

WINDOW HINGE

TECHNICAL FIELD

The present disclosure relates to the field of hinge structures, and particularly, to a window hinge.

BACKGROUND

In recent years, American plastic door and window systems inherit the advantages of European doors and windows, wherein for the windows, window sashes may be opened or closed from positions in contact with window frames, and more particularly, the window sashes can rotate about edges of the window frames at a certain angle for a number of times under an action of an external force, so that the purpose of opening or closing the window sashes is achieved. However, the window sashes and the window frames are directly connected by hinges.

A common window hinge includes a sliding rail, which is fixed on a window frame; a pulling rod, which is fixed on a window sash; a sliding portion, which is mounted within the sliding rail and is capable of sliding; a first connecting plate, one end of which is rotatably fixed on the sliding portion and the other end of which is rotatably fixed at one end of the pulling rod; a second connecting plate, one end of which is rotatably fixed on an end portion of the sliding rail and the other end of which is rotatably fixed to the middle of the pulling rod; a third connecting plate, one end of which is rotatably fixed on the sliding portion and the other end of which is rotatably fixed to the middle of the second connecting plate; and a hinge wrap angle portion, which is fixed on an end portion of the sliding rail by mechanical punching riveting.

Generally, an end portion, which is in contact with the hinge wrap angle portion, of the pulling rod has a triangular tip. The triangular tip abuts against the hinge wrap angle portion when the pulling rod is closed, so that a certain fixed pre-tightening force is generated between the hinge wrap angle portion and the pulling rod. However, when the pulling rod abuts against the hinge wrap angle portion, the pulling rod will impact the hinge wrap angle

portion, and further the hinge wrap angle portion upwards inclines and deforms.

In a window hinge, a manufacturing method of the window hinge, and a window using the window hinge which are disclosed in Chinese patent CN105317304B, as well as a casement window hinge, a manufacturing method of the casement window, and a casement window using the casement window hinge which are disclosed in Chinese patent CN107503605A, the problem that the hinge wrap angle portion upwards inclines and deforms due to an impact force is avoided by increasing a fixing force between the hinge wrap angle portion and the sliding rail. However, such a method cannot solve the problem fundamentally. As the use time increases, the hinge wrap angle portion will incline upwards, deform or even loosen.

SUMMARY

In order to solve the above problems, the present disclosure provides a window hinge, which may fundamentally solve the problem that a pulling rod impacts a hinge wrap angle portion, and the hinge wrap angle portion is prevented from upwards inclining, deforming or even loosening, so that the service life of the hinge wrap angle portion is prolonged.

The present disclosure is achieved by the following technical solution.

The present disclosure provides a window hinge, including a sliding rail, which is fixed on a window frame; a pulling rod, which is fixed on a window sash; a hinge wrap angle portion, which is fixed at one end of the sliding rail; a sliding portion, which is mounted within the sliding rail and is capable of sliding; and a connecting rod, one end of which is hinged with the pulling rod and the other end of which is hinged with the sliding portion. A fixing portion is clamped at a position in which the connecting rod is hinged with the pulling rod. The pulling rod and the fixing portion both angularly move relative to the sliding rail when the sliding portion slides. Moreover, during the angular movement, the fixing portion swings relative to the pulling rod, the pulling rod never contacts the hinge wrap angle portion, and when the pulling rod and the sliding rail are in a closed state, one end of the fixing portion abuts against the hinge wrap angle portion.

Further, the fixing portion is provided with a first wrapping edge and a second wrapping edge which wrap two sides of the pulling rod respectively, and a gap is provided between the first wrapping edge or the second wrapping edge and a side portion of the pulling rod.

Further, when the pulling rod and the fixing portion angularly move relative to the sliding rail, the gap allows the fixing portion to swing relative to the pulling rod.

Further, the fixing portion includes a first side portion and a second side portion, and a fixing point is provided at an intersection of the first side portion and the second side portion.

Further, the hinge wrap angle portion includes a first surface, a second surface, and an arc-shaped surface connecting the first surface and the second surface.

Further, when the pulling rod and the sliding rail are in the closed state, the fixing point completely fits the arc-shaped surface.

Further, a first angle is provided between the first side portion and the second side portion, a second angle is provided between the first surface and the second surface, and the first angle is smaller than the second angle.

Further, when the pulling rod and the fixing portion angularly move towards the second surface relative to the sliding rail, the fixing portion firstly abuts against the first surface, then abuts against the second surface, and finally separates from the second surface.

Further, when the pulling rod and the fixing portion angularly move towards the first surface relative to the sliding rail, the fixing portion firstly abuts against the second surface, then abuts against the first surface, and finally separates from the first surface.

Further, when the pulling rod and the fixing portion angularly move relative to the sliding rail to ensure that the pulling rod is closed relative to the sliding rail, the fixing portion starts to abut against the first surface or the second surface, and finally the fixing point completely

fits the arc-shaped surface.

The present disclosure has the following beneficial effects.

The window hinge provided by the present disclosure includes the sliding rail, which is fixed on the window frame; the pulling rod, which is fixed on the window sash; the hinge wrap angle portion, which is fixed at one end of the sliding rail; the sliding portion, which is mounted within the sliding rail and is capable of sliding; and the connecting rod, one end of which is hinged with the pulling rod and the other end of which is hinged with the sliding portion. The fixing portion is clamped at the position in which the connecting rod is hinged with the pulling rod. The pulling rod and the fixing portion both angularly move relative to the sliding rail when the sliding portion slides. Moreover, during the angular movement, the fixing portion swings relative to the pulling rod, the pulling rod never contacts the hinge wrap angle portion, and when the pulling rod and the sliding rail are in the closed state, one end of the fixing portion abuts against the hinge wrap angle portion. By means of the window hinge provided by the present disclosure, the problem that the pulling rod impacts the hinge wrap angle portion may be fundamentally solved, and the hinge wrap angle portion is prevented from upwards inclining, deforming, or even loosening, so that the service life of the hinge wrap angle portion is prolonged.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram showing a structure when a pulling rod of a window hinge according to the present disclosure is extended;

FIG. 2 is a schematic diagram showing a structure when a pulling rod of a window hinge according to the present disclosure is closed;

FIG. 3 is a schematic cross-sectional diagram showing a structure when a pulling rod of a window hinge according to the present disclosure is extended;

FIG. 4 is a schematic diagram showing a structure of a fixing portion of a window hinge according to the present disclosure; and

FIG. 5 is a schematic diagram showing a structure of a hinge wrap angle portion of a window

hinge according to the present disclosure.

DETAILED DESCRIPTION

In order to explain the technical solution of the present disclosure more clearly and completely, the present disclosure will be further described below in conjunction with accompanying drawings.

With reference to FIG. 1 to FIG. 5, the present disclosure provides a window hinge, including a sliding rail 1, which is fixed on a window frame; a pulling rod 2, which is fixed on a window sash; a hinge wrap angle portion 3, which is fixed at one end of the sliding rail 1; a sliding portion 4, which is mounted within the sliding rail 1 and is capable of sliding; and a connecting rod 5, one end of which is hinged with the pulling rod 2 and the other end of which is hinged with the sliding portion 4. A fixing portion 6 is clamped at a position in which the connecting rod 5 is hinged with the pulling rod 2. The pulling rod 2 and the fixing portion 6 both angularly move relative to the sliding rail 1 when the sliding portion 4 slides. Moreover, during the angular movement, the fixing portion 6 swings relative to the pulling rod 2, the pulling rod 2 never contacts the hinge wrap angle portion 3, and when the pulling rod 2 and the sliding rail 1 are in a closed state, one end of the fixing portion 6 abuts against the hinge wrap angle portion 3.

In this embodiment, the present disclosure achieves hinging by means of a rivet connection. In this embodiment, a top end surface of the pulling rod 2 is of a circular arc shape, and a top end surface of the fixing portion 6 is of a triangular mouth shape.

In this embodiment, in a process that the pulling rod 2 and the fixing portion 6 both angularly move relative to the sliding rail 1, each time the pulling rod 2 is switched between a closed state and an extended state, the fixing portion 6 may swing relative to the pulling rod 2.

Further, the fixing portion 6 is provided with a first wrapping edge 60 and a second wrapping edge 61 which wrap two sides of the pulling rod 2 respectively, and a gap 62 is provided

between the first wrapping edge 60 or the second wrapping edge 61 and a side portion of the pulling rod 2.

In this embodiment, a spacing between the first wrapping edge 60 and the second wrapping edge 61 is greater than that between two side portions of the pulling rod 2, such that when the pulling rod 2 is positioned between the first wrapping edge 60 and the second wrapping edge 61, the gap 62 is provided between the first wrapping edge 60 or the second wrapping edge 61 and the side portion of the pulling rod 2. Preferably, for attractive appearance, the height of the first wrapping edge 60 and the second wrapping edge 61 is equal to the thickness of the pulling rod 2. Certainly, in other embodiments, the height of the first wrapping edge 60 and the second wrapping edge 61 may be designed to be greater or smaller than the thickness of the pulling rod 2, and this falls within the scope of protection of the present disclosure.

Further, when the pulling rod 2 and the fixing portion 6 angularly move relative to the sliding rail 1, the gap 62 allows the fixing portion 6 to swing relative to the pulling rod 2.

Further, the fixing portion 6 includes a first side portion 63 and a second side portion 64, and a fixing point 65 is provided at an intersection of the first side portion 63 and the second side portion 64.

Further, the hinge wrap angle portion 3 includes a first surface 30, a second surface 31, and an arc-shaped surface 32 connecting the first surface 30 and the second surface 31.

Further, when the pulling rod 2 and the sliding rail 1 are in the closed state, the fixing point 65 completely fits the arc-shaped surface 32. At this time, the fixing point 65 completely abuts against the arc-shaped surface 32, such that a certain fixed pre-tightening force is generated between the hinge wrap angle portion 3 and the pulling rod 2.

Further, a first angle is provided between the first side portion 63 and the second side portion 64, a second angle is provided between the first surface 30 and the second surface 31, and

the first angle is smaller than the second angle.

In this embodiment, when the pulling rod 2 is closed relative to the hinge wrap angle portion 3, the second angle is positioned outside the first angle, and the second angle must be greater than the first angle. In this way, it is possible to ensure that the fixing point 65 of the fixing portion 6 is positioned within the arc-shaped surface 32 of the hinge wrap angle portion 3.

Further, when the pulling rod 2 and the fixing portion 3 angularly move towards the second surface 31 relative to the sliding rail 1, the fixing portion 6 firstly abuts against the first surface 30, then abuts against the second surface 31, and finally separates from the second surface 31.

In this embodiment, the pulling rod 2 may be switched into an extended state from a closed state along two directions. When the pulling rod 2 and the fixing portion 6 angularly move towards the second surface 31 relative to the sliding rail 1, the fixing point 65 of the fixing portion 6 firstly separates from the arc-shaped surface 32, and further the fixing portion 6 firstly abuts against the first surface 30. At this time, the pulling rod 2 slowly approaches the second wrapping edge 61, and then abuts against the second wrapping edge 61, such that the gap 62 is provided between the first wrapping edge 60 and the pulling rod 2. The pulling rod 2 and the fixing portion 6 are not in the same center line, that is, the fixing portion 6 swings once relative to the pulling rod 2. Subsequently, the fixing portion 6 separates from the first surface 30, and then the fixing portion 6 abuts against the second surface 31. The gap 62 is provided between the first wrapping edge 60 and the pulling rod 2, until the fixing portion 6 finally separates from the second surface 31 to maintain the pulling rod 2 to be in the extended state.

Further, when the pulling rod 2 and the fixing portion 6 angularly move towards the first surface 30 relative to the sliding rail 1, the fixing portion 6 firstly abuts against the second surface 31, then abuts against the first surface 30, and finally separates from the first surface 30.

In this embodiment, the pulling rod 2 may be switched to the extended state from the closed state. When the pulling rod 2 and the fixing portion 6 angularly move towards the first surface 30 relative to the sliding rail 1, the fixing point 65 of the fixing portion 6 firstly separates from the arc-shaped surface 32, and further the fixing portion 6 firstly abuts against the second surface 31. At this time, the pulling rod 2 slowly approaches the first wrapping edge 60, and then abuts against the first wrapping edge 60, such that the gap 62 is provided between the second wrapping edge 61 and the pulling rod 2. The pulling rod 2 and the fixing portion 6 are not in the same center line, that is, the fixing portion 6 swings once relative to the pulling rod 2. Subsequently, the fixing portion 6 separates from the second surface 31, and then the fixing portion 6 abuts against the first surface 30. The gap 62 is provided between the second wrapping edge 61 and the pulling rod 2, until the fixing portion 6 finally separates from the first surface 30 to maintain the pulling rod 2 to be in the extended state.

Further, when the pulling rod 2 and the fixing portion 6 angularly move relative to the sliding rail 1 to ensure that the pulling rod 2 is closed relative to the sliding rail 1, the fixing portion 6 starts to abut against the first surface 30 or the second surface 31, and finally the fixing point 65 completely fits the arc-shaped surface 32.

In this embodiment, the pulling rod 2 may be switched to the closed state from the extended state along two directions. When the pulling rod 2 and the fixing portion 6 angularly move towards the second surface 31 relative to the sliding rail 1, in a process that the fixing portion 6 moves towards the second surface 31, at this time the pulling rod 2 separates from the second wrapping edge 61 and starts to abut against the first wrapping edge 60, and then the fixing portion 6 starts to abut against the second surface 31, and the fixing point 65 completely fits the arc-shaped surface 32 by means of an inclination along the second surface 31. The gap 62 is provided between the second wrapping edge 61 and the pulling rod 2.

In this embodiment, the pulling rod 2 may be switched to the closed state from the extended state along two directions. When the pulling rod 2 and the fixing portion 6 angularly move

towards the first surface 30 relative to the sliding rail 1, in a process that the fixing portion 6 moves towards the first surface 30, at this time the pulling rod 2 separates from the second wrapping edge 60 and starts to abut against the second wrapping edge 61, and then the fixing portion 6 starts to abut against the first surface 30, and the fixing point 65 completely fits the arc-shaped surface 32 by means of an inclination along the first surface 30. The gap 62 is provided between the first wrapping edge 60 and the pulling rod 2.

In this embodiment, since the fixing portion 6 is clamped at the position in which the connecting rod 5 is hinged with the pulling rod 5, in a process that the pulling rod 2 and the fixing portion 6 both angularly move relative to the sliding rail 1, each time the pulling rod is switched between the closed state and the extended state, the fixing portion 6 may swing relative to the pulling rod 2. The fixing portion 6 performing swinging prevents the fixing portion 6 from directly impacting the hinge wrap angle portion 3.

By means of the window hinge provided by the present disclosure, the problem that the pulling rod 2 impacts the hinge wrap angle portion 3 may be fundamentally solved, and the hinge wrap angle portion 3 is prevented from upwards inclining, deforming, or even loosening, so that the service life of the hinge wrap angle portion 3 is prolonged.

Certainly, the present disclosure may have many other embodiments. Based on this embodiment, other embodiments obtained by those ordinarily skilled in the art without any creative efforts fall within the scope of protection of the present disclosure.

CLAIMS

1. A window hinge, comprising a sliding rail, which is fixed on a window frame; a pulling rod, which is fixed on a window sash; a hinge wrap angle portion, which is fixed at one end of the sliding rail; a sliding portion, which is mounted within the sliding rail and is capable of sliding; and a connecting rod, one end of which is hinged with the pulling rod and the other end of which is hinged with the sliding portion, wherein a fixing portion is clamped at a position in which the connecting rod is hinged with the pulling rod; the pulling rod and the fixing portion both angularly move relative to the sliding rail when the sliding portion slides; and moreover, during the angular movement, the fixing portion swings relative to the pulling rod, the pulling rod never contacts the hinge wrap angle portion, and when the pulling rod and the sliding rail are in a closed state, one end of the fixing portion abuts against the hinge wrap angle portion.

2. The window hinge according to claim 1, wherein the fixing portion is provided with a first wrapping edge and a second wrapping edge which wrap two sides of the pulling rod respectively, and a gap is provided between the first wrapping edge or the second wrapping edge and a side portion of the pulling rod.

3. The window hinge according to claim 2, wherein when the pulling rod and the fixing portion angularly move relative to the sliding rail, the gap allows the fixing portion to swing relative to the pulling rod.

4. The window hinge according to claim 2, wherein the fixing portion comprises a first side portion and a second side portion, and a fixing point is provided at an intersection of the first side portion and the second side portion.

5. The window hinge according to claim 4, wherein the hinge wrap angle portion comprises a first surface, a second surface, and an arc-shaped surface connecting the first

surface and the second surface.

6. The window hinge according to claim 5, wherein when the pulling rod and the sliding rail are in the closed state, the fixing point completely fits the arc-shaped surface.

7. The window hinge according to claim 5, wherein a first angle is provided between the first side portion and the second side portion, a second angle is provided between the first surface and the second surface, and the first angle is smaller than the second angle.

8. The window hinge according to claim 5, wherein when the pulling rod and the fixing portion angularly move towards the second surface relative to the sliding rail, the fixing portion firstly abuts against the first surface, then abuts against the second surface, and finally separates from the second surface.

9. The window hinge according to claim 5, wherein when the pulling rod and the fixing portion angularly move towards the first surface relative to the sliding rail, the fixing portion firstly abuts against the second surface, then abuts against the first surface, and finally separates from the first surface.

10. The window hinge according to claim 5, wherein when the pulling rod and the fixing portion angularly move relative to the sliding rail to ensure that the pulling rod is closed relative to the sliding rail, the fixing portion starts to abut against the first surface or the second surface, and finally the fixing point completely fits the arc-shaped surface.