Feb. 23, 1965 H. K. LORENTZEN ETAL 3,170,505

FULL-CLOSURE TYPE VENETIAN BLINDS

Original Filed May 12, 1955 2 Sheets-Sheet 1

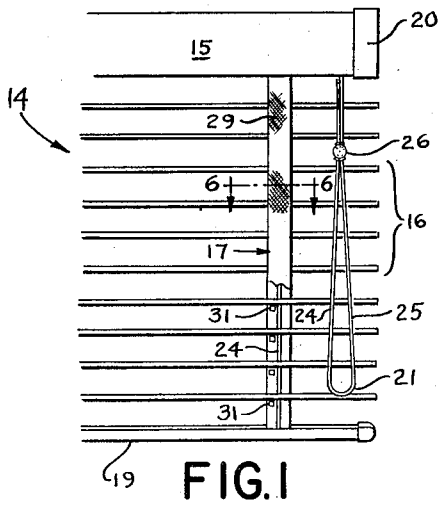


FIG. 1

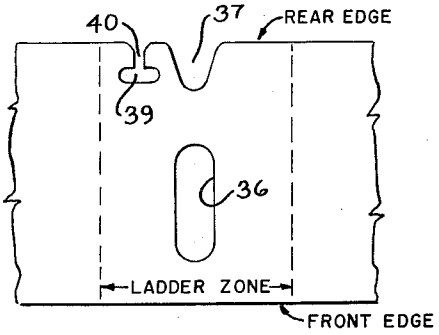


FIG. 4

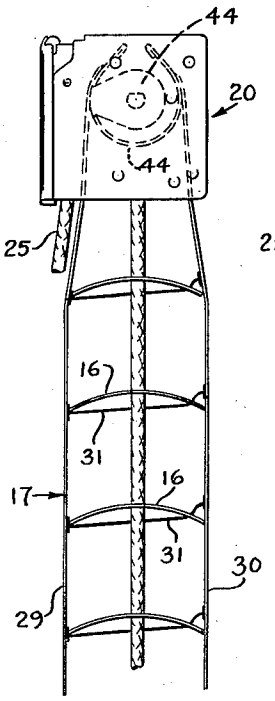


FIG. 2

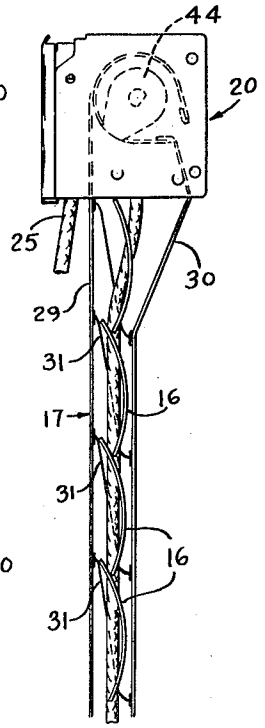


FIG. 3

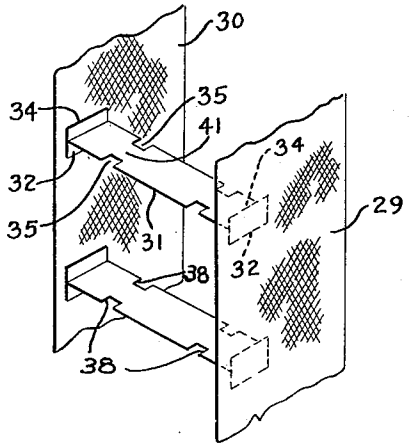


FIG. 5

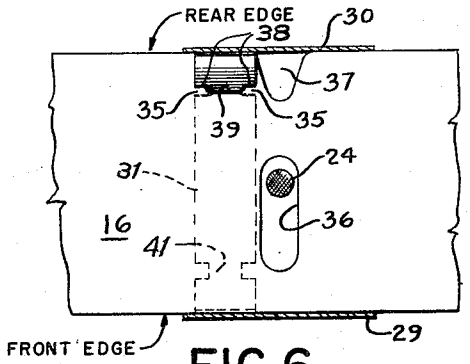


FIG. 6

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FULL-CLOSURE TYPE VENETIAN BLINDS

Original Filed May 12, 1955 2 Sheets-Sheet 2

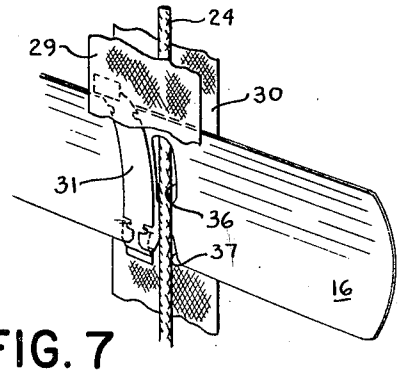


FIG. 7

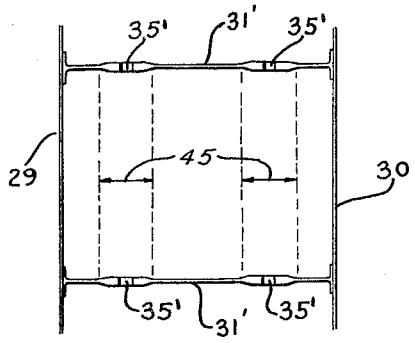


FIG. 10

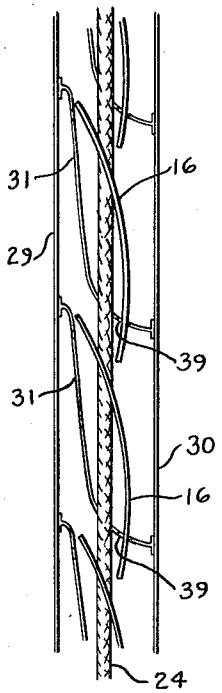


FIG. 8

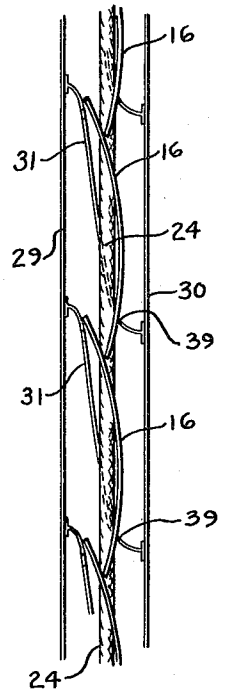


FIG. 9

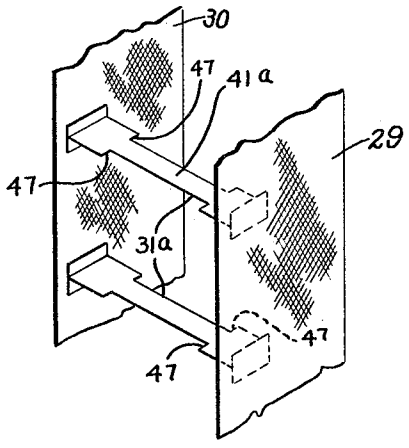


FIG. 11

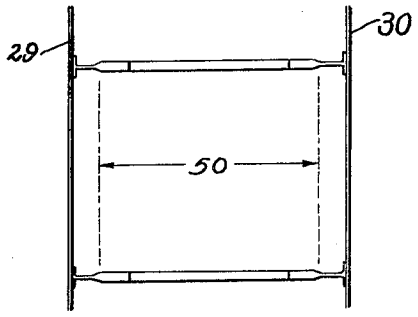


FIG. 12

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3,170,505

FULL-CLOSURE TYPE VENETIAN BLINDS

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Continuation of application Ser. No. 507,782, May 12, 1955. This application Dec. 27, 1962, Ser. No. 247,721
11 Claims. (Cl. 160—176)

This invention relates to Venetian blinds, and more particularly to Venetian blinds which allow the overlapped slats to move substantially into contact. This gives the blind greater light-excluding capacity, and such blinds have been referred to in the trade as "black-out" blinds and "full-closure" blinds.

The present application is a continuation of our application Serial Number 507,782, filed May 12, 1955, now abandoned.

A Venetian blind, of the class to which the present invention is applicable, is essentially an assembly of superimposed articulated slats suspended from a head bar or "head" extending across the top of the blind and on or in which is mounted mechanism which comes into play in raising and tilting the slats of the blind. Such a blind is usually raised by two lift cords which begin at a depending loop that hangs on the front or room side of the blind, extend upwardly into the head, partially across the head to respective pulleys or other cord-guiding and direction-changing means at locations spaced along the width of the blind, and then downwardly (ordinarily through holes in the slats) to the bottom bar. The slats and bottom bar are conventionally tiltable through approximately 180° from one "blind-closed" position, through the "blind-open" position in which the slats lie horizontal, to a second "blind-closed" position.

In the "blind-closed" positions of many Venetian blinds the overlapped edge portions of adjacent slats cannot approach each other any more closely than is permitted by the diameter of the lift cord, which extends between the overlapped edges. In "full-closure" blinds this limitation on the approach of the overlapped edge portions to each other is reduced or eliminated, at least as regards the tilting of the slats in one direction, so that the overlapped edge portions of adjacent slats can move closer together or even into contact.

Blind constructions and arrangements have been proposed from time to time to render Venetian blinds "full-closing" to various degrees. However, the full-closing type blinds of the prior art have disadvantages of various sorts, among which are lack of simplicity in structure, manufacture and assembly, extra parts, weakening of certain parts, sharp corners which tend to snag dust cloths and brushes, openings which admit light despite substantial contact of the overlapped slats, etc.

Among the objects of the present invention are to render a Venetian blind substantially full-closing without complicating the structure of the blind or employing additional parts, to render a Venetian blind subsanially full-closing without unduly weakening any of its parts, to provide a full-closing type Venetian blind which is free of sharp corners that are likely to snag dust cloths or the like, to provide a full-closing type Venetian blind in which openings that are in the slats are well shielded from the transmission of light, to provide for a full-closure type Venetian blind parts which can be rapidly and economically manufactured on a quantity-production basis, and to provide a full-closure type Venetian blind which can be rapidly and economically assembled.

Other objects and advantages, and objects and advantages relating to details of construction, assembly, operation, and use, will be apparent from the detailed description which follows.

FIGURE 1 is a fragmentary, somewhat diagrammatic front elevation of a Venetian blind embodying the present invention, the room side of the blind being considered as the "front" of the blind, and a portion of one of the ladders being broken away.

FIGURE 2 is a fragmentary end view looking from the right of FIGURE 1, the blind being in open position and portions of the lift cords being broken away.

FIGURE 3 is a view similar to FIGURE 2, the blind being fully closed.

FIGURE 4 is a fragmentary plan view of one of the slats, on a larger scale than FIGURES 1–3.

FIGURE 5 is a fragmentary isometic view of one of the ladders of the blind illustrated in FIGURES 1–3 and 6–9.

FIGURE 6 is a fragmentary sectional view on the line 6–6 of FIGURE 1.

FIGURE 7 is a fragmentary perspective view showing one slat of the bind tilted for substantial full closure, the relation thereto of the ladder and lift cord being indicated.

FIGURE 8 is a fragmentary end view, looking from the right of FIGURE 1, showing the position of the slats as they approach full closure.

FIGURE 9 is a view similar to FIGURE 8 but showing the slats fully closed.

FIGURE 10 is a fragmentary side elevation showing a modification of the ladder shown in FIGURE 5.

FIGURE 11 is a fragmentary isometric view showing a further form of ladder in accordance with the present invention.

FIGURE 12 is a fragmentary side elevation showing a modification of the ladder shown in FIGURE 11.

Reference will first be had to FIGURES 1, 2 and 3. The blind, designated as a whole by **14**, includes a head **15**, a series of slats **16**, ladders **17** (one shown), and a bottom bar **19**. The blind is adapted to be counted as a unit in conventional manner by means of a pair of installation brackets **20** of known form (one shown), the brackets being attached to the jamb of a window, for example, and receiving the ends of the head **15**.

The blind includes a pair of ladders, such as ladder **17**, though additional ladders may be used in the case of a wide blind. A lift-cord loop **21** hangs on the front (room side) of the blind. From this loop lift cords **24** and **25** extend upwardly through a cord equalizer **26** of known type and thence into the head, where these cords are arranged in known manner in connection with known means for guiding and changing the direction of the lift cords and for locking the lift cords to secure the blind in fully or selected partially raised positions. One lift cord, for example cord **24**, extends from the head downwardly at the ladder **17** and is attached to the bottom bar. The lift cord **25** is arranged in similar manner, extending downwardly at the other ladder of the aforesaid pair of ladders. When the loop **21** is pulled downwardly, the blind is raised in conventional manner.

The ladder **17** has front and rear vertical tapes **29** and **30** connected by cross tapes **31** on each of which one of the slats **16** rests. The entire ladder **17** may be made of suitable plastic material. Each cross tape **31** has at each end oppositely disposed integral tabs **32** and **34** (FIGURE 5) which are fixedly secured to the vertical tapes **29** and **30** as by heat and pressure. Near but spaced from each end of the cross tape is a pair of oppositely positioned notches **35**, **35** the two pairs of notches being symmetrically positioned with respect to the transverse central axis of the cross tape. The cross tapes **31** are arranged in a single tier as shown in FIGURE 1.

The slats **16** are all alike and all of them cooperate in the same manner with the ladders and with the lift cords. The slats are made of suitable sheet material, preferably metal, and they are upwardly crowned as shown in FIGURE 2.

Referring to FIGURE 4, which shows a fragment of one of the slats **16** including the ladder zone, the slat has an elongated transverse opening **36** which is somewhat wider than the thickness of the lift cord, the transverse central axis of the opening lying closer to the front edge of the slat than it does to the rear edge of the slat. Aligned with the transverse opening **36** is a notch **37** in the rear edge of the slat. Spaced inwardly as shown from the rear edge of the slat is an elongated longitudinal hole **39** which is longitudinally offset with respect to the edge notch **37**. An entrance slot **40** leads from the rear edge of the slat to the hole **39**.

Referring to FIGURES 2 and 6, the front edge of the slat **16** rests directly on the cross tape **31** in abutting relation to the front vertical tape **29** of the ladder. As the cross tape **31** approaches the rear vertical tape **30** of the ladder, it passes upwardly through the hole **39**. As shown, the cross tape is wider than the length of hole **39** and the notches **35, 35** interlock with the slat at the ends of the hole **39**, one side of each notch **35** constituting a shoulder **38** which engages the top of the slat. Preferably, the notches **35, 35** are wide enough, and the neck portion **41** of the cross tape narrow enough, to avoid chafing engagement between the cross tape and the slat at hole **39**.

The entrance slot **40** affords convenient assembly of the cross tape with the slat, the cross tape being inserted sidewise through the slot and pushed into the hole **39**. As far as operation of the blind is concerned, the cross tape need have only one pair of notches **35, 35**. However, we prefer to provide such notches near both ends of the cross tape, and to make the cross tape symmetrical about its central transverse axis, so that in assembling a blind either one of the vertical tapes of the ladder may be used as the rear tape.

The upper ends of front and rear vertical tapes **29** and **30** are attached in known manner to a suitable tape rocker **44**, indicated in dotted lines in FIGURES 2 and 3. In tilting the blind, the rocker is shifted in known manner so that it raises one of the vertical tapes of the ladder and simultaneously lowers the other vertical tape of the ladder, as is well understood in the art. With the blind of the present invention, the greatest light exclusion is obtained by turning the tape rocker **44** in such direction that it raises the front tape **29** and lowers the rear tape **30**, bringing the blind to the condition shown in FIGURE 3.

Reference will now be had to FIGURES 7, 8, and 9. In FIGURE 8 the slats are approaching fully closed position and in FIGURE 9 they have reached fully closed position, the rear edges of the slats now being lowermost. Since the upper ends of the vertical tapes **29** and **30** are held apart by the tape rocker **44**, the effect of such spacing must be overcome to a considerable extent if the overlapping portions of the slats are to be brought into contact. As may be seen in FIGURE 8, the upward pull on front vertical tape **29** is transmitted to the now depending cross tape **31** and brought to bear upon slat **16** at the location of hole **39** which is interlocked with the notches **35, 35**. This hole **39** is removed from (i.e., spaced from) the now lower edge of the slat, and hence the cross tape acts to pull this edge-removed zone of the slat directly toward the overlapped slat beneath. Thus, the bottom zone of the slat is drawn directly toward the overlapped portion of the slat beneath, leaving rear vertical tape **30** spaced from the slats.

The lift cord depends vertically between the front and rear vertical tapes **29** and **30**, passing through the transverse opening **36** in the slat. As the slat moves into fully tilted position, the notch **37** in the slat receives the lift cord, e.g., cord **24**, and permits the lower edge of the slat to move into contact with the overlapped slat beneath without limitation imposed by the thickness of the lift cord. This fully closed condition of the blind is shown in FIGURE 9 and the corresponding position of a single slat is shown in FIGURE 7.

FIGURE 10 illustrates a modification of the ladder shown in FIGURES 1 through 9. This has cross tapes **31'** each provided with pairs of notches **35', 35'** (one notch of each pair shown) arranged in the same manner as the notches of the cross tape shown in FIGURE 5. To compensate for the weakening of the cross tape by the notches, the cross tape in FIGURE 10 is thickened in zones **45, 45**, the thickening extending throughout the entire width of the cross tape.

The form of ladder shown in FIGURE 11 is the same as that shown in FIGURE 5 except that the neck portion **41*a*** of the cross tape **31*a*** extends entirely across the central portion of the cross tape, leaving a pair of shoulders **47, 47** near each end of the cross tape, these shoulders corresponding to the outward sides of the notches **35, 35**. When this form of cross tape is used, these shoulders act to pull the lower zone of the tilted slat into contact with the slat beneath, as was explained in connection with FIGURE 8.

The ladder shown in FIGURE 12 is the same as that shown in FIGURE 11 except that the cross tape is thickened in the zone **50** to compensate for the weakening caused by the long neck **41*a*** shown in FIGURE 11. This thickening extends throughout the width of the neck and throughout the width of the tape in zones adjacent to the ends of the neck.

The blind described may, of course, be tilted in the direction opposite to that shown in FIGURE 3, in which case the rear vertical tapes of the ladders are raised and the front vertical tapes of the ladders are lowered. When the blind is tilted in this direction, the lift cords limit the degree of closure; also the slats are in a less favorable position to block light coming downwardly at an angle from the sky.

Under breezy conditions the slats of Venetian blinds are subject to flutter and chatter, particularly when the blinds are closed. This tendency to flutter and chatter is aggravated when the slats are "fully closed" because there is little space between the slats through which to vent the pressure imposed by the breeze striking the blind. With the blind of the present invention, such flutter and chatter are effectively opposed even with the blind "fully closed" as shown in FIGURES 3 and 9. Referring to FIGURE 9, it will be seen that when the wind tends to blow the lower edge of a tilted slat toward the rear vertical tape **30**, such movement is opposed by the shoulders **38, 38** (FIGURE 5) of the cross tape which is interlocked with the slat. Also, if the wind tends to blow the lower edge of the tilted slat toward the front vertical tape **29**, the movement is opposed by the contact of the lower edge with the slat beneath, the slat beneath having its upper edge against the stump portion of the cross tape. Likewise, if the wind tends to blow the upper edge of the slat in either direction, the movement is opposed—movement toward the front vertical tape **29** being opposed by the stump of the cross tape and movement toward the rear vertical tape **30** being opposed by the lower edge of the slat above. The result is that the fully tilted slat is effectively held against flutter to a marked extent, despite the fact that the blind does not have openings between slats which will readily vent wind pressure that builds up against the blind.

We claim:

1. In a Venetian blind of the full-closure type in which (*a*) a plurality of ladders have front and rear vertical tapes that are interconnected by vertically-spaced cross tapes, (*b*) crowned slats are supported by the cross tapes, (*c*) lift cords depend between the front and rear vertical tapes and pass through elongated transverse openings in the slats, and (*d*) the rear edges of the slats are formed to move astride of the lift cords when the blind is closed; the improvement which comprises: the slats having openings through which the cross tapes pass close to but spaced from the rear edges of the slats, the cross tapes having shoulders which, when the slats are horizontal, engage the

tops of the slats at points close to but spaced from the rear edges of the slats whereby, when the blind is closed with the rear edges of the slats depressed, the cross tapes pull the lower edges of the slats away from the rear vertical tapes and against the faces of the subjacent slats.

2. The improvement as in claim 1 in which the front edges of the slats are continuous straight edges.

3. The improvement as in claim 1 in which the openings through which the cross tapes pass are elongated ones extending longitudinally of the slats, and the portions of the cross tapes that lie between the openings and the rear vertical tapes are wider than the lengths of the openings.

4. The improvement as in claim 1 in which the openings through which the cross tapes pass are elongated ones extending longitudinally of the slats, and on both sides of the slats the cross tapes have portions that are adjacent to the openings and are wider than the lengths of the openings.

5. The improvement as in claim 1 in which the front edges of the slats are continuous straight edges, the openings through which the cross tapes pass are elongated ones extending longitudinally of the slats, and the portions of the cross tapes that lie between the openings and the rear vertical tapes are wider than the lengths of the openings.

6. A full-closure Venetian blind comprising: a plurality of ladders having front and rear vertical tapes that are interconnected by vertically-spaced cross tapes, crowned slats supported by the cross tapes, the slats having openings adjacent to their rear edges through which the cross tapes pass at points that are in spaced relation to the rear edges of the slats, and the cross tapes having shoulders which bear against the tops of the slats when the slats are horizontal and which when the blind is closed with the rear edges of the slats depressed cause the lower edges of the slats to contact the faces of the subjacent slats.

7. A Venetian blind comprising: a plurality of crowned slats having openings adjacent to one edge thereof, said one edge being normally at the bottom when said slats are tilted closed, ladders supporting said slats in vertically-spaced arrangement, each of said ladders comprising front and rear vertical tapes of soft pliable material and a plurality of vertically-spaced cross tapes of soft pliable material extending between said vertical tapes, the width of said slats from the innermost sides of said openings to the opposite edges of the slats being less than the length of said cross tapes, said cross tapes passing under said slats and through said openings and engaging the slats at the innermost sides of said openings, and said cross tapes being shaped to provide shoulder means thereon engageable with the slats toward the bottom edges thereof to hold the slats against sliding down into the junctions of said cross tapes with said rear vertical tapes when said slats are tilted closed.

8. A Venetian blind comprising: a plurality of crowned slats having openings adjacent to one edge thereof, said one edge being normally at the bottom when said slats are tilted closed, ladders supporting said slats in vertically-spaced arrangement, each of said ladders comprising front and rear vertical tapes of soft pliable material and a plurality of vertically-spaced cross tapes of soft pliable material extending between said vertical tapes, the width of said slats from the innermost sides of said openings to the opposite edges of the slats being less than the length of said cross tapes, each of said cross tapes

including end portions adjoining said vertical tapes, the intermediate portions of said cross tapes between said end portions being narrower in width than the end portions, there being shoulders at the junctions of said intermediate portions with those end portions which adjoin the rear vertical tapes, said cross tapes passing under said slats and through said openings and engaging the slats at the innermost sides of said openings, said shoulders on said cross tapes being spaced inwardly from the rear vertical tapes and engaging said slats at the ends of said openings to hold the slats against sliding down into the junctions of the cross tapes with the rear vertical tapes when the slats are tilted closed.

9. A Venetian blind as in claim 7 in which said shoulder means includes two shoulders, one shoulder being at one edge of the cross tape and being engageable with the slat at one end of the slat-opening through which the cross tape passes, and the other shoulder being at the opposite edge of the cross tape and being engageable with the slat at the opposite end of the slat-opening through which the cross tape passes.

10. A Venetian blind as in claim 8 in which each cross tape has two of said shoulders, one at one edge of the cross tape and the other at the other edge of the cross tape.

11. A Venetian blind comprising: a plurality of crowned slats having openings for the passage of cross tapes therethrough at locations close to the rear edges thereof, the rear edges of the slats being normally at the bottom when said slats are tilted closed; and ladders supporting said slats in vertically-spaced arrangement, each of said ladders comprising front and rear vertical tapes of soft pliable material and a plurality of vertically-spaced cross tapes of soft pliable material extending between said vertical tapes, the lengths of the cross tapes being greater than the width of said slats from the front edges of the slats to the nearest edges of said openings in the slats, said cross tapes passing under said slats when the slats are horizontal and through said openings to positions above the tops of the slats and thence to the rear vertical tapes, and said cross tapes having means which engage the slats toward the bottom edge thereof when the slats are tilted closed and hold the tilted slats against sliding down into the junctions of the cross tapes with the rear vertical tapes.

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