

PATENT SPECIFICATION

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(54) DOOR FASTENING DEVICE

(71) I, YOSHITAKA NAKANISHI, of 12-9 5-Chome, Yawata Ichikawa-shi, Chiba-ken, Japan, of Japanese nationality, 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:—

This invention relates to a door fastening device combined with a pair of doors. The doors may be sliding doors or hinged doors.

In general, various devices for fastening doors have been used, such as cylinder lock operated flush bolts, dead bolts, and/or pivoting catches.

It is an object of this invention to provide a fastening device which is installed in a position not easily found by strangers and may exhibit a remarkable merit in respect to burglar-proofness.

Another object of this invention is to provide a fastening device which may be lock and unlocked, the device being mountable in such places as previously were not suitable for the installation of fastening devices, while it requires no skilled or troublesome work to install the device.

Further another object of this invention is the provision of a fastening device having a simple and sturdy construction and the provision of durable products combining an extremely simplified manufacture with low cost.

According to the invention, there is provided a fastening device combined with a pair of doors, one or both of which comprises a hollow vertical frame member, the fastening device comprising a base portion fixed to one or the hollow vertical frame member, a catch rotatably supported on the base portion, a rotatable shaft integral with the catch and rotatable as a unit with the catch and extending through the base portion into the hollow vertical frame

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member, a catch keeper fixed to a or the vertical frame member of the other door and engageable with the catch, a vertically slideable securing member provided in the hollow vertical frame member for securing and releasing the catch by engaging or disengaging with the rotatable shaft, an actuating member provided in a or the hollow vertical frame member for sliding the securing member vertically, and a flexible line connecting the actuating member and the securing member.

The term "frame member" or "door frame member" as used herein refers to a frame member forming an integral part of a door.

The invention will become clear by the following explanation referring to the drawings showing various embodiments.

Figure 1 is a partial perspective view of a fastening device according to this invention;

Figure 2 is a longitudinal sectional view of a portion of Figure 1;

Figure 3 is a perspective view of an embodiment of a guide member of this invention;

Figure 4 is a vertical cross-sectional view taken along the plane IV-IV of Figure 2;

Figure 5 is a partial front view of a door containing the door fastening device according to this invention;

Figure 6 shows another embodiment of the device of this invention, similar to that of Figure 5;

Figure 7 shows still another embodiment of the fastening device, similar to that of Figure 2;

Figure 8 is a vertical sectional view of a portion of the vertical frame member with another embodiment of the fastening device of this invention;

Figure 9 is a partial plan section taken along the plane IX-IX of Figure 8;

Figure 10 is a view similar to Figure 8

and showing another embodiment of the device.

Figures 1 to 4 show an inner door 1 and an outer door 10.

5 The vertical hollow frame member 2 of the inner door 1 is provided with a base 7a of a catch 8 rotatably supported on the base 7a by means of a rotatable shaft 12, which is integral with the catch 8, and
10 passes through the base. A free end portion 13 of the rotatable shaft is provided in the vertical frame member 2 and possesses flat faces 14a and 14b in order to engage in the groove of the bifurcated securing
15 member 3 which will be referred to later. A catch keeper 9 with which the catch 8 is engageable is secured on the vertical frame member 11 of the outer door 10. The catch 8 is provided with a handle portion
20 8a.

The securing member 3 is slidable vertically inside the vertical frame member 2 and has a fork 3a with a groove 15 for receiving and securing the end portion 13.
25 The actuating member 4 is situated on the room-side surface of the vertical frame member 2 and has an integral panel 59 and arm 17 which passes through an aperture 20 in the vertical frame (see Figure 2).
30 A flexible line 6 such as a wire, chain or string is connected to the arm 17, extending through an aperture 18 and another aperture 16 on the top of the securing member 3. A screw 19 secures the
35 line to the arm 17.

The sliding panel 59 of the actuating means is covered by a cover plate 23. This cover plate 23 is fixed to the vertical frame with screws 50. This enables the sliding
40 panel to slide vertically within the space 58 enveloped by the vertical frame member 2 and the cover plate 23.

The fastening device may be mounted on a door by putting the securing member 3
45 through the opening 20 in the frame and allowing it to drop down on the end of the line 6; this would not be possible if a stiff rod were used in place of the line.

Now in the condition shown in Figure 2, the catch 8 is engaged with the catch
50 keeper 9; the end portion 13 of the rotatable shaft of the door catch 8 enters the groove 15 of the securing member 3; the movement of the rotatable shaft is arrested; the guide piece 21 of the securing
55 member is inserted into the vertical frame member in advance.

If the actuating member 4 is slid upward, the securing member 3 will accordingly be raised by the line 6 along the
60 guide piece 21, and when the fork 3a separates from the end portion 13, the catch 8 may rotate freely. If, contrarily, the actuating means 4 is lowered, the securing
65 member 3 descends under its own weight,

while the groove 15 engages with the end portion 13 of the rotatable shaft, whereby the rotation of the catch 8 is prevented.

The guide piece 21 which prevents the
70 securing member 3 from rotating has a hollow structure with a square cross section, and an opening 21d open at its upper and lower ends, and parts of the guide are partially cut away to provide stepped portions 21a and 21b. The guide piece is
75 located inside the vertical frame member 2 and the aforementioned securing member is guided into the opening 21d. The tapered face 21c at the top of the guide piece 21 is provided for smooth entry of the lock
80 piece in assembling. The projection 22 formed by bending upward a portion of the vertical frame member arrests the guide piece at a predetermined position.

The upper stepped portion 21a of the
85 guide piece is provided to accommodate the fastening screw of the door catch when it is mounted on the door frame member. The lower stepped portion 21b, on the other hand, is provided in order to allow
90 the end portion 13 of the rotatable shaft of the door catch 8 pass into the guide piece, thereby engaging the tip of the rotatable shaft of the door latch with the securing member provided in the guide piece.
95

Means are provided to avoid the excessive fall of the securing member under its own weight. The structure of this means is as follows:

The cover plate of the actuating member
100 is provided with an aperture 53, and two pairs of grooves 24, and the fall of the securing member 3 under its own weight is braked by engaging a two part pin 26 in two opposed grooves 24 by the action of a
105 compression spring 25 between the parts of the pin fitted in the opening 52 of the actuating member 4 shown in Figure 4.

Figures 5 and 6 indicate another possible
110 position of the actuating member. In the arrangement shown in Figure 5, the actuating member 4 is installed below the door catch 8, which is connected with the securing member by means of the line 6 suspended from a pulley 27 near the top of
115 the frame 2. Another embodiment shown in Figure 6 comprises the catch 8 installed on one vertical frame member 2 of a door 1, and the actuating member 4 mounted on the other vertical frame member 28 of the
120 door. The catch and the actuating member are connected with each other by means of the line 6 running over the pulleys 27 and through the horizontal frame 5. Thus, safety against those who may attempt a
125 trespass is heightened because the catch is separated from the actuating means by a considerable distance.

Another type of actuating member may
130 be employed in lieu of the actuating mem-

ber 4 described above.

In Figure 7 is shown an actuating means 29 having a pivoting lever 30.

The actuating means 29 is composed of
 5 a frame 60 secured to the vertical frame member 2, and a sliding member 35 vertically slidable on the back of the frame; a cylinder 34 is provided on the back side and the line 6 is engaged at the lower side,
 10 a second sliding member 33 horizontally slidable inside the cylinder, a compression spring 61 provided between the sliding member 33 and the cylinder 34 and the lever 30 pivoted on a pivot pin 31 on the frame and connected with the sliding member 33 by means of a pin 32. The sliding member 35 is guided vertically between the back side of the frame 60 and pins 62, and the pins are each supported by a bracket
 15 63 which is integral with the frame. When the lever is rotated downward or counter-clockwise on the pivot pin 31, the rotation is accompanied by the sliding motion of the sliding member 33 upwardly as well as laterally to the right (as illustrated) inside the cylinder 34 by means of the pin 32, and the sliding member 33 slides the sliding member 35 upwardly.

The lower bent portion 35a of the sliding member 35 is secured to the upper end of the line 6, which accordingly raises the securing member 3, whereby the catch 8 is rotatable as described above. If, on the contrary, the lever 30 is rotated upward,
 35 the reverse action will result in moving the sliding member 35 downward while the securing member 3 drops by its own weight, until the free end portion 3 of the rotatable shaft of the catch 8 enters the groove 15, when the rotation of the catch 8 is prevented.

Figures 9 and 10 show another embodiment of this invention where a push-type actuating means 36 is employed.

In this embodiment, the actuating means is mounted on the front of the vertical frame member 2 in such a manner that a cylinder 40 with an L-shaped slot is supported in the vertical frame, and the actuating means is equipped with a bolt 38 that passes through the cylinder and can be operated by one-touch action.

The securing member 3 is raised above the end portion 13 of the rotatable shaft so that the catch 8 is allowed to rotate and the bolt 38 is retracted.

When a push button 37 is pushed under such a condition, the bolt 38 slides in parallel with a pin 39, connected with the bolt and push button, and the pin moves to the end of a slot 41 aligned with the axial direction of the cylinder 40. When the pin 39 has reached the entrance of a circumferential and downwardly opening slot 42, the bolt 38 is rotated by a torsion

spring 43 and comes to a stop when the pin has reached the lower end of the slot 42. The tip of the bolt then penetrates into the opening 44 of the vertical frame member 11 of the opposing door, thereby connecting both vertical frame members 2 and 11. On the other hand, the pin 39 is connected with a line 6, which slackens by the above described rotation of the pin, and the securing member 3 is allowed to descend. If, therefore, the door catch is operated so that the end portion is rotated, the securing member moves down and engages with the rotatable shaft.

For unlocking the door, the push button 37 needs only to be turned in the reverse direction, when the pin 39 enters the slot 41 and the bolt 38 slides to the left to a standstill in the original frame opening by means of the torsion spring 43, the rotation of the pin raising the securing member 3 by the line 6. This particular embodiment of the invention provides two securing means, the bolt 38 and the catch 8. This feature makes this arrangement recommendable as a particularly rigid anti-burglar measure.

In another construction the bolt 38 falls short of reaching the opening 44, which therefore may be omitted and only the pin 39 being actuated by the bolt in order to slacken or raise the line. This, obviously, simplifies the structure of the securing member. In addition, the securing member 3 may be applied not only to the rotational shaft of the above-described door catch, but also to the shaft of either a circular catch or a lever catch as well as some other shaft similar to that of the above door catch.

A modification of the securing member is shown in Figure 8. The remainder of the locking device is the same as in Figure 10.

A securing member 73 presents a rectangular transverse cross section as shown in Figure 9, and the flat face 45 thus formed contacts a flattened face 46 of the rotatable end portion 13, of a shaft of circular cross-section, whereby the shaft is prevented from rotating.

WHAT WE CLAIM IS:—

1. A fastening device combined with a pair of doors, one or both of which comprises a hollow vertical frame member, the fastening device comprising a base portion fixed to one or the hollow vertical frame member, a catch rotatably supported on the base portion, a rotatable shaft integral with the catch and rotatable as a unit with the catch and extending through the base portion into the hollow vertical frame member, a catch keeper fixed to a or the vertical frame member of the other door and engageable with the catch, a vertically slideable securing member provided in the

ber 4 described above.

In Figure 7 is shown an actuating means 29 having a pivoting lever 30.

The actuating means 29 is composed of 5 a frame 60 secured to the vertical frame member 2, and a sliding member 35 vertically slidable on the back of the frame; a cylinder 34 is provided on the back side and the line 6 is engaged at the lower side, 10 a second sliding member 33 horizontally slidable inside the cylinder, a compression spring 61 provided between the sliding member 33 and the cylinder 34 and the lever 30 pivoted on a pivot pin 31 on the 15 frame and connected with the sliding member 33 by means of a pin 32. The sliding member 35 is guided vertically between the back side of the frame 60 and pins 62, and the pins are each supported by a bracket 20 63 which is integral with the frame. When the lever is rotated downward or counter-clockwise on the pivot pin 31, the rotation is accompanied by the sliding motion of the sliding member 33 upwardly as well as 25 laterally to the right (as illustrated) inside the cylinder 34 by means of the pin 32, and the sliding member 33 slides the sliding member 35 upwardly.

The lower bent portion 35a of the sliding 30 member 35 is secured to the upper end of the line 6, which accordingly raises the securing member 3, whereby the catch 8 is rotatable as described above. If, on the contrary, the lever 30 is rotated upward, 35 the reverse action will result in moving the sliding member 35 downward while the securing member 3 drops by its own weight, until the free end portion 3 of the rotatable shaft of the catch 8 enters the 40 groove 15, when the rotation of the catch 8 is prevented.

Figures 9 and 10 show another embodiment of this invention where a push-type actuating means 36 is employed.

45 In this embodiment, the actuating means is mounted on the front of the vertical frame member 2 in such a manner that a cylinder 40 with an L-shaped slot is supported in the vertical frame, and the actuating means is equipped with a bolt 38 50 that passes through the cylinder and can be operated by one-touch action.

The securing member 3 is raised above the end portion 13 of the rotatable shaft so 55 that the catch 8 is allowed to rotate and the bolt 38 is retracted.

When a push button 37 is pushed under such a condition, the bolt 38 slides in 60 parallel with a pin 39, connected with the bolt and push button, and the pin moves to the end of a slot 41 aligned with the axial direction of the cylinder 40. When the pin 39 has reached the entrance of a 65 circumferential and downwardly opening slot 42, the bolt 38 is rotated by a torsion

spring 43 and comes to a stop when the pin has reached the lower end of the slot 42. The tip of the bolt then penetrates into the opening 44 of the vertical frame member 11 of the opposing door, thereby connecting both vertical frame members 2 and 11. On the other hand, the pin 39 is connected with a line 6, which slackens by the above described rotation of the pin, and the securing member 3 is allowed to descend. If, therefore, the door catch is operated so that the end portion is rotated, the securing member moves down and engages with the rotatable shaft.

For unlocking the door, the push button 80 37 needs only to be turned in the reverse direction, when the pin 39 enters the slot 41 and the bolt 38 slides to the left to a standstill in the original frame opening by means of the torsion spring 43, the rotation 85 of the pin raising the securing member 3 by the line 6. This particular embodiment of the invention provides two securing means, the bolt 38 and the catch 8. This feature makes this arrangement 90 commendable as a particularly rigid anti-burglar measure.

In another construction the bolt 38 falls 95 short of reaching the opening 44, which therefore may be omitted and only the pin 39 being actuated by the bolt in order to slacken or raise the line. This, obviously, simplifies the structure of the securing member. In addition, the securing member 3 may be applied not only to the rotational 100 shaft of the above-described door catch, but also to the shaft of either a circular catch or a lever catch as well as some other shaft similar to that of the above door catch. 105

A modification of the securing member is shown in Figure 8. The remainder of the locking device is the same as in Figure 10.

A securing member 73 presents a rectangular transverse cross section as shown 110 in Figure 9, and the flat face 45 thus formed contacts a flattened face 46 of the rotatable end portion 13 of a shaft of circular cross-section, whereby the shaft is prevented from rotating. 115

WHAT WE CLAIM IS:—

1. A fastening device combined with a pair of doors, one or both of which comprises a hollow vertical frame member, the fastening device comprising a base portion 120 fixed to one or the hollow vertical frame member, a catch rotatably supported on the base portion, a rotatable shaft integral with the catch and rotatable as a unit with the catch and extending through the base 125 portion into the hollow vertical frame member, a catch keeper fixed to a or the vertical frame member of the other door and engageable with the catch, a vertically slideable securing member provided in the 130



hollow vertical frame member for securing and releasing the catch by engaging or disengaging with the rotatable shaft, an actuating member provided in a or the hollow vertical frame member for sliding the securing member vertically, and a flexible line connecting the actuating member and the securing member.

2. A combination as claimed in Claim 1, wherein the securing member is raised by the actuating member and is lowered under its own weight.

3. A combination as claimed in Claim 2, wherein the securing member engages the rotatable shaft of the door catch at one position and prevents it from rotating thus locking the door.

4. A combination as claimed in Claim 3, wherein the securing member is bifurcated and the rotatable shaft is engaged in a groove between two prongs thereof.

5. A combination as claimed in Claim 3, wherein the securing member has a flat face which engages with a flat face of the rotatable shaft to prevent rotation thereof.

6. A combination as claimed in any preceding claim, wherein the actuating member comprises a slideable member and the upper end of the flexible line is fixed to the slideable member.

7. A combination as claimed in claim 6, wherein the slideable member is moved by rotation of a lever.

8. A combination as claimed in any of claims 1 to 5, wherein the actuating member comprises a frame fixed to the frame hollow vertical member, a first slide slideable vertically within the frame, having a projecting cylinder and connected with the flexible line, a second slide horizontally slideable inside the cylinder, a compression spring provided between the second slide and the cylinder, and a lever pivoted to the frame as well as the second slide, which moves vertically as it moves horizontally in accordance with the rotation of the lever, resulting in the vertical movement of the first slide whereby the line is moved.

9. A combination as claimed in any of claims 1 to 5, wherein the actuating member comprises a cylinder, a bolt provided inside the cylinder in such a manner that it can slide from its withdrawn position to its projecting position, a torsion spring which is located between the bolt and the cylinder and flips the bolt to its withdrawn position, an L-shaped groove in the cylinder, a pin member provided on the bolt and moveable along the groove while changing the position of the bolt, the pin member being connected with the line, whereby the line is moved.

10. A combination as claimed in any preceding claim, further comprising a guide member with a square cross-section provided in the hollow vertical frame member so as to guide the securing member in the vertical direction, the guide member having, on one side, a stepped portion for the fastening screw of the base of the door catch, and another stepped portion for extending an end portion of the rotatable shaft into the guide member.

11. A combination as claimed in any preceding claims, wherein the flexible line is passed over a pulley in the hollow vertical frame member.

12. A combination as claimed in any preceding claim, wherein the flexible line comprises a length of string.

13. A combination as claimed in any of claims 1 to 11, wherein the flexible line comprises a length of wire.

14. A combination as claimed in any of claims 1 to 11, wherein the flexible line comprises a chain.

15. A door fastening device, combined with a pair of doors, substantially as herein described with reference to the accompanying drawings.

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