Dec. 11, 1945. H. J. COHN 2,390,826

CORDLESS VENETIAN BLIND

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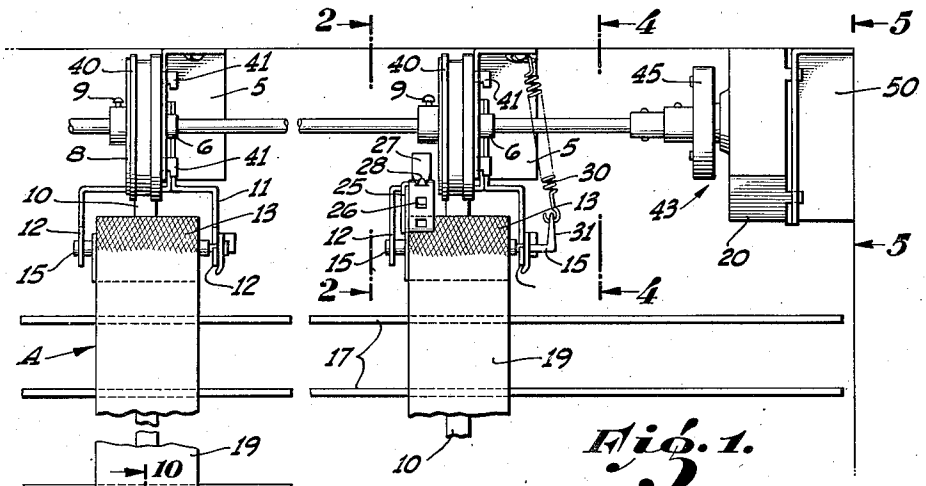
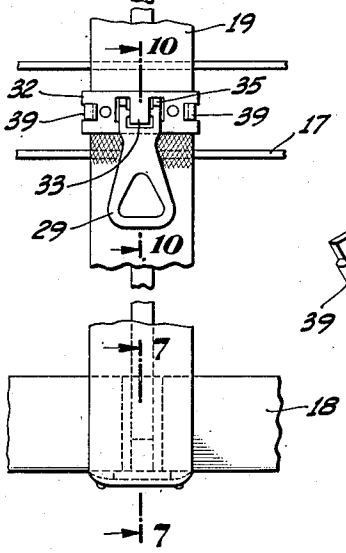


Fig. 1.



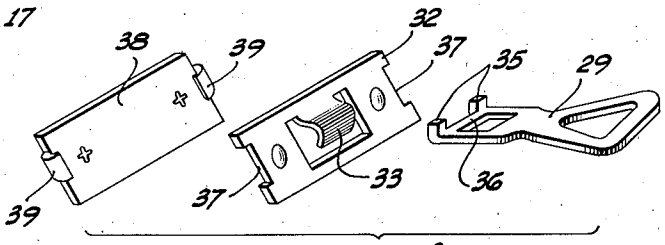


Fig. 9.

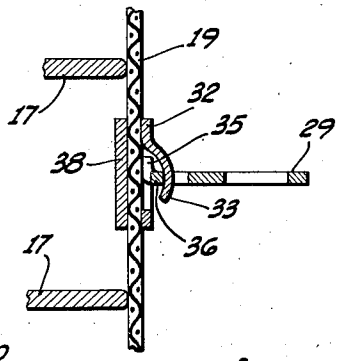


Fig. 10.

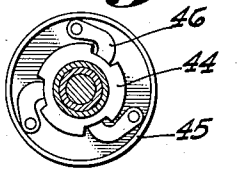


Fig. 11.

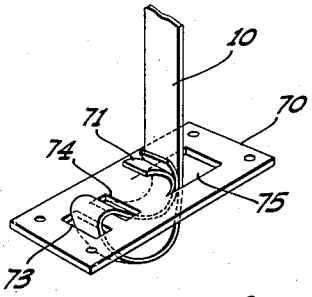


Fig. 8.

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Fig. 2.

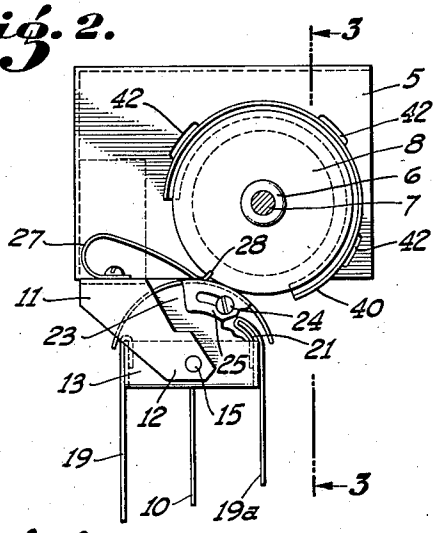


Fig. 3.

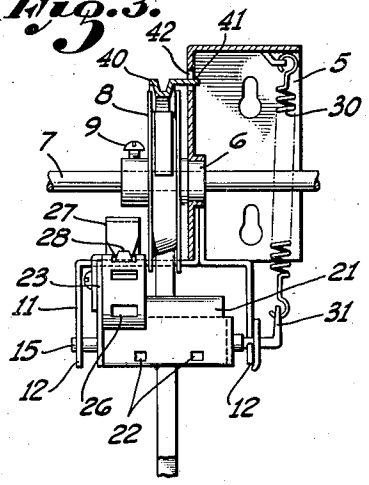


Fig. 4.

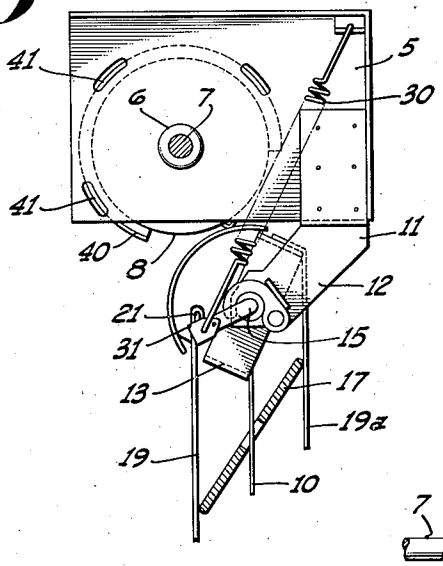
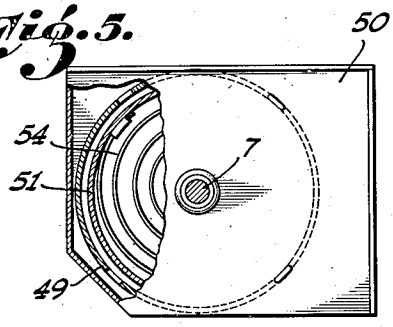


Fig. 5.



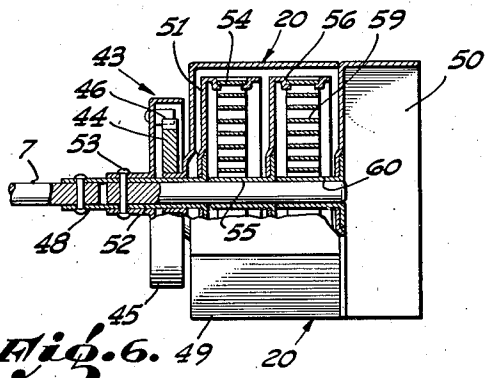


Fig. 6.

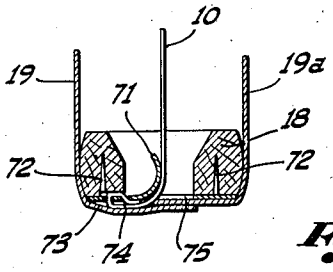


Fig. 7.

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UNITED STATES PATENT OFFICE

2,390,826

CORDLESS VENETIAN BLIND

Harold J. Cohn, Los Angeles, Calif., assignor to Automatic Venetian Hardware Corporation, a corporation of California

Continuation of application Serial No. 345,890, July 17, 1940. This application December 16, 1943, Serial No. 514,494

12 Claims. (Cl. 160—170)

My invention relates generally to Venetian blinds, and more particularly to an improved type of Venetian blind hardware for use with conventional slats to form a blind which can be operated without the necessity of cords.

Heretofore, the Venetian blinds on the market have usually employed reduction gears, ratchets, or other rotative means operated by a cord for raising or lowering the blind. Likewise, it has been customary to employ a heavy tilting bar as the top slat of the blind, and to operate this tilting bar with a cord.

Obviously, the presence of cords dangling in front of or along the side of a Venetian blind materially detracts from its appearance, and various expedients have been tried in an attempt to hide or eliminate these cords. However, so far as I am aware, no one as yet has ever offered to the market a truly cordless Venetian blind. This application is a continuation of my copending application, Serial No. 345,890, filed July 17, 1940.

One of the objects of this invention is to provide a novel Venetian blind structure which is raised by a spring motor adapted to have energy stored therein by the manual operation of lowering the blind.

Another object of my invention is to provide a Venetian blind of the character stated in which a plurality of spring motor elements cooperate to provide for increasing the amount of potential travel of the blind, with substantially no more force being necessary to lower a long blind than to lower a short one.

It is a further object of my invention to provide Venetian blind operating means which is universally adaptable to all sizes of blind, and which can be installed in windows of various widths by the simple expedient of varying the length of the drive shaft.

Another object of my invention is to provide ladder tape supporting means which permits the blind to be completely closed without substantial effort and without placing undue strain upon the respective parts.

A still further object of my invention is to provide a novel type of supporting tape, reel and guard, whereby it is made impossible for said tape to come off of the reel even when the blind is raised too rapidly.

These and other objects of my invention will become apparent from the following description of a preferred form thereof, and by reference to the accompanying drawings in which

Fig. 1 is a fragmentary front elevation of my improved blind installed in a window casing,

Fig. 2 is a vertical section taken at the line 2—2 in Fig. 1, showing the supporting and tilting mechanism in detail,

Fig. 3 is a front elevation, partially in section taken on line 3—3 of Fig. 2 of the parts shown in Fig. 2 with the ladder tapes removed.

Fig. 4 is a vertical section similar to Fig. 2 but taken at 4—4 in Fig. 1, and showing the tilting mechanism in one extreme position,

Fig. 5 is an end elevational view partly cut away, taken at 5—5 in Fig. 1,

Fig. 6 is a front elevation, partly broken away, of a plural spring motor for use in my invention,

Fig. 7 is a vertical section of the bottom rail taken at 7—7 in Fig. 1 and illustrating how the lifting tape is fastened to said base bar,

Fig. 8 is a perspective view of the lifting tape locking plate,

Fig. 9 is an exploded perspective of the lifting tab assembly,

Fig. 10 is a vertical section of the lifting tab taken along the line 10—10 of Fig. 1, and

Fig. 11 is a sectional view of the inside of the pawl housing.

Referring now to the drawings, and particularly to Fig. 1 thereof, it will be seen that the letter A generally designates a Venetian blind which is mounted in a window casing B. The blind A may be secured to the window casing by means of spaced mounting brackets 5, provided with bearings 6 therein. A horizontally-disposed shaft 7 is journaled in the bearings 6 with its ends projected through and beyond said bearings. Drums or reels 8 are adjustably secured to the shaft 7 as by set screws 9 and are disposed in spaced relation, the number of reels used depending upon the width of the blind. The drums 8 are provided with flexible metal lifting tapes 10 wound thereon, each of said tapes being of a sufficient length to extend to the bottom of the blind when it is in its extended position.

The mounting brackets 5 are provided with downwardly and forwardly extending U-shaped hangers 11, each provided with a pair of spaced parallel arms 12—12. A generally rectangular or box-like tilting element or rocker 13 is pivotally mounted within each pair of arms 12—12 by means of trunnions 15. The slat structure of the blind may be constructed in conventional manner, and includes a plurality of slats 17 and a bottom rail 18, supported in spaced relation by the usual ladders which are preferably formed

and a rear ladder tape 19a with fabric rungs 16 at intervals for supporting the slats 17.

The slats 17 are provided with vertically-aligned apertures 14 through which the lifting tapes 10 extend, the lower ends of said tapes being connected to the bottom rail 18 in suitable manner, as will be explained in detail later.

As seen best in Fig. 1, shaft 7 is operatively connected to a spring motor 20 whose novel construction will be described more in detail hereinafter.

Considering now the tilting mechanism in detail as best seen in Figs. 2, 3 and 4, it will be noted that the forward wall of the right-hand rocker 13 extends above and is curved back rearwardly with respect to the main rocker frame, forming a curved lip 21. The lower portion of the forward wall of the rocker is provided with a pair of apertures 22 and the forward ladder tape 19 passes up over the lip 21 and down across the rear thereof to be securely fastened by clip means (not shown), cooperating with the apertures 22. By thus extending the tape-bearing wall or lip 21 rearwardly and upwardly with respect to the pivot point, an increased range of effective rotation is given to the rocker 13, permitting the blind to be completely closed when the forward ladder tape is pulled down to its lowermost position, as shown in Fig. 4. It is thus seen that the effective lever arm is adequate to easily rotate the blind, even when the rocker itself has been rotated to an angular position which causes the slats to approach their most nearly vertical position.

As seen best in Fig. 3, side wall 23 of rocker 13 extends above the lip 21, and adjustably attached thereto as by screw 24 is an arcuate index plate 25 which is provided with a series of rectangularly-shaped apertures 26. A leaf spring 27 is rigidly fastened to the rear portion of hanger 11, and extends forwardly so that its upturned free end or lip 28 will resiliently engage the apertures 26. The tension in the spring 27 is adjusted so that when the lip 28 engages an aperture 26, the rocker and consequently the blind is held in fixed position. However, a relatively small amount of force exerted on the ladder attached to the rocker bearing the index plate is sufficient to disengage the spring lip 28 from the aperture 26 and permit the rotation of the rocker 13 on its trunnions 15. It will be apparent that the spring lip 28 will in turn engage consecutive apertures 26, and will hold the rocker in any one of several positions at varying angles of rotation as desired.

It will be apparent, of course, that all that is needed to rotate the rockers and slats forwardly (clockwise in Fig. 2) is a downward pull on the forward ladder tape 19. However, it is likewise apparent that an upward pull on the forward ladder tape 19 will not exert a direct force on the rocker sufficient to rotate it against the action of spring 27. This could, of course, be accomplished by a downward pull on the rear ladder tape 19a, but to get a satisfactory grasp on the rear tape would be very unhandy. To obviate this necessity and to make it possible to rotate the rocker both ways by merely exerting a pull on the tab 29, I provide a counterbalancing spring 30 fastened at its upper end to a portion of the bracket 5 and at its lower end to an arm 31 which may suitably be formed as an extension of one of the trunnions 15 of the rocker 13. This spring 30 is tensioned so that when an upward pull is exerted on the tab 29, thereby releasing some [illegible] and consequently the rocker 13, the tension in the spring 30 will be sufficient to disengage the leaf spring lip 28, and cause the rocker 13 to rotate rearwardly (counter-clockwise in Fig. 2). Thus, it is seen that by the simple expedient of grasping the tab 29 and either raising it or lowering it, the blinds are tilted to any desired position. It will be noted that it is only necessary to have the index plate 25 and spring 27 on one of the rockers, since without a tilting bar the weight of the slats can be easily shifted and held in place as described. By thus leaving the other rocker free to rotate, less force is needed to tilt the blind.

From an inspection of Figs. 9 and 10, it will be seen that I have provided a novel tab which is particularly adapted to provide the right type of pulling movement for the most efficient operation of my blind. A front plate 32 is formed with a centrally-disposed aperture and a depending arcuate finger 33, centrally disposed therein. A tab key 34 is provided with a bifurcated end, the tines 35 of which are bent at right angles adjacent their outer ends and are connected by a cross-piece 36. As will be seen, the finger 33 is adapted to be inserted in the space defined by the tines 35 and the cross-bar 36, the cross-bar 36 finding an axial seat in the recessed portion of the finger 33, and the bent ends of the tines being accommodated by the portions of the aperture on either side of the finger 33. In assembling the tab mechanism, the plate 32 with its associated tab key 34 is held against the front of the forward ladder tape 19 and a complementary member or back plate 38 provided with a pair of flanges 39 is placed on the rear side of the tape so that the flanges 39 will engage notches 37 in the ends of the front tab plate. With the plate held firmly in position, the flanges 39 are crimped into tight engagement with the front plate 32, thereby securely clamping the two plates with the ladder tape 19 between them and holding the tab key 34 in place, but allowing it to be rotated upwardly to a horizontal position, at which point the bent ends of the tines 35 engage the tape, which is backed up by the rear tab plate 38, thus preventing the tab key from rotating further.

As previously mentioned, the lift tapes 10 are wound on drums 8, and it will be apparent that if the blinds are raised more rapidly than the natural speed of the drums, the tape will tend to climb off the drums and not be wound securely thereon, thus putting the blind mechanism out of commission for the time being. To eliminate this possibility, I provide a guard 40 formed as the major arc of a circle and provided with fingers 41 adapted to loosely fit in and be retained by slots 42 in the bracket 5. In cross-section, the guard 40 is U-shaped, with the base of the U fitting in to the groove provided by the circular side faces of the drum.

As will be seen from an inspection of Fig. 3, the width of the base of the U-shaped guard 40 is slightly smaller than the width of the groove in drum 8, and while permitting free movement of the drum, the guard effectively prevents the tape 10 from rising off of the drum. Inasmuch as the reels are adjustably mounted on the shaft 7, their spacing depending upon the width of the blind being installed, it is essential that the guard 40 have a certain amount of play with respect to the drum, i. e. that it in effect floats on the drum so as to be sure and not bind the same. Consequently, as mentioned, the fingers 41 fit loosely in the slots 42 so that the guard is permitted a cer-

tain amount of rotational play with respect to the drum 8. It will also be noted that the outside diameter of the guard is but slightly greater than the outside diameter of the drum side faces, so that the base or bottom of the U rides well within the groove formed by said faces. I prefer to form the guard of resilient material so that it can be sprung into position and need not be tightly held to maintain its relationship with respect to said reels. The loose fit of the bracket fingers 41 permits the guard to rotate or to adjust itself both rotationally and laterally with respect to the reels. I find this construction and assembly particularly valuable in that it greatly simplifies construction and provides the most efficient operation.

As previously mentioned, a spring motor 20 is provided for raising the blind and is disposed in operative relation with shaft 7 adjacent the right end thereof in Fig. 1. The spring motor unit includes a casing 49 secured to a mounting bracket 50 which is adapted to be fastened to the window casing B. A cup-shaped spring housing 51 is disposed within the casing 49 near the left end thereof, and is provided with a hub 52 extending through and journaled in the end walls of the casing. The hub 52 is secured to the main shaft 7 by pins 48 and 53. A flat coil spring 54 is disposed spirally within the housing 51, and has its outer end secured thereto and its inner end secured to a short hub 55 journaled in the casing.

A second cup-shaped spring housing 56 is located within the casing 49 adjacent the housing 51, and is rigidly attached to the hub 55. A flat coil spring 59 is disposed spirally within the housing 56 and has its outer end secured thereto, and its inner end secured to a hub 60 which is in turn fixed to the right-hand side of the casing 49. Both the springs are wound in the same direction, so that only the outer coils thereof will first come in to play. In raising and lowering the blind, the above mechanism functions as follows.

In order to lower the blind, a person merely grasps the bottom rail 18 and pulls it downwardly. This downward movement of the bottom rail will effect an unreeling of the lift tapes 10 from the drums 8 and cause rotation of said drums and the shaft 7, upon which they are mounted. The rotation of the shaft 7 will also cause rotation of the spring housing 51 due to the pin connection therebetween. Continued rotation of the housing 51 will exert a winding force on the outer coils of the spring 54 which will be transferred through the inner coils to the hub 55 and thence to the spring housing 56. As the tension in the spring 54 grows greater, the housing 56 will be caused to rotate, thereby winding spring 59 from the outside inwardly. Thus, it is seen that the force required to lower the blind a considerable distance is relatively small throughout the entire travel of the blind since, as is well known, the outer coils of a spiral spring are much looser wound than the inner coils, and much less force is required to wind them up. This same condition is maintained when the spring 54 becomes sufficiently tightened to cause movement of the housing 56, since it is also connected to the outer coils of its spring 59 so that continued downward motion of the blind and consequent rotation of the shaft 7 accomplishes a winding of both springs 54 and 59 from the outside with a minimum of effort being expended. By properly proportioning the strengths and number of springs used, the pull can be kept substantially constant throughout the entire length of travel.

The blind may be stopped and maintained at any desired height relative to the window casing by suitable means, such as centrifugal pawl stops similar to those used in ordinary window shades. These pawl stops are disposed at the left end of the motor casing 20, and are indicated generally by the numeral 43. The pawl stop mechanism includes an annular stop ring 44 surrounding the hub 52 and secured to the outer face of the casing 20. A cup-shaped housing 45 having a plurality of pawls or detents 46 pivotally mounted therein is disposed in cooperative relation with stop ring 44 and is secured to the hub 52, preferably by the pin 53. It will therefore be obvious that the ring 44 remains stationary and that the housing 45 will rotate relative thereto according to the rotation of the shaft 7 and the spring housing 51 functioning in the well-known manner to maintain the blind at any desired vertical adjustment.

In raising the blind from a lowered position, it is only necessary to free the pawls 46 by a quick downward pull and a sudden relaxing of the pull on the blind in the well known manner used in operating conventional window shades. As soon as the pawls are released, energy stored in the springs 54 and 59 causes rotation of the shaft 7 with the consequent raising of the blind by means of the lift tapes 10. It will be apparent, of course, that in unwinding, the springs will function in the reverse order to that previously described in winding them up, and due to the fact that they are each wound from the outside in, so that only the loose outer coils of the springs are used, the flow of power will be even and uniform throughout the raising of the blind, so as to preclude any possibility of the blinds raising too fast.

It will be understood, of course, that in small installations where the blind is only a few feet long, that a one spring motor will be sufficient, i. e. the housing 56 and spring 59 may be dispensed with. However, I have found that in normal-sized windows of six feet or more, it is highly advisable to provide a double spring motor as described, so that the amount of effort necessary to lower the blind to its lowermost position is kept at a minimum and is easily within the convenient range for the ordinary housewife. It will likewise be understood that if larger blinds are required, additional springs can be used in the motor attached in series in the manner heretofore described, so that the motor housing may contain two, three, four or any number of springs necessary to accomplish the easy and rapid raising of the blind. It will also be understood, of course, that if desired a plurality of separate motor units can be hooked up in series to accomplish the same result described.

Referring now to Fig. 7, wherein is illustrated my novel means for anchoring the lift tapes 10 to the bottom rail 18, it will be seen that apertures are provided in the rail 18 in line with the lift tapes 10. A plate 70 provided with an upstruck curved lug 71 is fastened to the lower surface of the rail 18 across said aperture by any suitable means, such as screws 72. It will be noted that the plate 70 is provided with a pair of relatively small apertures 73 and 74 aligned with and to one side of the lug 71. In fastening the supporting tape to the bottom rail, the end of the tape is led down across the lug 71 through the aperture 75 and then is threaded through the apertures 73 and 74, respectively. After the tape has been threaded through said apertures and crimped, the plate 70 is fastened in place on

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