United States Patent

Anderle

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[54] INCLINED-SOFFIT VENETIAN BLIND AND INSTALLATION

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[52] **U.S. Cl.** **160/168**

[51] **Int. Cl.** **E06b 9/30**

[58] **Field of Search** 160/20, 88, 93, 94, 114, 115, 160/132, 134, 166–178; 52/76, 77

[56] **References Cited**

UNITED STATES PATENTS

1,447,189 3/1923 Simon ..... 160/134 X

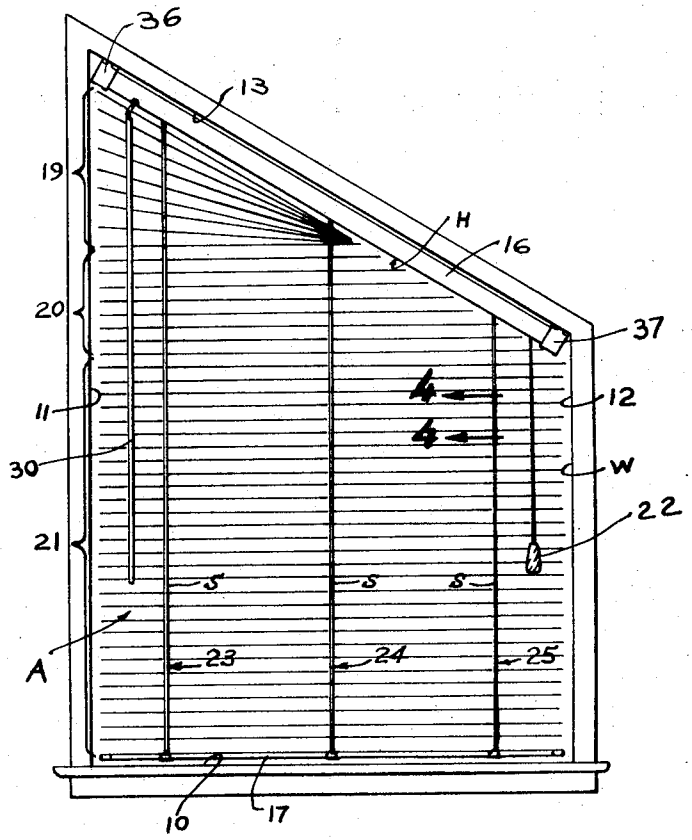
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[57] **ABSTRACT**

A window which is either triangular or trapezoidal by reason of an inclined soffit is provided with a venetian blind which controls the passage of light through all portions of the window.

16 Claims, 5 Drawing Figures



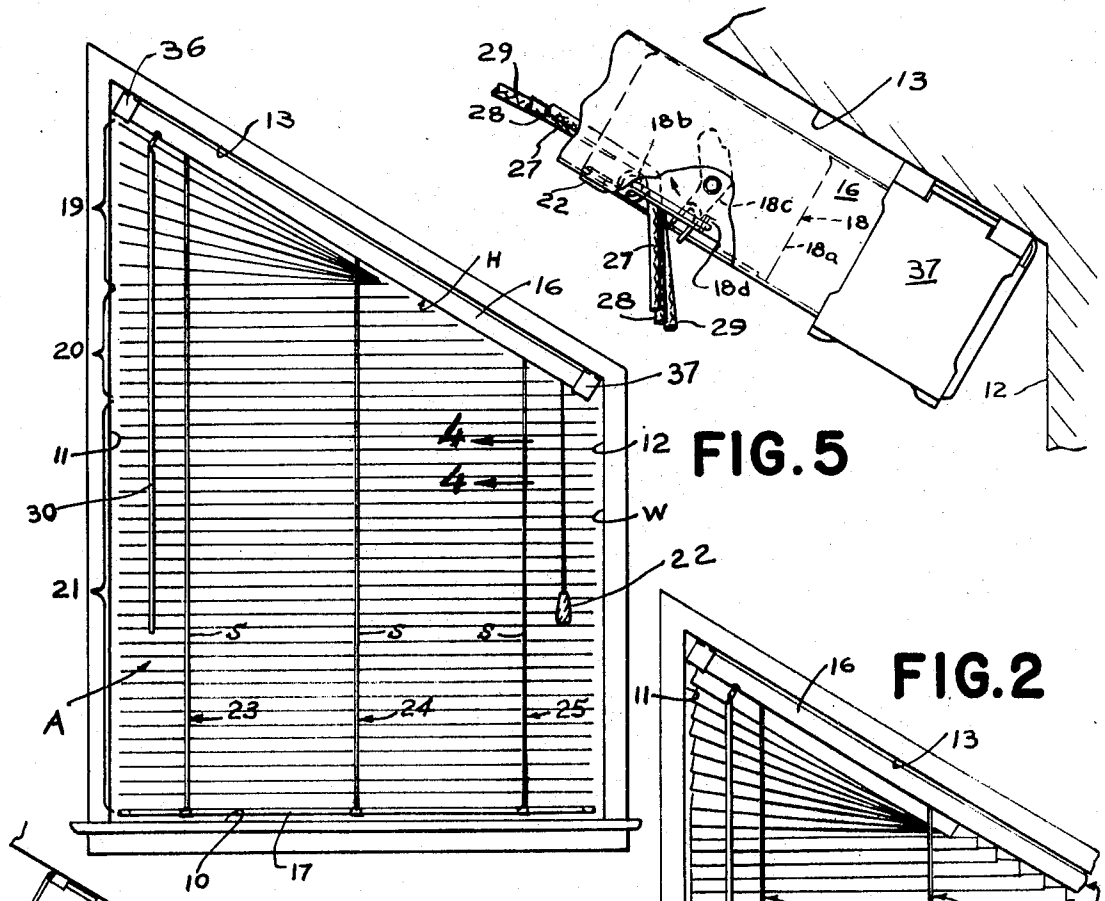


FIG. 5

FIG. 1

FIG. 2

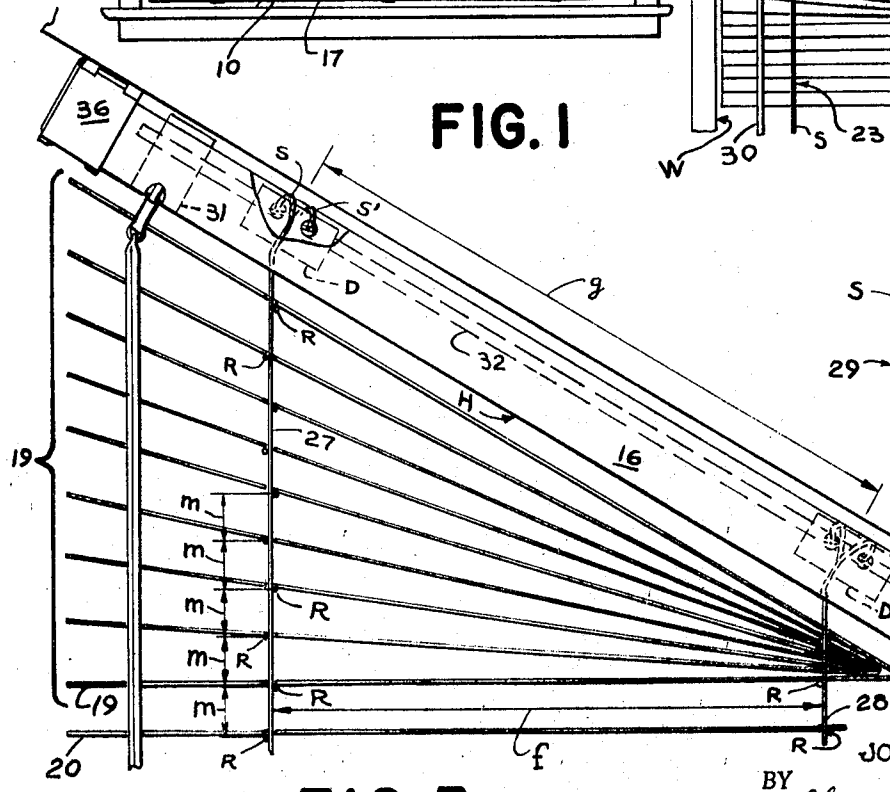


FIG. 3

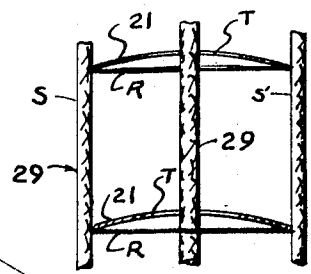


FIG. 4

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INCLINED-SOFFIT VENETIAN BLIND AND INSTALLATION

BACKGROUND OF THE INVENTION

Windows which have inclined straight line soffits are used at times in various buildings, e.g., in buildings of A-frame construction, in churches of modern design, and in split level houses of the type which provide a living room that has a so-called cathedral ceiling. In some instances the window opening is a right-angled triangle with the hypotenuse delineated by the inclined soffit. In other instances the window opening is an isosceles triangle, in which case the window may be considered as having two soffits that are oppositely inclined and are delineated by the two legs of the triangle. In still other instances the window opening is trapezoidal, being composed of a rectangular area that is topped by a triangular area; the triangular area may be either a right-angled triangle or an isosceles triangle.

Heretofore windows with inclined soffits have been rather generally left uncovered or, in the alternative, been covered permanently in whole or in part with fabric or other material. A conventional venetian blind controls the passage of light through a rectangular area and, if used at a window that has an inclined soffit, leaves one or more triangular areas which are outside of the light-controlling area of the blind.

SUMMARY OF THE INVENTION

The present invention provides a venetian blind which may be wholly triangular, or may have a triangular area which tops a rectangular area.

In accordance with a feature of the invention the venetian blind controls the passage of light through a triangular area by means of a series of slats which have one of their ends bunched together and the other of their ends spaced apart. In accordance with further features these slats include a lowermost slat which extends horizontally, and all of the slats rest upon vertically spaced rungs of a ladder which is remote from the bunched together ends of the slats.

In accordance with another feature of the invention the venetian blind has a triangular light-controlling area which is relatively large and is composed of two series of slats, the first a triangular-area series in the upper portion of the large triangular area and the second a trapezoidal-area series in the lower portion of the large triangular area. In accordance with further features the first series is composed of slats which have one of their ends bunched together and the other of their ends spaced apart and vertically aligned, and the second series is composed of parallel slats which are disposed horizontally from end to end and which have one of their ends vertically aligned with the spaced-apart ends of the slats of the first series and have the other of their ends in stepped formation.

In accordance with another feature of the invention the venetian blind has a series of slats for controlling the passage of light through a rectangular area; in some blinds this is a second series which is directly below a triangular-area series, in other blinds it is a third series which is separated from the triangular-area series by a trapezoidal-area series.

In accordance with still further features of the invention the venetian blind is installed at a window which has an inclined soffit, the blind includes a head that is mounted at an inclination corresponding to the inclination of the soffit, and the blind includes a plurality of ladders of different length which hang vertically from the inclined head. In accordance with additional features the blind includes at least three ladders of different length; and a triangular-area series of slats and also a trapezoidal-area series of slats are supported by two of the ladders neither of which is the shortest ladder, while a rectangular-area series of slats is supported by the shortest ladder and at least one of the other ladders.

Where the blind has a rectangular-area series of slats it may include means to raise slats of that series and lock them in raised position.

In accordance with other features of the invention the head of the blind is inclined and includes a ladder rocker that is pivoted on a similarly inclined axis, and a series of slats is suspended beneath the head by string means which hangs vertically from the head and includes a string ladder that is connected to the rocker for tilting the slats.

The invention affords all of the foregoing features, among others. It is left to the user to select the features which are needed or desirable for his particular use.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a partly diagrammatic front elevation, i.e., from the room side, showing a venetian blind of the present invention installed at a trapezoidal window. The blind is fully extended and the slats of the blind are untilted.

FIG. 2 is a partly diagrammatic front elevation of the upper portion of the installation shown in FIG. 1. The slats of the blind are tilted forwardly to the fullest extent, i.e., the slat edges that face the room are at maximum depression while the slat edges that face away from the room are at maximum elevation.

FIG. 3 is a partly diagrammatic view, on a larger scale, of the upper portion of the installation shown in FIG. 1. The slats are untilted and are shown diagrammatically in central longitudinal section. The tilter, tilt rod and two of the ladder drums or rockers are shown in dotted lines, being within the head of the blind. A breakout in the front wall of the head exposes a portion of one of the ladder drums or rockers.

FIG. 4 is an enlarged detail section taken generally on the line 4—4 of FIG. 1. Two slats are shown in cross section and the associated ladder and lift cord are shown in elevation.

FIG. 5 is a fragmentary front elevation, on a larger scale than FIG. 1, showing the right-hand end portion of the head of the blind and associated structure and arrangement.

DESCRIPTION OF THE EMBODIMENTS WHICH ARE PRESENTLY PREFERRED

The best modes thus far contemplated of carrying out the invention are herein disclosed. Nevertheless, the disclosed modes are by way of illustration and example, since other modes may be used; and the claims embrace other modes. Except as otherwise indicated, the description hereinafter (prior to the claims) is of the particular form of the invention that is shown in the drawing and does not necessarily refer to any other form.

A window opening W is bounded by a horizontal sill **10**, vertical jambs **11** and **12**, and an inclined straight line soffit **13**. As with other venetian blinds, the venetian blind of the present invention may be either nested within the window opening or be slightly in front of the window opening and extend beyond the boundary of the window opening. The drawing shows the blind nested within the window opening.

The venetian blind shown has a ladder-and-slat assembly A which is suspended beneath a head H. The head H consists essentially of a sheet steel channel **16** within which there are known mechanisms and arrangements through which the ladder-and-slat assembly of the blind is suspended and tilting of the slats and raising of slats is afforded. At the bottom of the ladder-and-slat assembly A there is a bottom bar **17**, as is customary; this tilts in unison with the slats and may be considered as the lowermost slat of the blind.

The array of slats is composed of three series of slats, viz., a triangular-area series of slats **19** at the top of the blind, a trapezoidal-area series of slats **20** immediately below the triangular-area series, and a rectangular-area series of slats **21** immediately below the trapezoidal-area series. Taken as a whole the array of slats is supported by three ladders **23**, **24** and **25** of progressively decreasing length; these hang vertically from the head H. The series of slats **19** and the series of slats **20** are each supported by the ladders **23** and **24**, while the series of slats **21** is supported by all three of the ladders. Each of the

ladders 23, 24 and 25 has a front sidepiece S and a rear sidepiece S'; see FIG. 4 for the sidepiece S'. At regular vertical intervals, i.e., at regularly spaced levels, the sidepieces S and S' are interconnected by crosspieces or rungs R upon which the slats rest. The ladders are of the "string" type; the sidepieces S and S' are braided cords and each rung R is composed of a plurality of strands, e.g., four strands, which are side by side and each of which is braided or twisted.

The slats of the blind are tilted by manually twisting a baton or wand 30 which acts through a worm-and-gear tilter 31 (FIG. 3) to rotate a tilt rod 32 that extends longitudinally within the head channel 16. The tilt rod carries and oscillates rockers or drums D, one for each ladder, to which the upper ends of the sidepieces S and S' are connected—whereby the ladders are manipulated in known manner to tilt the slats when the drums D are oscillated. The baton or wand 30, the tilter 31, the tilt rod 32, and the rockers or drums D are of known construction and arrangement; they are preferably constructed, arranged and mounted as disclosed in the Lorentzen et al. U.S. Pat. No. 3,425,479 issued Feb. 4, 1969. Within the head H the sidepieces S and S' of the ladders are preferably arranged and guided as disclosed in that patent and are preferably connected to the rockers or drums D in the manner disclosed in that patent.

By means of suitable installation brackets 36 and 37, of known type that are used in mounting venetian blind heads horizontally, the head H is mounted at an inclination corresponding to the inclination of the soffit 13. When the blind is nested within the window opening W the head H is ordinarily mounted in closely confronting relation to the soffit as is shown in the drawing. Except for the cord lock, which will be referred to later, everything within the head H may be the same as though the head were to be mounted horizontally. Coming from the drums D, the sidepieces S and S' of the ladders pass downwardly through eyeletlike guides which are adjacent to the bottom of the head channel 16 and are as disclosed in said U.S. Pat. No. 3,425,479; from these guides the sidepieces of the ladders hang down vertically as is seen in FIG. 1.

A lift cord is associated with each ladder, the lift cords being designated respectively by 27, 28 and 29. One rung R of the ladder is on one side of the lift cord, the next rung R on the opposite side and so on as is seen in FIGS. 3 and 4. While two lift cords may be provided by two cord-branches extending from a bight, it will be convenient to treat the lift cords as separate cords. The three lift cords extend upwardly from the bottom bar 17, pass into the head H and extend longitudinally within the head—all in known manner, preferably as disclosed in said U.S. Pat. No. 3,425,479 and related Lorentzen et al. U.S. Pat. No. 3,447,585 issued June 3, 1969. Near the right-hand end of the head H the three lift cords 27, 28 and 29 pass in side-by-side relation through a cord lock 18 of known type and hang down in front of the ladder-and-slat assembly A. The depending ends of the three lift cords are joined together within a tassel 22, which can be grasped for pulling in and paying out the lift cords in unison for raising and lowering slats of the blind.

The cord lock 18 may have a sheet-steel body and a sheet-steel locking dog, and may be of the type disclosed in Lorentzen U.S. Pat. No. 2,872,976 issued Feb. 10, 1959. The body of the cord lock is U-shaped in cross section, each leg being planar, being in a vertical plane, and being of generally rectangular form as per the leg 18*a* shown in dotted lines in FIG. 5. The web which connects the two legs of the U-formation is flat, is against the bottom of the head channel 16 and is fixedly secured to the bottom in suitable manner, e.g., by eyelets one of which is shown at 22. Extending between the legs of the U-formation there is a curved cord guide 18*b* and a pivoted locking dog 18*c*. The dog confronts the cord guide as shown in FIG. 5.

The lift cords 27, 28 and 29 pass in side-by-side relation over the cord guide 18*b*, pass between the cord guide and the locking dog 18*c*, pass through aligned openings in the bottom of the cord lock and the bottom of the head channel, and then hang down in front of the ladder-and-slat assembly. The unbalanced weight of the pivoted locking dog 18*c* biases the dog counterclockwise as viewed in FIG. 5, and a bendable stop 18*d* is set to arrest the dog in the position shown in the drawing. This adapts the cord lock for the inclination of the head that is shown in the drawing; the cord lock is the same as used in a horizontally mounted head but the stop 18*d* for the dog is differently adjusted. The locking dog 18*c* has a pair of parallel edges which are serrated and confront the three lift cords in conventional manner. With the lift cords under tension from the weight of the bottom bar 17 and slats accumulated thereon, the lift cords are locked by swinging them against one or both of the confronting edges of the locking dog 18*c* and then paying them out slightly; the cords swing the dog clockwise as indicated by the small arrow, whereupon the dog clamps the three lift cords against the cord guide 18*b*. The lift cords are unlocked by pulling them down slightly while swinging them a little to the left.

The bottom bar 17 and the attachment of the lift cords and ladders thereto are preferably as in Lorentzen et al. U.S. Pat. No. 3,485,286 issued Dec. 23, 1969.

The slats 19, 20 and 21 of the blind are of sheet metal, e.g., sheet aluminum. They may be 1 or 1⅜ inches wide and they are crowned or upwardly arched as shown in FIG. 4. All of the slats have transverse slots, commonly called rout openings, for the passage of the lift cords. These rout openings have the usual dimensions except for most of the rout openings adjacent to the bunched together ends of the slats 19, as will now be explained.

As is perhaps best seen in FIG. 3, the series of slats 19 have one of their ends bunched together and the other of their ends spaced apart. Each of the slats 19 has two rout openings which extend transversely of the slat and through which the respective lift cords 27 and 28 pass. For the lift cord 27 all of the rout openings have dimensions which are normal for the width of the slat and the thickness of the lift cord, being the same as the rout opening T in FIG. 4. For the lift cord 28 the lowermost slat 19 (see FIG. 3), which extends horizontally from end to end, has a rout opening the dimensions of which are normal for the width of the slat and the thickness of the lift cord. For the lift cord 28 the other slats 19, which are inclined from end to end, have rout openings which are as large as needed to prevent these slats from binding when the slats are tilted.

The lowermost slat 19 rests upon two rungs R that are at the same level, one rung being in ladder 23 and the other rung being in ladder 24. The bunched together ends of the other slats 19 are stacked on top of the lowermost slat 19. Thus the bunched together ends of the slats 19 are supported by a single rung R of the ladder 24. The ladder 24 has no rungs above the one on which the lowermost slat 19 rests, any rungs above having been cut out. Coming to ladder 23, which is remote from the bunched together ends of the slats 19, the slats 19 rest individually upon successive rungs R as is best seen in FIG. 3. Progressing upwardly from the lowermost slat 19, the slats 19 are increasingly inclined from end to end. The inclination of each slat is determined approximately by relationship between two distances, viz., (a) the horizontal distance between the lift cord and ladder 27,23 and the bunched together ends of the slats 19, and (b) the vertical distance between the lowermost slat 19 and the rung of the ladder 23 upon which the inclined slat rests. The ends of the slats 19 opposite to the bunched together ends are vertically aligned; and they are spaced apart to a somewhat greater extent than the spacing *m* of the rungs of the ladder 23, the spacing of these ends increasing with the horizontal distance between them and the ladder and lift cord 23,27.

In the lowermost slat 19 the rout openings for the lift cords 27 and 28 are spaced, center to center, by the distance which is indicated by the arrow *f* in FIG. 3. Progressing upwardly from slat to slat, the spacing of the two rout openings in the successive slats 19 is increased as required to afford vertical alignment of all of the rout openings for the lift cord 27 and all of the rout openings for the lift cord 28. Likewise the eyelet-

like guides at the bottom of the head channel for the entry of the lift cords **27** and **28** are vertically aligned with the respective tiers of rout openings in the slats **19**; this places these guides at a distance apart, center to center, which is the same as indicated by the arrow *g* in FIG. **3**. The pairs of eyeletlike guides for the entry into the head of the sidepieces S and S' of the ladders **23** and **24** are also spaced, center to center, by a distance which is the same as indicated by the arrow *g* in FIG. **3**.

While the spacing of the rout openings in the slats **19** varies as measured along the slats, it may be noted that in horizontal projection the center-to-center spacing of the rout openings in all of the slats **19** and of the lift cord guides at the bottom of the head are the same, viz., the spacing indicated by the arrow *f* in FIG. **3**.

The spaced-apart ends of the slats **19** are in vertical alignment. For such alignment it is not only necessary that the slat lengths between the lift cords **27** and **28** increase with the inclination of the slats, but it is also necessary that the slat lengths between the lift cord **27** and the spaced-apart ends of the slats increase with the inclination of the slats. Again, however, all of the slats **19** have the same length in horizontal projection between the lift cord **27** and the spaced-apart ends of the slats.

The trapezoidal-area series of slats **20** are traversed by the lift cords **27** and **28**, these slats having rout openings which are the same as the rout openings T in FIG. **4** and which are vertically aligned with the respective tiers of rout openings in the slats **19**. The slats **20** are of increasing length, considered from the top slat **20** to the bottom slat **20**; they have one of their ends in vertical alignment with the spaced-apart ends of the slats **19** and the other of their ends in stepped formation as is seen in FIGS. **1** and **2**. Each slat **20** rests upon two rungs which are at the same level, one rung in ladder **23** and the other rung in ladder **24**.

The rectangular-area series of slats **21** are conventional, being conventionally arranged and being conventionally supported by the ladders **23**, **24** and **25**. The slats **21** are all of the same length, each extending for the full width of the blind. One end of each slat **21** is vertically aligned with the spaced-apart ends of the slats **19**.

When the wand **30** is twisted to tilt the slats of the blind all of the slats **19**, **20** and **21** tilt in unison. The rectangular-area series of slats **21** functions conventionally, each slat moving into overlapping relation with the adjoining slat and the uppermost slat **21** moving into overlapping relation with the lowermost slat **20**. The trapezoidal-area series of slats **20** tilts conventionally, each slat moving into overlapping relation with the adjoining slat and the uppermost slat moving into overlapping relation with the lowermost slat **19**. While the slats **20** tilt conventionally, the upper corners of the stepped ends (right-hand ends in the drawing) move into closely confronting relation to the inclined head H as is shown in FIG. **2**. It will be seen that the series of slats **20** controls the passage of light through a trapezoidal area, consisting of a rectangular area plus an area that is in the form of a right-angled triangle and, in the drawing, projects to the right from the rectangular area.

The slats **19** tilt to the condition shown in FIG. **2**, covering an area that is a right-angled triangle. At their spaced-apart ends the tilted slats **19** overlap one another by a small amount. The overlap increases as the slats are traversed toward their bunched together ends, the overlap being substantially total at the bunched together ends of the slats **19**. With the slats **19** tilted, the upper edge of the uppermost slat **19** closely confronts the bottom of the head H as is seen in FIG. **2**. The top slat or two of the series of slats **19** tends to flop over upon being fully tilted. This flop-over tendency can be obviated by lacing the slat through the strands of the rung R of the ladder **27**, whereby the slat rests on some of the strands and is held against the same by at least one other strand.

Considered as a whole, the blind shown in the drawing controls the passage of light through a trapezoidal area which consists of a rectangular area that is topped by an area in the form of a right-angled triangle. The series of slats **21** controls the passage of light through the rectangular area. In the large triangular area the passage of light is controlled by two series of slats; the triangular-area series of slats **19** controls the passage of light through the upper portion of the large triangular area, and the trapezoidal-area series of slats **20** controls the passage of light through the lower portion of the large triangular area.

While the venetian blind shown in the drawing has three series of slats, three ladders and three lift cords, the blind of the invention may have less of any or all of these and may have more than three ladders and more than three lift cords. For a small triangular window the series of slats **20** and **21** will be omitted and the ladder **25** and the lift cord **29** will be omitted, the head H being appropriately shortened. If the window has a narrow rectangular area immediately beneath the small triangular area an appropriate rectangular-area series of slats may be added beneath the small triangular-area series, the trapezoidal-area series of slats **20** being omitted. In various instances the window, whether triangular or trapezoidal, is so wide as to call for the blind of the invention to be provided with additional ladders and/or lift cords, the head H being appropriately lengthened.

Combinations of blinds may be used at a large window. For a window having a large rectangular area topped by an area in the form of an isosceles triangle two blinds such as shown in FIG. **1** may be used, the heads of the blinds sloping in opposite directions and the blinds being mounted with their long vertical edges in juxtaposition. Blinds of the present invention may also be used in combination with rectangular-area blinds. Triangular or trapezoidal areas that are left uncovered by the rectangular-area blinds can be covered with blinds of the present invention.

I claim:

1. A venetian blind wherein the improvement comprises:
an elongated head which is inclined from one of its ends to the other,
a series of slats for controlling the passage of light through a triangular area beneath the head,
the slats of the series having one of their ends bunched together and the other of their ends spaced apart,
and means to tilt the slats of the series in unison,
such tilting means being composed in part of a string ladder which hangs vertically from the inclined head, and on rungs of which the slats of the series rest.

2. A venetian blind as in claim **1** wherein the improvement further comprises:
said series of slats is disposed with one slat horizontal and the other slats above it,
the successive slats above the horizontal slat are at inclinations which increase from slat to slat,
and the inclinations are upward from the bunched together ends of the slats to the spaced-apart ends.

3. A venetian blind as in claim **2** wherein the improvement further comprises:
the spaced-apart ends of the slats are in vertical alignment.

4. A venetian blind wherein the improvement comprises:
a series of slats for controlling the passage of light through a triangular area,
the slats of the series having one of their ends bunched together and the other of their ends spaced apart,
said series of slats is disposed with one slat horizontal and the other slats above it,
the successive slats above the horizontal slat are at inclinations which increase from slat to slat, and
the inclinations are upward from the bunched together ends of the slats to the spaced-apart ends,
and means to tilt the slats of the series in unison,
the means to tilt the slats includes a ladder which is remote from the bunched together ends of the slats and has a series of rungs at vertically spaced levels, and
the successive slats of the series of slats rest upon rungs of said ladder at successive levels.

5. A venetian blind as in claim **4** wherein the improvement further comprises:

the means to tilt the slats includes a second ladder, which is close to the bunched together ends of the slats,

the horizontal slat of the series rests upon a rung of the second ladder,

and the bunched together ends of the other slats are stacked on top of the horizontal slat when it is untilted.

6. A venetian blind installation wherein the improvement comprises:

a first series of slats which controls the passage of light through a triangular area,

and a second series of slats, located below the first series, which controls the passage of light through a trapezoidal area.

7. A venetian blind installation as in claim **6** wherein the improvement further comprises:

the slats of the first series have one of their ends bunched together and have the other of their ends spaced apart and vertically aligned,

the slats of the second series have one of their ends vertically aligned with the spaced-apart ends of the slats of the first series, and

the slats of the second series have the other of their ends in stepped formation.

8. A venetian blind installation as in claim **6** wherein the improvement further comprises:

a third series of slats, located below the second series, which controls the passage of light through a rectangular area.

9. A venetian blind installation as in claim **6** wherein the improvement further comprises:

a third series of slats, located below the second series, which controls the passage of light through a rectangular area,

the slats of the first series have one of their ends bunched together and have the other of their ends spaced apart and vertically aligned,

the slats of the second series have one of their ends vertically aligned with the spaced-apart ends of the slats of the first series,

the slats of the second series have the other of their ends in stepped formation with the longest slat at the bottom,

and the slats of the third series have one of their ends vertically aligned with the spaced-apart ends of the slats of the first series.

10. A venetian blind installation as in claim **6** wherein the improvement further comprises:

the blind is installed at a window that has an inclined soffit,

the blind includes a head which is mounted at an inclination corresponding to the inclination of the soffit,

a plurality of ladders of different length hang vertically from the head, and

each of the two series of slats is supported by these ladders.

11. A venetian blind installation as in claim **7** wherein the improvement further comprises:

a third series of slats, located below the second series, which controls the passage of light through a rectangular area,

the blind is installed at a window that has an inclined soffit,

the blind includes a head which is mounted at an inclination corresponding to the inclination of the soffit,

at least three ladders of different length hang vertically from the head,

the first and second series of slats are each supported by at least two of the ladders neither of which is the shortest ladder,

and the third series of slats is supported by the shortest ladder and also by at least one of the ladders that supports the first and second series of slats.

12. A venetian blind installation as in claim **11** wherein the improvement further comprises:

the blind includes means to raise and lower slats of the third series of slats.

13. A venetian blind installation as in claim **11** wherein the improvement further comprises:

there are three ladders only—a ladder of intermediate length, one longer and one shorter,

the first and second series of slats are each supported by the ladder of intermediate length and the ladder that is longer,

and the third series of slats is supported by all three of the ladders.

14. A venetian blind wherein the improvement comprises:

an elongated head which is inclined from one of its ends to the other,

the head includes a ladder rocker that is pivoted on an axis which inclines similarly to the inclination of the head,

a series of slats is suspended by string means which hang vertically from the inclined head, and

the string means includes a string ladder which is connected to said rocker and by which it is rocked for tilting the slats.

15. A venetian blind as in claim **14** wherein the improvement further comprises:

the string ladder is toward one end of the slats of the series, and successive slats rest upon successive rungs of the string ladder.

16. A venetian blind as in claim **14** wherein the improvement further comprises:

the head includes a plurality of ladder rockers which are mounted in spaced relation on a tilt rod which extends longitudinally of the inclined head,

the string means by which the slats are suspended include a plurality of spaced string ladders which hang vertically and each of which is connected to an individual ladder rocker, and

the blind has slats at least some of which rest on successive rungs of a plurality of the ladders.

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