the above examples may be made longer as required and the design of other structures may be modified appropriately, but it is also possible to add auxiliary devices as shown in Fig. 13 and Figures 14a and 14b.

That is to say, a projecting shaft 33 of square cross section is attached to the end of rod 17, the projecting tongue 34 is fixed to the boss 35 having a through shaft hole 36 of square cross section and the boss 35 is supported in the case in a freely rotatable condition so as to make it possible for the tongue 34 to project through the opening 38 on the side of case 37. Any of the fastenings described in the above examples may be employed as required. The case 37 is fixed with screws to the back of door frame 39 of one of the hinged door leaves, the cylinder 6 of the fastening is inserted in the front side and the shaft 33 is inserted into the shaft hole 36. To the frame 39a of the other hinged door leaf, the housing 41 having a slot 40 is fixed with screws. The hinged door leaves are closed, the knob 18 is pushed and when the rod 17 is inserted in a

manner described hereinbefore and turned clockwise, the boss 35 rotates in the same direction as the shaft 33, its tongue 34 projects through the slot 38 and enters into the slot 40 of housing 41, thus completing the latching.

WHAT WE CLAIM IS:—

1. A fastening comprising a cylinder, a rod slidable and rotatable in the cylinder, a boss projecting from the rod, a pretwisted spring being connected at one end to the cylinder and at the other end to the rod, and a cam slot in the cylinder wall for guiding the boss on the rod, the boss extending into the cam slot.

2. A fastening as claimed in Claim 1 wherein the cam slot is inclined to the axis of the rod.

3. A fastening as claimed in claim 1 wherein the cam slot is in the form of a zig-zag and a housing and a plate are positioned at a predetermined spacing to correspond with ports of the zig-zag slot.

4. A fastening as claimed in claim 1, wherein the rod is provided with a guide groove having a width twice the width of the cam slot, a pin screwed in a separate knob member so as to project into the guide groove, the cylinder having a front plate with a stop pin, another guide groove with a greater width than the width of the cam slot being formed on the inner surface of the knob member, the screw pin and stop pin being positioned so that after the screw pin reaches an intermediate position in the rod guide groove and the knob is turned anticlockwise the stop pin enters the knob guide groove, the rod then rotates from that position to the end of the cam slot.

5. A fastening substantially as described with reference to the accompanying drawings.

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the knob 18 is released. Then the rod 17 is urged by the spring 19 to move forward, the stop pin 30 then enters into the guide groove 32, rotates and effects latching in the same manner as in the case of preceding example. To release the latch, the knob 18 is turned anti-clockwise and when the boss 25 escapes from slot 23, the knob is pulled to withdraw the rod 17 and when the stop pin 30 escapes from the guide groove 32, the knob 18 is turned clockwise and the end of the knob's tubular section 31 is pressed against the above mentioned stop pin 30, thus maintaining the withdrawn position.

The rod 17 may not be equipped with a retaining pin 27 as illustrated in Fig. 12.

The present invention is also applicable in the form of a fastening such as for hinged door leaves of a book shelf. In this case, the retaining pins 27 of the respective fastenings described in the above examples may be made longer as required and the design of other structures may be modified appropriately, but it is also possible to add auxiliary devices as shown in Fig. 13 and Figures 14a and 14b.

That is to say, a projecting shaft 33 of square cross section is attached to the end of rod 17, the projecting tongue 34 is fixed to the boss 35 having a through shaft hole 36 of square cross section and the boss 35 is supported in the case in a freely rotatable condition so as to make it possible for the tongue 34 to project through the opening 38 on the side of case 37. Any of the fastenings described in the above examples may be employed as required. The case 37 is fixed with screws to the back of door frame 39 of one of the hinged door leaves, the cylinder 6 of the fastening is inserted in the front side and the shaft 33 is inserted into the shaft hole 36. To the frame 39a of the other hinged door leaf, the housing 41 having a slot 40 is fixed with screws. The hinged door leaves are closed, the knob 18 is pushed and when the rod 17 is inserted in a

manner described hereinbefore and turned clockwise, the boss 35 rotates in the same direction as the shaft 33, its tongue 34 projects through the slot 38 and enters into the slot 40 of housing 41, thus completing the latching.

WHAT WE CLAIM IS:—

1. A fastening comprising a cylinder, a rod slidable and rotatable in the cylinder, a boss projecting from the rod, a pretwisted spring being connected at one end to the cylinder and at the other end to the rod, and a cam slot in the cylinder wall for guiding the boss on the rod, the boss extending into the cam slot.

2. A fastening as claimed in Claim 1 wherein the cam slot is inclined to the axis of the rod.

3. A fastening as claimed in claim 1 wherein the cam slot is in the form of a zig-zag and a housing and a plate are positioned at a predetermined spacing to correspond with parts of the zig-zag slot.

4. A fastening as claimed in claim 1, wherein the rod is provided with a guide groove having a width twice the width of the cam slot, a pin screwed in a separate knob member so as to project into the guide groove, the cylinder having a front plate with a stop pin, another guide groove with a greater width than the width of the cam slot being formed on the inner surface of the knob member, the screw pin and stop pin being positioned so that after the screw pin reaches an intermediate position in the rod guide groove and the knob is turned anticlockwise the stop pin enters the knob guide groove, the rod then rotates from that position to the end of the cam slot.

5. A fastening substantially as described with reference to the accompanying drawings.

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