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HANDLE DEVICE

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

5 This invention relates to a handle device such as a cam-latch handle device in which a handle is pivotably attached on a base.

2. DESCRIPTION OF RELATED ART

Heretofore, a cam-latch type locking mechanism has been known as one of locking mechanisms equipped on a sash window where a sash is assembled in a sash
10 window frame such that sash can be opened and closed.

The locking mechanism comprises a cam-latch handle device in which a handle having a tongue-shaped portion is pivotably attached on a base and a bracket on which the tongue-shaped portion of the handle is engaged in a removable manner.

Then, the base of the cam-latch handle device is fixed on an edge member of the
15 sash and the bracket is fixed on a frame member of a sash window frame. When the sash is closed, it can be locked by pivoting the handle to engage the tongue-shaped portion with the bracket.

Referring now to Fig. 7, there is shown an example of the well-known handle device such as the cam-latch handle device described above (hereinafter, referred to as a
20 first handle device). The first handle device comprises a handle 3 and a base 1, where an axial part 4 extending from the end of the handle 3 is inserted through a hole 2 formed in the base 1. The end 4a of the axial part 4, which is protruded from the opposite side of the base 1 is riveted such that the handle 1 is pivotably secured on the base 1 without becoming pulled out.

25 Referring now to Fig. 8; on the other hand, there is shown another example of the well-known handle device (hereinafter, referred to as a second handle device). In the second handle device, an axial part 4 of an handle 3 is inserted through a hole 2 of a base 1 and a washer 5 is fixed on a tip end surface 4b of the axial part 4 by a screw 6 such that

the handle 3 is pivotably secured on the base 1 without becoming pulled out.

In the first handle device, the axial part 4 is worked so as to have a smaller diameter as far as possible to easily rivet the end of the axial part 4.

Therefore, the strength of the axial part 4 may be poor when the axial part 4 is
5 integrally formed on the handle 3. In this case, there is a possibility that the axial part 4 is damaged when the handle 3 is inadequately pivoted to cause a bending stress on the axial part 4.

For preventing such a trouble, there is an idea of providing the axial part 4 made of a material having a strength higher than that of the handle 3. Such an axial part 4 is
10 fitted in an opening of the handle 3, so that the axial part 4 can be prevented from damaging even though the axial part 4 is of a small diameter.

In this case, however, the manufacturing cost can be increased, compared with the case in which the axial part 4 is integrally formed on the handle 3.

In the case of the second handle device described above, the axial part 4 may be
15 of having a large diameter, compared with the first second handle device. In this case, however, there is a possibility that the screw becomes loosed because the axial part 4 rotates as the handle 3 pivots on the base 1. Therefore, there is a need of any means to prevent the screw 6 from loosing.

Furthermore, if there is a clearance between the axial part 4 and the hole 2 of the
20 base 1, the handle 3 rattles in the base 1. Therefore, there is a need of finishing the axial part 4 and the hole 2 of the base more accurately to prevent the generation of rattle. However, such an accurate processing is very time-consuming job.

SUMMARY OF THE INVENTION

25 The present invention has been accomplished in consideration of the above problems. Therefore, an object of the present invention is to provide a handle assembly that satisfies the conditions in which an axial part of a handle can be easily riveted, the axial part can be prevented from damaging, there is no need to provide any means to

prevent a screw from rattling, the price of the handle assembly can be cheap, a handle does not rattle in a hole of a base even though the axial part and the hole of the base and the axial part are not subject to a high accurate processing.

According to the first invention, there is provided a handle device comprising: a
5 base 20 having a handle-installing hole 21; and a handle 30 integrally provided with an axial part 31 in the shape of a tube passing through the handle-installing hole 21 of the axial part 31 in a rotatable manner, wherein a protruded portion 31a of the axial part 31 protruded from the handle-installing hole 21 of the axial part 31 is crimped such that the axial part 31 cannot be pulled out of the handle-installing hole 21, and a reinforcing screw
10 32 is screwed in the inside of the axial part 31, where the screw 32 is tightened in the axial part 31.

As the protruded portion 31a of the tubular axial part 31 is crimped, so that the cross-sectional area of the part to be actually crimped can be smaller than the cross-sectional area commensurate with the outer diameter of the axial part 31.

15 Also, the tubular axial part 31 is reinforced using the reinforcing screw 32, so that there is no possibility of damaging the axial part 31.

Furthermore, the axial part 31 is integrally formed on the handle 30, so that the manufacturing cost thereof can be decreased.

The screw 32 is tightened in the axial part 31, so that there is no possibility that
20 the screw 32 becomes loosed by the pivotal movement of the handle 30 and thus there is no need of any means to prevent the screw 32 from loosening.

The protruded portion 31a of the axial part 31 is crimped, so that the outer peripheral surface of the axial part 31 and the inner peripheral surface of the hole 2 of the base 1 are contacted with each other without clearance even though the handle 30 rattles in
25 the base 1. Thus, there is no need of finishing the axial part 31 and the handle-installing hole 21 to prevent the generation of rattle with handle 30.

According to the second invention, in the handle device of the first invention, the axial part 31 in the shape of a tube may have a tip end surface in which a tip portion

hole 34 is formed and a proximal end in which a proximal threaded hole 35 is formed so as to be continuously extended from the tip portion hole 34, and the diameter of the tip portion hole 34 is larger than the diameter of the proximal threaded hole 35.

Accordingly, the radial thickness of the crimping portion of the axial part 31 is thinner than that of the portion to be screwed, so that the crimping can be more easily carried out.

In addition, there is no deformation of the threaded hole 35 in the proximal end of the axial part 31 and so on when the protruded portion 31a is crimped. Therefore, the screw 32 can be smoothly screwed in the proximal threaded hole 35 without fault.

According to the third invention, in the handle device of the second invention, the reinforcing screw 32 may be screwed in the proximal threaded hole 35 and the head portion 32a of the screw 32 is contacted with the crimped portion of the axial part 31.

Accordingly, the reinforcing screw 32 is screwed in the proximal threaded hole 35 and the head portion 32a thereof comes in contact with the crimped portion to tightly fasten the screw 32 in the axial part 31.

Furthermore, the crimped portion is reinforced by the head portion 32a of the screw 32, so that there is no possibility of damaging the crimped portion.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a transverse cross sectional diagram of a sash window having a locking mechanism in accordance with a preferred embodiment of the present invention;

Fig. 2 is a front diagram of the locking mechanism shown in Fig. 1;

Fig. 3 is a cross-sectional diagram of a cam-latch handle device;

Fig. 4 is an exploded perspective diagram of the cam-latch handle device;

Fig. 5 is an enlarged cross-sectional diagram of an attached portion between a base and a handle in the cam-latch handle device shown in Fig. 3;

Fig. 6 is a cross-sectional diagram viewed along the line A-A in Fig. 5;

Fig. 7 is a cross-sectional diagram of an attached portion between a base and a

handle in a first conventional example; and

Fig. 8 is a cross-sectional diagram of an attached portion between a base and a handle in a second conventional example.

5 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)**

A locking mechanism as a first preferred embodiment of the invention is shown in Fig. 1 and Fig. 2. As shown in the figures, the locking mechanism 12 of this embodiment is of a cam-latch type and is comprised of two parts attached on a sash 10 and a sash frame 11 of a sash window, respectively. In this embodiment, the sash window
10 is a vertical sliding window.

The locking mechanism 12 comprises a cam-latch handle device 12a and a bracket 12b. The cam-latch handle device 12a is attached on a vertical edge member 10a of a sash 10, while the bracket 12b is attached on a vertical frame portion 11a of a sash window frame 11.

15 The cam-latch handle device 12a comprises a base 20 and a handle 30. The handle 30 is pivotably attached on the base 20. In addition, the base 20 is secured on the vertical edge member 10a.

The handle 30 has a tongue-shaped portion 30a. As shown in Fig. 2, the tongue-shaped portion 30a can be engaged with the bracket 12b for locking the sash 10.
20 When the handle 30 in a state of being locked as shown in Fig. 2 is pivoted along the arrow "a" from (represented by a solid line), the handle 30 is shifted to a state of being unlocked (represented by a phantom line in the figure) so that the tongue-shaped portion 30a is detached from the bracket 12b to unlock the sash 10.

Referring now to each of Fig. 3 and Fig. 4, there is shown a concrete
25 configuration of the cam-latch handle device 12a.

The base 20 comprises a hole 21 for installing the handle 30 on the base 20 and holes 22 for securing the base 20 on the vertical edge member 10a. In other words, the base 20 can be secured on the vertical edge member 10a using screws 23 through the holes

22 in the base 20.

As shown in Fig. 3 and Fig. 4, furthermore, screw covers 24 are mounted on the base 20 to cover the respective screws 23.

In this embodiment, an axial part 31 is integrally formed on the end of the handle
5 30. The end 31a of the axial part 31 passes through the hole 21 and is protruded from the surface of the base 20. Such a protruded end 31a of the axial part 31 is crimped so that the axial part 31 cannot be pulled out of the hole 21 while being pivotable. In addition, the peripheral surface of the axial part 31 contacts with the inner peripheral surface of the hole 21 without clearance.

10 Therefore, the handle 30 is pivotably secured on the base 20 without a possibility of coming out thereof. In addition, the handle 30 cannot be rattled.

The axial part 31 of the handle 30 is shaped like a tube, so that the cross-sectional area of the part to be actually crimped can be smaller than the cross-sectional area commensurate with the outer diameter of the axial part 31.

15 Therefore, such a tubular axial part 31 can be easily crimped even though the diameter of the axial part 31 is large enough to increase the strength thereof.

In the inside of the tubular axial part 31, a screw 32 is fastened in the axial part 31. The axial part 31 can be reinforced with the screw 32, so that the strength of the tubular axial part 31 is substantially the same as the strength of the solid axial part.

20 Furthermore, if the screw is made of a material with a strength higher than that of the axial part 31, the strength of the axial part 31 with the screw 32 becomes not less than the strength of the solid axial part.

Therefore, even if the handle 30 is forcefully turned, the axial part 31 can be hardly damaged as the strength of the axial part 31 is reinforced.

25 In addition, the screw 32 does not work loose as the screw 32 rotates together with the axial part 31.

Referring now to Fig. 5, there is shown an attached portion between the base 20 and the handle 30 which will be described below in detail.

As shown in the figure, the base 20 has a surface 20a which can be secured on the vertical edge member 10a of the sash 10 and an opposite surface 20b on which the handle 30 can be attached. In addition, a recessed portion 25 is formed in the surface 20a of the base 20. Also, the hole 21 is defined by the bottom surface 24a of the recessed portion 25 and the surface 20b so that the axial part 31 of the handle 21 can be fitted in the hole 21.

A part of the inner peripheral surface of the handle-installing hole 21 is notched in the peripheral direction to provide a notched portion 26 as an additional space opened to the surface 20b. As shown in Fig. 6, viewing from the handle's side, the notched portion 26 is shaped like a circular arc.

Furthermore, the axial part 31 has a protruded portion 33 that extends from a part of the outer peripheral surface thereof in the radial direction. In addition, the protruded portion 31 is allowed to move along the notched portion 26 without restraint. Therefore, the combination of the protruded portion 33 and the notched portion 26 forms a handle stopper that restricts the maximum extent of the pivoting angle of the handle 30.

For instance, when the protruded portion 33 comes into contact to one end surface 26a of the notched portion 26 as shown in Fig. 6, the pivotal movement of the handle 30 in one direction is restricted to allow the engagement between the tongue-shaped portion 30a and the bracket 12b as shown in Fig. 2. On the other hand, when the handle 30 is reversely pivoted almost 90 degrees from this state (i.e., in the direction indicated by the arrow a in Fig. 2), the protruded portion 33 comes into contact to the other end surface 26b of the notched portion 26 and the pivotal movement of the handle 30 in the other direction is restricted.

Before the installation, the axial part 31 of the handle 30 is of a tubular shape as represented by phantom lines in Fig. 4 and Fig. 5. That is, the axial part 31 has a tip end hole 34 formed in the tip end surface 31b thereof and a proximal threaded hole 35 coaxially extended from the hole 34. The diameter of the tip end hole 34 is larger than that of the proximal threaded hole 35.

Therefore, the radial thickness of the tip portion of the axial part 31 is thinner than the radial thickness of the proximal end portion on which the threaded hole 35 is formed. The tip portion of the axial part 31 protrudes from the hole 21, so that such a protruded portion 31a can be easily crimped as described above.

5 Furthermore, there is no deformation of the threaded hole 35 in the proximal end of the axial part 31 when the protruded portion 31a is crimped. Therefore, the screw 32 for the reinforcement can be smoothly screwed in the proximal threaded hole 35 without fault.

Furthermore, the proximal threaded hole 35 may be used as an insertion hole for a crimping jig to be used for crimping the protruded portion of the axial part 31. Thus, the crimping can be performed using the crimping jig.

The screw 32 is screwed in the proximal threaded hole 35 and the head portion 32a thereof is contacted with the crimped portion and the screw 32 is tightened on the axial part 31. Therefore, the crimped portion can be reinforced, so that the crimped portion cannot be damaged.

15 As shown in Fig. 5, the crimped portion (protruded portion 31a) of the axial part 31 is pressed against the base 20 (i.e., the bottom surface 25a of the recessed portion 25) through a first washer 36 made of a resin and a second washer 37 made of a stainless steel.

The handle-mounting surface 20b of the base 20 and the handle 30 are contacted with each other through a washer 38 made of a resin.

20 Therefore, the handle 30 can be easily pivoted on the base 20.

In the above embodiments, the com-latch handle device has been described. According to the present invention, however, the handle device is not limited to such a com-latch type. Alternatively, any handle device in which a handle is pivotably attached on a base may be used as a matter of course.

WHAT IS CLAIMED IS:

1. A handle device, comprising:

a base 20 having a handle-installing hole 21; and

5 a handle 30 integrally provided with an axial part 31 in the shape of a tube passing through the handle-installing hole 21 of the axial part 31 in a rotatable manner, wherein

a protruded portion 31a of the axial part 31, which is protruded from the handle-installing hole 21 of the axial part 31, is crimped such that the axial part 31 cannot be
10 pulled out of the handle-installing hole 21, and

a reinforcing screw 32 is screwed in the inside of the axial part 31, where the screw 32 is tightened in the axial part 31.

2. A handle device as claimed in Claim 1, wherein

15 the axial part 31 in the shape of a tube has a tip end surface in which a tip portion hole 34 is formed and a proximal end in which a proximal threaded hole 35 is formed so as to be continuously extended from the tip portion hole 34, and

the diameter of the tip portion hole 34 is larger than the diameter of the proximal threaded hole 35.

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3. A handle device as claimed in Claim 2, wherein

the reinforcing screw 32 is screwed in the proximal threaded hole 35 and the head portion 32a of the screw 32 is contacted with the crimped portion of the axial part 31.

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