This invention relates to Venetian blinds having movable elements or louvers which are opened and closed by rotation on their axes. More particularly, the invention is concerned with a vertical louver blind having a number of novel features, which include means for rendering the blind wholly ineffective by movement of the louvers to one side of the window opening and separate means for draping the louvers at one side of the opening to produce a decorative effect. The blind of the invention has a bottom control member of novel construction which adjusts itself automatically to compensate for differences in overall length of the suspended louvers and thus maintains the louvers taut at all times, and a novel suspension for the louvers, which makes it possible for it to move between open and closed positions without raising or lowering them.

The blind of the invention is in some respects similar to that disclosed in my prior Patent 2,173,275, issued Sept. 19, 1939, but differs therefrom by the inclusion of improved features overcoming objections to the prior blind. In the blind of the patent, the louvers are suspended by individual tapes from a shaft rotatable on its longitudinal axis and, in the open position of the louvers, the tapes hang down from the shaft with their planes normal to the shaft. When the louvers are to be closed, the shaft is rotated 90° in either direction and this movement of the shafts causes each tape to fold upon itself along a line at 45° to the axis of the tape, so that the plane of the tape lies parallel to the axis of the shaft. This rotational movement of the shaft not only closes the blind but also raises the louvers so that an objectionable open space is left below the blind. When the blind is to be moved out of the window opening, the shaft must be rotated to wind the tapes and louvers and, as the louvers ordinarily extend from top to bottom of the opening and are long, the shaft must be rotated many times to wind up the louvers completely. Moreover, it is difficult to suspend the louvers from the shaft in such a way that the louvers can be wound up and unwound evenly and without interference with one another.

The louvers in the patented blind are attached at their lower ends to a rigid control member and, when the louvers are to be draped at one side of the window opening, the end of the bar remote from that side of the opening is swung upwardly until the bar extends vertically. To move the member to and from the vertical position, guide rings are attached to the front edges of the louvers in a line extending downwardly at 45° to the vertical from a point at a height equal to the length of the control bar at the side of the window opening, toward which the bar is to be swung. A cord is passed through the rings and attached at one end to the end of the bar remote from the stated side of the opening, so that, by pulling the cord, the bar may be raised to drape the louvers. The cord and the rings attached to the louvers are unsightly and the cord and rings make difficult the even winding of the louvers on the shaft. Moreover, the use of a rigid control bar requires that the lower end of exactly the same length and carefully be attached to the shaft, so that their lower ends will lie in a horizontal line, since a slight shortness in the overall length of one louver causing its lower end to lie above the line will result in raising the control bar and producing slackness in the other louvers.

The present invention is directed to the provision of a blind which makes available desirable features of the patented blind and, at the same time, overcomes its drawbacks. The new blind is thus easier to operate, easier to construct, and of better appearance than the prior blind. For a better understanding of the invention, reference may be made to the following drawings in which:

FIG. 1 is a front elevational view of the blind of the invention in a window frame with the blind partially closed and the opening movement of the louvers indicated;
FIG. 2 is a fragmentary front elevational view of the blind in open position;
FIGS. 3, 4, and 5 are sectional views on the line 3—3 of FIG. 2 showing different stages in the closing of one louver;
FIG. 6 is a fragmentary elevational view of the parts in FIG. 5 as viewed from the right;
FIG. 7 is a fragmentary front elevational view of the blind in a window frame with the blind partially closed and the closing movement of the louvers indicated;
FIG. 8 is a fragmentary elevational view of the blind showing the mounting of the louver suspension bar on an enlarged scale;
FIG. 9 is a sectional view on the line 9—9 of FIG. 2 on an enlarged scale;
FIG. 10 is a view of the blind in front elevation illustrating the manner of making the blind ineffective;
FIG. 11 is a view similar to FIG. 10 showing the louvers draped;
FIG. 12 is a sectional view on the line 12—12 of FIG. 1;
FIG. 13 is a bottom plan view of the control member with the blind closed;
FIG. 14 is a sectional view on the line 14—14 of FIG. 12;
FIG. 15 is a sectional view on the line 15—15 of FIG. 14;
FIG. 16 is a diagrammatic perspective view showing the traverse bar construction;
FIG. 17 is a fragmentary diagrammatic perspective view of metallic louvers.

One form of the new blind shown in FIG. 1 installed in a window frame comprises a suspension bar 20 which may be of any suitable material and is illustrated as of wood and rectangular in section. The bar is mounted on a pair of arms, of which the arm 21a (FIG. 9) is attached to a stub shaft 22 mounted in a bearing carried by a plate 23 secured by screws 24 to a side member of the frame. The other arm 21b (FIG. 10) is provided with a sleeve encircling a fixed pivot pin attached to the opposite side member of the frame and aligned with the stub shaft 22. In the construction illustrated, the bar 20 has a slot extending inward from each end and each arm is received in one of the slots and held in place therein by a bolt 25 passed through aligned openings in the bar and arm and having a nut 26 threaded on one end. The arms are of such length and the bar of such cross-section that the lower surface of the bar lies in the common axis of the stub shaft 22 and the pivot pin. A grooved pulley 27 is secured to the bar 20 and a cord or bead chain 25 is looped about the pulley and extends downward along the adjacent side member of the window frame. Beneath the pulley, the cord is guided to slipping out of the groove of the pulley by a U-shaped plate 30 attached to the adjacent plate 23 to enclose the pulley and having an opening for the passage of the stub shaft 22. The bar 20 supports a plurality of vertical louvers 31 which may be made of a suitable fabric, such as a shade cloth, coated fabrics which will not fray when cut, a fiberglass fabric, etc. If desired, the louvers may be made of thin strips of a metal, such as aluminum, although a
flexible fabric is preferred. Each louver is suspended from the bar by a flexible tape 32 with the tape and louver in such manner that the lower end of the tape normally lies in a plane perpendicular to the longitudinal axis of the bar. In the blind illustrated, the upper end section 32a (FIG. 8) of each tape is folded at right angles to the remainder of the tape and secured to the flat bottom surface of the bar beneath a right triangle plate 34 (FIG. 6) which is secured to the bar with the apex of the triangle lying in a plane through the longitudinal axis of the bar.

With the arrangement described, the rotation of the pulley 27 causes angular movement of the bar about its common axis of the stub shaft 22 and the pivot pin and such movement causes the tape to be folded upon itself along one inclined edge of the plate 34 (FIG. 6). In such movement, the louver attached to the tape is rotated on its longitudinal axis, the direction of rotation depending on the direction of angular movement of the bar 20. In the position of the bar shown in FIG. 3, the louver is in full open position and, when the bar has been moved counterclockwise through a 90° angle to the position shown in FIG. 5, the louver has been moved clockwise as viewed from above to closed position. If the bar is moved 90° clockwise from its position as shown in FIG. 3, the louver will be moved counterclockwise as viewed from above to closed position. The louver may be placed in any desired intermediate position between open and closed positions by angular movement of the bar 20 through an angle of less than 90°. In the movements of the louvers described, they are not raised and lowered, since the free depending part of each tape terminates at the under surface of the bar and lies in a horizontal plane through the common axis of the stub shaft 22 and the aligned pivot pin.

At their lower ends, the louvers are connected to a control member which comprises a series of connected links 35 lying in a line through the longitudinal axes of the louvers and a second series of links 36 lying parallel to the first series and lying near one edge of each louver. Each link 37 in each series is a channel member pivotally attached to the lower end of a louver and having one end 37a flattened so as to be receivable in the channel portion of the adjacent link. The links are connected together by a projection 38 on the flattened end of one link received in a slot 37b formed in one side of the channel portion of the adjacent link and extending lengthwise of the series.

With the control member formed as described, the individual links are free to move relative to one another in a vertical plane so that, if the overall length of one louver is slightly less than that of the remaining louvers, the links attached to the short louver may be elevated slightly without causing slackness in adjacent louvers.

The louvers of the new blind may be moved to lie close to one of the side members of the window frame to render the entire blind ineffective and, for this purpose, an endless cord 39 is trained about a pulley 40 on one side member 41 of the window frame and about a pulley 42 on the opposite side member 43. The cord then passes around a tensioning pulley 44 acted on by a spring 45 secured to the frame member 43 near its lower end. From the tensioning pulley, the cord passes up to a pulley 46 on the frame member 43 and then opens to a pulley 47 on the frame member 41. The cord then extends back toward the frame member 43 and passes around pulleys 48, 49 on that frame member. From pulley 49 to the pulley 40. A traverse bar 50 is attached by clamps 51 to stretches 52, 53 of the cord, which move in the same direction when the cord is pulled and, if the window opening is relatively nar-
6. The blind of claim 5, in which the links of one series are connected to the louvers at the mid-points of their lower ends and the links of the other series are connected to the lower ends of the louvers near side edges of the louvers.

7. The blind of claim 5, in which the connection between adjacent links includes a slot in one link extending lengthwise of the link and a projection on the other link receivable in the slot.

8. The blind of claim 5, in which each link is a channel member having a flattened end receivable in the channel of an adjacent link.

9. The blind of claim 1, which includes a control member attached to the lower ends of the louvers and means for draping the louvers at one side of the opening, including means attached to the end of the control member at that side of the opening for raising the end of the member until the member extends vertically along the side of the opening.

10. The blind of claim 9, in which the means for raising the end of the control member includes a cord attached to the end of the member and extending over a pulley mounted at the side of the opening near the upper end thereof.

11. A blind for a window or like opening, which comprises a horizontal suspension bar, means for supporting the bar for angular movement about an axis eccentric to the longitudinal axis of the bar, a plurality of tapes attached at one end to the bar to depend therefrom in parallel planes normal to the bar, a louver attached to the other end of each tape with its plane in the plane of the depending part of the tape, the free depending end of each tape terminating and lying in a horizontal plane through the eccentric axis, and means for moving the bar angularly in either of opposite directions, movement of the bar through 90°, generally triangular shaped plates positioned at the apex of the triangle lying in a plane through the longitudinal axis of the bar and causing the tapes to fold upon themselves adjacent to the bar to rotate the louvers on their vertical axes to lie substantially parallel to the eccentric axis to prevent horizontal displacement of the louvers during rotation.

12. A blind of claim 11 in which a right triangular plate secures a marginal edge of the tape to the bar with the marginal end of the tape extending in a horizontal plane and the apex of the triangular plate positioned at the center of the tape adjacent the fold between the marginal edge and the depending portion of the tape.

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