Jan. 16, 1940. F. E. LAWSON 2,187,458

HOUSING FOR VENETIAN BLIND OPERATING MECHANISM

Original Filed May 7, 1937 3 Sheets-Sheet 1

Fig. 1.

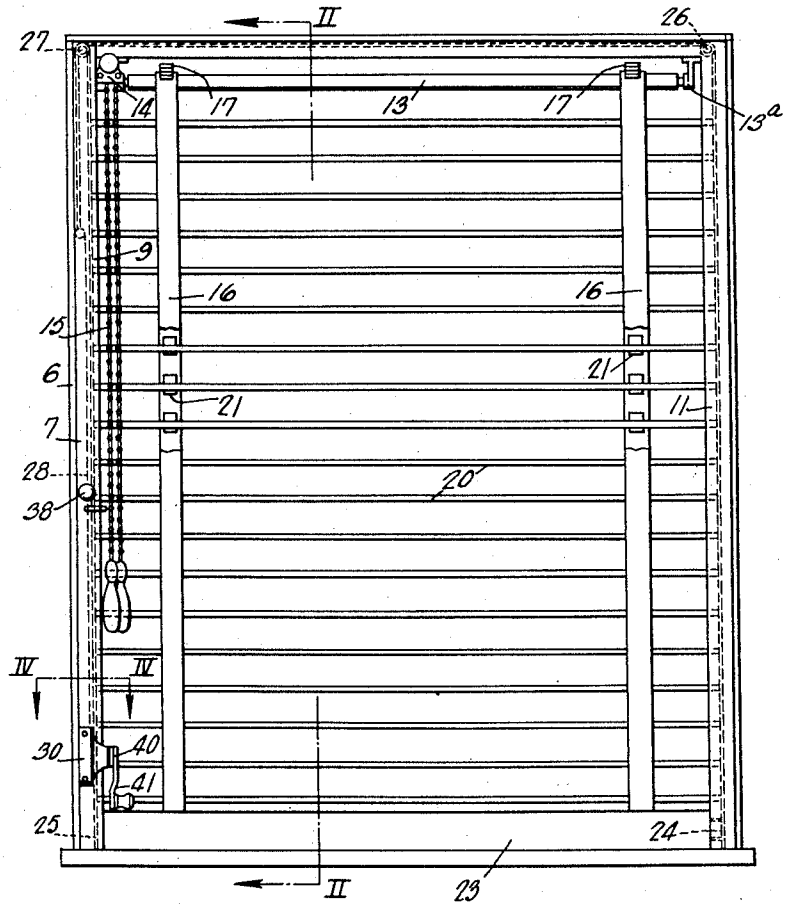


Fig. 2.

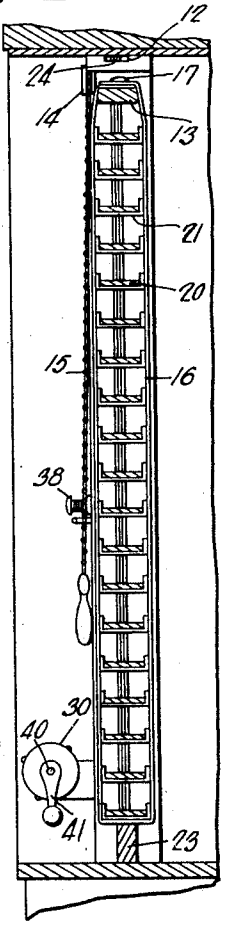


Fig. 3.

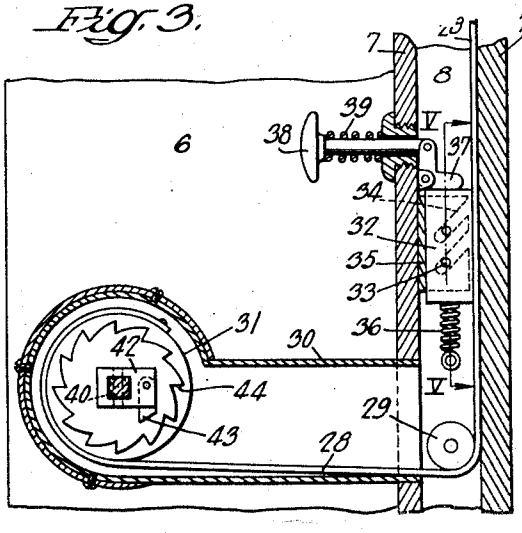


Fig. 4.

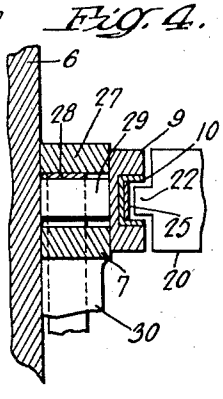
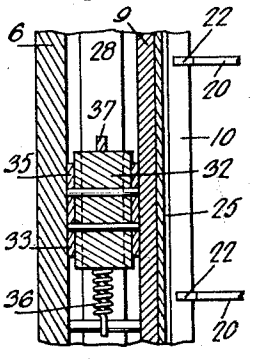


Fig. 5.



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Original Filed May 7, 1937 3 Sheets-Sheet 2

Fig. 6.

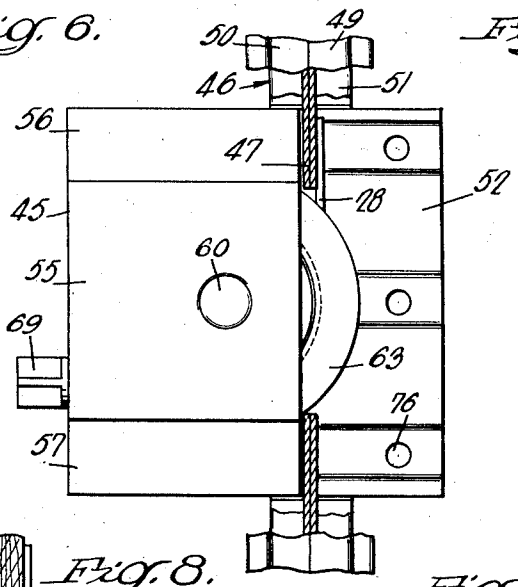
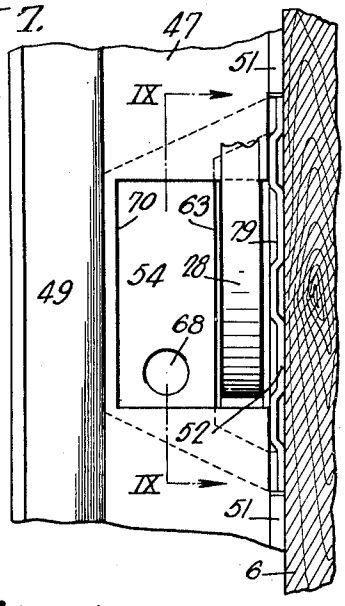


Fig. 7.



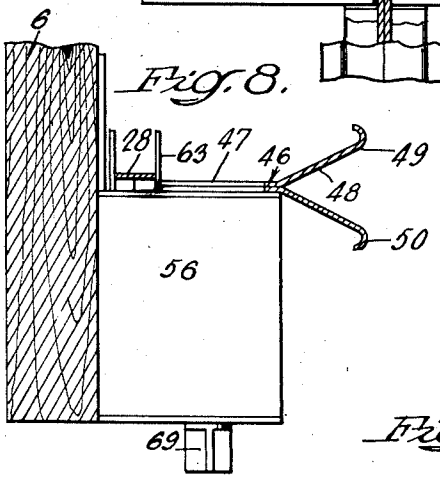


Fig. 8.

Fig. 12.

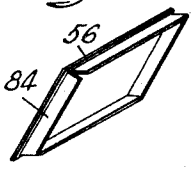


Fig. 11.

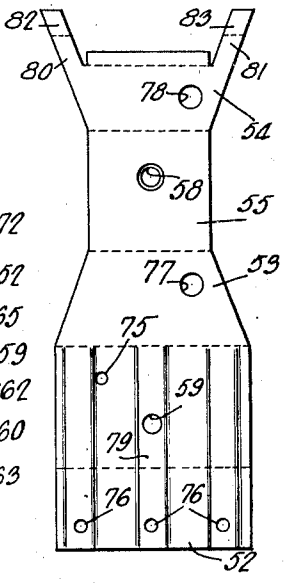


Fig. 10.

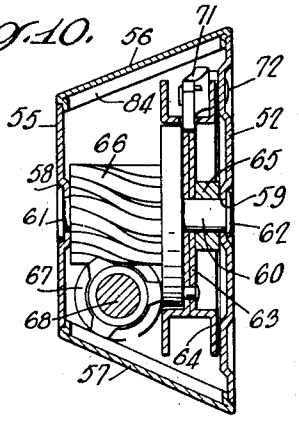
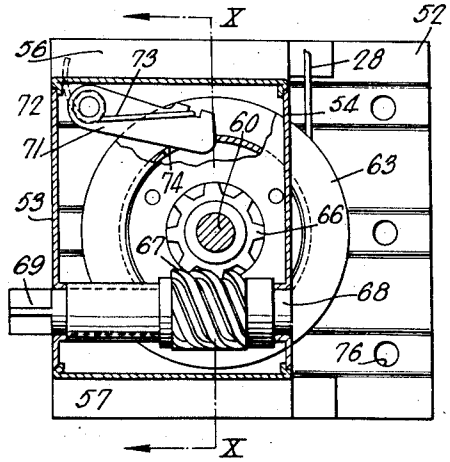


Fig. 9.



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HOUSING FOR VENETIAN BLIND OPERATING MECHANISM

Original Filed May 7, 1937 3 Sheets-Sheet 3

Fig. 14.

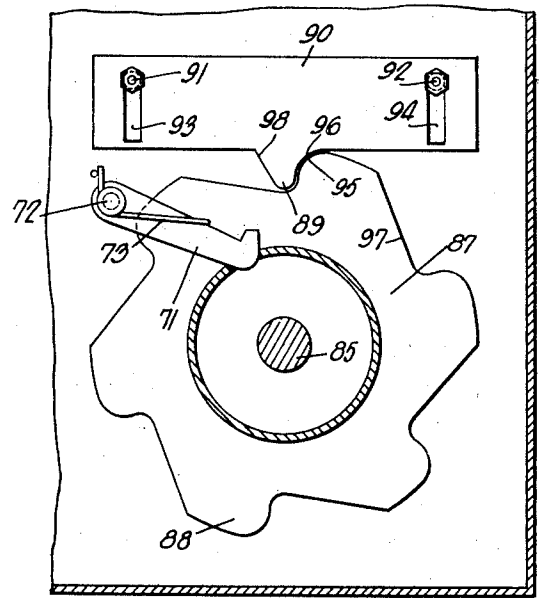
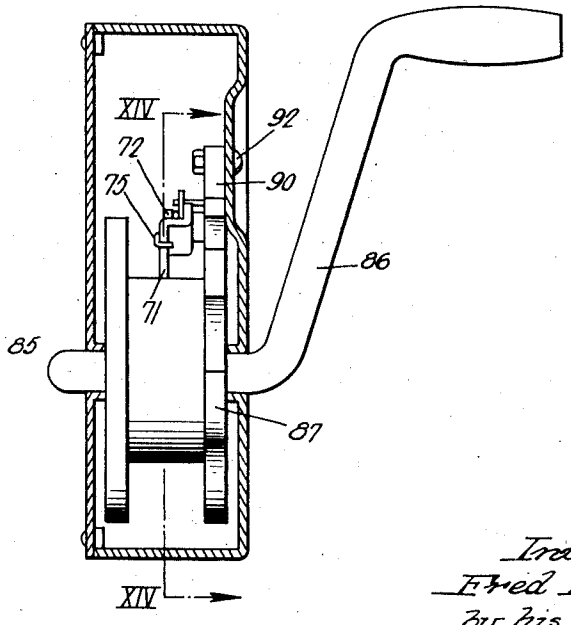


Fig. 13.



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UNITED STATES PATENT OFFICE

2,187,458

HOUSING FOR VENETIAN BLIND OPERATING MECHANISM

Fred E. Lawson, Philadelphia, Pa.

Original application May 7, 1937, Serial No. 141,225. Divided and this application March 3, 1939, Serial No. 259,642

3 Claims. (Cl. 156—17)

This application is a division of my copending application, Serial No. 141,225, filed May 7, 1937, now Patent Number 2,149,301, March 7, 1939.

The present invention relates in general to a Venetian blind and is more particularly concerned with the details of construction of such a blind, whereby simplicity of construction is secured and manipulation of the blind is facilitated.

The primary object of the herein described invention is to provide a manually operable drum and flexible connector between the drum and the bottom rail of the blind for raising and lowering the slats of the blind.

The present invention more particularly relates to an improved housing structure for the elements of the blind operating mechanism, which will enable the use of a standard preformed blank of such construction that it may be utilized for effecting housings which are adapted for either right or left hand mounting, as desired.

Other features of the present invention will more fully appear from the following detailed description taken in connection with the accompanying drawings which illustrate several embodiments thereof, and in which:

Fig. 1 is a view in elevation of a Venetian blind assembly embodying one form of the herein described invention;

Fig. 2 is a sectional view of the same, taken substantially on the line 2—2 of Figure 1;

Fig. 3 is an enlarged fragmentary sectional view through one side of the associated window frame, showing constructional details of the blind raising and lowering mechanism;

Fig. 4 is an enlarged section taken substantially on line 4—4 of Fig. 1;

Fig. 5 is an enlarged sectional view taken substantially on line 5—5 of Fig. 3;

Fig. 6 is a side view of a modified form of raising and lowering mechanism, showing its association with a slat guide member;

Fig. 7 is a rear view of the same attached to a window frame;

Fig. 8 is a fragmentary sectional plan view of the same;

Fig. 9 is a sectional view taken through the housing of the raising and lowering mechanism showing the operative relationship of the instrumentalities therein; taken substantially on line 9—9 of Fig. 7, the slat guide member being removed;

Fig. 10 is a transverse sectional view through the same, taken substantially on line 10—10 of Figure 9;

Fig. 11 is a plan view of a standard blank which may be utilized for forming right or left hand mountable housings for the raising and lowering mechanism;

Fig. 12 is a detail view showing the construction of cover plates for utilization with said housings;

Fig. 13 is a transverse sectional view showing the details of another modified form of reel mechanism; and

Fig. 14 is an enlarged fragmentary sectional view of the same, taken substantially on line 14—14 of Figure 13, to show the details of its latching mechanism.

As shown on the drawings:

The numeral 6 indicates a window frame to which my improved blind is applied. It will be understood that the frame is provided with the usual sash but this has been omitted for convenience of illustration. Secured to one side of the frame is a guide rail comprising a pair of strips 7, spaced apart to form a tape passage 8 and a facing strip 9. The latter strip is provided with a guideway preferably lined with a metal channel bar 10. Secured to the other side of the frame is a second guide rail 11 similar in all respects to the rail just described except that the tape passage 8 may, if desired, be omitted. Connecting the upper ends of the two guide rails is a rail 11' having formed therein a tape passage 12.

The tilt bar 13 is removably supported by a pair of hangers 13' and 14, the latter being provided with the usual gearing and operating cord 15 for controlling the position of the bar. These hangers may be of any usual and well-known construction and, therefore, need not be described in detail. The ladder tapes 16 are each secured to the tilt bar by a clamp 17 which may be of any desired construction. The slats 20 rest freely on the cross members 21 of the ladder tapes without any connection thereto. They are provided at each end with the usual trunnions 22 projecting into the channel bars 10. The fact that the slats are not attached to the tapes permits of their quick and easy removal and also permits relative movement between the slats and the tapes which, together with the clamping of the tapes along the center line of the tilt bar, insures light tight closure of the slats when the tilt bar is moved to its extreme position in either direction.

The ends of the lift bar 23 extend into the channel 10 and have secured to them a pair of thin metal tapes 24 and 25. The tape 24 extends upwardly through the channel 10 of the rail 11 directly behind the ends of the slat trun-

nions therein. It passes over a roller 26 at the top of the channel and thence through the channel 12 in the rail 11' to the opposite side of the frame and over a roller 27. The tape 25 passes upwardly through the channel 10 in the strip 9 and also passes over the roller 27. The two tapes 24 and 25, after passing over the roller 27, are connected to a tape 28 (which may be a continuation of one of them). Tape 28 passes downwardly through the tape passage 8 to a roller 29, being twisted through an angle of 90 degrees during its passage. After passing around the roller 29, the tape enters a casing 30 and is secured to a winding drum or reel 31 mounted therein.

In its passage to roller 29 the tape 28 passes behind a clutch block 32 having pins 33 movable in inclined slots 34 in a bracket 35 secured in the tape passage 8. A spring 36 normally forces the block upwardly to clamp the tape. The tape is thus free to move downwardly but is locked against upward movement until the block is released. Bearing upon the upper end of the block is one end of a bell-crank lever 37, the other end of which is pivoted to the stem of a push-button 38, normally held in forward position by a coil spring 39 surrounding its stem. The drum 31 rotates freely on a shaft 40 provided at its outer end with a handle 41 and having nonrotatably secured thereto a block 42 carrying a pivoted pawl 43 adapted to engage with internal ratchet teeth 44 on the drum.

The operation of the form of the invention just described is as follows:

To raise the blind the handle 41 is rotated in a clockwise direction. This causes the pawl 43 to engage with the ratchet teeth 44 and rotate the drum 31. The tape 28 is then wound on the drum, thus drawing up the tapes 24 and 25. This elevates the lift bar 23 which carries with it the slats 20. When the blind is raised to the desired position the handle is released and will return to neutral position, as shown in the drawings. The action of the clutch block 32 on the tape 28 prevents the return of the lift bar and slats to lowered position until the tape is released by pressure on the push-button 38. The use of the ratchet is to prevent the operator from rotating the drum in a counterclockwise direction which would result in slack in the tape 28 and consequent kinking or buckling of the tape.

The modified form of the raising and lowering mechanism as illustrated in Figures 6 to 12 will now be described.

In its broad concept, this form of the invention operates upon the same broad principles as the previously described form of the invention.

As shown in Figure 6, this form of the invention includes a housing construction generally indicated at 45, which is adapted to be formed from a preformed blank in a manner which will be subsequently described. This housing is arranged to suitably support the associated instrumentalities of the mechanism, and is also arranged to be associated with a fabricated guide member 46 which may be secured in any suitable manner to the window frame.

As shown, the guide 46 comprises a web portion 47 having a V-shaped trough 48 along one edge defined by diverging members 49 and 50. Along the opposite edge of the guide, the web is formed to define a T-shaped foot 51 which may be provided with suitable holes therethrough by means of which the guide may be secured to the window frame so as to extend vertically therealong. The V-shaped trough 48 is arranged to receive the slat trunnions therein for vertical movement in the same manner as the trunnions 22 are received into the channel bar guide 10 as previously described.

The housing 45 is a box-like structure comprising a main plate portion 52, front and rear walls 53 and 54 respectively and a side wall 55 which is in spaced relation and parallel to the main plate 52. The upper and lower edges of the front and rear walls are inclined and arranged to receive therein top and bottom cover plates 56 and 57 respectively which are similarly formed to permit their being interchanged.

Mounted in aligned openings 58 and 59 of the side wall 55 and base plate 52 respectively of the housing is a shaft 60 which is held against rotative movement in any suitable manner. In the present instance this shaft is provided at one end with a head 61 and is riveted or peened over at its other end as shown at 62.

Rotatably mounted on the shaft 60 is a winding reel 63 which is formed with a circumferentially extending channel or groove 64 which is adapted to have wound thereon in superposed layers the tape 28.

The reel 63 is maintained in spaced operative relationship relative to the wall 52 by means of a collar spacer 65 which is disposed between the reel and the wall 52 surrounding the shaft 60. Also, the reel is secured for simultaneous rotative movement to a helical worm gear 66.

Meshing with the worm gear 66 is a triple thread worm 67 which is fixedly secured to a shaft 68 extending at right angles relative to shaft 60 and having its ends rotatably supported in the front and rear walls 53 and 54 of the housing. One end of this shaft projects past the front wall of the housing and is formed with a polygonal end 69 adapted to receive an operating handle by means of which the shaft may be rotated.

From experience, it has been found that with the ordinary type of worm and worm wheel drive, for the purpose described herein, they do not give a practical operating speed, when the pitch of the worm and gear are so selected as to prevent reverse drive of the mechanism due to the weight of the blind. In order to overcome this difficulty, the present invention resorts to the novel expedient of providing a worm and worm gear drive in which the angle of worm lead is greater than the helix angle of the worm gear. Such a design is contrary to good gear design and in fact results in an inefficient power transmitting arrangement. This arrangement, due to the fact that it is operated at low speed, sacrifices some of the advantages of efficient operation, but does result in effecting the desirable advantage of setting up sufficient friction between the meshing teeth of the worm and the teeth of the worm gear to prevent reverse drive and at the same time enable the use of such pitch as will enable the attaining of a practical speed of operation.

In the present arrangement, the guide strip is cut out to form an opening 70, as shown in Fig. 7 in the web portion 47 and foot portion 51 of the guide strip of sufficient size to enable the insertion of the base plate 52 of the housing into the opening beneath the guide until the rear wall 54 of the housing abuts the guide member. In this position, the reel 63 projects past the web portion 47 of the guide, as shown in Fig. 8 sufficiently to bring the strip 28 along the rear side of web 47. The strip 28 is connected at its uppermost end to

flexible connections corresponding to the two tapes 24 and 25 as previously described, except that in the present instance it is desirable that these flexible connections be small cables rather than strips. These cables will be carried downwardly through the V-shaped trough of the guide and connected to the lifting bar as in the previously described arrangement.

It has been found desirable when the lifing bar has been lowered to its lower limit to provide means for preventing further movement of the reel 63 in a lowering direction. This is accomplished by a novel latch arrangement which is controlled by the flexible connection strip 28. It will be obvious that if some means were not provided, the reel could be continued in its lowering movement and the strip 28 would be wound on the reel in the opposite direction with the result that it would become kinked and otherwise damaged.

In order to guard against such contingency, a latch member 71 is pivotally suppored at one end of a pivot stud 72 which is anchored to the base plate of the housing. The free end of the latch member projects into the channel 64 on the reel and is provided with a spring 73 which normally tends to rotate the latch in a clockwise direction about its pivot as viewed in Fig. 9.

The base of the channel 64 is provided with an opening 74 which is adapted to receive the end of the latch arm therein, when there is no strip 28 wound on the reel. Thus, when the reel is being rotated in a counterclockwise direction as shown in Fig. 9, which is the direction for lowering the blind, and the tape has been completely unwound, the latch passes into the opening 74 and prevents further movement of the reel in lowering direction. Of course, with this arrangement the flexible connection to the lift bar should be of proper length to assure that the tape 28 is unwound when the lift bar reaches the bottom of the window.

Although the latch 71 will prevent further lowering movement under these conditions of the reel 63, the reel is free to be moved in the opposite or raising direction. As the reel is thus moved in raising direction, the tape 28 will be wound on the reel and since this tape covers the opening 74, the tape will prevent entrance of the latch into the opening during raising movement of the blind.

Referring to Figure 11, the preformed blank from which the housing is fabricated is shown. The various wall sections of the housing are integrally formed and provided with openings for receiving the shafts 66 and 68. The base plate section contains the opening 59 and also an opening 75 which may be utilized for mounting the pivot 72 of the latching arm 71. In addition screw holes 76 are also provided in the base plate section. The front and end wall sections 53 and 54 are provided with openings 77 and 78 which are adapted in the finished housing for receiving the ends of shaft 66. Likewise, the side wall section 55 is provided with openings 58.

This blank may be cut to the shape shown and provided with the various openings to form a standard preformed blank. This blank is adapted to be deformed into a housing suitable for right or left hand mounting simply by bending the various sections in appropriate direction.

It is desirable to provide the base plate with longitudinally extending corrugations as shown at 79, and these corrugations may be stamped or otherwise formed in the base plate portion, the material being upset in proper direction depending upon whether the blank is to form a right or left hand housing.

With the blank as just described, it will not make any difference whether it is formed into a right or left hand housing. In either case, the apertures 58 and 59 will be properly aligned as will also the apertures 77 and 78.

The rear wall section 54 is provided with diverging leg portions 80 and 81 having deflective ends 82 and 83 to provide feet for welding or otherwise securing these leg portions to the base plate 52, when the housing is completely formed. These leg portions provide a suitable space so that the reel 63 may project from the housing as shown. The top and bottom cover plates are stamped or otherwise formed from a single sheet of material and are preferably provided with peripheral edge flanges 84 which are adapted to slidably fit within the walls of the housing and hold the covers in position.

In Figures 13 and 14 there is illustrated another form of winding reel for raising and lowering a Venetian blind.

This form of the invention comprises, as in the previously described arrangement, a suitable housing for the reel operating mechanism which may be, though not necessarily constructed from a preformed blank as described above.

The winding reel is mounted on a shaft 85 which is rotatably mounted in the housing walls. This shaft may be extended at one end to integrally form an operating handle 86, or if desired, this handle may be separately formed and adapted in any suitable manner for removably securing to the shaft.

Instead of providing similar end flanges on the winding reel, one end flange of the reel is defined by a latch wheel 87 having a plurality of teeth 88 arranged around its circumference. These teeth are cooperatively associated with a tooth 89 carried by a latch member 90, this member being supported for raising and lowering guided movements on spaced guide pins 91 and 92. The pins are each anchored at one end in the adjacent wall of the housing and respectively project into guide slots 93 and 94. The latch member is therefore free to move upwardly and downwardly to move the tooth 89 out of and into meshing relation with the teeth on the latch wheel, the latch member being actuated downwardly by the action of gravity thereon.

The teeth 88 are correspondingly each provided with a curved abutment edge on one side as shown at 95, this edge being arranged to interfittingly engage with a mating surface 96 on the tooth 89, when the latch member is in lowered or latching position.

The other side of each of the teeth 88 is formed with a straight edge 97 which is inclined toward the curved edge 95. The edges 97 are arranged to strike against an inclined edge 98 which is formed on the other side of tooth 89, when the tooth wheel is rotated in a clockwise direction as viewed in Figure 14. The cam action of the surface 97 of each tooth against the surface 98 causes the latch member to be raised, wherein the tooth 89 is moved out of its cooperative relation with the teeth on the latch wheel.

With the latch member moved to unlatched position, the reel is then free to be moved in either direction, and so long as the reel is operated at a relatively fast speed the latch member will be prevented by the teeth from moving

to latching position. However, as soon as movement of the reel is terminated the latch member under the action of gravity is moved to latching position wherein the tooth 89 provides a stop for preventing movement of the latch wheel and consequently the winding reel in a counterclockwise direction.

In using this form of reel mechanism, the flexible tape connecting the reel to the lifting bar of the blind is wound on the reel in such direction that the weight of the blind tends to cause the reel and latching wheel to move in a counterclockwise direction, as shown in Figure 14.

By the use of this mechanism, the blind may readily and easily be moved from one position of adjustment to another. If the blind is to be raised, the crank or handle is merely moved in the raising direction until the blind is at the desired height, and as soon as the crank movement is stopped, the latch will operate to positively hold the blind. To lower the blind, the crank is initially moved in a raising direction to cause the latch to be released, whereupon the crank is actuated in the other direction to lower the blind to the desired position. As soon as the crank movement is stopped the latch again operates to positively hold the blind at its new position of adjustment.

From the foregoing description, it will be apparent that the present invention provides improved means for raising and lowering a blind; which embodies novel means for automatically maintaining the blind in adjusted position and at the same time enables it to be readily and easily raised and lowered to other positions of adjustment; which embodies a novel irreversible worm gear drive; which is provided with novel means for preventing damage to the flexible member which is wound on the winding reel, which might be occasioned by winding the flexible member on the reel in the opposite direction; and in which the housing for the raising and lowering mechanism is fabricated for right or left mounting as desired from a standard preformed blank.

It is of course to be understood that although I have described in detail several embodiments of my invention, the invention is not to be thus limited but only insofar as defined by the scope and spirit of the appended claims.

I claim:

1. In a device of the character described, a reel mechanism, a housing for said mechanism formed from a flat blank, said blank having sections so arranged that the blank may be deformed in one direction to effect a right-hand housing and in an opposite direction to effect a left-hand housing.

2. In a device of the character described, a reel mechanism, a housing for said mechanism, said housing being formed from a flat blank deformable to adapt it for right and left-hand mounting, and a closure member adapted to be associated with said housing irrespective of whether it is deformed for right or left-hand mounting.

3. In a device of the character described, a reel mechanism, and a housing for said mechanism comprising a preformed flat blank having a plurality of integrally joined sections, certain of said sections containing apertures to be brought into alignment upon the deformation of said blank to form a right or left-hand mountable housing, as desired.

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