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3,189,081

VENETIAN BLIND SLAT AND CROSS TAPE CONSTRUCTION

Filed Oct. 26, 1962

3 Sheets-Sheet 1

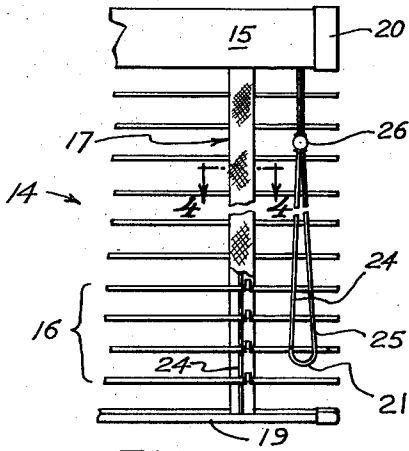


FIG. 1

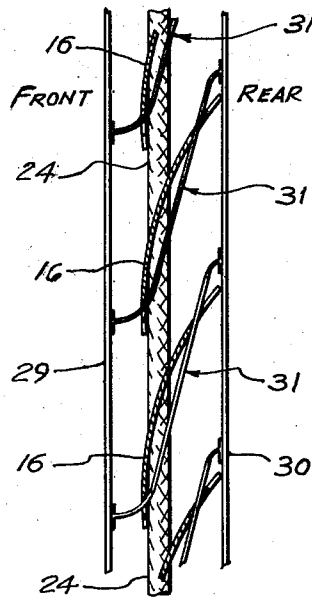


FIG. 10

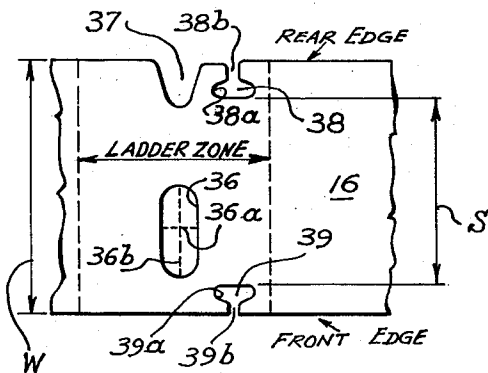


FIG. 2

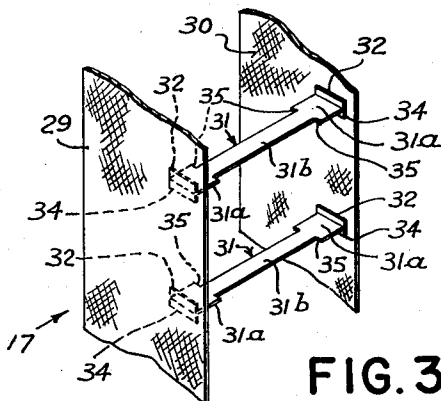


FIG. 3

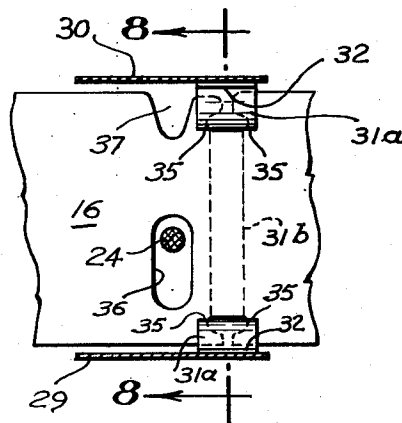


FIG. 4

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3 Sheets-Sheet 2

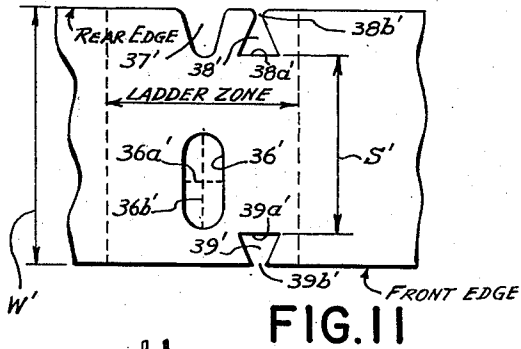


FIG. 11

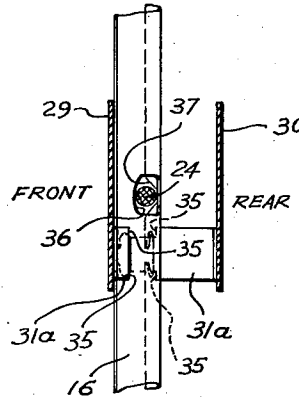


FIG. 6

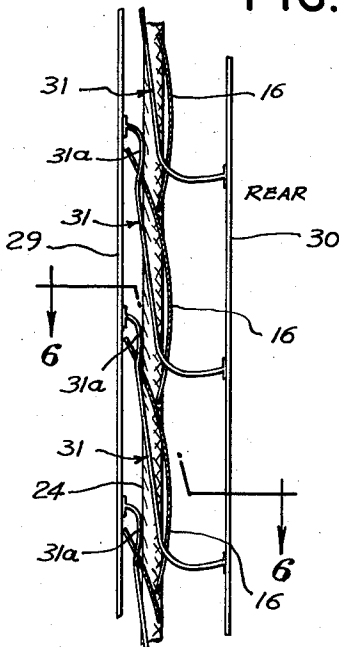


FIG. 5

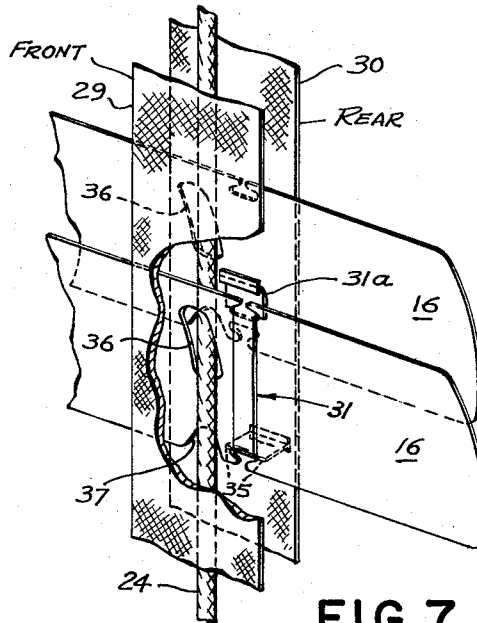


FIG. 7

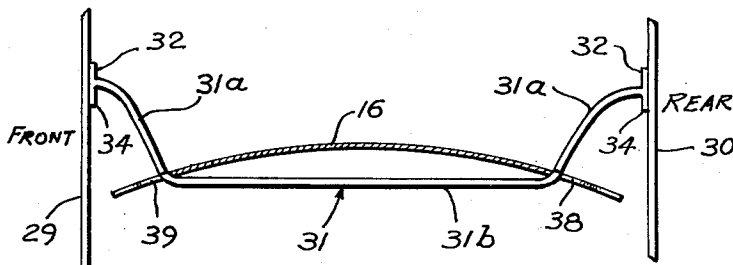


FIG. 8

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3 Sheets-Sheet 3

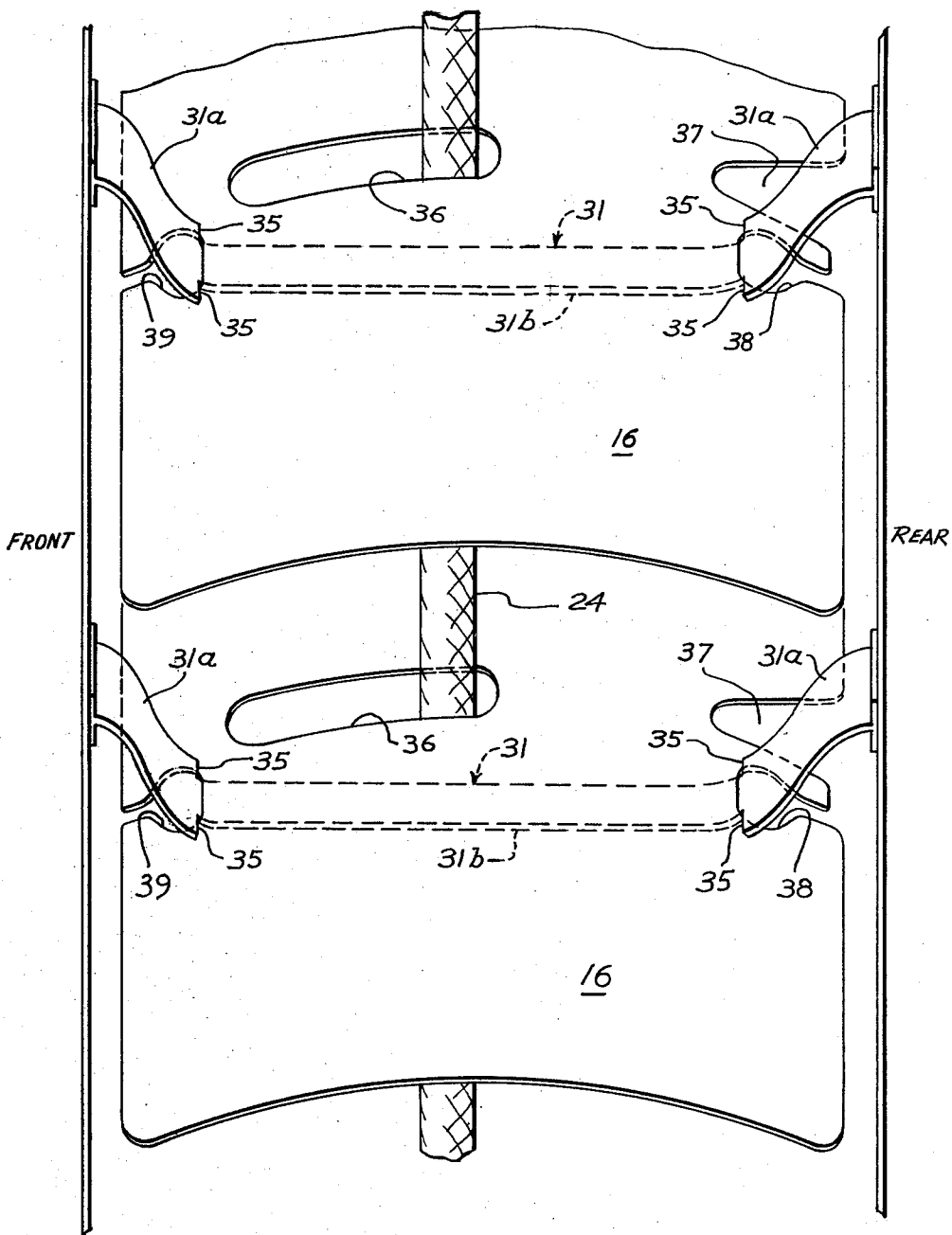


FIG. 9

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3,189,081

VENETIAN BLIND SLAT AND CROSS TAPE CONSTRUCTION

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4 Claims. (Cl. 160-173)

This invention relates to Venetian blinds of the type in which the longitudinal axes of the slats are horizontally disposed.

In blinds of the aforesaid type the slats are customarily supported, one above another, by ladderlike elements. Each ladderlike element is composed of a front vertical tape, a rear vertical tape, and a series of cross tapes that extend between the two vertical tapes. Under one nomenclature that is in use in the trade, and which is thought to be the preferred nomenclature, the entire ladderlike element is called a "ladder." However, various other nomenclatures are in use, and some of the nomenclatures conflict with others. The entire ladderlike element is also called a "ladder tape." And the cross tapes alone are sometimes called "ladders." When there is a divided cross tape or a pair of cross tapes at each slat level the entire ladderlike element is often called a "twin-ladder tape."

Customarily the ladders are suspended from means which are operative to tilt the slats in unison in either direction. In most blinds the tilting of the slats is accomplished by pulling up one vertical tape of each ladder and simultaneously paying out the other vertical tape by an equal amount. However, blinds have been made in which one vertical tape only was raised and lowered.

Customarily the blind includes lift cords which extend vertically, being located between the front and rear vertical tapes of the ladders. In most blinds the lift cords pass through rout openings in the slats and are connected to a bottom bar for raising the bottom bar and accumulating the slats on top of it.

Venetian blinds present special problems with regard to the action of wind on the slats and also with regard to obtaining a high degree of closure when maximum exclusion of light is desired. The present invention is concerned with wind action and also with full closure.

When a Venetian blind hangs before an open window it is likely to be subjected to varying wind action, and such wind action is of frequent occurrence in certain geographical locations. If the air is moving through the window at substantial speed it is necessary to leave the blind open somewhat in order to allow space for the air to pass through the blind. Otherwise the blind as a whole will tend to wave or flap.

The slats, which are customarily made of thin sheet-metal, tend to flutter and rattle under the action of the wind. Under some circumstances portions of the slat may vibrate similarly to a tuning fork, in which case it is sometimes said that the slats "sing." Sometimes the wind causes the slats to beat against one another. In some instances the wind closes the slats, by raising one edge of the slats from the cross tapes or tilting the slats away from the cross tapes.

By way of coping with the wind problems, blinds have been made with the so-called "twin-ladder tape" that has already been referred to. The slat is laced between the two cross tapes, or the two cross-tape branches, whereby one cross tape or branch supports the slat and the other cross tape or branch overlies the slat and holds it in place. While this has advantages as regards wind action on the blind, it has disadvantages as regards the assembly of the blind and also as regards tilting of the slats to close the

blind. Lacing the slat between the two cross tapes, or the two cross-tape branches, is a cumbersome assembly operation. And the cross tape or cross-tape branch which overlies the slat may interfere with full tilting of the slat. Also, when the blind is closed the overlying cross tape, or cross-tape branch, tends to push the vertical tapes outwardly.

When the slats of a Venetian blind are tilted to close the blind the lower edge of a tilted slat moves towards the lift cord from one side thereof and the upper edge of the subjacent tilted slat moves towards the lift cord from the other side thereof. This means that in the absence of special construction and arrangement the degree of closure is limited by the thickness of the lift cord. To obtain greater room darkening, e.g., for daytime sleeping and the projection of motion pictures, one edge of each slat has been notched to permit it to move astride of the lift cord when the slat is tilted with that edge of the slat depressed. Blinds of this type have been referred to by a number of names, including "full-closure" blinds, "black-out" blinds, "audio-visual" blinds, and "AV" blinds.

Full closure of a Venetian blind is not necessarily easily obtained. It is difficult to manufacture the plastic ladders for a Venetian blind with absolutely uniform spacing between the cross tapes, and this has caused difficulty in blinds of the full-closure type. Moreover, the use of an overlying cross tape or cross-tape branch to cope with the wind problems has, under some circumstances, reduced the effectiveness of full-closure blinds.

Among the individual objects of the present invention are to provide a Venetian blind construction which is more satisfactory for use in windy locations, which is also suitable for full-closure blinds, in which the arrangements for coping with the wind problem do not significantly impair the full closure, which has increased tolerance as regards manufacturing variations in the spacing of the cross tapes of the ladders, and which may be rapidly and economically assembled.

Various other objects and advantages will be apparent from the detailed disclosure hereinafter. The disclosure sets forth the best modes thus far contemplated of carrying out the invention. Nevertheless, the disclosure is by way of illustration and example only since the invention may be carried out in other modes and, for some uses, there may be no occasion to accomplish certain of the objects. Unless otherwise indicated, the specification including the drawing refers only to the particular modes disclosed of carrying out the invention.

In the claims parts may at times be identified by specific names for ready understanding, but such nomenclature is to be read as broadly as is consistent with the context and the scope of the invention as distinguished from the pertinent prior art.

The side of the blind which faces the room is considered to be the front of the blind, and the side of the blind which faces the window is considered to be the rear of the blind. When the slats are untilted, so that the blind is fully open, the slats are said to be horizontal. When the slats are tilted with the front edges of the slats depressed, they are said to be tilted forwardly. When the slats are tilted with their rear edges depressed the slats are said to be tilted rearwardly.

FIGURE 1 (Sheet 1) is a fragmentary front elevation of the Venetian blind, a single ladder being shown and a portion of the front vertical tape thereof being broken away.

FIGURE 2 (Sheet 1) is a fragmentary top plan view of the ladder-associated portion of a slat, the slat being horizontal.

FIGURE 3 (Sheet 1) is an isometric view of a short length of one of the plastic ladders. Both the vertical tapes and the cross tapes are soft and pliable but, for the

purpose of illustration, the cross tapes are shown straight just as though the entire ladder were rigid.

FIGURE 4 (Sheet 1) is a horizontal section of the ladder-and-slat assembly, the slats being horizontal and the section being taken as indicated by the line 4—4 in FIGURE 1.

FIGURE 5 (Sheet 2) is a fragmentary elevation, looking from the right-hand side of the blind in FIGURE 1, showing a short length of the ladder-and-slat assembly with the slats tilted rearwardly to fully closed position.

FIGURE 6 (Sheet 2) is a fragmentary section of the ladder-and-slat assembly, taken as indicated by the line 6—6 in FIGURE 5 and showing a single slat.

FIGURE 7 (Sheet 2) is an isometric view showing a short length of the ladder-and-slat assembly with the slats tilted rearwardly to fully closed position.

FIGURE 8 (Sheet 2) shows a single slat and the portion of the ladder that is associated therewith. The slat is in section on the line 8—8 in FIGURE 4, and the ladder is in elevation.

FIGURE 9 (Sheet 3) is a fragmentary isometric view of the ladder-and-slat assembly, with the slats horizontal, looking downwardly at an angle toward the ends of the slats. For the purpose of illustration in this view the ladder is shown as being abnormally close to the ends of the slats and the vertical tapes of the ladder are shown definitely spaced from the edges of the slats.

FIGURE 10 (Sheet 1) is the same type of view as FIGURE 5 but showing the slats tilted forwardly.

FIGURE 11 (Sheet 2) is the same type of view as FIGURE 2 but showing a modified slat that has been found to be advantageous.

In FIGURE 1 the blind is designated as a whole by 14 and includes a head 15, a series of slats 16, ladders 17 (one shown), and a bottom bar 19. The blind is adapted to be mounted 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 17 (one shown). In the case of a wide blind additional ladders would be used. A lift-cord loop 21 hangs on the front 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 19. 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.

As is perhaps best seen in FIGURE 3, 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 is soft and pliable. It may be made of suitable plastic material as is known in the art, threads or mesh being customarily embedded in the plastic of the front and rear vertical tapes 29 and 30. Each cross tape 31 has at each end oppositely disposed integral tabs 32 and 34 (see also FIGURE 8) which are fixedly secured to the vertical tapes 29 and 30 in suitable manner, as by being welded thereto through heat and pressure. The end portions 31a, 31a of each cross tape are wider than the intervening portion 31b. These end portions provide shoulders 35 (two shown towards each end of each cross tape) which are in spaced relation to the adjacent vertical tape 29 or 30, as the case may be. The cross tapes 31 are arranged in a single tier as shown in FIGURE 3 and other figures.

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, which are flexible and resilient, are made of suitable material such as thin sheet steel or thin sheet aluminum, and they are upwardly crowned as is seen in FIGURE 8 and other figures.

Referring to FIGURE 2 which shows a fragment of one of the slats 16 including the ladder zone thereof, the slat has an elongated transverse opening 36, known as a rout opening or rout hole, which is somewhat wider than the thickness of the lift cord. This opening has short axis 36a and long axis 36b, the short axis lying closer to the front edge of the slat than it does to the rear edge of the slat. Aligned with the rout opening 36 is a notch 37 in the rear edge of the slat. To one side of the notch 37 there is a keyhole-shaped opening that is designated as a whole by 38. This opening has a wide portion 38a which is spaced from the rear edge of the slat and a narrow portion 38b which extends from the wide portion to the rear edge of the slat. Aligned with the keyhole-shaped opening 38 there is a similar keyhole-shaped opening 39 which is associated with the front edge of the slat. This opening has wide portion 39a, which is spaced from the front edge of the slat, and has narrow portion 39b, which extends from the wide portion and intersects the front edge of the slat.

The slats 16 are interlocked with the cross tapes 31 in a manner which is perhaps best seen in FIGURES 8 and 9. The narrow portion of a cross tape is beneath the slat and the ends of the narrow portions 31b extend upwardly through the wide portions of the keyhole openings 38 and 39 in the slat. The wide end-portions 31a of the cross tape are above the slat, and the shoulders 35 overlie the slat and are closely adjacent to the top face thereof. Thus, without an overlying cross tape, the slat as a whole is held in place on its supporting cross tape. Wind action will not lift the slat, or either edge thereof, away from the cross tape. Also, the shoulders 35 provide damping toward each edge of the slat; this inhibits tuning-forklike vibration that is sometimes referred to as "singing." Additionally, the shoulders 35 hold the slat against any substantial movement lengthwise of the cross tape.

The upper ends of the front and rear vertical tapes 29 and 30 are attached in known manner to a suitable tape roll or tape rocker. A suitable arrangement is shown in U.S. Patent 2,831,536 issued April 22, 1958. To tilt the slats of the blind the tape roll or tape rocker is rotated on its axis in known manner to raise one of the vertical tapes of the ladder and simultaneously pay out the other vertical tape of the ladder.

The blind disclosed is of the full-closure type, affording full closure when the slats are tilted rearwardly. In FIGURES 5, 6 and 7 the slats are in the fully-closed position. The lift cord 24 depends between the front and rear vertical tapes 29 and 30, passing through the rout opening 36 in each slat 16. As the slat moves into the fully-closed position the notch 37 in the rear edge of the slat (see also FIGURE 4 for the notch itself) moves astride of the lift cord and permits the lower edge of the slat to move into contact with the face of the subjacent slat without limitation imposed by the thickness of the lift cord. As each slat approaches the fully-closed position shown in FIGURES 5, 6 and 7 the upward pull on the front vertical tape 29 is transmitted to the downwardly-inclined portion of the cross tape 31. Those shoulders 35 which are toward the bottom of the tilted slat (see particularly FIGURE 7) engage the lower portion of the tilted slat, and the lower portion of the tilted slat moves toward the front vertical tape. Upon sufficient continued upward movement of the front vertical tape 29 the lower edge of the tilted slat moves into contact with the face of the subjacent slat as shown in FIGURE 5. FIGURES 5 and 7 show the slats and ladder so proportioned that the lower edge of each tilted slat is located below the upper cross tape portion 31a that is associated with the subjacent slat.

For a clear understanding of the cross tape portion 31a and the shoulders 35, 35 thereof it may be helpful to refer to FIGURE 9.

FIGURE 10 shows the maximum forward tilting of the slats that the blind provides. The closure is limited by the thickness of the lift cord, and is the closure that is normal to a Venetian blind which is not of the full-closure type.

The length of the narrow portion 31b of the cross tape is approximately the same as the distance S (FIGURE 2) between the slat openings 38 and 39, being longer than the distance S only by the amount needed to permit the four shoulders 35 to be appropriately placed on top of the thin slat 16. However, the length of each end portion 31a of the cross tape is substantially in excess of the distance between its shoulders 35 and the slat edge over which it passes. This makes for normal closure when the slats are tilted forwardly and, as regards both forward and rearward closure, gives the ladder tolerance in respect of manufacturing variations in the spaced of the cross tapes.

In the blind from which the drawings were made the following materials and dimensions were present:

Slat.—The slat was painted and was of rolled aluminum .010" thick before painting; it was crowned $\frac{3}{16}$ ". The slat dimensions which follow were with the slat pressed out flat, i.e. as before crowning. The width W (FIGURE 2) was 2". The space S between the keyholes 38 and 39 was 1.438"; it extended from a point spaced .312" from the rear edge of the slat to a point spaced .250" from the front edge of the slat. The maximum width (lengthwise of the slat) of wide portions 38a and 39a of the keyholes was .342". The minimum width (lengthwise of the slat) of the narrow portions 38b and 39b of the keyholes was .090". The width of the rout opening 36, i.e. the length of the short axis 36a, was .320". The length of the rout opening 36, i.e. the length of the long axis 36b, was .750". The center of the rout opening 36, i.e. the point of intersection of the axes 36a and 36b, was .662" from the front edge of the slat. The depth of notch 37 was .375". The distance (lengthwise of the slat) between axis 36b and a parallel line bisecting keyholes 38 and 39 was .430".

Lift cord.—The lift cord was of braided nylon and had a diameter of .140".

Ladder.—The ladder was made of polyvinyl chloride with fine rayon mesh embedded in the front and rear vertical tapes of the ladder. The front and rear vertical tapes were each $1\frac{1}{2}$ " wide and .012" thick. The cross tapes 31 of the ladder were $2\frac{3}{16}$ " long and .013" thick. The narrow portions 31b of the cross tapes were $\frac{5}{16}$ " wide and were centered with respect to the lengths of the cross tapes. As manufactured these narrow portions were $1\frac{13}{32}$ " to $1\frac{1}{2}$ " long. The wide portions 31a of the cross tape were $\frac{1}{2}$ " wide. The spacing of the cross tapes 31 along the length of the ladder was $1\frac{1}{2}$ ", but a spacing of $1\frac{5}{8}$ " has also been used. The longitudinal center lines of the cross tapes 31, which center lines extend transversely of the slats, were .320" from the nearest edge of the front and rear vertical tapes 29 and 30. To insure maximum forward tilting of the slats each rear vertical tape 30 was pulley up $1\frac{1}{16}$ " from the position in which the slats were horizontal, each front vertical tape 29 being simultaneously lowered by the same amount. To insure full closure upon rearward tilting of the slats each front vertical tape 29 was pulled up $1\frac{1}{16}$ " from the position in which the slats were horizontal, each rear vertical tape 30 being simultaneously lowered by the same amount.

The modified slat shown in FIGURE 11 is substantially the same as the slat shown in FIGURE 2 except that the openings through which the cross tape pass are dovetail-shaped instead of keyhole-shaped. The reference characters in FIGURE 2 have been carried to the corresponding portions in FIGURE 11 but with a prime mark added to each reference character in FIGURE 11.

Using a slat of the form shown in FIGURE 11 a blind

has been made in which the following materials and dimensions were present.

Slat.—The slat was painted and was of rolled aluminum .010" thick before painting; it was crowned $\frac{3}{16}$ ". The slat dimensions which follow were with the slat pressed out flat, i.e. as before crowning. The width W (FIGURE 11) was 2". The distance between the rear edge of the slat and the widest portion of the dovetail opening 38' (i.e. portion 38b') was .360". The distance between the front edge of the slat and the widest portion of the dovetail opening 39' (i.e. portion 39b') was .250". The space S' between the dovetail openings 38' and 39' was 1.390". The maximum width (lengthwise of the slat) of each of the dovetail openings 38' and 39' (i.e. the width of the portions 38a' and 39a') was .342". The minimum width (lengthwise of the slat) of the narrow portion of the dovetail openings 38' and 39' (i.e. the width of the narrow portions 38b' and 39b') was .080". The width of the rout opening 36' (i.e. the length of the short axis 36a') was .320". The length of the rout opening 36' (i.e. the length of the long axis 36b') was .750". The center of the rout opening 36 (i.e. the point of intersection of the axis 36a' and 36b') was .662" from the front edge of the slat. The depth of the notch 37' was .375". The distance (lengthwise of the slat) between axis 36b' of the rout opening and a parallel line bisecting the dovetail openings 38' and 39', was .430".

Lift cord.—The lift cord was of braided nylon and had a diameter of .140".

Ladder.—The ladder was of the same materials and had the same dimensions as the ladder heretofore described except that the length of the narrow portion 31b of each cross tape was decreased by $\frac{3}{32}$ " whereby the narrow portion of each cross tape had a length of $1\frac{13}{32}$ " to $1\frac{1}{16}$ " as manufactured and substantially $\frac{1}{32}$ " was added to the length of each end portion 31a of the cross tape.

In assembling a blind having the form of slat shown in FIGURE 2 the ladders have been suspended with the two ends of each cross tape at the same level. Then the slat has been inserted between the front and rear vertical tapes of each ladder and allowed to rest on the cross tape, the openings 38 and 39 in the slat being positioned directly above the cross tape. Then the end of the cross tape portion 31b adjacent to the opening 38 has been twisted and inserted through the neck 38b of the opening 38 and into the wide portion 38a of the opening; and likewise for the opposite end of the narrow portion 31b of the cross tape and the opening 39 of the slat.

In assembling a blind having the form of slat shown in FIGURE 11 the same procedure can be used. However, instead of twisting the ends of portions 31b of the cross tape and inserting such portions into the dovetail notches, the edges of the slat can be pressed down and the triangular portions of the slat adjacent to the dovetail openings be slipped under the cross tape—first the two triangular portions that are on one side of the pair of dovetail openings and then the two triangular portions that are on the other side of the pair of dovetail openings.

With either the slat shown in FIGURE 2 or the slat shown in FIGURE 11 the slat is locked to the flexible cross tape, front and back, without any clips or fasteners and without any overlying cross tape. The slat is effectively held against wind action raising one edge of the slat from the cross tape or otherwise tilting the slat way from the cross tape. Also, the slat is held against movement longitudinally of the cross tape (transversely of the slat), as well as transversely of the cross tape (longitudinally of the slat). Nevertheless full closure of the blind may be achieved in one direction, and normal closure be achieved in the opposite direction. As between the form of slat shown in FIGURE 2 and FIGURE 11 we prefer the FIGURE 11 form as affording a more secure interlocking between the slat and the cross tape.

As with other full-closure Venetian blinds, the array of slats effects a very high degree of light-exclusion when

the slats are fully tilted to the rear. Channels, light shields and other light blocks for coping with light leakage around the array of slats (i.e. at the sides, top and bottom of the array of slats) are known and are customarily used with full-closure blinds where a very high degree of light-exclusion is desired as, for example, where the blinds are installed in a room that is used for the projection of motion pictures.

We claim:

1. In a Venetian blind of the full-closure type in which (a) a plurality of plastic ladders have front and rear vertical tapes, (b) the vertical tapes are interconnected by vertically-spaced cross tapes, (c) the cross tapes have front and rear ends, (d) crowned slats are supported by the cross tapes, (e) the slats have front and rear edges, and (f) the slats are spaced and the blind constructed to afford overlapping and contact of the slats when the slats are fully tilted in one direction, which direction is normally with the rear edges of the slats depressed; the improvement which comprises:

the cross tapes being substantially longer than the width of the slats,

the slats and cross tapes being preformed with definitely-located complementary-formations,

such formations being located toward the front and rear edges respectively of the slats, and toward the front and rear ends respectively of the cross tapes,

and such formations being located at predetermined inward spacings from the edges of the slats and the ends of the cross tapes respectively, the complementary formations of the slats-and-cross-tapes providing shoulders on the cross tapes which overlie the slats at predetermined inward distances from the edges of the slats and at predetermined inward distances from the ends of the cross tapes, such inward distances being pre-established by the preforming of the slats and cross tapes, said cross-tape shoulders holding the slats against the cross tapes at locations that are toward the front and rear edges of the slats, and the cross-tape shoulders that are toward the front edges of the slats co-operating with the cross-tape shoulders that are toward the rear edges of the slats to retain the slats at predetermined intermediate positions along the lengths of the cross tapes.

2. In a Venetian blind of the full-closure type in which (a) a plurality of plastic ladders have front and rear vertical tapes, (b) the vertical tapes are interconnected by vertically-spaced cross tapes, (c) the cross tapes have front and rear ends, (d) crowned slats are supported by the cross tapes, (e) the slats have front and rear edges, and (f) the slats are spaced and the blind constructed to afford overlapping and contact of the slats when the slats are fully tilted in one direction, which direction is normally with the rear edges of the slats depressed; the improvement which comprises:

the cross tapes being substantially longer than the width of the slats,

the slats and cross tapes being preformed with definitely-located complementary-formation,

such formations being located toward the front and rear edges respectively of the slats, and toward the front and rear ends respectively of the cross tapes,

and such formations being located at predetermined inward spacings from the edges of the slats and the ends of the cross tapes respectively, the complementary formations of the slats-and-cross-tapes providing shoulders on the cross tapes which overlie the slats at predetermined inward distances from the edges of the slats and at predetermined inward distances from the ends of the cross tapes, such inward distances being pre-established by the

preforming of the slats and cross tapes, and the inward distance from the rear edges of the slats being greater than the inward distance from the front edges of the slats,

said cross-tape shoulders holding the slats against the cross tapes at locations that are toward the front and rear edges of the slats, and the cross-tape shoulders that are toward the front edges of the slats co-operating with the cross-tape shoulders that are toward the rear edges of the slats to retain the slats at predetermined intermediate positions along the lengths of the cross tapes.

3. In a Venetian blind of the full-closure type in which (a) a plurality of plastic ladders have front and rear vertical tapes, (b) the vertical tapes are interconnected by vertically-spaced cross tapes, (c) the cross tapes have front and rear ends and have, between the ends, narrowed sections that extend throughout the major portions of the lengths of the cross tapes, (d) crowned slats are supported by the cross tapes, (e) the slats have front and rear edges; and (f) the slats are spaced and the blind constructed to afford overlapping and contact of the slats when the slats are fully tilted in one direction, which direction is normally with the rear edges of the slats depressed; the improvement which comprises:

the cross tapes being substantially longer than the width of the slats,

the slats and cross tapes being preformed with definitely-located complementary-formations,

such formations being located toward the front and rear edges respectively of the slats, and toward the front and rear ends respectively of the cross tapes,

and such formations being located at predetermined inward spacings from the edges of the slats and the ends of the cross tapes respectively,

the complementary formations of the slats-and-cross-tapes comprising neck portions on the cross tapes which extend through openings in the slats together with shoulders on the cross tapes which extend longitudinally of the slats in opposite directions from said neck portions and overlie the slats at predetermined inward distances from the edges of the slats and at predetermined inward distances from the ends of the cross tapes, said neck portions being the end portions of said narrowed sections of the cross tapes, said inward distances being pre-established by the preforming of the slats and cross tapes, and the inward distance from the rear edges of the slats being greater than the inward distance from the front edges of the slats,

said cross-tape shoulders holding the slats against the cross tapes at locations that are toward the front and rear edges of the slats,

and the cross-tape shoulders that are toward the front edges of the slats co-operating with the cross-tape shoulders that are toward the rear edges of the slats to retain the slats at predetermined intermediate positions along the lengths of the cross tapes.

4. In a Venetian blind of the full-closure type in which (a) a plurality of plastic ladders have front and rear vertical tapes, (b) the vertical tapes are interconnected by vertically-spaced cross tapes, (c) the cross tapes have front and rear ends and have, between the ends, narrowed sections that extend throughout the major portions of the lengths of the cross tapes, (d) crowned slats are supported by the cross tapes, (e) the slats have front and rear edges, and (f) the slats are spaced and the blind constructed to afford overlapping and contact of the slats when the slats are fully tilted in one direction, which direction is normally with the rear edges of the slats depressed; the improvement which comprises:

the cross tapes being substantially longer than the width of the slats,

the slats and cross tapes being preformed with definitely-located complementary-formations,

such formations being located toward the front and rear edges respectively of the slats, and toward the front and rear ends respectively of the cross tapes,

and such formations being located at predetermined inward spacings from the edges of the slats and the ends of the cross tapes respectively,

the complementary formations of the slats-and-cross-tapes comprising neck portions on the cross tapes which extend through openings in the slats together with shoulders on the cross tapes which extend longitudinally of the slats in opposite directions from said neck portions and overlie the slats at predetermined inward distances from the edges of the slats and at predetermined inward distances from the ends of the cross tapes, said neck portions being the end portions of said narrowed sections of the cross tapes,

said slat-openings extending to the edges of the slats and being of dovetail form, with the small ends of the dovetails at the edges of the slats,

said inward distances at which said shoulders overlie the slats being pre-established by the preforming of the slats and cross tapes, and the inward

distance from the rear edges of the slats being greater than the inward distance from the front edges of the slats,

said cross-tape shoulders holding the slats against the cross tapes at locations that are toward the front and rear edges of the slats,

and the cross-tape shoulders that are toward the front edges of the slats co-operating with the cross-tape shoulders that are toward the rear edges of the slats to retain the slats at predetermined intermediate positions along the lengths of the cross tapes.

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HARRISON R. MOSELEY, *Primary Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,189,081

June 15, 1965

Hans K. Lorentzen et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 44, for "extends" read -- extend --; column 4, line 33, for "overlies" read -- overlie --; column 5, line 20, for "spaced" read -- spacing --; line 61, for "pulley" read -- pulled --; column 7, line 62, for "complementary-formation" read -- complementary-formations --; column 8, line 21, for "edges;" read -- edges, --; column 10, line 16, for "Laborada et al." read -- Laborda et al. --.

Signed and sealed this 22nd day of February 1966.

(SEAL)

Attest:

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