Oct. 25, 1966 R. J. ELDREDGE, JR., ETAL 3,280,891

VERTICAL VENETIAN BLIND TRAVERSE APPARATUS

Filed March 18, 1964 4 Sheets-Sheet 1

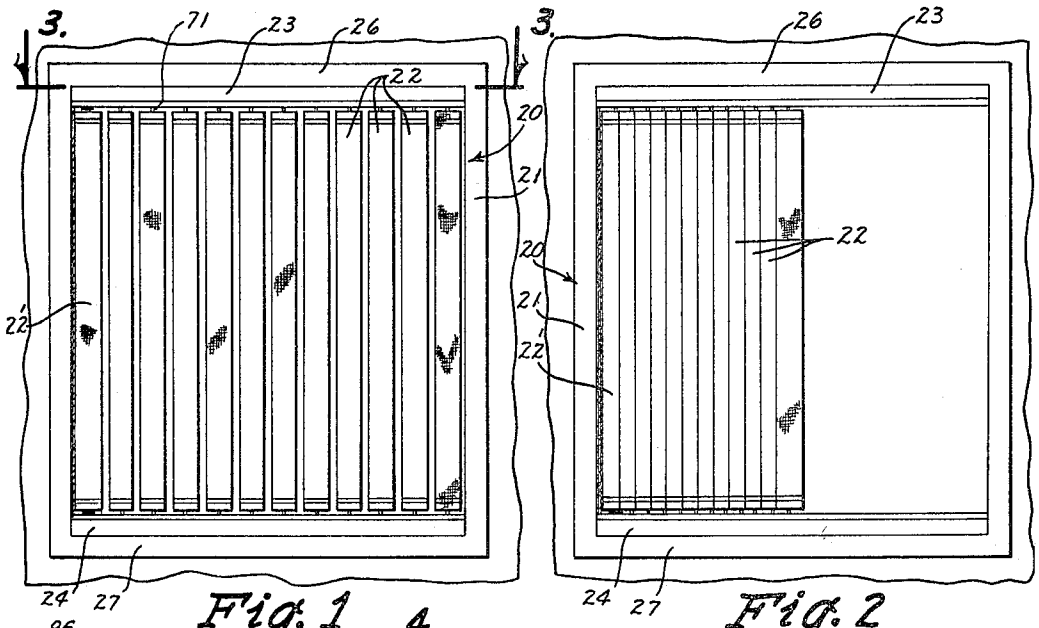

Fig. 1

Fig. 2

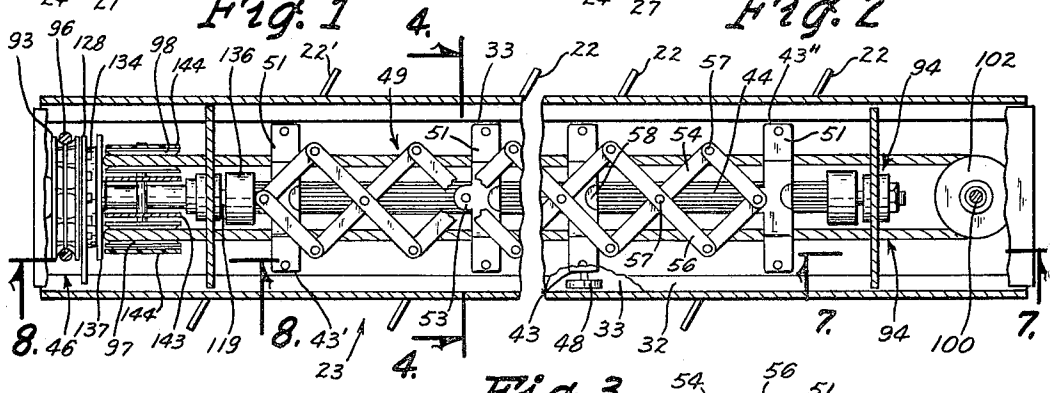

Fig. 3

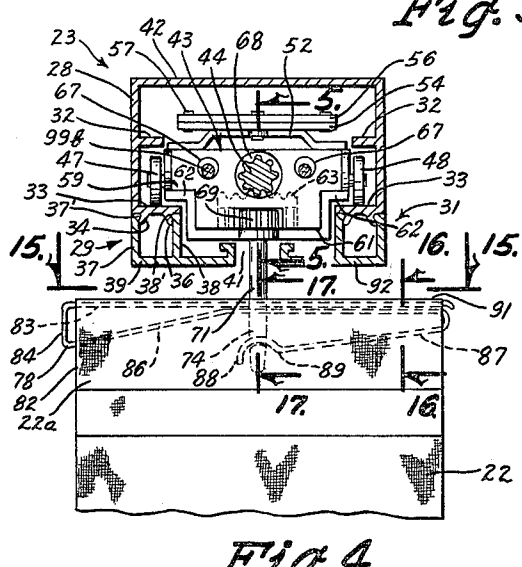

Fig. 4

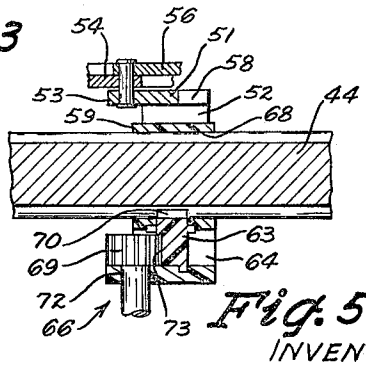

Fig. 5

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VERTICAL VENETIAN BLIND TRAVERSE APPARATUS

Filed March 18, 1964 4 Sheets-Sheet 2

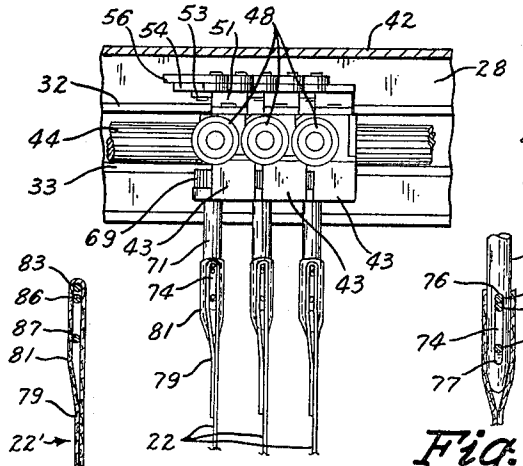

Fig. 6

Fig. 16

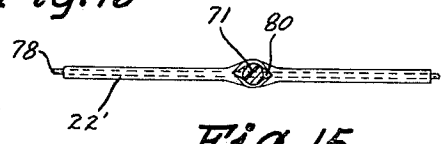

Fig. 15

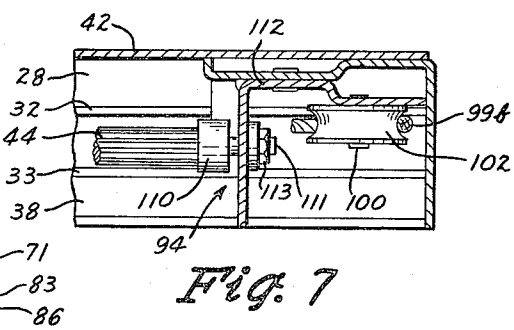

Fig. 7

Fig. 17

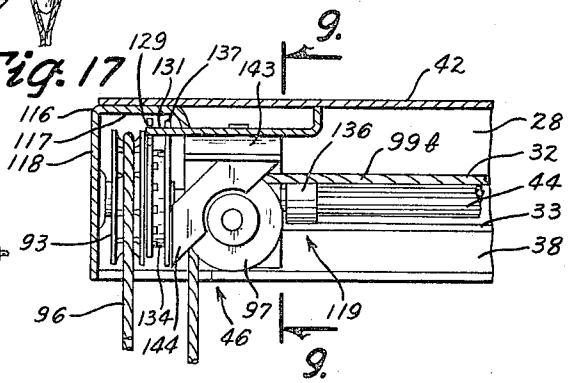

Fig. 8

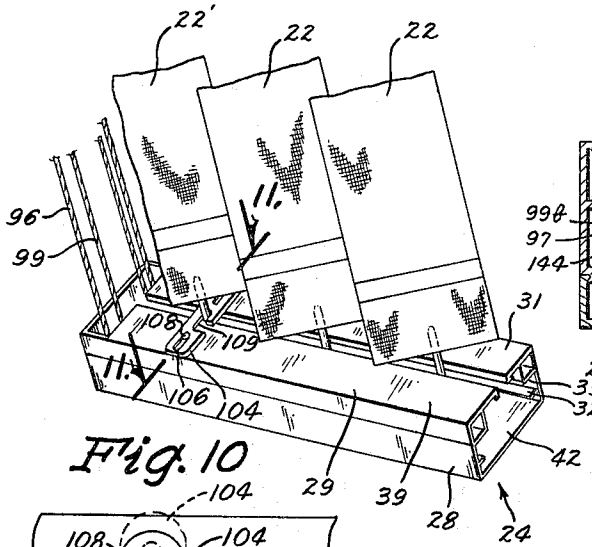

Fig. 10

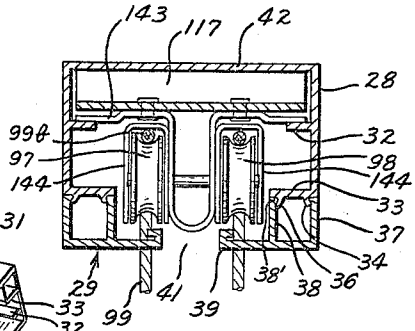

Fig. 9

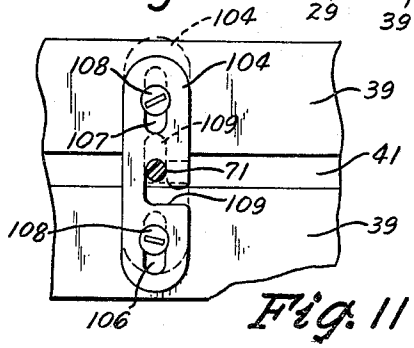

Fig. 11

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VERTICAL VENETIAN BLIND TRAVERSE APPARATUS

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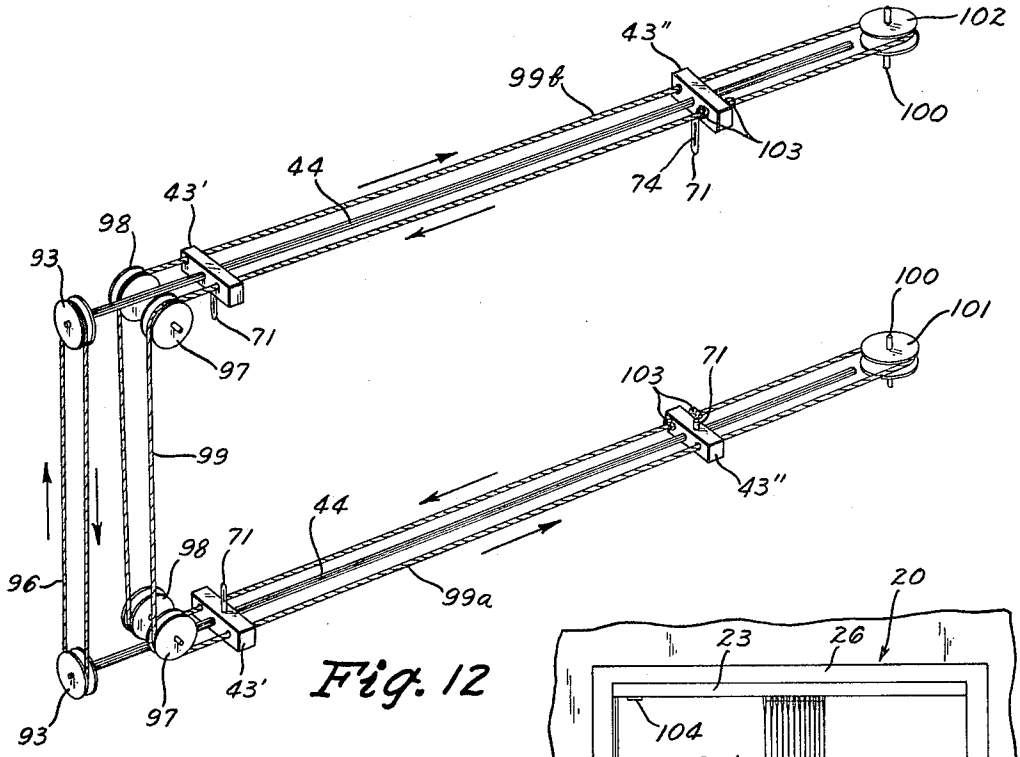

Fig. 12

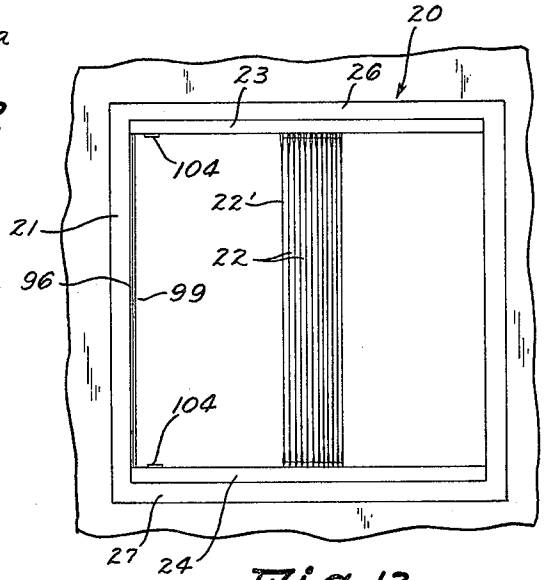

Fig. 13

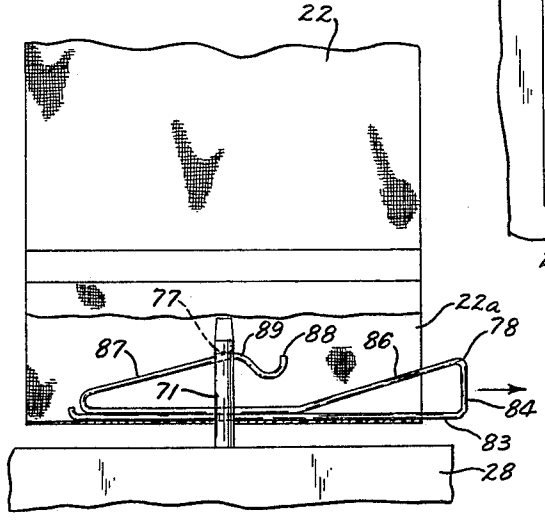

Fig. 14

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VERTICAL VENETIAN BLIND TRAVERSE APPARATUS

Filed March 18, 1964 4 Sheets-Sheet 4

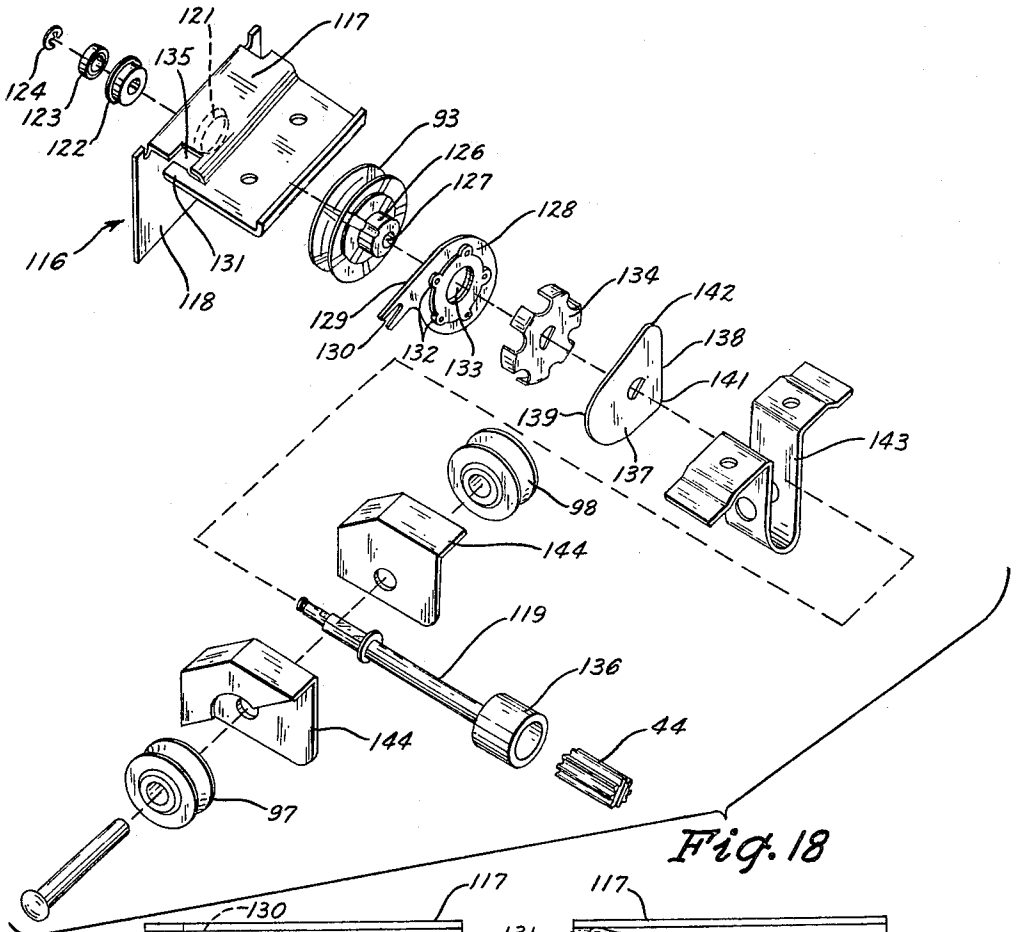

Fig. 18

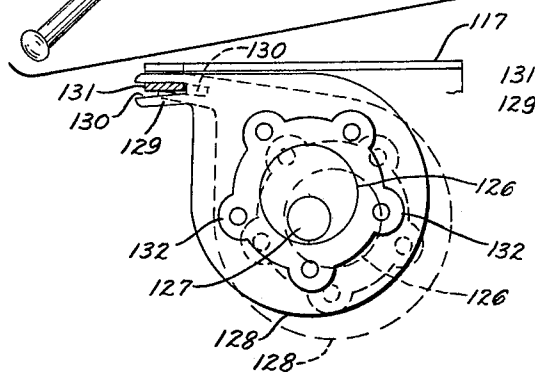

Fig. 19

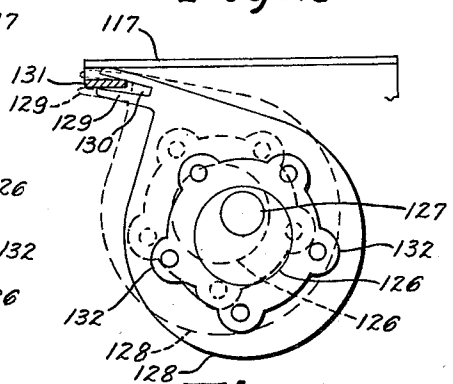

Fig. 20

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3,280,891

VERTICAL VENETIAN BLIND TRAVERSE APPARATUS

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Filed Mar. 18, 1964, Ser. No. 352,730
8 Claims. (Cl. 160—172)

This invention relates generally to Venetian blinds, and in particular to a vertical blind having vertically disposed louvers, shiftable laterally in the manner of draw drapes, and rotatable about their vertical axes to adjust the light entry.

It is an object of this invention to provide an improved vertical Venetian blind.

It is another object of this invention to provide an improved vertical Venetian blind of the horizontally traversable, vertically rotatable louver type.

It is yet another object of this invention to provide a novel horizontally reciprocal carrier for holding a louver at either end thereof, and wherein the carrier includes means for rotating the louver about a vertical axis.

Still another object of this invention is the provision of a novel control arrangement for cooperation with the carrier to reciprocally move the carrier on the horizontal, and to coact with the carrier means to rotate its louver.

Yet another object of this invention is to provide a novel louver rotating means and further to provide a novel structure for rotating the means.

It is still another object of this invention to provide a novel unit for securing a louver to a carrier, whereby the louver is easily assembled to and detached from the carrier, and further wherein the louver is held continually taut.

Another object of this invention is to provide a vertical blind traverse apparatus wherein the connecting stems between the carrier and the louver extend through an extremely narrow slit so as to obviate as much as possible foreign objects entering the carrier and cable area of the apparatus.

Yet another object of this invention is to provide a housing for the operating structure and the carriers, which housing is so constructed to permit excellent maintenance access while still being capable of substantially complete enclosure.

It is another object of this invention to provide a control arrangement wherein but a short pull on a cord provides a complete rotation of a louver.

Still another object of this invention is to provide a carrier and control arrangement adapted for use with either the upper ends of a plurality of vertical louvers, or with both upper and lower ends thereof, and with only one section of louvers capable of being traversed completely across a window, or with a pair of sections the louvers of which are traversably movable toward and away from each other and, for example, from the center of a window.

A further object of this invention is to provide a novel vertical blind traverse apparatus wherein the inner blind can be readily released from its normally fixed position, and with the louvers pulled to an expanded condition, the louvers can be manually contracted toward and away from the center-most louver to enable washing the window directly behind the normally fixed louver.

Still another object of this invention is to provide a novel vertical blind traverse apparatus capable of attaining all of the above designated objectives and which is economical to manufacture, effective in operation, and easy to service.

These objects, and other features and advantages of this invention will become readily apparent upon reference to the following illustrations, wherein:

FIG. 1 is an elevational view of the vertical blind traverse apparatus of this invention assembled in a window frame and in a closed position;

FIG. 2 is an elevational view similar to FIG. 1 with the blind partially traversed to an open position;

FIG. 3 is an enlarged, foreshortened horizontal sectional view taken along the line **3—3** in FIG. 1 and showing the traversing mechanism in top plan view;

FIG. 4 is a vertical section taken along the line **4—4** in FIG. 3 and showing a carrier in elevation, and showing further the securement of an upper end of a louver to a depending stem of a carrier, with a flexible element shown in dotted lines for clarity of illustration;

FIG. 5 is a vertical sectional taken along the line **5—5** in FIG. 4;

FIG. 6 is a vertical, fragmentary elevational view of a plurality, three in particular, of carriers shown in their closed or contracted, face-to-face position, and showing a vertical section through each end of a louver;

FIG. 7 is a vertical section taken along the line **7—7** in FIG. 3 and showing the tension adjustment end of the drive shaft in side elevation;

FIG. 8 is a vertical section taken along the line **8—8** in FIG. 3 and showing the drive unit for the drive shaft in side elevation;

FIG. 9 is a vertical section taken along the line **9—9** in FIG. 8;

FIG. 10 is a fragmentary, perspective view of several louvers adjacent one end of a carrier housing and showing a slide fastener arrangement;

FIG. 11 is an enlarged, fragmentary view of the slide fastener of FIG. 10;

FIG. 12 is a diagrammatic, perspective view of the control arrangement for the traverse apparatus;

FIG. 13 is a view similar to FIGS. 1 and 2, and showing the louvers moved manually together after the inner fixed louver is released;

FIG. 14 is an enlarged, fragmentary view showing the flexible spring fastener partially inserted, or removed from, a louver stem, for securing the stem and louver together;

FIG. 15 is a horizontal sectional view taken along the line **15—15** in FIG. 4;

FIG. 16 is a vertical sectional view taken along the line **16—16** in FIG. 4;

FIG. 17 is a vertical sectional view taken along the line **17—17** in FIG. 4;

FIG. 18 is an exploded view of the drive shaft unit; and

FIGS. 19 and 20 are vertical views showing rotational positions of an eccentric cam and drive plate arrangement from the drive unit of FIG. 18.

Referring now to the drawings, the vertical Venetian blind traverse apparatus, hereinafter referred to as the blind, is indicated generally at **20** in FIG. 1 and is shown assembled to a window frame **21** with the louvers **22** thereof in a closed position shutting out the light.

For the purpose of clarity of describing the invention, only one blind section is shown, with all louvers traversely movable either away from or toward a semi-fixed louver **22'** at the left side of the blind section as viewed in FIGS. 1 and 2. It will be remembered, however, that the invention is equally applicable to a pair of blind sections with each outer louver semi-fixed, and with the louvers of each section traversable toward and away from each other.

It is further noted that both upper and lower traversing mechanism housing units **23** and **24** are used, secured respectively to the upper and lower portions **26** and **27** of the window frame **21**. Nevertheless, only the upper

housing unit **23** need be used, with the lower ends of the louvers **22** either completely free of each other or merely string-connected to cut down on their swaying, and the invention would still be complete.

As each housing unit **23** and **24** is the same, only the upper housing unit **23** (FIGS. 3 and 4) will be described. It is comprised of three elongated parts of aluminum extrusion, a right angular housing **28** closed on three sides (FIG. 4) and open on one side, and a pair of identical trim strips **29** and **31**. A pair of inwardly extended, parallel, vertically spaced shelves **32** and **33** are formed on each inner side of the housing, and with each shelf **33** including a pair of depending, diverging projections **34** and **36**, as seen in cross section in FIG. 4. The facing surfaces of the shelves **32** and **33** are smooth for a purpose to appear hereinafter.

Each trim strip **29** and **31** has an upstanding pair of parallel legs **37** and **38** and a horizontally disposed leg **39**. The legs **37** and **38** have inwardly projected beads **37'** and **38'** at their upper ends, are spaced so as to snap on and off the projections **34** and **36**; and when both trim strips **29** and **31** are attached, the widths of the legs **39** are such that a relatively narrow gap **41** (FIG. 4) exists therebetween. The arrangement is such that the upper side **42** of the housing **28** is affixed by screws or the like to the wood framing. Were the housing **28** used for the lower housing unit **24**, the housing **28** and the trim strips **29** and **31** would be merely inverted, with the side **42** being attached to the frame lower portion **27**.

Within the upper housing unit **23**, as is within the lower housing unit **24**, are a plurality of identical carriers **43** (FIGS. 3, 4 and 6) arranged in a face-to-face relation, and which are mounted on an elongated drive shaft **44**. The drive shaft **44** extends the complete length of the housing unit **23**, has the shape of a gear with teeth in cross-section (FIG. 4), and is rotatable about its longitudinal axis by a drive unit indicated generally at **46** in FIGS. 3 and 8, and illustrated by exploded view in FIG. 18.

The carriers **43** are each provided with a pair of wheels **47** and **48** (FIG. 4) at opposite sides thereof, the wheels riding on the smooth surface of the lower housing shelf **33**. Also, they are interconnected by a pantograph structure indicated generally at **49** in FIG. 3 and which is commonly referred to as a lazy tong arrangement. The pantograph structure includes a connector **51** secured to the top of each carrier **43** and having a raised center portion **52** (FIG. 4) with a projection **53** (FIG. 5) to which is pivotally connected a pair of pantograph arms **54** and **56**. The arms are identical and are connected one upon the other (see FIGS. 4 and 5). Where a pair of arms are not pivotally connected at their centers to each other and to a connector projection **53**, they are merely connected together, as at **57** in FIG. 3. By having the same number of arms connected between each carrier **43**, irrespective of the expanded or contracted nature of the pantograph structure, the carriers **43** and thus the louvers **22** are always equally spaced. Upon a contraction of the pantograph structure, the projection **53** fits into a cutout **58** (FIGS. 3 and 5) in the adjacent connector **51**. Thus the connectors **51** are placed in a contiguous position as are all of the pantograph arms **54** and **56** (FIG. 6). When contracted, all carriers **43** are engaged in a face-to-face relation.

As the carriers **43** are identical, only one carrier **43** best shown in FIGS. 4 and 6 will be described. Each carrier is made of Delrin, except for rivets, whereas the connectors **51** and pantograph arms **54** and **56** are of metal. The carrier **43** includes, in addition to the wheels **47** and **48**, an upper half **59** (FIG. 4), a U-shaped lower half **61** with ears **62** riveted to the upper half **59**, a rack **63** reciprocally movable transversely of the housing **28** within a cavity **64** (FIG. 5) provided therefor in the upper half **59**, and a louver stem unit indicated generally at **66**.

The upper half **59** has a pair of transversely spaced and aligned passages **67** formed therein longitudinally of the housing **28**, and also has a large aperture **68** formed therein parallel to and intermediate the passages **67**. The aperture **68** communicates with the cavity **64** and is of a diameter to rotatably receive the drive shaft **44**, whereby the drive shaft **44** is placed in mesh with the upper teeth **70** of the rack **63**. The length of the cavity **64** is sufficient to enable slightly more than a 180° rotation of the drive shaft **44**.

The rack **63** (FIGS. 4 and 5) slides on top of the lower half **61** and is in mesh with a pinion **69** which with an elongated stem **71** comprises the stem unit **66**. A bore **72** (FIG. 5) is formed in the lower half **61** for receiving the stem **71** whereby the pinion **69** is in mesh with the face teeth **73** of the rack **63**. A 180° rotation of the drive shaft **44** results in a 180° rotation of the stem **71** about its vertical axis.

An elongated slot **74** (FIGS. 4, 6 and 14) is formed in the exposed end of the stem **71** and which slot has upper and lower ends **76** and **77**. The lower end **77** has a convex curvature relative to the stem **71** for a purpose hereinafter seen. The slot **74** is particularly adapted for use with a flexible spring **78** for attachment to an end **22***a* of a louver **22**.

Both upper and lower ends of a louver **22** are reversed upon themselves and sewn or otherwise secured as at **79** (FIG. 6) whereby to form a loop **81**. An opening **80** (FIG. 15) is formed centrally in the loop **81** along its top edge for entry therein of the exposed end of a louver stem **71**. A spring **78** is then insertable into the loop **81** from one end, for example the left end **82** in FIG. 4, and through the stem slot **74** until locked in the stem **71** in the position of FIG. 4.

Each spring **78** (FIGS. 14–17) comprises a single piece of spring steel music wire including a straight leg **83**, an upright portion **84**, a bent leg **86** partially engageable with the straight leg **83**, and a locking leg **87** having a hooked end **88**.

All portions of the spring **78** (FIG. 14) are disposed in a single plane (FIG. 15) with the bent leg **86** sprung toward the straight leg **83**, and the locking leg **87** sprung away from the straight and bent legs. When the spring **78** is inserted into the slot **74** from the left thereof as viewed in FIG. 4 (see FIG. 17), the straight leg **83** engages the upper end **76** of the slot **74**, and the locking leg **87** engages the lower end **77** thereof. As the normal spacing between the straight and locking legs is greater than the length of the slot **74**, it will be appreciated that the locking leg **87** is flexed toward the straight leg **83** as the spring **78** is forced into the slot **74**.

Upon the hooked end **88** reaching the lower end **77** of the slot **74**, the concavely formed hooked end **88** grasps the convexly formed end **77** in a complementary manner, thereby resiliently locking the spring **78** to the stem **71**, and thus resiliently locking the louver **22** to the stem **71**. It should be noted that the louvers **22**, or slats, are maintained in a taut condition when the springs **78** at each end thereof abut the upper and lower ends of the upper and lower slots **74**, respectively, by having the lengths of the slats **22** slightly less than the distance between the upper end of the slot **74** (FIG. 17) of the upper stem member and the lower end of the slot **74** of the lower stem member. To increase the grasping strength of the spring **78**, the locking leg **87** need merely be manually sprung further away from the bent leg **86**.

Referring to FIG. 4, it may readily be seen that the formation of the hooked end **88** prevents further movement of the spring to the right without complete distortion of the spring. However, due to the flexibility of the spring and the complementary curvature of the hooked end **88** and the slot lower end **77**, upon grasping the upright portion **84** and pulling to the left, gently holding the louver end **22***a* about the stem **71** with another hand so

as to hold the stem steady, the locking leg **87** will "give" toward the straight leg **83**.

As best seen in FIG. 14 where the spring **78** is shown being pulled to the left, after pulling the spring **78** sufficiently to force the crest **89** of locking leg **87** past the slot end **77**, the spring **78** is easily removed, enabling the louver end **22***a* to be separated from the louver stem **71**. By this arrangement, the upper straight edge **91** (FIG. 4) can be located contiguous with the lower (or upper as the case may be) surface **92** of the trim strips horizontal legs **39**. Furthermore, accidental disengagement of the louvers **22** from the stems **71**, or even partial disengagement is virtually impossible. The extreme thinness of the spring connection enables the louvers **22**, when closed upon each other with a three-eighths inch overlap, to be practically flat upon each other to close out all light.

To rotate the stems **71** of all the carriers **43** simultaneously is provided by the drive shaft **44** which is inserted through each carrier aperture **68** in mesh with each rack **63**. Referring to FIG. 12, the control arrangement for both rotating the stems **71** of the carriers **43** and reciprocally moving the carriers toward and away from a semifixed pair of carriers **43'** is illustrated. Although only one pair of outer carriers **43''** is shown, it may be realized that many others are interposed therebetween, as shown in FIG. 3.

At the left end (FIG. 3) of each drive shaft **44** is the drive unit **46**, which includes a drive wheel **93**, with both drive wheels interconnected by a continuous, two-run cord **96**. The right end of each drive shaft is supported by a tension adjustment unit **94** (FIGS. 3 and 7). As indicated by arrows in FIG. 12, upon a downward pull of the front run of the cord **96**, both wheels **93** are rotated clockwise and thus both drive shafts **44** are rotated clockwise. Were the front run pulled upwardly, the wheels **93** and drive shafts **44** would be rotated counterclockwise.

Each drive unit **46** also includes a pair of drive pulleys **97** and **98** (FIGS. 3 and 12), mounted as described hereinafter for supporting a continuous cord **99**. As best seen in FIG. 12, the cord **99** has a lower double run **99***a* trained around an idler pulley **101**, and an upper double run **99***b* trained around an upper idler pulley **102** (see also FIG. 3). Each run **99***a* and **99***b* are inserted through the respective passages **67** provided therefor in the carriers (see FIG. 4). The outer movable carriers **43''** in FIG. 12 are secured to a respective run by beads **103** formed on the front run of the upper run **99***b*, and formed on the rear run of the run **99***a*. Both idler pulleys **101** and **102** are rotatably mounted on spindles **100** secured to the respective housings **28** (FIG. 7).

Thus, upon movement of the vertical portion of the cable **99** to effect movement of the lower run **99***a* in FIG. 12 as indicated by the arrows, the lower carrier **43** moves to the left as does the upper carrier **43**. Remembering the pantograph structure **49** (FIG. 3) which interconnects all the carriers **43**, upon movement of the outer carriers **43''** toward the semi-fixed carriers **43'**, all of the carriers will attain a face-to-face contiguous position (FIG. 6) at the left side of the apparatus **20**. FIG. 2 shows the louvers **24** retracted by their carriers to a half-closed position.

Thus, by an extremely short pull of 6" at the most on the cord **96** (FIG. 12), the carrier stems **71** and the louvers **24** carried thereby may be rotated in one direction 180°, and by moving the cord **96** in the opposite direction, the louvers may be rotated to any position in an opposite direction. Additionally, depending upon the vertical pull of the cord **99**, the louvers may be moved from a completely retracted position to a completely expanded position (FIG. 1), or to any intermediate position, with the louvers always equally spaced.

Should it be desirable to retain the outer carriers **43''** in their partially expanded positions of FIGS. 12 and 13, and retract or gather the louvers **22** toward the right as viewed, instead of toward the left, a slide fastener plate **104** (FIGS. 10 and 11) is provided on both the upper and lower housings **28** (FIG. 10). The plate **104** has a pair of transversely aligned and spaced slots **106** and **107** formed therein by which the plate may be secured, as by screws, **108**, across the gap **41** formed between the horizontal legs **39** of the trim strips **31**. An L-shaped cut-out **109** is also formed in the plate **104**, and when the plate **104** is held in the full line position of FIG. 11, it is seen that the stem **71** of the inner carrier **41'** is fixedly secured.

However, upon releasing the plate **104** for movement by untightening the screws **108**, and moving the plate to the dotted line position of FIG. 11, the stem **71** and thus the carrier **43'** can be moved to the right, whereby the louvers **22** may be temporarily gathered as shown in FIG. 13, enabling the normally uncovered window area behind the semi-fixed inner louver **43'** to be serviced.

As mentioned hereinbefore, the drive unit **46** (FIG. 3) and the tension adjustment unit **94** rotatably support the drive shaft **44** in the housing **28** in a horizontally disposed manner, and provide for rotation of the drive shaft about its longitudinal axis. To help maintain the drive shaft **44** in a horizontal position, the tension adjustment unit **94** (see also FIG. 7) includes a receptacle **110** for the outer end of the drive shaft **44** and which is secured thereto. The receptacle **110**, rotatable with the drive shaft, is secured to a stub shaft **111** which is inserted through and supported by a hanger bracket **112** secured to the housing **28**. The outer end of the shaft **111** is threaded and engaged by a nut **113**. Thus, by predetermined rotation of the nut **113**, a jack screw effect results, increasing or lessening the tension upon the drive shaft **44**. Any tendency of the drive shaft to sag is thereby obviated.

The drive unit **46**, shown in plan view in FIG. 3, side elevation in FIG. 8, and exploded view in FIG. 18, includes an L-shaped hanger bracket **116** having a horizontal portion **117** affixed to the housing **28**, and a vertical portion **118** which acts as an end to the housing **28** and a support for one end of a connecting shaft **119**. An opening **121** is formed in the portion **118** for receiving a bearing housing **122**, and a bearing **123** through which the shaft **119** is inserted and secured by a snap ring **124**.

The aforementioned drive wheel **93** is securely mounted on the shaft **119** adjacent the portion **118** and has a circular part affixed thereto with a cam **126** integral therewith, and which cam **126** is eccentric relative to a passage **127** formed therein through which the shaft **119** extends. A stabilizer **128** comprising a flat plate smooth on both sides and with an opening centrally thereof is loosely mounted on the connecting shaft **119**. The stabilizer **128** has a circular shape except for a finger portion **129** having an elongated, horizontally disposed slot **130**. As viewed in FIGS. 8 and 19, the finger portion **129** embraces a lug **131** integral with the bracket **116** and formed by a cut-out **135**. Thus, the finger portion **129** extends laterally through the cut-out **135** so as not to engage the undersurface of the horizontal portion **117**, it being noted that the slot **130** is longer in transverse width than the width of the lug **131** (FIG. 19). Affixed to the face of the stabilizer **128** opposite the eccentric cam **126** face is a wobble gear **132** having a plurality of arcuately spaced, radially spaced shoulders concentric with an opening **133** for the connecting shaft **119**.

Facing the wobble gear **132** is a ratchet wheel **134** having a plurality of ratchet teeth engageable by and with said shoulders in a manner described hereinafter. The ratchet **134** is securely mounted on the connecting shaft **119**, and concentric therewith. To prevent more than a 180° rotation of the shaft **119**, and thus the drive shaft **44** to which its receptacle end **136** is pinned, a stop plate **137** is secured to the connecting shaft **119**. The stop plate **137** has a flat side **138** and a semicircularly curved

side **139**, with the flat side **138** disposed on the vertical as illustrated in FIG. 18. Thus, in the position of the stop plate **137** in FIG. 18 the connecting shaft **119** can only be rotated clockwise, where after slightly more than 180° rotation, the corner **141** of the stop plate strikes the horizontal portion **117** of the bracket **116**. The connecting shaft **119** is then rotatable counterclockwise until the opposite corner **142** engages the portion **117**. It will be remembered that the carrier stems **71** rotate a complete 180° in response to a 180° rotation of the drive shaft **44**.

Adjacent the stop plate **137**, a hanger plate **143** is mounted at its flanges to the hanger bracket **116** and has a pair of Delrin supports **144** secured thereto which in turn rotatably support the drive pulleys **97** and **98**. The pulleys are mounted on bearings (not shown) integral therewith and rotatable on a pin inserted through the hanger plate **143**.

Operation of the drive wheel **93** (FIGS. 3 and 18) results in a reduced rate of the drive of the connecting shaft **119** as follows. Rotation of the drive wheel **93** results in like rotation of the cam **126** whereby the stabilizer **128** is moved. As the finger portion **129** engages the stationary lug **131**, the stabilizer **128** does not rotate with the cam **126**.

Rather, the stabilizer **128** reciprocates as the cam **126** rotates. For example, when the cam **126** rotates from the full line to the dotted line position of FIG. 19, the stabilizer **128** takes the dotted line position thereof. Note the finger portion **129** moves laterally of the lug **131**. And when the cam **126** is rotated from the full line position of FIG. 19 to the dotted line position, thereof, the stabilizer **128** reciprocates back toward its original full line position of FIG. 19. Thus, although the wobble gear **132** is not fixed to the connecting shaft **119**, it reciprocates as illustrated in FIGS. 19 and 20.

This oscillatable-type movement by the shoulders of the wobble gear **132** is transmitted to the rachet **134** by the shoulders **132** intermittently drivingly engaging one or more of the ratchet teeth, thus effecting a rotation of the ratchet wheeel **134** and thus the shaft **119**. The resulting rate of rotation of the shaft **119** is considerably less than the rotational rate of the drive wheel **93**, a reduced rate being effected by the wobble gear arrangement. As the drive wheel **93** and drive plate **128** are free to move on the connecting shaft **119** at will, their rotation is not affected by the stop plate **137**.

Although a preferred embodiment of the invention has been described and disclosed herein, it is to be remembered that various alterations can be made thereto without departing from the true spirit and scope of the invention as defined by the appended claims.

We claim:

1. A vertical Venetian blind comprising in combination:

carrier means including a plurality of carriers arranged in face-to-face positions, one of said carriers at one end thereof in a fixed position and the remainder thereof relatively movable;

pantograph means directly interconnecting said carriers;

means supporting said carriers for movement thereof in a horizontal plane, said one carrier releasably connected to said supporting means; and

means including a plurality of pulleys rotatably mounted on said supporting means and having a continuous cord trained thereabout, said cord connected to a second of said carriers at an end thereof opposite said one end for expanding and contracting said carriers toward and away from said fixed carrier, said carriers movable in response to movement of said cord toward said second carrier in a contracted position upon release of said one carrier.

2. A control apparatus for moving a vertical Venetian blind louver horizontally and for rotating the louver about a vertical axis comprising in combination:

a rotatable elongated gear shaft disposed horizontally and rotatable about its horizontal axis;

a continuous cord having a pair of straight, parallel runs disposed in a horizontal plane on opposite sides of and parallel to said gear shaft; and

a carrier unit for a louver comprising a member having a pair of transversely spaced passages formed therein for receiving said runs which pass therethrough, said body having an aperture formed therein intermediate said passages for receiving said gear shaft, a reciprocal rack mounted within said body for meshed engagement with said gear shaft, and said body including further a gear stem in meshed engagement with said rack and movable about a vertical axis, said gear stem having a stem portion externally of said body for engagement with the louver.

3. A control apparatus as defined in claim **2** and further wherein rotation of said gear shaft through a 180° arc effects a 180° rotation of said stem portion and the louver.

4. In a vertical blind, means for rotating a shaft comprising in combination:

bracket means having an upstanding portion;

an elongated rod one end of which is rotatably supported in said upstanding portion and the other end of which is driveably engageable with the shaft;

driven means concentric with and rotatably mounted on said rod;

means secured to and rotatable with said driven means and including a cam eccentric as to the longitudinal axis of said rod;

shoulder means rotatably mounted on said eccentric cam and movable through an arc in response to rotation of said cam; and

means engageable with said shoulder means and rotatable thereby and securely mounted on said rod.

5. In a vertical blind, means for rotating a shaft comprising in combination:

bracket means having an upstanding portion and a generally horizontal portion;

an elongated rod one end of which is rotatably supported in said upstanding portion and the other end of which is driveably engageable with the shaft;

driven means concentric with and rotatably mounted on said rod;

means secured to and rotatable with said driven means and including a cam eccentric as to the longitudinal axis of said rod;

upstanding shoulder means engageable with said horizontal portion and rotatably mounted on said cam for relative movement thereto, said shoulder means movable in said upstanding position through an arc in response to rotation of said cam; and

means engageable with and rotated by said shoulder means at a reduced rate in response to rotation of said shoulder means, and securely mounted on said rod.

6. In a vertical Venetian blind, means for rotating a shaft comprising in combination:

bracket means having an upstanding portion and a generally horizontal portion;

an elongated rod one end of which is rotatably supported in said upstanding position and the other end of which is adapted for driving engagement with the shaft;

driven means rotatably mounted on said rod;

eccentric means secured to said driven means and including an eccentric cam relative to the longitudinal axis of said rod;

plate means rotatably mounted on said eccentric cam, said plate means movable in all directions a limited distance, engageable with said horizontal portion and thereby maintained against direct rotation with said eccentric cam, said plate means including a plurality of opposed shoulders; and

a circular ratchet secured at its center to said rod and rotatable therewith, said ratchet rotated by said plate means upon rotation of said driven means.

7. A Venetian blind comprising in combination:

a stem having an elongated slot formed longitudinally axially therein;

a louver having a hem at one end thereof forming an open loop, the hem adapted to receive said slotted stem inserted into said loop; and

a flexible element inserted into said loop and through said slot to positively secure said flexible element to said stem, said flexible element having at least a pair of legs reversely bent at one portion upon one another and sprung away from each other into engagement with the said stem at opposite ends of said slot, one leg having a hook formed at the end opposite said bent portion and having a length from said bent portion approximately one-half the length of the other leg as measured from said bent portion, said flexible element immovable outwardly of said slot in a direction toward said bent portion and movable outwardly of said slot in an opposite direction, the other leg engaging also said louver hem whereby to maintain said louver hem in a taut condition.

8. A Venetian blind comprising in combination:

a stem having an elongated slot formed longitudinally axially therein, said stem having a convex curvature at one end of said slot;

a louver having a hem at one end thereof forming an open loop, the hem adapted to receive said slotted stem inserted into said loop; and

a flexible element inserted into said loop and through said slot to positively secure said flexible element to said stem, said flexible element having a length approximately the width of the louver and including at least two legs extended within the same plane and resiliently sprung away from each other, one leg having approximately one-half the length of the other leg and having further a hook formed at the free end thereof, said hook of a concave formation for releasable engagement with said convex slot and, the other leg engageable intermediate its length with said stem at the other end of said slot and also engageable with said louver hem on an inner surface thereof to maintain said louver hem in a taut condition.

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