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VENETIAN BLIND TILTER MECHANISM

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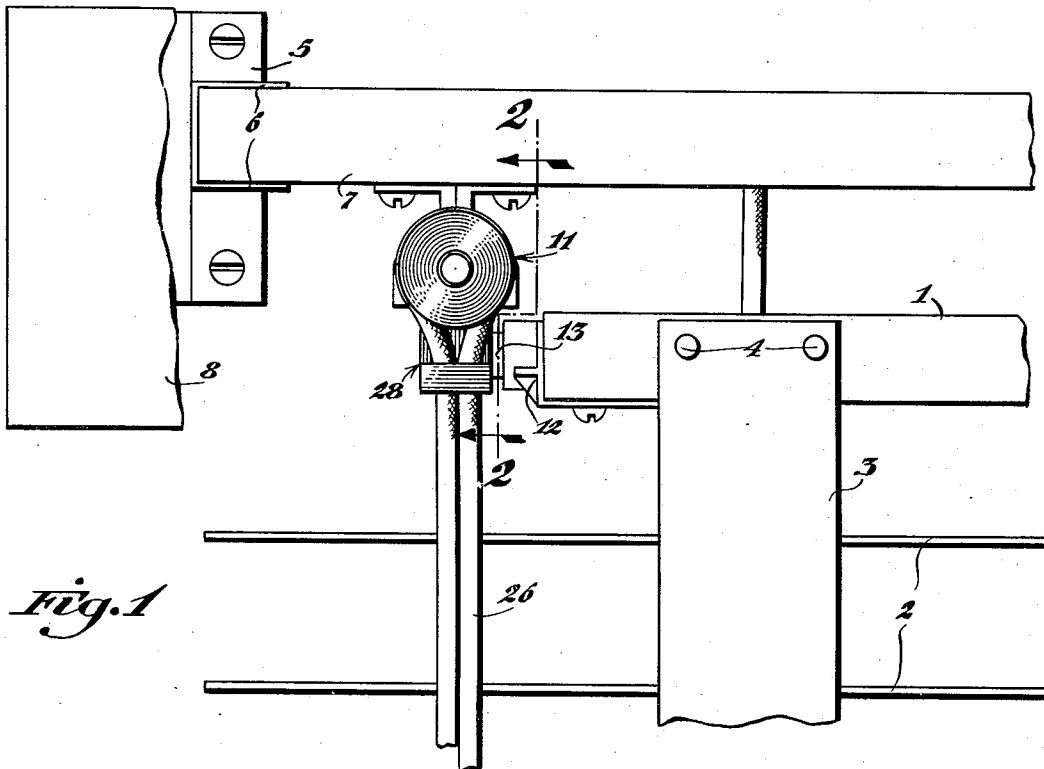


Fig. 1

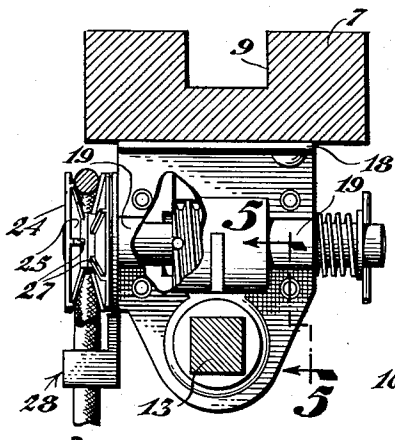


Fig. 2

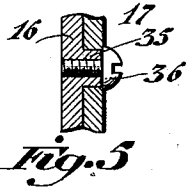


Fig. 5

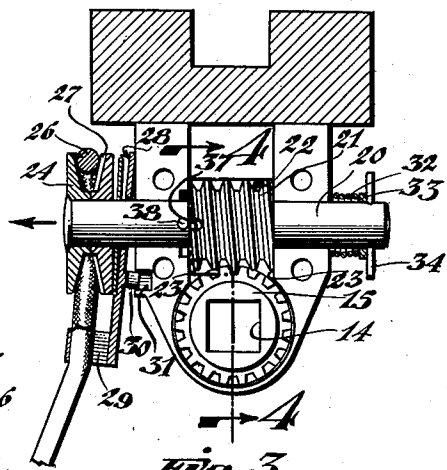


Fig. 3

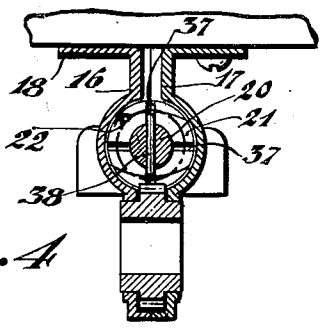


Fig. 4

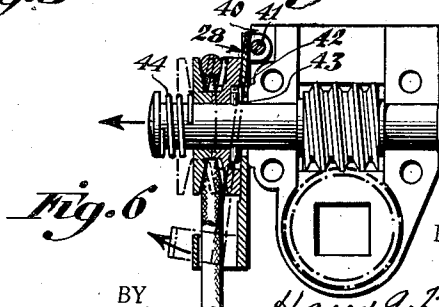


Fig. 6

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UNITED STATES PATENT OFFICE

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VENETIAN BLIND TILTER MECHANISM

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15 Claims. (Cl. 156—17)

This invention relates to improvements in devices for tilting the slats of Venetian blinds. Such tilters are operated by a pair of cords which hang from the operating mechanism at the head of the blind. By pulling one of the cords, the slats of the blind are tilted so that a greater amount of light may pass intermediate the slats, and by pulling on the other cord, the slats are moved in the other direction to decrease the amount of light.

In the usual structure, the slats of which the blind is comprised, are carried on ladder-type tapes which are suspended from a head rail, and the head rail itself is interconnected with the tilting mechanism for tilting adjustment.

In the conventional tilter mechanism the operating cords engage a pulley wheel for rotation of the wheel upon adjustment of the cords. One of the principal difficulties exhibited by the conventional blind tilting devices has been the tendency of the operating cords to slip or creep because of improper traction with the pulley, with the result that, after a short period of usage of the blinds, the cords have become displaced so badly that the tilt bar cannot be operated through its full range. Ordinarily, the two operating cords are of equal length when the tilt bar is in a substantially horizontal position, but due to slippage or creepage or both, one of the cords eventually becomes so short, relative to the operating mechanism, that it is impossible to move it a distance requisite for full tilting action. For instance, the knob on the shorter cord will hit the pulley to limit its travel. Besides this difficulty, a blind in which the tilting cords are not of approximately even length is quite unsightly.

To correct the conditions and to reestablish the position of the cords, it has been necessary to disassemble the tilting mechanism, or otherwise tediously work the cord back over the pulley by hand without operating the tilting mechanism. Either task is a substantial nuisance.

Various devices have been proposed in the past for snubbing the operating cords in such a manner that creepage or slippage of them is substantially impossible. However, devices of this nature are complex, quite cumbersome in size and quite expensive to construct. They have not been a satisfactory solution to the problem.

Recognizing the inherent tendency of a cord operating upon a pulley to slip and creep over a period of usage, the object of the present invention has been to provide a simple inexpensive device for adjusting the cord after it has slipped, so as to restore the cord to its proper position.

Otherwise expressed, the principal object of the present invention has been to improve the tilter mechanism by constructing it in such a manner that the cord may be shifted along its length without affecting the position of the tilting mechanism or the head rail associated with it. More specifically, the object of the invention has been to provide a tilter mechanism comprising means for divorcing the pulley from the tilter members, in order that, as the occasion arises, the pulley may be freed to rotate when one or the other of the operating cords is pulled, whereby the position of the cords may be corrected without causing the tilting action to take place.

Still more specifically, the objective of the invention has been to provide a clutch mechanism which, in one position, interconnects the pulley and the operating mechanism for tilting action when the pulley cords are operated, and which, in another position, disconnects or otherwise divorces the pulley from the operating mechanism for movement of the pulley of the cord independently of the tilting members.

The present invention is disclosed particularly in relation to a tilting device of the type conventionally used in Venetian blinds. The pulley of such an apparatus is carried on a rotatable shaft and a worm is carried by the shaft for engagement with a worm wheel. The latter member is interconnected with the head rail of the blind and when the pulley wheel is rotated, therefore, the head rail is tilted or rotated. In the tilting apparatus, the worm is keyed to the shaft and the pulley member is provided with facets in its groove, or other friction members adapted to prevent the slippage of the cord as far as possible.

Briefly, the present invention, in a preferred embodiment, contemplates a mechanism in which a clutch is provided for interconnecting the worm and the pulley or the shaft on which it is carried, and the pulley is arranged to be moved laterally for engagement and disengagement of the clutch. The pulley is divorced from the tilting worm when the clutch is disengaged through lateral movement of the pulley, whereupon it is rotatable independently of the worm. When the pulley is moved to another lateral position the clutch interconnects the worm and the pulley so that the two are movable in unison for tilting action. The clutch may be installed in the mechanism at various positions; in a typical structure, the worm may be free to rotate on the pulley shaft and the clutch arranged to effect engagement and disengagement of the shaft with the worm. In another typical modification the worm may be

keyed to the shaft and the clutch provided intermediate the pulley and the shaft for similar operation.

In the preferred structure the shaft is moved to a clutch disengaging position simply by pulling angularly outwardly upon the pulley cords, and is returned to clutch engaging position by a spring which operates as soon as the outward pull is released. In this arrangement, the clutch normally connects the worm and pulley. By pulling downwardly upon one of the cords or the other, the blind slats are tilted; by pulling downwardly and outwardly upon the cords, and moving either one of them, the pulley may be operated independently of the tilter mechanism for positioning the cords with respect to one another.

As an alternative or modification, those skilled in the art will understand that the clutch may normally be disengaged, in which event, an outward pull upon the cords with respect to the pulley is necessary to effect the tilting adjustment. This adjustment is perhaps not as desirable as the other since most people are used to tilting Venetian blinds simply by pulling downwardly upon the cords and would be apt to be confused were it necessary to pull outwardly as well as downwardly.

From the foregoing principles of the invention and the following detailed description of the drawing, those skilled in the art will comprehend the modifications to which the invention is susceptible.

In the drawing:

Figure 1 is a front elevation showing the tilting device and the adjacent portions of the Venetian blind and support thereof.

Figure 2 is a side elevation taken on the line 2—2 of Figure 1. In this view, the clutch is shown in engaged position.

Figure 3 is a view similar to Figure 2, but with one of the cover plates of the bracket removed, and with the clutch shown in the disengaged position.

Figure 4 is a sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a fragmentary sectional view taken on the line 5—5 of Figure 2.

Figure 6 is a sectional view similar to Figure 3, showing a modified form of apparatus in which the clutch is provided for controlling the connection of the pulley with the shaft on which it is supported.

The Venetian blind which is shown in the drawing comprises a head rail 1. A plurality of slats 2—2 are supported upon the rungs of ladder tapes 3 which are tacked to the head rail as at 4. A bracket 5, adapted to be fastened to a window frame or the like, is provided with projecting arms 6—6; these, in turn, carry a supporting piece 7 from which the blind structure is suspended. The bracket 5 also is configured to support a fascia piece 8 which extends outwardly beyond the blind and tilter mechanism to enclose or house the members in order that the face of the blind be of neat appearance. Cross member 7 is grooved longitudinally, as at 9, with the usual pulley wheels (not shown) provided in the grooves for tracking and guiding the lifting cords 10 by which the blind is raised or lowered. These parts are of the usual design and form no part of the present invention.

The tilter mechanism, to which the present invention is addressed, is indicated generally at 11, and it is operatively connected with the head rail 1 through a foot bracket 12. The bracket

extends upwardly along the end of the head rail, to carry a drive boss 13 projecting therefrom longitudinally of the rail. The drive boss is preferably of square shape and is positioned to engage an aperture 14 in the worm wheel 15 of the tilter mechanism through which it is rotated.

Worm wheel 15 is housed in a cavity provided in a pair of cooperating bracket members 16 and 17. These members extend upwardly from the worm wheel and terminate in foot portions 18 which are fastened to the cross member 7. In the usual structure, the cavity provided by the brackets is of sufficient size to clear the periphery of the worm wheel, and as shown best in Figure 4, bores of somewhat smaller diameter than the cavity are provided in the bracket faces for journalling the worm wheel at shoulders located on opposite sides of the toothed portion of the wheel.

Intermediate the feet of the bracket and the worm wheel cavity, the brackets are configured to provide journals 19 for a pulley shaft 20, which extends transversely through the bracket to carry a worm 21 in position for engagement of the teeth of it with the worm wheel 15. The worm 21 is free to rotate on the pulley shaft and is housed in a cavity indicated generally at 22, the latter being formed in the brackets centrally intermediate the journals of the pulley shaft. Worm 21 is such that it fits rather snugly in the cavity, with the faces 23 of the cavity preventing any substantial longitudinal movement of this member.

The shaft 20 extends beyond the brackets 19, and at its one end a pulley wheel 24 is fastened to it. This wheel is grooved in its periphery as at 25 to carry the tilting cord or rope 26 as shown in Figure 1, so that as the one end or other end of the tilting cord is moved vertically, the pulley is rotated to drive the shaft 20 on which the worm 21 is located. If desired, facets or friction members 27 may be provided at the faces of the groove of the pulley in order to provide better traction of the cord with the pulley; however, the present invention, as previously described, contemplates a simple structure for readjustment of the pulley cords after the slippage takes place, and consequently, the prevention of slippage is not of any consequence.

A guide member indicated generally at 28 is suspended from the pulley shaft intermediate the pulley and the adjacent edge of the bracket members. This member comprises a plate containing a bore through which the pulley shaft extends, with wings being bent from the lower edge of the plate to form an aperture 29 through which the tilting cords pass at a point just below the pulley. The aperture is of somewhat lesser width than the diameter of the pulley and, therefore, locates the cords with respect to the pulley and prevents them from jumping the pulley track. A tang 30 is struck from the guide member 28 for engagement with a recess 31 formed in the bracket plates, whereby the guide member is prevented from rotating as the cords are operated. The guide member 28 extends above the pulley shaft and the upper end of it acts as a fulcrum, engaging the adjacent edge of the bracket, as the lower part of the bracket at the other side engages the periphery of the pulley wheel. In this manner, as shown in Figure 3, the guide plate urges the pulley outwardly when there is outward or lateral pull applied to the operating cords.

At the end opposite the pulley, shaft 20 extends

beyond the bracket to carry a clutch spring 32. One end of this spring engages the adjacent edge of the bracket or the end of the shaft journal which is formed in the bracket, and the other end of it abuts a washer 33 which is held in place by means of a cotter pin 34, or the like, which passes through the shaft.

The mating bracket members 16 and 17 are held together as shown in Figure 5; the one bracket member contains bosses 35 at points spaced about the worm cavity 22 and these bosses fit in appropriate apertures in the other bracket member, thereby serving to align the two members. The bosses 35 are bored for the reception of screws or rivets 36 by which the two parts are fastened together.

Worm 21 contains a slot 37 in one endwise face of it and a pin 38 or other suitable clutch teeth are provided to extend transversely from the shaft 20 for engagement with the clutch slot 37. As shown best in Figure 4, the recess 39 is provided in the cooperating bracket members at a point adjacent the cavity 22, so as to provide for clearance for the clutch teeth.

Mode of operation

Shaft 20 is rotatably housed in the journals 19 of the bracket and is also movable longitudinally, being limited in one direction by the spring and in the other direction by abutment of the pulley with the guide plate 28 or the edge of the bracket.

The spring 32 normally urges the shaft inwardly; that is, in a direction for engagement of the clutch pins 38 with the slot 37 in the endwise face of the worm. The spring in the embodiment disclosed therefore normally maintains operating engagement of the pulley shaft with the worm by holding the clutch pin in the clutch groove. Now, when one or the other of the ends of the tilting cord 26 is pulled downwardly, the pulley is rotated and the pulley shaft 20 drives the worm 21 which, in turn, effects rotation of the worm wheel 15 to rotate the head rail 1 for tilting adjustment of the blind slats.

However, when the operating cords 26 are pulled outwardly away from the Venetian blind, as shown in Figure 3, the cords engage the forward face of the guide 29, and the outward pull at the lower part of this member causes it to tilt on the pulley shaft with the upper part engaging the edge of the brackets 16 and 17. As this movement takes place the face of the guide bracket pushes upon the periphery of the pulley wheel, moving it outwardly to effect displacement of the pulley shaft in the direction indicated by the arrow, with attending compression of the spring 32.

Clutch pin 38 is now moved out of engagement with the clutch groove 37 in the worm, the pulley shaft is divorced from the worm and the pulley and shaft are free to be rotated independently of the worm. By holding the cords outwardly, they may be moved in either direction for alignment without effecting any tilting action since rotation of the pulley wheel or shaft 20 effects no motion of the worm or worm wheel.

During this period the worm acts as a lock for the teeth of the worm wheel, preventing any inadvertent tilting of the head rail of the blind. As soon as the outward force upon the pulley shaft is released, by permitting the operating cords to swing backwardly into depending relationship with respect to the tilter mechanism, the spring 32 urges the shaft backwardly for reengagement of the clutch pin in the clutch groove

of the worm wheel. If the two are not exactly aligned they become so just as soon as the pulley is rotated through a partial cycle, and at the instant of alignment, the clutch pin snaps into the slot 37. The clutch may comprise one, two, or a series of teeth or mating members.

In place of a bracket of the conventional type illustrated in the drawing, the invention may be embodied in other types of structure, for example, mechanisms in which a tilting motion is provided through a segmental rack or screw thread.

One such structure is illustrated in Figure 6. In this form the guide bracket 28 is pivoted to an appropriate ear 40 provided on one or the other bracket members 16 or 17, 41 indicating the pivot pin. The pivot is located on the side of the pulley shaft opposite the aperture 29 through which the operating cords are passed. Pulley 24 is rotatably carried on the pulley shaft 20 and the face of it contains a slot 42, while the shaft 20 contains a clutch pin 43 for engagement with the slot in a structure which suitably may be similar to the structure disclosed in a previous part of the specification. This clutch, comprised of the slot 42 and the clutch pin 43, is preferably provided in the face of the pulley adjacent the guide plate 28. A clutch spring 44 is provided to abut the other face of the pulley; the spring being held in place by the head 45 provided at the end of the pulley shaft.

When an outward pull is applied upon the operating cord 6 the bracket plate pivotally is swung outwardly, thereby pushing the pulley against the spring 44 to disengage the clutch pin 43 from the clutch groove in the pulley face. In this position the pulley is free to be rotated and the cords, therefore, can be aligned while they are held in the outward or lateral position. As soon as they are swung backwardly in depending relationship to the tilting mechanism the clutch becomes again engaged and rotation of the pulley thereupon drives the worm wheel.

It is to be understood that the invention is not limited to the embodiment disclosed in the drawing, but only by the claims which follow.

Having described my invention, I claim:

1. A tilter mechanism for a Venetian blind, which comprises a rotatable shaft, a pulley carried by the shaft, an operating cord carried by the pulley, means operated by the shaft when it is rotated for effecting tilting motion, and means for disengaging the shaft with the tilter means upon longitudinal movement of the shaft.

2. A tilter mechanism for a Venetian blind, comprising a bracket, a cooperating worm and worm wheel housed within said bracket, a shaft rotatably journaled in said bracket for operating said worm, and means for disconnecting said shaft from said worm, comprising a clutch controlled through longitudinal movement of said shaft.

3. A tilter mechanism for a Venetian blind, comprising a bracket, a cooperating worm and worm wheel carried in said bracket, a shaft rotatably journaled in said bracket for operating said worm, means for urging said shaft longitudinally in one direction and a clutch for disengaging said shaft from said worm when said shaft is moved in an opposite direction.

4. A tilter mechanism for a Venetian blind, comprising a rotatable shaft, a cooperating worm and worm wheel, said shaft being adapted to be moved longitudinally to one position for operating said worm and being adapted to be moved

in another position in which it is free to rotate independently of said worm.

5 5. A blind slat tilting mechanism, which comprises a shaft carrying a pulley, the shaft being
 10 rotatable about its axis and movable along its axis, a worm rotatably mounted on said shaft, means including a worm wheel for connection of
 15 a head rail of a Venetian blind with said tilting mechanism for actuation thereby, operating cord means carried by said pulley, and clutch means
 20 operated through longitudinal movement of said shaft for interconnecting the shaft and the worm when the shaft is in one position and for disconnecting the shaft from the worm when the shaft
 25 is in another position.

6. In a tilter mechanism for a Venetian blind, a pulley shaft which is rotatable and longitudinally movable, a worm rotatably mounted on said shaft, means for moving the shaft longitudinally
 20 and means for interconnecting the shaft with said worm wheel when it is moved longitudinally.

7. A tilting device for a Venetian blind, which comprises a pulley having a groove for the reception of an operating cord, a worm, a worm wheel
 25 in engagement with the worm, and clutch means for interconnecting the pulley with said worm, said clutch means being operable upon outward pull upon said cord.

8. A tilter mechanism for a Venetian blind,
 30 which comprises a bracket, a pulley journaled on said bracket, an operating cord carried by said pulley, tilter means carried by said bracket and adapted to be operated upon rotation of said pulley, and a clutch for divorcing the pulley from
 35 said tilter means upon outward pull of said operating cords.

9. A tilter mechanism for a Venetian blind, comprising a bracket, a pulley journaled on said bracket, a cord carried by said pulley for rotation
 40 thereof, means adapted to be operated by said pulley to provide a tilting action, and clutch means for disengaging said pulley when it is moved laterally.

10. A tilter mechanism for a Venetian blind,
 45 comprising a bracket, a shaft journaled in the bracket, a pulley carried by the shaft, operating cords carried by the pulley and a guide member mounted on said shaft and providing a guide aperture through which said operating cords are
 50 passed, tilter means carried by said bracket and adapted to be operated upon rotation of said pulley, and a clutch which is constructed to disengage said pulley from said tilter means when said guide member is moved outwardly by outward pull upon said operating cords.
 55

11. A tilter mechanism for a Venetian blind, comprising a bracket, a shaft journaled in said bracket, a pulley carried by said shaft, tilter means adapted to be driven by said shaft, a
 60 clutch comprising cooperating members which,

when in engagement with one another, effect rotation of said tilter means upon rotation of said pulley and, when out of engagement with one another, permit said pulley to be operated independently of said tilter means, a cord carried by
 5 said pulley, and a guide member engaging said cord and adapted to operate said clutch means when said cord is pulled laterally with respect to the tilter mechanism.

12. A tilter mechanism for a Venetian blind,
 10 comprising a pulley, a bracket, a shaft carried by the bracket, tilter means adapted to be operated upon rotation of said pulley, a clutch for divorcing said pulley from said tilter means, operating
 15 cords carried by said pulley, a member in slidable engagement with said operating cords for operating said clutch when the cords are pulled laterally in one direction, and means for restoring the clutch to interconnect the pulley and the tilter means when the lateral pull upon the operating
 20 cords is released.

13. A tilter mechanism for a Venetian blind, comprising a bracket, a shaft journaled in the bracket, cooperating worm and worm wheel member adapted to be operated by the shaft upon rotation thereof, a pulley carried by the shaft for
 25 reception of an operating cord through which the shaft is rotated, a clutch normally interconnecting the pulley and the shaft, a guide plate carried by the shaft and operable laterally by cord means
 30 carried by said pulley, for disengaging the clutch to enable the pulley to operate independently of the shaft, and means for restoring interconnection of the pulley and the tilter means through the clutch.
 35

14. A tilter mechanism for a Venetian blind, comprising a bracket, a shaft journaled on said bracket, a worm rotatively carried by said shaft and adapted to operate a worm wheel, thereby to provide a motion for tilting operation of a
 40 Venetian blind, a pulley carried by said shaft and rotatable therewith, a clutch for controlling operative connection of said shaft and worm, the clutch constructed so as to be disengaged upon lateral movement of said pulley, and spring
 45 means for restoring the clutch to a position for operative interconnection of the pulley and the worm.

15. A tilter mechanism for a Venetian blind or the like, which comprises first, means for imparting tilting motion to a rail of a Venetian blind, second, means including an operating cord for operating said motion imparting means, and a clutch constructed to interconnect said first means and said second means when the operating cord is pulled in one direction, and to disconnect said first means and said second means when the operating cord is pulled in a different direction.

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