United States Patent [19]

Debs

[11] **3,795,267**

[45] **Mar. 5, 1974**

[54] **VENETIAN BLIND**

[75] Inventor: **Victor Debs,** Staten Island, N.Y.

[73] Assignee: **Levolor Lorentzen, Inc.,** Hoboken, N.J.

[22] Filed: **Aug. 1, 1972**

[21] Appl. No.: **277,022**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 6,395, Jan. 28, 1970, Pat. No. 3,703,920.

[52] **U.S. Cl.** **160/168,** 160/107

[51] **Int. Cl.** **F06b 9/30**

[58] **Field of Search** 160/107, 166–178

[56] **References Cited**

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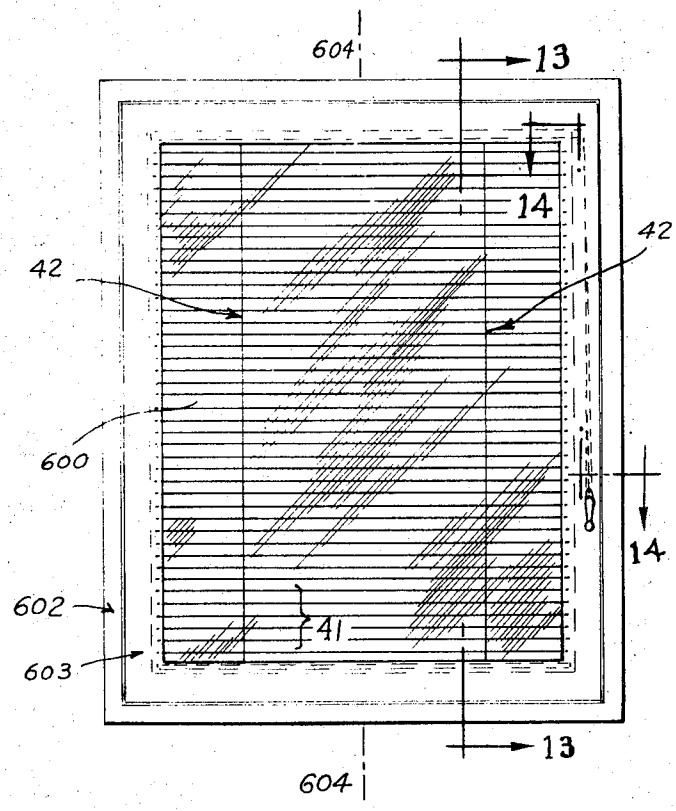
Primary Examiner—Peter M. Caun

Attorney, Agent, or Firm—Charles F. Chisholm

[57] **ABSTRACT**

The head of the Venetian blind is attached to the soffit or lintel of window framing. At least one of the jambs affords a vertical passageway which is separated from the window opening by a jamb wall. A cord-guide fitting, which is part of the Venetian blind head, projects through an entrance in the jamb wall and guides the tilt and lift cords into the vertical passageway at an upper level. The tilt and lift cords extend downwardly in the vertical passageway and are operatively connected to a jamb-mounted cord-operating unit at a lower level.

21 Claims, 24 Drawing Figures



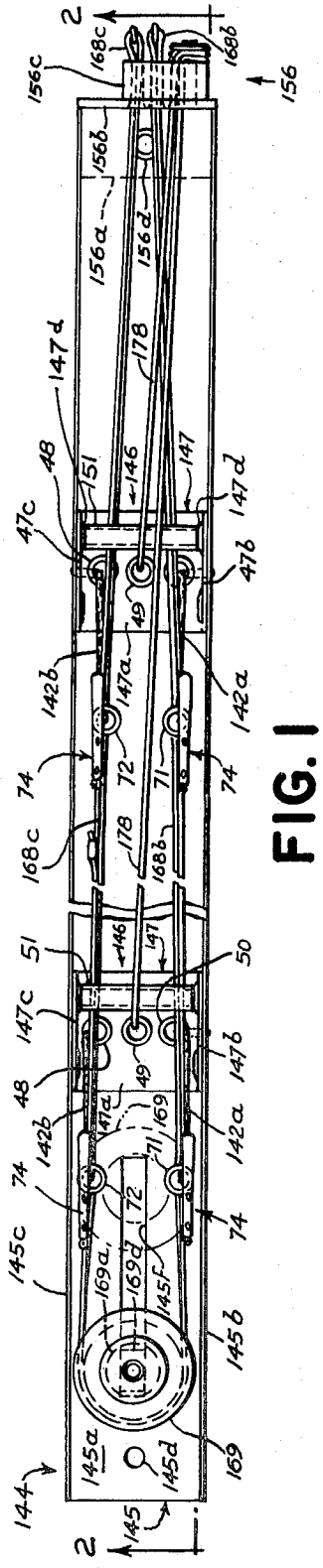


FIG. 1

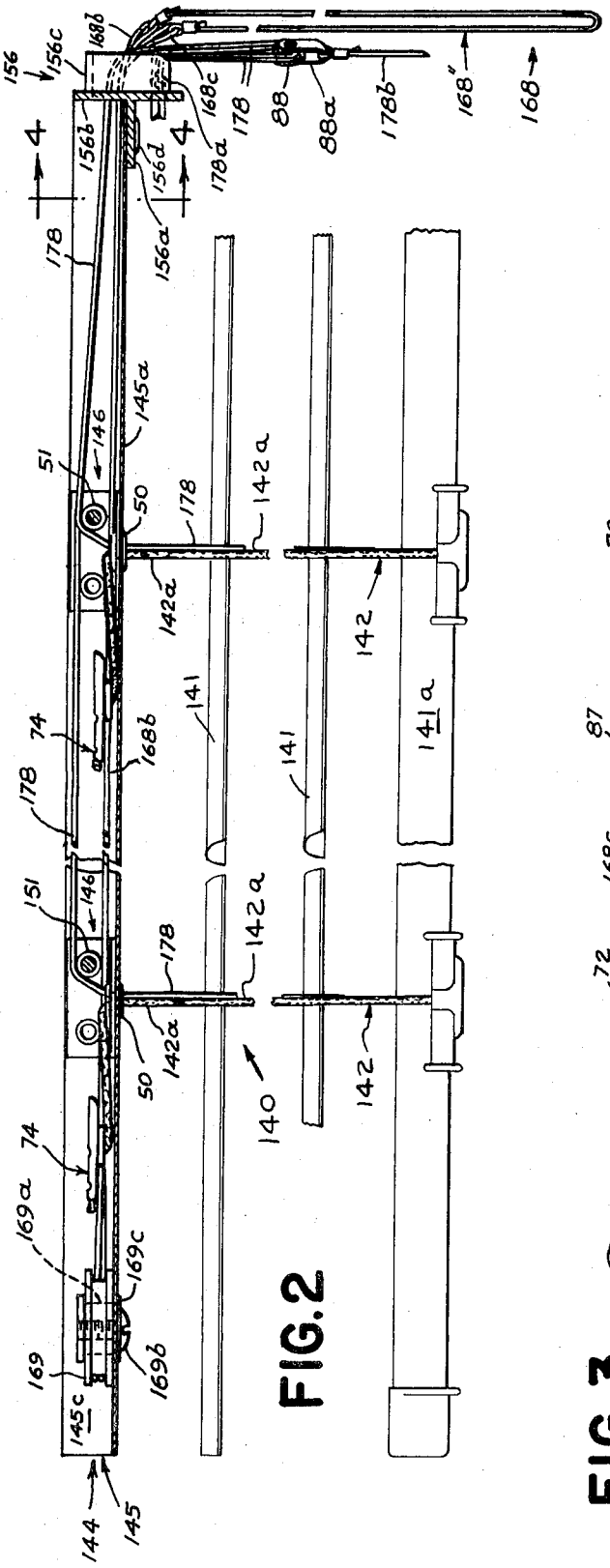


FIG. 2

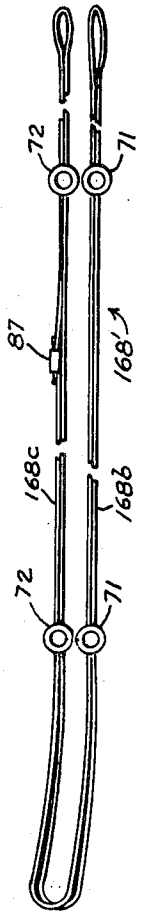


FIG. 3

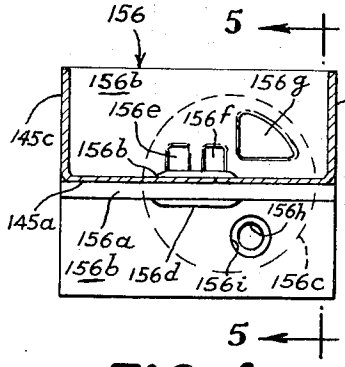


FIG. 4

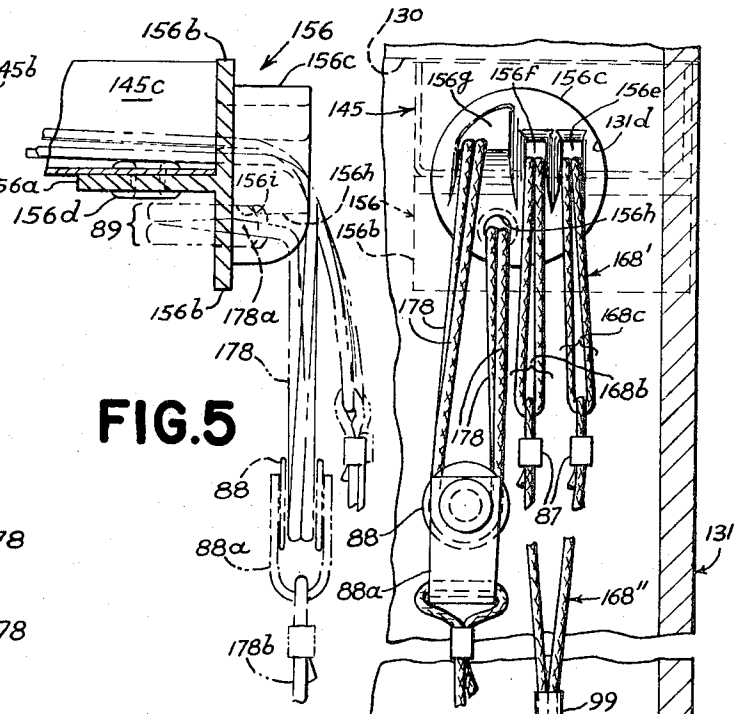


FIG. 5

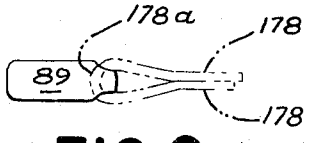


FIG. 6

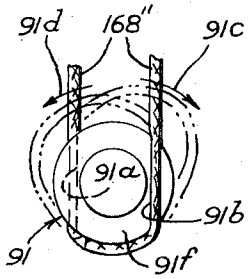


FIG. 9

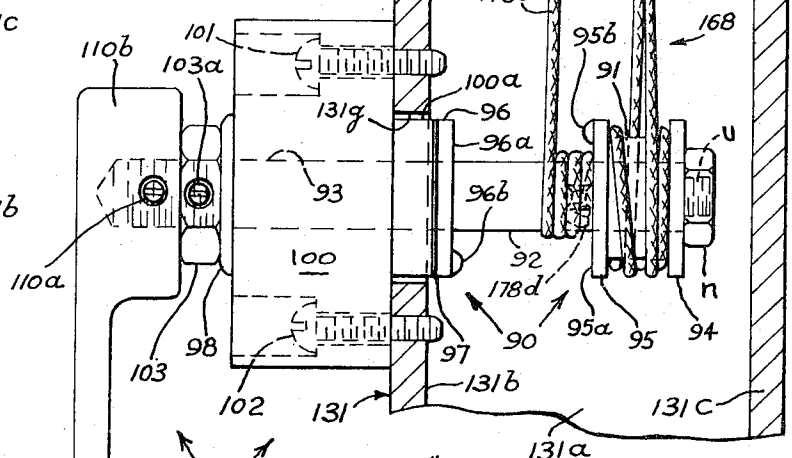


FIG. 7

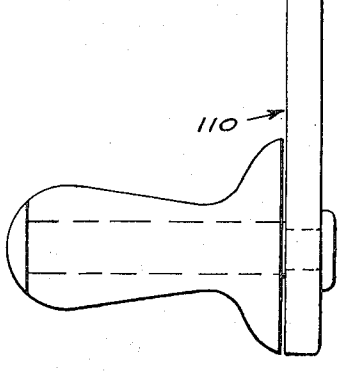


FIG. 8

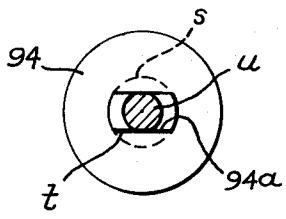


FIG. 11

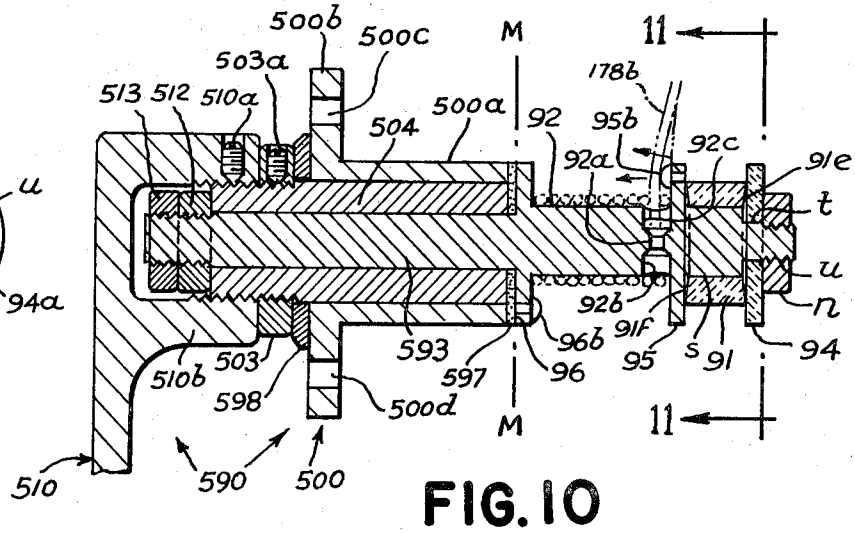


FIG. 10

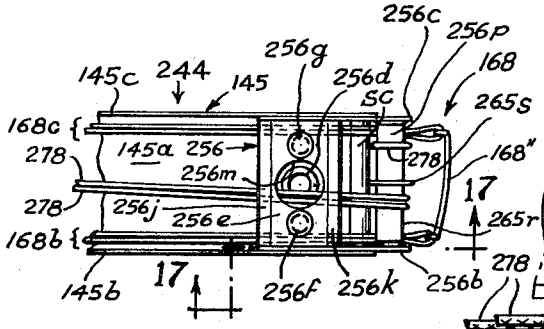


FIG. 16

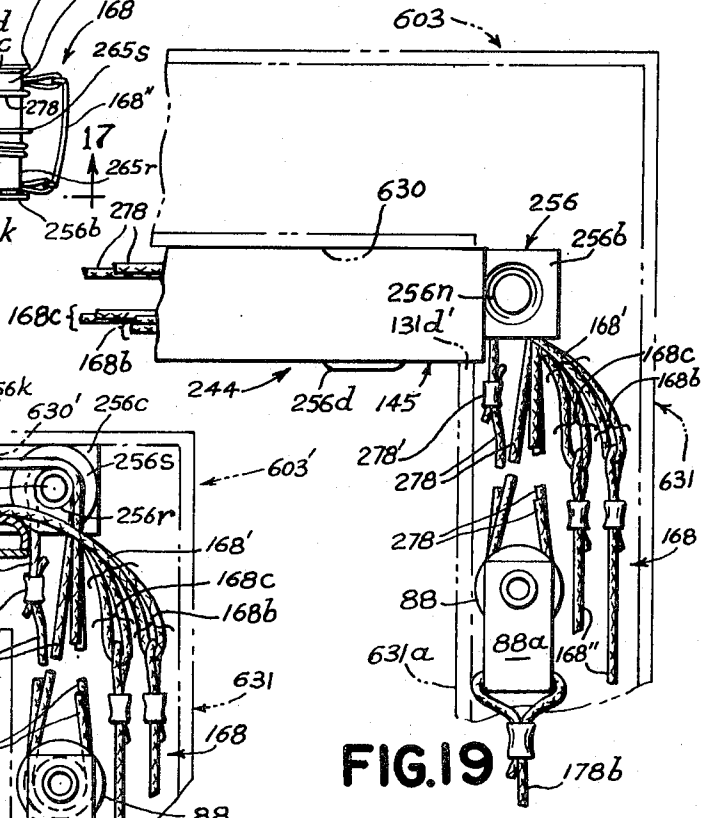


FIG. 19

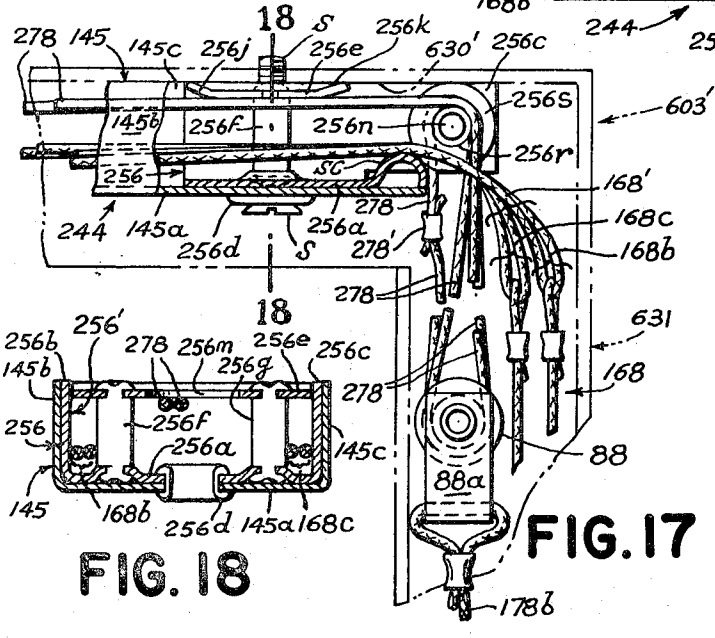


FIG. 17

FIG. 18

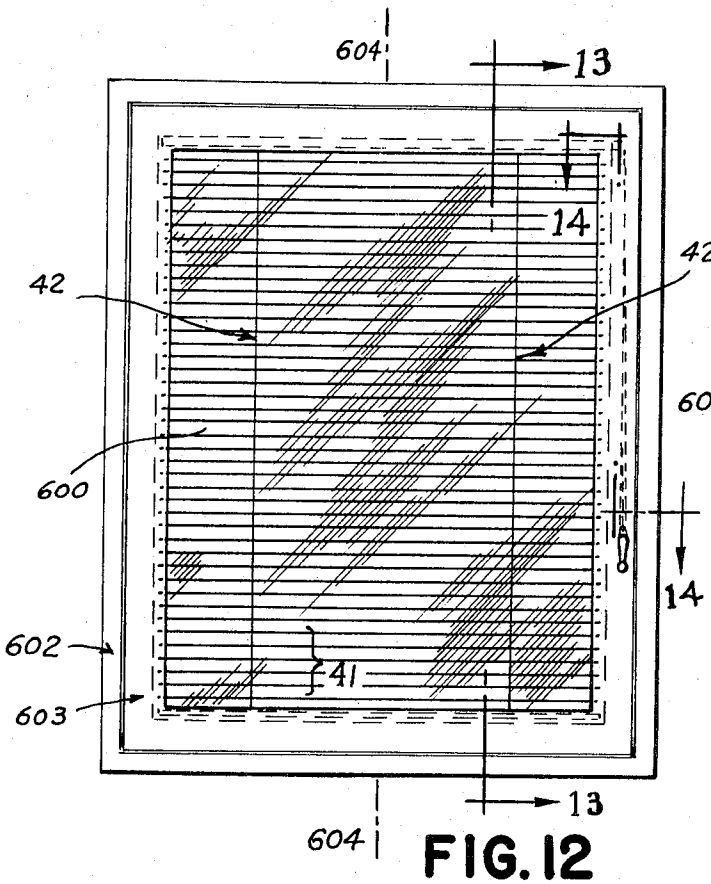


FIG. 12

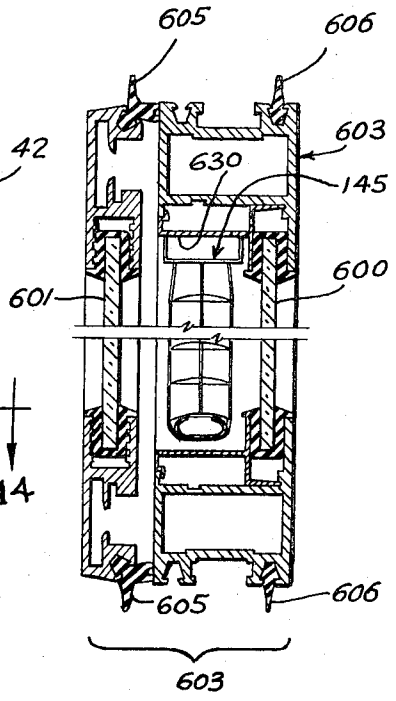


FIG. 13

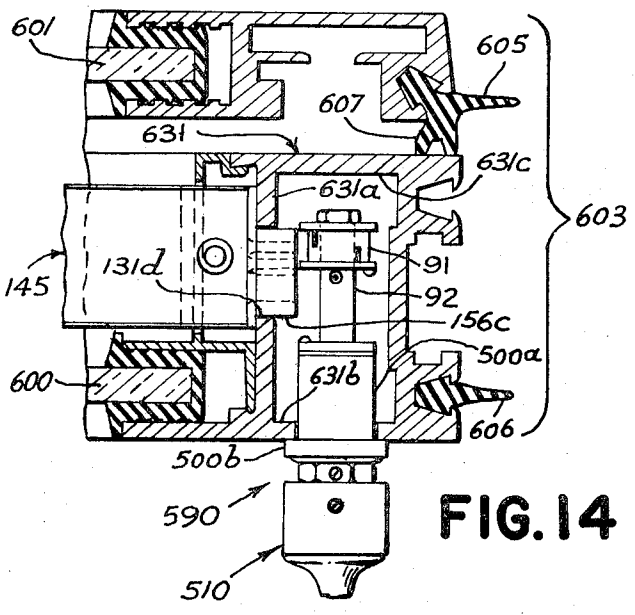


FIG. 14

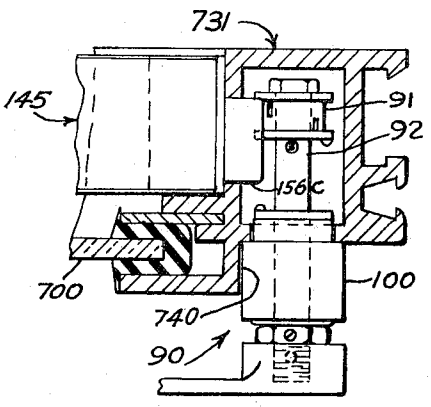


FIG. 15

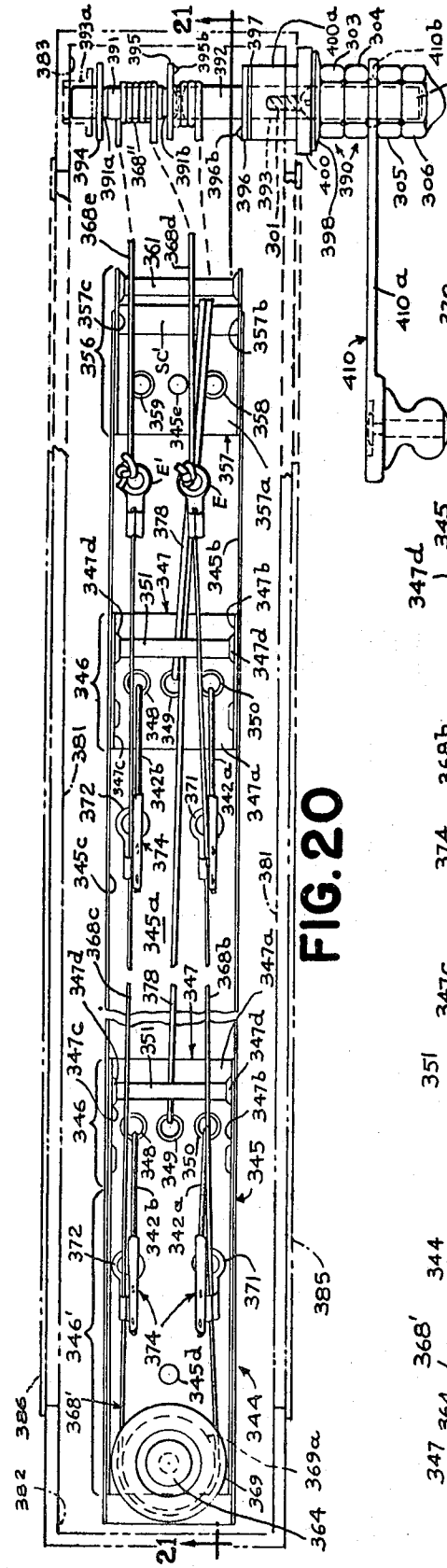


FIG. 20

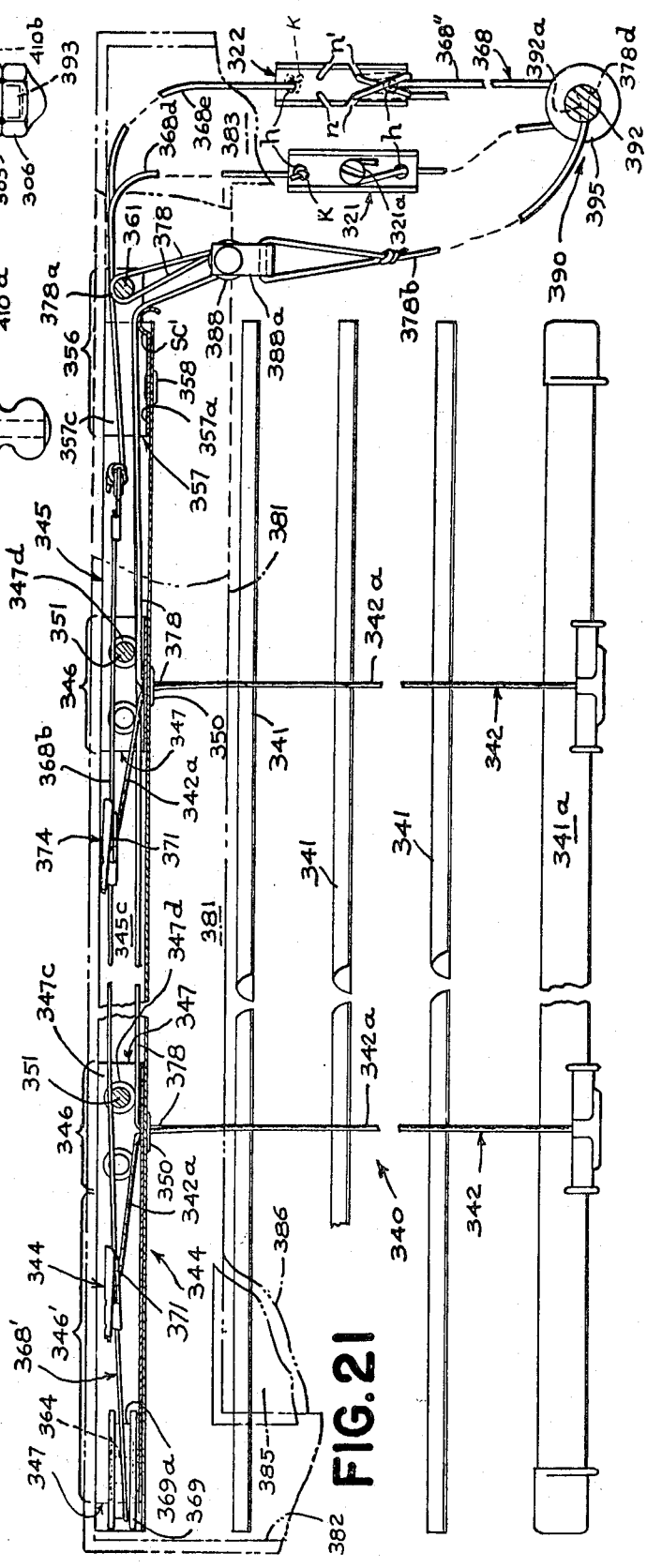


FIG. 21

FIG.24

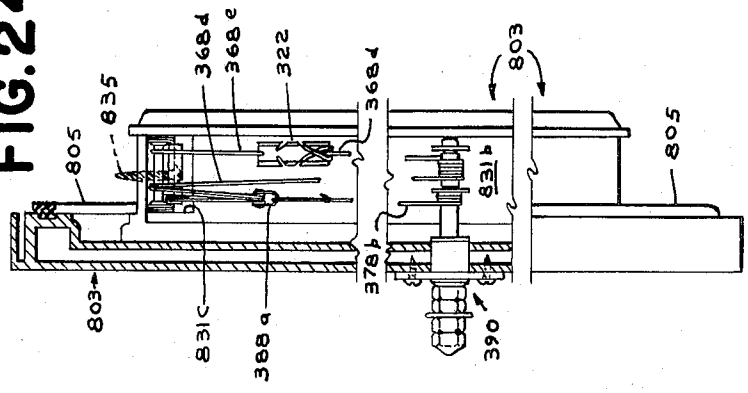


FIG.23

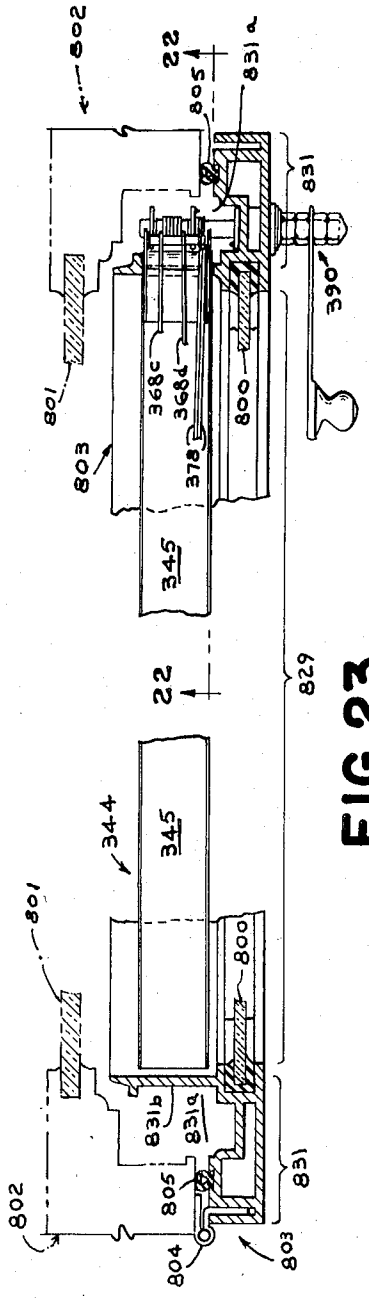
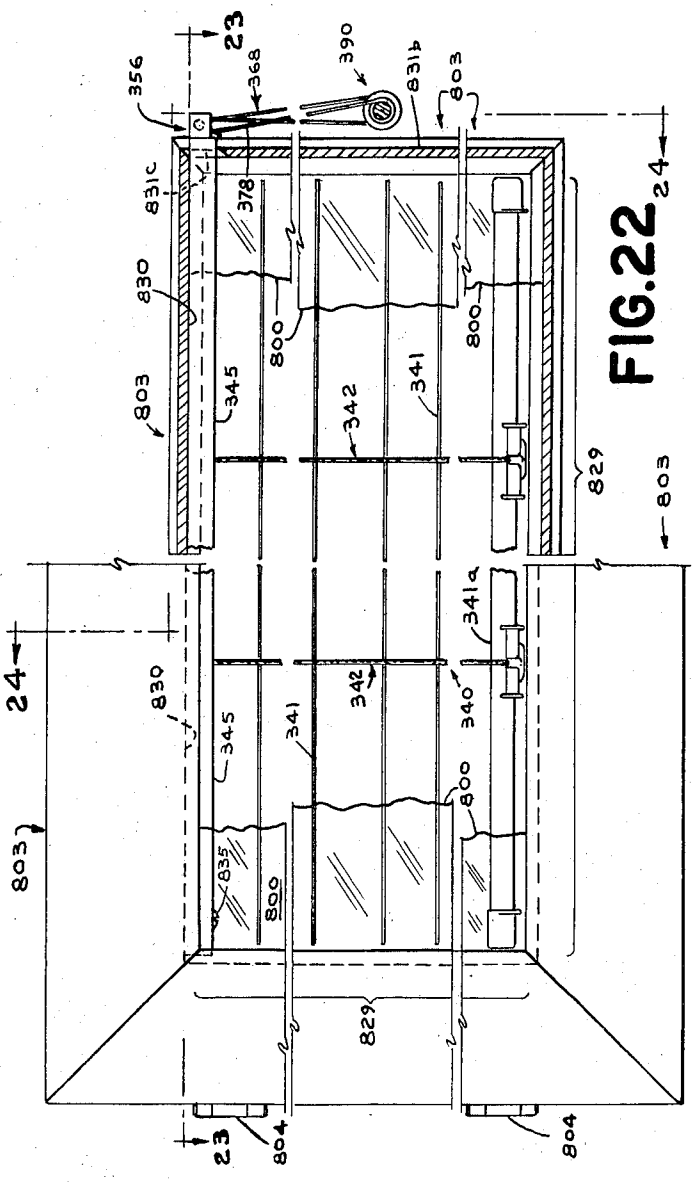


FIG.22



VENETIAN BLIND

RELATED APPLICATIONS

The present application is a continuation-in-part of my original application Ser. No. 6,395 filed Jan. 28, 1970, now U.S. Pat. No. 3,703,920.

Additionally the present application is related to my application Ser. No. 269,372 filed July 6, 1972; that application, like the present application, is a continuation-in-part of my original application Ser. No. 6,395 filed Jan. 28, 1970.

BACKGROUND OF THE INVENTION

Although Venetian blinds are now highly developed, the cost of various components has been higher than is desirable, and the space required for the more reliable and durable blinds has been greater than is desirable. Also most Venetian blinds, and particularly the more reliable and satisfactory ones, have not been well adapted for being combined with windows having metal framing, particularly when these windows were double glazed and it was desired to locate the ladder-and-slat assembly of the blind between the glazings. In various instances only very limited space is available for installation of a Venetian blind. The prior Venetian blind constructions and arrangements that have been for use in severely limited space have been constructions and arrangements which left much to be desired as regards speed and ease of assembly and installation and also as regards reliability and durability after installation.

Summary of the Invention

A window is ordinarily in the exterior wall of a building. However a window may be in any wall or partition, even one that is shiftable and serves as a door. The term "window" will be used as embracing the opening in the wall or partition, the glazing or glazings, the framing in which the glazing or glazings are mounted, and the framing (if any) which is interposed between the glazing-supporting framing and the opening in the wall or partition. The term "window opening" will be used to designate the opening of the window which, in the absence of a blind or curtain, is adapted to pass light.

The Venetian blind of the present invention can be manufactured and installed at low cost, having in mind the reliability and operating characteristics that the blind affords. Moreover the blind of the present invention can be installed readily in a window having fabricated metal framing, the ladder-and-slat assembly of the blind being placed between the glazings if the window has double glazing.

Among the features and aspects afforded by the presently preferred forms of the invention, taken collectively, are: The head of the Venetian blind has a cord-guide fitting which is adapted for entry into a vertical passageway that is afforded by a jamb channel of the window framing, for so guiding the tilt and lift cords that they will hang down in such vertical passageway; the down-hanging lift cords pass around a pulley and back up to the head, having their ends secured to the head, the pulley being rotatable in a movable pulley frame, and a cord extending downwardly from the pulley frame for shifting the pulley vertically to raise and lower the slats of the blind; cord-operating means, including both tilt-cord-operating means and lift-cord-operating means, is located at a lower level in the jamb channel; slippage is provided at the tilt-cord-operating means upon full tilting of the slats being effected; confronting cord portions may be pulled toward each other to tighten the tilt cord; quick connection of the confronting portions after tightening the tilt cord is afforded; quick release of the confronting cord portions for readjustment, with quick reconnection after readjustment, is afforded; and the cord-operating means for the tilt and lift cords are incorporated in a jamb-mounted cord-operating unit that is of advantageous construction and has advantageous operating characteristics.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view, with portions broken away, of a Venetian blind in accordance with the invention. This means for manipulating the tilt and lift cords are omitted.

FIG. 2 is a view, with portions broken away, taken generally on the line 2—2 of FIG. 1. The means for manipulating the tilt and lift cords are omitted.

FIG. 3 is a plan view, with portions broken away, showing a looped double-tilt-cord element with four eyelets affixed thereto as prepared for incorporation into the Venetian blind as shown in FIGS. 1 and 2.

FIG. 4 is an enlarged cross section on the line 4—4 of FIG. 2, the tilt and lift cords being omitted.

FIG. 5 is a fragmentary view on the line 5—5 of FIG. 4, portions of the tilt cord and portions of the lift-cord means being indicated in dot-dash lines.

FIG. 6 is a top plan view of the lift-cord equalizer, a cord fragment being indicated in dot-dash lines.

FIG. 7 is a sectional elevation showing in vertical section a fragment of a metal channel which constitutes one of the jambs of metal window framing, e.g., the framing of the sash. The plane of the section is perpendicular to the expanse of the window opening. The tilt cord of FIGS. 1 and 2 and also the lift-cord means of FIGS. 1 and 2 are shown extending downwardly in the channel and operatively connected to a cord-operating unit which is attached to the channel.

FIG. 8 is a top plan view of the tilt-cord spool-member, to which the tilt cord is shown connected in FIG. 7, a fragment of the tilt cord being included in FIG. 8.

FIG. 9 is an elevation looking from the left of FIG. 8, with a diagram added to indicate the manner in which the tilt cord is wound about the tilt-cord spool-member before that spool member is put in place in the cord-operating unit.

FIG. 10 is a central longitudinal section, with parts broken away, showing a modified cord-operating unit. The plane of the section is considered to be vertical. The part of the unit which lies to the right of the line M—M is taken unchanged from the cord-operating unit of FIG. 7.

FIG. 11 is a detail view, taken on the line 11—11 of FIG. 10, showing the friction disc and shaft shoulder which are contiguous to the line 11—11.

FIG. 12 (Sheet 4) is a small-scale front-elevation showing a blind of the present invention incorporated in a known double-glazed window having aluminum framing. The particular window is one that has been manufactured by Hope's Windows, Inc. of Jamestown, N.Y., being shown in that company's insert in Sweets Architectural Catalog File for 1968 (Copyright 1967),

page 7 of the insert. The cord-operating unit is the cord-operating unit of FIGS. **10** and **11**; otherwise the blind is the blind of FIGS. **1–5** and **7**.

FIG. **13** (Sheet **4**) is a vertical section taken generally on the line **13—13** of FIG. **12**, the outer framing of the window being omitted and the blind being shown largely diagrammatically with details omitted. The scale of FIG. **13** is much larger than the scale of FIG. **12** and, to keep FIG. **13** to a reasonable size, the major portion of the height of the structure is broken away in the center of the figure.

FIG. **14** (Sheet **4**) is a fragmentary view, to a much larger scale than FIG. **12**, taken generally on the line **14—14** of FIG. **12**. The outer framing of the window is omitted. The tilt cords and the lift-cord means are omitted also.

FIG. **15** (Sheet **4**) is a view similar to FIG. **14** showing a blind of the present invention incorporated in a different window that has aluminum framing also. The blind is the blind of FIGS. **1–5** and **7**, the cord-operating unit being the unit of FIG. **7**. The outer framing of the window is omitted. The tilt cords and the lift-cord means are omitted also.

FIGS. **16–19** (Sheet **3**) taken collectively shown, among other things, a cord-guide unit **256** which may be substituted for the cord-guide unit **156** that is shown in FIGS. **1, 2, 4, 5** and **7**.

FIG. **16** is a fragmentary top plan view showing the cord-guide unit **256** incorporated in the Venetian blind of FIGS. **1–5** and **7**. FIG. **16** corresponds to the right-hand portion of FIG. **1** and, as in FIG. **1**, the means for manipulating the tilt and lift cords are omitted.

FIG. **17** is a view, to a larger scale than FIG. **16**, taken generally on the line **17—17** of FIG. **16**. The full-line showing in FIG. **17** corresponds with the right-hand portion of FIG. **2** and, as in FIG. **2**, the means for manipulating the tilt and lift cords are omitted. In FIG. **17** window-framing structure is indicated in phantom lines.

FIG. **18** is a vertical section showing the head channel, the cord-guide unit **256**, and the tilt and lift cords, all at line **18—18** of FIG. **17**.

FIG. **19** is a view similar to FIG. **17**. In FIG. **19** the full-line showing is looking from the bottom of FIG. **16**. Window-framing structure is indicated in phantom lines, this window-framing structure being different from the window-framing structure indicated in FIG. **17**.

FIG. **20** is a largely diagrammatic top plan view, with portions broken away, of another Venetian blind in accordance with the invention. Various parts are in exploded relation and relevant relationships are indicated by broken lines. Omitted are certain lift and tilt cord connections between the head of the blind and the remotely located cord-operating unit; for these see FIG. **21**.

FIG. **21** is a largely diagrammatic view, with portions broken away, taken generally on the line **21—21** of FIG. **20**, parts being in exploded relation similarly to FIG. **20**.

FIG. **22** is a front view, looking out the window, of a Venetian blind installation embodying the present invention. The blind is the blind of FIGS. **20** and **21**, a single quick connector being incorporated in the tilt cord and for which see FIG. **24**. To reduce FIG. **22** to manageable size there are both vertical and horizontal breaks; other portions are broken away also. The ladder and slat assembly is in the window opening of the inner framing of a double glazed window, such inner framing being shown. The inner glazing, which is mounted in the inner framing, is shown also. The left half of the view is in elevation. The right half is taken generally on the line **22—22** of FIG. **23**.

FIG. **23** is a horizontal view of the Venetian blind installation of FIG. **22**, taken generally on the line **23—23** of FIG. **22**. The outer framing and the outer glazing are indicated fragmentarily in phantom lines, such framing and glazing being omitted in FIGS. **22** and **24**. The inner framing is hinged to the outer framing, and the outer framing is nested into and fills the opening in the building wall.

FIG. **24** is a sectional elevation, with parts broken away, taken generally on the line **24—24** of FIG. **23**. Less of of the vertical extent of the structure is broken out than in FIG. **22** and, therefore, the overall height of FIG. **24** is greater than the overall height of FIG. **22**.

DESCRIPTION OF THE EMBODIMENTS THAT ARE PRESENTLY PREFERRED

The presently preferred embodiments of the invention, taken collectively, afford all of the features and aspects set forth in the summary of the invention and additional features and aspects that will be apparent from the disclosure. Except as may be otherwise indicated, the description hereinafter that is prior to the claims refers to one or more of the particular forms of the invention that are shown in the drawings; it does not necessarily refer to any other form or forms in which the invention may be embodied. The claims, however, do embrace other forms in which the invention may be embodied. The best modes thus far contemplated of carrying out the invention are disclosed. Nevertheless the disclosure is by way of illustration and example, since other specific modes are possible and it is left to the manufacturer and/or user to dispense with any feature or aspect that is not needed for his purpose.

Reference will now be had to FIGS. **1–9**, which deal with the first Venetian blind that is disclosed. A ladder-and-slat assembly is designated as a whole by **140** and includes sheet-metal slats **141** which are supported by two "string" ladders each of which is designated as a whole by **142**. The ladder-and-slat assembly is suspended beneath a horizontally-extending support or head that is designated as a whole by **144**. The head that is shown may be considered as consisting of the sheet-steel channel **145** and the thereto-attached units and elements which guide the tilt and lift cords.

Above the ladders **142** the head **144** has duplicate cord-guide units, each designated as a whole by **146**. Space on the drawing being limited, the reference characters for the units **146** are divided between the two units to some extent. Each cord-guide unit **146** has a U-shaped sheet-steel body **147** that is nested as shown within the head channel **145**, the bottom **147***a* of the cord-guide-unit body being against the bottom **145***a* of the head channel and the sides **147***b* and **147***c* of the cord-guide-unit body being against the sides **145***b* and **145***c* of the head channel. The bottom **147***a* of the body of each of the guide units **146** is attached to the bottom **145***a* of the head channel by three conventional metal eyelets **48, 49** and **50**. These eyelets, which may be considered as part of the cord-guide unit **146**, pass

through the bottom **147***a* of the cord-guide body and also through the bottom **145***a* of the head channel. The eyelets **48, 49** and **50** also do cord guiding, as will be explained. A sleevelike cylindrical roller **51** is on a shaft which extends between the sides **147***b* and **147***c* of the U-shaped cord-guide-unit body **147.** To facilitate free turning of the roller **151** two annular beads **147***d* are pressed out from the sides **147***b* and **147***c* and loosely confront the adjacent ends of the rollers.

At its right-hand end in FIGS. **1** and **2** the head **144** has a cord-guide unit which is designated as a whole by **156**; see also FIGS. **4** and **5.** As viewed in FIG. **2** the cord-guide unit **156** includes a formation which is T-shaped but turned on its right side, this formation being composed of a horizontal flange **156***a* and a vertical flange **156***b*. The cord-guide unit **156** also includes a cylindrical boss **156***c* which projects to the right from the vertical flange **156***b* as viewed in FIGS. **1, 2** and **5.** The flanges **156***a* and **156***b* and the boss **156***c* may be fabricated from sheet metal, may be die-cast in one piece of metal, or may be molded in one piece of suitable plastic. The cord-guide unit **156** also includes one or more eyelets or tubular rivets **156***d* (one shown) by which it is attached to he right-hand end of the head channel **145,** the flange **156***a* being beneath the head channel and the attaching eyelets or rivets passing through the flanges **156***a* and the bottom wall **145***a* of the head channel.

The vertical flange **156***b* extends upwardly and downwardly from the horizontal flange **156***a*, closing the end of the head channel and also depending beneath the head channel. The cord-guide unit **156** is formed with guideway passages for the passage of cords through the vertical flange **156***b* and thence longitudinally through the boss **156***c*, so that the cords can extend outwardly and downwardly from the free end of the boss. In FIG. **4** these guideway passages are seen endwise, looking down the length of the head channel toward the vertical flange **156***b;* in FIG. **7** these guideway passages are seen endwise, looking in the opposite direction. Close to the bottom of the head channel there are two guideway passages **156***e* and **156***f*. At a somewhat higher level there is a guideway passage **156***g*. As these three guideway passages proceed toward the free end of the boss **156***c*, their bottom surfaces curve downwardly to provide smooth downward-and-outward exits for the cords coming from the head channel and extending through the guideway passages.

Below the head channel the cord-guide fitting **156** is provided with a horizontal bore **156***h* which leads from the free end of the boss **156***c* and extends longitudinally through the boss and thence through the vertical flange **156***b*. The bore **156***h* is counterbored at **156***i*, the counterbore extending through the vertical flange **156***b* and for a distance into the boss **156***c*.

The tilt cord is designated as a whole by the reference character **168** which is in the lower-right corner of FIG. **2.** The tilt cord **168** is a composite, which is composed of two tilt-cord elements that are connected together end-to-end. One of the tilt-cord elements is shown separately in FIG. **3** and is designated as a whole by **168'**. The other tilt-cord element is the loop that is hanging down at the right edge of FIG. **2** and is designated as a whole by **168''**. The tilt-cord element **168'** is formed of a single length of cord that is doubled and looped as shown in FIG. **3.** The two ends of the single length of cord are fastened together in any suitable manner as by being passed through a tubular sheet-metal fastener **87** that is crimped about the overlapped end portions of the cord. When installed in the head **144** the tilt-cord element **168'** makes a 180° turn round pulley **169** and has front and rear horizontal runs in the head channel, the front horizontal run being designated by **168***b* and the rear horizontal run being designated by **168***c*. By virtue of the tilt-cord element **168'** the tilt cord **168,** in the front and rear horizontal runs **168***b* and **168***c*, is a double cord with side-by-side cord-branches.

The eyelets **71** and **72,** at which the upper ends of the ladder sidepieces **142***a* and **142***b* are connected to the horizontal runs of the tilt cord, are crimped about the side-by-side cord-branches of the double cord in the front and rear horizontal runs **168***b* and **168***c*. The eyelets **71** and **72** are all alike and they are affixed in suitable manner, e.g., as explained in original application Ser. No. 6,395, now U.S. Pat. No. 3,703,920.

The cord-guide pulley **169** is slidably mounted on the head channel **145** so that the pulley can be shifted between the full-line position and the phantom-line position shown in FIG. **1.** This affords slackening and tightening of the tilt cord during installation of the blind in a window frame as explained in original application Ser. No. 6,395, now U.S. Pat. No. 3,703,920. The pulley **169** is captive on a vertically-disposed headed-shaft **169***a* that is movable along the longitudinal slot **145***f* in the bottom of the head channel. Suitable clamping means, which is operable from beneath the head channel, serves to clamp the shaft **169***a* in adjusted position along the slot **145***f*. The clamping means shown includes a clamping screw **169***b* which passes through the slot **145***f* and is threaded into an axial bore in the shaft **169***a*. Upon being tightened, the screw **169***b* pulls the lower end of the shaft **169***a* tight against the bottom of the head channel, thereby clamping the shaft in adjusted position along the slot **145***f*. The screw **169***b* may be kept centered with respect to the width of the slot **145***f* by means of an interposed washer **169***c* that is provided with a rectangular protuberance **169***d* which fits into the slot **145***f* and has a height that is somewhat less than the thickness of the bottom wall **145***a* of the head channel.

From the pulley **169** the front and rear horizontal runs **168***b* and **168***c* of the tilt cord extend lengthwise of the head **144,** passing under the rollers **151** of the cord-guide unit **146.** At the right-hand end of the head, as viewed in FIGS. **1** and **2,** the front horizontal run **168***b* extends through the guideway passage **156***f* (FIGS. **4** and **7**) and hangs down from the free end of the cylindrical boss **156***c* for a short distance as shown in FIGS. **1, 2** and **7.** The rear horizontal run **168***c* of the tilt cord extends similarly to the right-hand end of the head, where it extends through the guideway passage **156***e* (FIGS. **4** and **7**) and hangs down from the free end of the cylindrical boss **156***c* for a short distance as shown in FIGS. **1, 2** and **7.** The two ends of the tilt-cord element **168''** are connected to the two ends of the double tilt-cord element **168'** in any suitable manner, e.g., in the manner shown in FIG. **7** with the aid of tubular sheet-metal fasteners **87.**

The Venetian blind of FIGS. **1** and **2** has lift-cord means including two lift cords **178** which are shiftable lengthwise of themselves to raise and lower the slats. The two lift cords **178** extend from the bottom bar **141***a* of the ladder-and-slat assembly **140,** upwardly through the slats **141,** through the eyelets **49** into the

head **144**, over one or both of the rollers **51**, through the guideway passage **156***g* (FIGS. **4** and **7**) in the boss **156***c*, and then hang down from the boss. The two lift cords **178** are provided by a continuous length of cord having two branches extending from a bight **178***a* (see also FIGS. **5** and **6**). With the ladder-and-slat assembly of the blind fully lowered before the blind is installed, the two lift cords **178** are pulled slack free and the bight **178***a* formed at the point along the length of cord which provides equalization of the two lift cords **178** for horizontal suspension of the bottom bar of the ladder-and-slat assembly.

A pulley **88** (FIGS. **2, 5** and **7**) is rotatably mounted in a frame **88***a* which is vertically movable beneath the boss **156***c*. Either before or after the bight **178***a* is formed, the two lift cords **178** are passed under the pulley **88** as shown; then the bight **178***a* is passed backwardly through the boss **156***c*, being inserted through bore **156***h* (FIGS. **7** and **4**) and thence through the counterbore **156***i*. A two-legged equalizer **89** is passed between the two lift cords **178** and placed astride of the bight **178***a* as indicated in FIG. **6**. Then the two lift cords **178** are pulled through the bore **156***h*, whereupon the equalizer **89** nests in the counterbore **156***i* and the bight-adjacent ends of the two lift cords **178***a* are anchored to the head-bar-attached fitting **156**. A cord **178***b*, which is part of the lift-cord means, is attached as shown to the pulley frame **88***a* and extends downwardly therefrom. When the cord **178***b* is pulled downwardly the bottom bar of the blind is raised in 2:1 ratio, i.e., the bottom bar is raised two inches for each inch that the cord **178***b* is pulled down.

FIGS. **9** and **368'** omit the means for manipulating the tilt and lift cords. The tilt and lift cords are manipulated by a cord-operating unit which is located at a distance from the horizontal runs of these cords in the head **144** of the blind. Such cord-operating unit is attached to framing of the window with which the Venetian blind is combined; see FIG. **7** where the cord-operating unit, designated as a whole by **90**, is attached to such framing. The cord-operating unit **90** is also dealt with in FIGS. **8** and **9**; it is further dealt with in FIG. **11** and the portion of FIG. **10** which lies to the right of the line M—M. about the

The Venetian blind of FIGS. **1** and **2** is adapted to be combined with existing single and double-glazed windows —including single and double-glazed windows in which fabricated metal framing lines the opening in the building wall, with or without metal framing interposed between the glazings and the framing which lines the opening in the building wall. Many of the fabricated metal framings are made of aluminum; and many have a lintel and have jamb channels which extend vertically downward from the ends of the lintel, the bottom walls of the channel formations of the two jamb channels facing toward each other. The Venetian blind of FIGS. **1** and **2** is particularly well-suited for combining with such a window; the framing of the window need not be disturbed except for making in it two round holes of reasonable size for receiving parts of the blind plus three small holes for receiving attaching screws.

In FIG. **7** the blind of FIGS. **1** and **2** is combined with a window having fabricated metal framing which provides a horizontal lintel at **130** and vertical jamb channels **131** (one shown) which extend downwardly from the ends of the lintel. The head channel **145** of the head **144** (FIGS. **1** and **2**) extends along the length of the lintel **130**, being closely adjacent to the bottom face of the lintel. The ladder-and-slat assembly **140** hangs beneath the head channel **145**. The bottom wall **131***a* of the channel formation of each jamb channel **131** is toward the edge of the space which receives the ladder-and-slat assembly, while the front and rear side-walls **131***b* and **131***c* of the channel formation of each jamb channel have their widths extending away from the space which receives the ladder-and-slat assembly. Close to the upper end of the jamb channel **131** shown in FIG. **7** a hole **131***d* has been provided through the bottom wall of the channel formation of the jamb channel. The boss **156***c* which projects from one end of the head channel **145**, the right-hand end in FIGS. **1** and **2**, makes a sliding fit with the hole **131***d* and is telescoped therein, whereby the end of the head channel is supported. The opposite end of the head channel **145** is supported by an attaching screw (not shown) which is inserted through the hole **145***d* (FIG. **1**, left-hand end) and threaded into the lintel **130**.

The cord-operating unit **90** is considered to be part of the Venetan blind; it has a tilt-cord spool-member **91** which is individual to the tilt cord **168**, and a lift-cord-spool-member **92** which is individual to the lift cords **178**. These two spool members, which are cylindrical, are rotatable with a cylindrical shaft **93**; however there is slippage between the shaft **93** and the tilt-cord spool-member **91** while the ladder-and-slat assembly of the blind is being raised or lowered. The tilt-cord spool-member **91** is a separate member which is mounted on the shaft **93**. The lift-cord spool-member **92** is part of the shaft itself. Spool member **91** spans the space between the discs **94** and **95**, which have confronting planar faces. Spool member **92** spans the space between discs **95** and **96** which have confronting planar faces also. The discs **94, 95** and **96** rotate with the shaft **93**, each disc being in nonslip relation to the shaft.

The tilt cord **168** includes the double-cord portion **168'** (see also FIG. **3**) and the single-cord portion **168''** (see also FIG. **2**, lower right-hand corner). The double-cord portion **168'** is connected to the tilt-cord spool-member **91** by the length of cord which constitutes the single-cord portion **168''**. The spool member **91** has parallel chordal slots **91***a* and **91***b* with which the cord **168''** makes a tight fit (FIGS. **8** and **9**). Before the tilt-cord spool-member **91** is mounted on the shaft **93**, an intermediate portion of the cord **168''** is connected to the spool member **91** by forcing short lengths of the cord **168''** sidewise into the slots and placing the intervening length of the cord against the cylindrical surface of the spool member **91** (FIGS. **8** and **9**). From the upper end of the slot **91***a* as the slot stands in FIG. **9** the cord **168''** is wound one or two convolutions about the spool member **91**, proceeding clockwise as indicated by the arrow **91***c*. From the upper end of slot **91***b* the cord is wound one or two convolutions about the spool member **91**, proceeding counterclockwise as indicated by the arrow **91***d*. When the slats of the blind are untilted the tilt-cord spool-member **91** is in the rotative position of FIG. **7** and approximately equal amounts of cord **168''** are wound, in opposite directions, on the tilt-cord spool-member **91**.

In FIG. **10** the part of the operating unit which lies to the right of the lines M—M conforms to the corresponding part of the cord-operating unit **90** of FIG. **7**; and FIG. **10** (also FIG. **11**) will now be referred to by

way of further explaining the cord-operating unit **90** of FIG. **7**.

The portion of the cord-operating-unit shaft which lies to the right of disc **95** is composed of a cylindrical portion *s*, a flat-sided portion *t* and a threaded stem *u*. The tilt-cord spool-member **91**, with the cord **168''** connected to it and wound around it as has been explained, is telescoped onto the cylindrical shaft-portion *s* and placed against the disc **95**. The disc **94** has a flat-sided central-opening **94***a* which fits the flat-sided shaft-portion *t*. The disc **94** is telescoped onto the shaft-portion *t* and brought against the spool member **91** as is perhaps best seen in FIG. **10**. The disc **94** is resilient, and a nut *n* on the threaded stem *u* biases the disc **94** against the end face **91***e* of the spool member **91**. As shown in FIG. **10**, the over-all axial dimension of the spool member **91** is somewhat greater than the axial length of the shaft portion *s*, which insures that the spool member will be frictionally engaged by the disc **94**. The end faces **91***e* and **91***f* of the spool member **91** are concave as is seen in FIGS. **8** and **10**. Thus the contact between the spool member **91** and the planar-faced discs **94** and **95** is localized adjacent to the periphery of the spool member.

The disc **94**, which functions in conjunction with the disc **95**, is a friction drive which is operatively interposed between the tilt-cord-spool-member **91** and the shaft **93** and its crank **110** (FIG. **7**). Upon rotation of the crank **110** in either direction the tilt-cord spool-member **91** is driven through the friction drive (disc **94**) and the tilt cord **168** is shifted longitudinally of itself and tilts the slats of the blind. The slats having been fully tilted in either direction, the movement of the tilt cord **168** and tilt-cord spool-member **91** are brought to a halt. Any continued movement of the tilt cord **168** will be brief; it will raise the ladder-and-slat assembly until the top slat **141**, now fully tilted though shown untilted in FIG. **2**, will strike the bottom of the head channel **145** and prevent any further movement of the tilt cord **168** and tilt-cord spool-member **91**.

In addition to serving as a friction drive, the disc **94** serves as a brake also. The slats having been tilted to any desired position and the crank **110** released, fortuitous rotation of the crank **110** and shaft **93** is obviated by a brake disc **97** as will be explained. The disc **94** now serves as a brake; it prevents fortuitous rotation of the tilt-cord spool-member **91** on the portion *s* of the shaft **93**, thereby preventing fortuitous tilting movement of the slats.

To raise or lower the slats of the blind, the cord **178***b* is reeled in or payed out by the lift-cord spool-member **92** which is part of the shaft **93**. Full tilting of the slats is effected by a relatively small amount of rotative movement of the tilt-cord spool-membr **91**, and thereupon the rotation of the tilt-cord spool-member **91** is automatically brought to a halt as has been explained. During such full tilting of the slats the lift-cord spool-member **92** effects only insignificant raising or lowering of the slats as a result of the rotation of the crank **110** and shaft **93** to tilt the slats. Sufficient continued rotation of the crank **110** and shaft **93** effects the reeling in or paying out of the cord **178***b* which is needed for whatever raising or lowering of the slats is desired. The crank **110** is a common operator for rotating the tilt-cord and lift-cord spool-members **91** and **92**, and the crank is in continuous torque-imparting relationship to both of these spool members. The tilt and lift cord spool-members are in nonslip relation to the tilt and lift cords.

At the opposite ends of the lift-cord spool-member **92** there are cheek surfaces **95***a* and **96***a* that are provided by the discs **95** and **96**. Adjacent to the cheek surface **95***a* the spool member **92** has a diametrical hole **92***a* (FIG. **10**) which has counterbores **92***b* and **92***c* leading from its opposite ends. The lift-cord means of the blind is connected to the lift-cord spool-member **92** by passing the lower end of the cord **178***b* through the hole **92***a* and then providing the cord with an end knot **178***d* (FIG. **7**). In attaching the cord **178***b* to the spool member **92** it may be passed in either direction through the hole **92***a* (FIG. **10**). Upon the cord being knotted and then retracted the knot **178***d* will enter one or the other of the counterbores **92***b* and **92***c* (FIG. **10**). Withdrawal of the cord from the hole **92***a* is prevented by the knot **178***d* engaging the bottom of the counterbore **92***b* or **92***c* (see FIG. **7**).

As the cord **178***b* is wound on the spool member **92** it can be expected to move closely adjacent to the cheek surface **95***a* at some times and closely adjacent to the cheek surface **96***a* at other times. These cheek surfaces are provided with hemispherical projections **95***b* and **96***b* which, when the cord **178***b* is closely adjacent to the cheek surface, strike the cord and push it away and thereby inhibit the cord from piling up against the cheek surface. In FIG. **10** this section is indicated in connection with projection **95***b*; note the phantom showing of the cord **178***b* and the two arrows that are associated therewith.

The shaft **93** of the cord-operating unit **90** (FIG. **7**) extends from in front of the vertical jamb-channel **131**, through the front wall **131***b* of the jamb channel, and to the spool members **91** and **92** —the crank **110** being attached to the portion of the shaft which is in front of the jamb channel **131**. In extending from the crank **110** to the jamb channel **131** the shaft **93** passes through a bearing block **100** in which it is journalled. The bearing block **100** has a cylindrical boss **100***a* which projects through a circular hole **131***g* that has been provided previously through the front wall **131***b* of the jamb channel **131**. The bearing block **100** is attached to the front wall **131***b* of the jamb channel by screws **101** and **102**.

The disc **96** is integral with the shaft **93**, as is the disc **95**. The outward face of the disc **96** is flat and it confronts the flat end-face of the bearing block boss **100***a*, being separated therefrom by a friction disc or washer **97** that is on the shaft **93** and is shown diagrammatically. A flat-faced clamping nut **103** is threaded onto the outer end of the shaft **93** and confronts the flat outer face of the bearing block **100**, being separated therefrom by a friction disc or washer **98** which s on the shaft **93** and is shown diagrammatically. The friction discs or washers **97** and **98** are braking means which impose a drag upon rotation of the crank **110**. When the crank is released after raising the blind, i.e., raising the slats thereof, the drag imposed by the friction discs or washers **97** and **98** prevents reverse rotation of the crank **110** and thereby obviates fortuitous lowering of the slats due to their weight.

The friction discs or washers **97** and **98** are of suitable type and are made of suitable materials. At least one of these washers, e.g., the washer **98**, is of a type which affords resilient yielding in an axial direction to a marked extent when the washer is axially loaded. By

tightening the clamping nut **103** the discs or washers **97** and **98** are axially loaded to the extent needed to cause the drag which they exert to be sufficient to obviate fortuitous lowering of the heaviest ladder-and-slat assembly, when fully raised, with which the cord-operating unit **90** is to be used. With the nut **103** thus tightened, and then held with a wrench against rotation, the hub **110***b* of the crank is forcibly tightened against the nut **103** after the manner of a jamming lock nut. Thereby both the crank **110** and the nut **103** are made fast to the shaft **93.** If desired, set screws **103***a* and **110***a* may be provided to further lock the nut **103** and the crank **110** against movement relative to the shaft **93.**

For further disclosure pertaining to the cord-operating unit **90,** and also for procedure which may be used to install the cord-operating unit **90** in the jamb channel **131,** see original application Ser. No. 6,395, now U.S. Pat. No. 3,703,920.

The bearing block **100** of the cord-operating unit **90** has a relatively large axial dimension outside of the jamb channel (see FIG. **7**). This is undesirable when the blind is to be combined with some of the existing windows. A further limitation of the cord-operating unit **90** is that an inattentive or dull person might possibly continue to rotate the crank **110,** forcibily, after the slats had been fully raised; this could break the cord **178***b* of the lift-cord means. These limitations are overcome in the cord-operating unit **590** that is shown in FIG. **10.**

Reference will now be had to FIG. **10** and certain comparisons will be made with FIG. **7.** The bearing block **500** has substantially the same over-all axial-length as the bearing block **100.** However, the cylindrical bearing-block-boss **500***a* is much longer than the boss **100***a* (FIG. **7**); and the boss **500***a* occupies most of the over-all axial-length of the bearing block **500.** The rest of the bearing block **500** is reduced to a flange **500***b* that is secured against the front face of the jamb channel by screws inserted through holes **500***c* and **500***d;* cf. screws **101** and **102** in FIG. **7.** A thick-wall cylindrical-sleeve **504** is interposed between the shaft **593** and the bearing block **500.** The right-hand end of the sleeve **504** is planar and is flush with the planar end of the boss **500***a.* The confronting face of the disc **96** is planar, and a friction disc or washer **597** is interposed between the face of disc **96** and the end faces of sleeve **504** and boss **500***a.* Against the front face of the bearing block **500** there is a friction washer **598** which is shown diagrammatically. The washer **598** is of a type which affords resilient yielding in an axial direction to a marked extent when the washer is axially loaded.

Threaded onto the left-hand end of the shaft **593** there is a nut **512** and a jamming nut **513.** When the nut **512** is tightened the inner portion of the friction washer **597** is axially loaded; the disc **96** applies pressure to one side of the washer **597** and the confronting end of sleeve **504** applies pressure to the opposite side of the washer **597.** The inner portion of the friction washer **597,** which functions in conjunction with the end of sleeve **504** and the confronting face of disc **96,** constitutes a friction drive; and the driving torque for shaft **593** is transmitted by this friction drive when the sleeve **504** is rotated by the crank **510.** It will be seen that this drive is operatively interposed between the crank **510** and both the lift-cord spool-member **92** and the tilt-cord spool-member **91.** The purpose of this friction drive is to afford slippage between the crank **510** and the lift-cord spool-member **92** when the slats of the blind have been fully raised. This protects the cord **178***b* against breakage if rotation of the crank **510** is continued, forcibly, after the slats of the blind have been fully raised. By tightening the nut **512** the drive at the washer **597** is given a slipping torque which is substantially higher than the slipping torque of the drive at **94** and sufficiently high to insure that the slats of the blind can be fully raised without slippage of the friction drive that is at the washer **597.** Then jamming nut **513** is tightened against nut **512** to maintain the adjustment.

When nut **503** is tightened it axially loads washer **598** and the outer portion of washer **597,** the outer portion of washer **597** being squeezed between disc **96** and the end of boss **500***a.* The washer **598** and the outer portion of washer **597** constitute braking means which imposes a drag upon the rotation of the crank **510.** Nut **503** is tightened sufficiently to cause this braking means to impose a drag which is high enough to prevent counterrotation of the crank **510** and lowering of the slats under their own weight when the crank is released after the slats have been fully raised. The nut **503** may be held in adjusted position by a set screw **503***a.* The hub **510***b* of the crank **510** is screwed onto the end of the sleeve **504** and tightened against the nut **503.** The hub may be further held by a set screw **510***a.*

In FIGS. **12, 13,** and **14** the blind of FIGS. **1** and **2,** using the cord-operating unit of FIG. **10,** is combined with a commercial window. The window is "Hope's" window shown on page 7 of Hope's Windows, Inc's., insert at **19***a*/Ho in Sweets Architectural Catalog File for 1968. In FIGS. **12, 13** and **14** the window is taken from Hope's illustrations in Sweets Architectural Catalog File.

Hope's window is double-glazed and has fabricated aluminum framing. It has inner glazing **600** and outer glazing **601.** Outer framing **602** is provided to line the opening in the building wall. Sash framing **603** is interposed between the outer framing **602** and the glazings **600** and **601.** The sash framing **603** may be pivotally connected to the outer framing **602** on either a vertical or a horizontal axis, a vertical axis **604–604** being indicated in FIG. **12.** Sealing strips **605** and **606** seal the sash framing **603** to the outer framing **602.** The space between the glazings **600** and **601** is accessible by swinging the glazing **601** and its individual frame away from the remainder of the sash framing; the joint at the plane of separation is sealed by a sealing strip **607.**

The sash framing **603** has a lintel **630** (FIG. **13**). Jamb channels extend downwardly from the ends of the lintel, along the vertical edges of the space between the glazings. The right-hand jamb-channel is shown in cross section in FIG. **14** where it is designated as a whole by **631.** The channel formation of the channel **631** has a bottom wall **631***a* which is toward the space between the glazings, and has front and rear walls **631***b* and **631***c* which have their widths extending away from the space between the glazings, the walls **631***b* and **631***c* being generally parallel to the glazings **600** and **601.**

The blind is combined with the window in the manner that has been referred to and is more fully described in original application Ser. No. 6,395, now U.S. Pat. No. 3,703,920. The blind is shown diagrammatically in FIG. **13,** where the head channel **145** is shown against the lintel **630.** The right-hand end of the head

channel **145** (FIG. **14**) is supported by the boss **156***c* extending through the upper level hole **131***d* in the bottom wall **631***a* of the channel formation of the jamb channel. The opposite end of the head channel is supported by one or more screws inserted into the lintel through holes in the bottom of the head channel; see hole **145***d* in FIG. **1.** The tilt and lift cords are as in FIGS. **1, 2, 5** and **7,** extending downwardly within the jamb channel **631** and being connected to the tilt-cord spool-member **91** and the lift-cord spool-member **92** as has been explained.

In FIG. **15** the outer glazing and its individual frame are omitted, being the same as in FIG. **14.** The inner glazing is designated by **700** and the individual framing therefore differs from FIG. **14.** In FIG. **15** there is a recess at **740** and the front-to-rear space within the jamb channel **731** is less than in FIG. **14.** With the jamb channel of FIG. **15** the cord-operating unit **90** of FIG. **7** is used. The major portion of the axial length of the bearing block **100** is outside of the jamb channel **731,** and less front-to-rear space is needed within the channel **731.**

FIGS. **16–19** illustrate what may be considered to be the second Venetial blind that is disclosed; it is the blind of FIGS. **1–7** modified by different cord-guide unit at the right-hand end of the head and a different arrangement for anchoring the two lift cords to the cord-guide unit. In the Venetian blind illustrated in FIGS. **1–7** the head is designated as a whole by **144,** the cord-guide unit at the right-hand end of the head is designated as a whole by **156,** and each of the two lift cords is designated by **178.** In the Venetian blind illustrated in FIGS. **16–19** the head is designated as a whole by **244,** the cord-guide unit at the right-hand end of the head is designated as a whole by **256,** and each of the two lift cords is designated by **278.**

In both the Venetian blind of FIGS. **1–7** and the Venetian blind of FIGS. **16–19** the same parts are designated by the same reference characters, viz: The head channel is designated as a whole by **145;** it has a bottom wall that is designated by **145***a*, a front wall that is designated by **145***b* and a rear wall that is designated by **145***c*. The tilt cord is designated as a whole by **168** and it is a composite, which is composed of two tilt-cord elements that are connected together end-to-end. One of the tilt-cord elements is designated as a whole by **168′** and is formed from a single length of cord that is doubled and looped as shown in FIG. **3.** The other tilt-cord element is designated as a whole by **168″** and is the loop that depends from the right-hand end of the head (see FIGS. **2, 7** and **19**). The lift-cord means includes the pulley that is designated by **88,** the pulley frame that is designated by **88***a*, and the cord that is designated by **178***b* (see FIGS. **2, 5, 7, 17** and **19**).

The cord-guide unit **256** fits into and is nested within the head channel **145** as is best seen in FIG. **18.** The body of the cord-guide unit is designated as a whole by **256′** and is a U-shaped sheet-steel stamping having a bottom wall **256***a*, a front wall **256***b*, and a rear wall **256***c*. The bottom wall **256***a* of the cord-guide unit is against the bottom wall **145***a* of the head channel and is secured thereto by an eyelet **256***d*. At its right-hand end the bottom wall **256***a* of the cord-guide unit (FIGS. **16** and **17**) terminates in the vertical plane of the right-hand end of the head channel **145.** Before it terminates, however, it is formed to provide a convex semicylindrical cord-guiding surface SC that spans the space between the front and rear walls **256***b* and **256***c* of the cord-guide unit.

The cord-guide unit **256** has a stamped sheet-steel cover-member **256***e* which is horizontally disposed at a level that is adjacent to the upper edges of the front and rear walls **256***b* and **256***c*. This cover member is mounted and secured as shown in FIG. **18,** rivetlike posts **256***f* and **256***g* pass through the cover plate **256***e* and the bottom wall **256***a*, and these posts have annular shoulders against the cover member **256***e* and the bottom wall **256***a*. The ends of the posts **256***f* and **256***g* are swaged into holding engagement wtih the cover plate **256***e* and the bottom wall **256***a*. The bottom wall **256***a* is dimpled upwardly where the posts **256***f* and **256***g* pass through it, so that the swaged lower ends of the posts will not prevent the cord-guide unit from nesting fully into the head channel **145.** To obviate chafing of the two lift cords **278** by the left-hand and right-hand edges of the cover member **256***e*, the edge portions of the cover member are bent upwardly somewhat as seen at **256***j* and **256***k*, the bent-up portions spanning the space between the front and rear walls **256***b* and **256***c* of the cord-guide unit. A central hole **256***m* in the cover member **256***e* permits the insertion of an eyelet-setting tool when setting the eyelet **256***d* to secure the cord-guide unit to the head channel.

Longitudinally of the head channel **145,** the front and rear walls **256***b* and **256***c* of the cord-guide unit extend well beyond the end of the head channel; see FIGS. **16, 17** and **19.** Spanning the space between the front and rear walls **256***b* and **256***c* and positioned beyond the end of the head channel **145,** there is an axle **256***n*. The ends of the axle are affixed to the walls **256***b* and **256***c*. Rotatably mounted on the axle there are cylindrical sleeves **256***p* and **256***r* and an intervening washer **256***s*.

The two lift cords **278** extend under the cover member **256***e* between the posts **256***f* and **256***g;* they then pass over the rotatable sleeve **256***r*, downwardly to the pulley **88,** about half way around the pulley, and then back upwardly toward the cord-guide fitting **256** —all as best seen in FIG. **33.** The two lift cords **278** are "equalized", i.e., adjusted to suspend the bottom bar of the blind horizontally as is well understood. The ends of the equalized lift cords **278** coming up from the pulley **88** are then anchored to the head **244** in any suitable manner, e.g., similarly to the anchoring of the lift cords **178** in FIG. **2.** Alternatively, one of the lift cords **278** ascending from the pulley **88** may be extended and passed reversely over the rotatable sleeve **256***p* and then the ends of the two lift cords be fastened together by a metal fastener **278′**. As the cord **178***b* is pulled downwardly or allowed to move upwardly, the two lift cords **278** are pulled in or payed out and have double the movement of cord **178***b*, the same as with the two lift cords **178** in FIGS. **5** and **7.**

The front horizontal run **168***b* of the tilt cord passes between the front wall **256***b* of the cord-guide unit and the post **256***f* (see FIG. **18**), after which it passes over the cord-pulling surface SC and extends downwardly as seen in FIG. **17.** Simlarly the rear horizontal run **168***c* of the tilt cord passes between the rear wall **256***c* of the cord-guide unit and the post **256***g*, thence over the cord-guiding surface SC, and downwardly as seen in FIG. **17** and **19.**

As has been explained previously, FIGS. **12–14** show the Venetian blind of FIGS. **1** and **2** combined with one

of "Hope's commercial windows. FIG. **19** illustrates the second Venetian blind substituted for the Venetian blind of FIGS. **1** and **2**. In FIG. **19** the upper right-hand corner-portion of the Hope's sash forming **603** of FIGS. **12–14** is indicated diagrammatically in phantom lines, including the lintel **630** and the right-hand jamb-channel **631**. In lieu of the upper level circular hole **131***d* (FIGS. **14** and **7**) which receives the circular boss **156***c* (FIGS. **1, 2, 4, 5, 7** and **14**), the bottom wall **631***a* of the channel formation of the jamb channel **631** is provided with an upper level rectangular hole **131***d'* (FIG. **19**) which receives the right-hand end of the head channel and supports it closely adjacent to the lintel **630** as is shown in FIG. **19**. If desired a vertical attaching screw can also be used at the right-hand end of the head **244**, being inserted through the eyelet **256***d* and threaded into the lintel **630**.

FIG. **17** shows the second Venetian blind combined with a window which is a slight modification of the "Hope's" commercial window of FIGS. **12–14**. The window is the same as in FIGS. **12–14** except that it has modified sash framing which is indicated diagrammatically in phantom lines in FIG. **17** and is desginated as a whole by **603'**. This sash framing has the same right-hand jamb-channel **631**. However, the horizontal channel across the top has only a top wall and front and rear walls; there is no bottom wall toward the space between the glazings. As shown in FIG. **17**, the head **244** of the blind is nested within the horizontal framing channel at the top of the sash; the top wall of this channel becomes the lintel, which is designated by **630'**. The cord-guide fitting **256** projects into vertical alignment with the interior of the jamb channel **631**, and the tilt cords and the lift-cord means pass downwardly within the jamb channel and are operatively connected to the spool members **91** and **92** of the cord-operating unit **590** that is shown in FIGS. **14** and **10**. The right-hand end of the head channel **145** is secured to the lintel **630'** by a vertical screw S which is inserted through the eyelet **256***d* and threaded into the lintel **630'**. The left-hand end of the head channel **145** is similarly secured to the lintel by a screw inserted through the hole **145***d* (FIG. **1**), as has been explained.

FIGS. **20** and **21** hereof deal with the third Venetian blind that is disclosed. The ladder-and-slat assembly of the blind is designated as a whole by **340** and is positioned beneath a horizontally-extending support or head that is designated as a whole by **344**. The ladder-and-slat assembly includes a series of upwardly-crowned sheet-metal slats **341** and a bottom bar **341***a* that are supported and articulated together in known manner by two or more "string" ladders, each of which is designated as a whole by **342**. The ladder-and-slat assembly **340** may conform to the ladder-and-slat assembly that is disclosed in Lorentzen et al U.S. Pat. No. 3,425,479 dated Feb. 4, 1969, with the bottom bar **341***a* and its fittings and arrangement conforming to the bottom bar and its fittings and arrangement that are disclosed in Lorentzen et al U.S. Pat. No. 3,485,286 dated Dec. 23, 1969. The head **344** that is shown may be considered as consisting of the upwardly-opening U-shaped sheet-steel channel **345** and the thereto attached units which guide the tilt cord, guide the lift cords, and guide the head-entering portions of the side-pieces of the ladders **342**.

Above the ladders **342** the head **344** has two cord-guide units that are each designated as a whole by **346**. The cord-guide units **346** are duplicates, though the left-hand unit **346** is integrally connected to a pulley unit **346'**. Each cord-guide unit **346** has a U-shaped sheet-steel body **347** that is nested as shown within the head channel **345**, the bottom **347***a* of the cord-guide-unit body being against the bottom **345***a* of the head channel and the sides **347***b* and **347***c* of the cord-guide-unit body being against the sides **345***b* and and **345***c* of the head channel. The bottom **347***a* of the body of each guide unit **346** is attached to the bottom **345***a* of the head channel by three conventional metal eyelets **348, 349** and **350**. These eyelets, which may be considered as part of the cord-guide unit **346**, pass through the bottom **347***a* of the cord-gide-unit body and also through the bottom **345***a* of the head channel. The eyelets **348, 349** and **350** also do cord guiding as will be explained. A rivet-like shaft **351** extends between the sides **347***b* and **347***c* of the U-shaped cord-guide-unit body **347**. The shaft **351** has a smooth cylindrical surface for cord guiding; and the shaft constitutes a cord guide, as will be explained. Each end of the rivet-like shaft **351** is suitably prevented from retractive movement through the side **347***b* or **347***c*, for example, by upset or enlarged ends that are nested in outwardly-facing annular grooves that are impressed at **347***d* from the metal of the sides **347***b* and **347***c*. The shaft **351** may make a tight fit with the sides **347***b* and **347***c*, and thereby be nonrotatable. Alternatively, the shaft **351** may make a loose fit with the sides **347***b* and **347***c*, and thereby be rotatable.

At its right-hand end in FIGS. **20** and **21** the head **344** has a cord-guide unit which is designated as a whole by **356**. The cord-guide unit **356** has a U-shaped sheet-steel body **357** that is nested as shown within the head channel **345**, the bottom **357***a* of the cord-guide-unit body being against the bottom **345***a* of the head channel and the sides **357***b* and **357***c* of the cord-guide-unit body **357** being against the sides **345***b* and **345***c* of the head channel. The bottom **357***a* of the body of the cord-guide unit **357** is attached to the bottom **345***a* of the head channel by two conventional metal eyelets **358** and **359**. These eyelets, which may be considered as part of the cord-guide unit **356**, pass through the bottom **357***a* of the cord-guide-unit body and also through the bottom **345***a* of the head channel. As its right-hand end in FIGS. **20** and **21** the bottom wall **357***a* of the cord-guide-unit body is formed into a convex semicylindrical cord-guiding surface SC that spans the space between the front and rear walls of the cord-guide-unit body **357**. Through the bottom **357***a* of the cord-guide unit **356** there is a screw hole **345***e* which registers with a like hole (not shown) through the bottom wall **345***a* of the head channel; a screw (not shown) is inserted upwardly through these registering holes to attach the right-hand end of the head **344** to the soffit of a window frame or window opening.

Longitudinally of the head channel **345**, the front and rear walls **357***b* and **357***c* of the cord-guide-unit body **357** extend well beyond the right-hand end of the head channel **345** (FIGS. **20** and **21**). Spanning the space between the front and rear walls **357***b* and **357***c*, and positioned beyond the right-hand end of the head channel **345**, there is a rivet-like shaft **361** which constitutes a cord guide and which has a smooth cylindrical surface for guiding the cord. The shaft **361** is the same and is mounted the same as the shaft **351** of each cord-guiding unit **346**. The description and comments in

connection with shaft **351** apply in connection with shaft **361.**

The pulley unit **346'** is integral with the cord-guide unit **346** and, in FIGS. **20** and **21,** extends to the left therefrom. The body **347'** of the pulley unit is a sheet-steel channel that is nested in the head channel **345** and is a continuation of the channel **347** which constitutes the body of the adjacent cord-guide unit **346.** A stub shaft **364** is affixed to and projects vertically upward from the bottom wall of the pulley unit **346'**. Captive on the shaft **364** there is a freely rotatable plastic or metal pulley **369.** The pulley **369** has a peripheral groove **369***a* which receives the tilt cord of the blind. Through the bottom of the pulley unit there is a screw hole **345***d* which registers with a like hole (not shown) through the bottom wall **345***a* of the head channel; a screw (not shown) is inserted upwardly through these registering holes to attach the left-hand end of the head **344** to the soffit or lintel of a window opening.

The tilt cord of the third Venetian blind is designated as a whole by the reference character **368,** which is in the lower-right corner of FIG. **21.** The tilt cord **368** is a composite that is composed of an eyelet-carrying portion **368'** (shown separately in FIG. **23** of Ser. No. 269,372) and connecting portions and connectors by which the eyelet-carrying portion is connected to a cord-operating unit that is located at a distance from the eyelet-carrying portion.

The tilt cord **368,** and more especially the eyelet-carrying portion **368'** thereof, has front and rear horizontal runs **368***b* ad **368***c* within the head channel **345.** Between the front and rear horizontal runs **368***b* and **368***c* the tilt cord is guided through a 180° turn by the pulley **369,** whereby the front and rear horizontal runs move in opposite directions when the tilt cord is shifted longitudinally of itself.

Connected to the front horizontal run **368***b* of the tilt cord there are sheet-metal eyelets, one for each ladder **342,** which are spaced apart by a distance that is at least approximately equal (and preferably is equal) to the spacing of the ladders. Like eyelets are connected to the rear horizontal run **368***c*, being designated by **372** and being correspondingly positioned and spaced as is perhaps best seen in FIG. **23.** The manner of connecting the eyelets **371** and **372** to the tilt-cord runs **368***b* and **368***c* is explained and illustrated in my application Ser. No. 269,372 filed July 6, 1972.

Each ladder **342** has cordlike sidepieces, the front sidepiece being designated **342***a* (FIGS. **20** and **21**) and the rear sidepiece being designated **342***b* (FIG. **20**). The slats **341** rest on the crosspieces or rungs of the ladders **342,** as is well known and has been mentioned in connection with FIG. **3.** Each front sidepiece **342***a* extends upwardly into the head **344** through an eyelet **350** and is guided by the eyelet through a turn of approximately **90'**, after which it extends generally horizontally to the nearby eyelet **371.** Similarly the rear sidepiece **342***b* of the ladder extends upwardly into the head **344** through an eyelet **348** and is guided by the eyelet through a turn of approximately 90°, after which it extends generally horizontally to the nearby eyelet **372.** The upper end of each ladder sidepiece is provided with a sheet-metal barb **374** which is the same as the bard **74** in FIGS. **1, 2, 9,** and **10.** The barbs **374** are inserted through the eyelets **371** and **372**—connecting the front and rear sidepieces of the ladders **342** to the front and rear horizontal runs of the tilt cord **368,** the same as the corresponding connections in FIGS. **1** and **2.**

The Venetian blind of FIGS. **20** and **21** has lift-cord means which includes two lift cords that are shiftable lengthwise of themselves to raise and lower the slats. The two lift cords **378** extend from the bottom bar **341***a*, upwardly through conventional rout holes (not shown) in the slats **341,** into the head **344** through eyelets **349** that guide the lift cords through 90° turns, after which the lift cords extend horizontally to the right-hand end of the head (FIG. **20**), over the cord-guiding surface SC, under the pulley **388,** and back upwardly to a bight **37***a* (FIG. **21**) which embraces the transverse shaft **361.** The two lift cords **378** are provided by a continuous length of cord having two branches which unite at the bight **378***a*. The two branches which constitute the two lift cords **378** are installed by threading them through the blind from the bight **378***a*.

The pulley **388** (FIG. **21**) is rotatably mounted in a U-shaped sheet-metal frame **388***a* which is vertically movable beneath the shaft **361.** A cord **378***b*, which is part of the lift-cord means, is attached as shown to the pulley frame **388***a* and extends downwardly therefrom. When the cord **378***b* is pulled downwardly the blind is raised in 2:1 ratio, i.e., the bottom bar **341***a* is raised two inches for each inch that the cord **378***b* is pulled downwardly.

The tilt and lift cords are manipulated by the cord-operating unit **390** (FIGS. **20** and **21**) which corresponds to the cord-operating unit **90** in FIG. **7** and which is located at a distance from the horizontal runs of these cords in the head **344** of the blind. In FIGS. **20** and **21** the cord-operating unit **390** and elements and structure associated therewith are shown in exploded relation to a vertical plane adjacent to the right-hand end of the head **344,** and dotted lines are used to indicate diagrammatically the relevant continuations.

The blind of FIGS. **20** and **21** is adapted to be combined with a window by securing the head **344** to the soffit or lintel, the expanse of the ladder-and-slat assembly **340** confronting the glazing in the case of a single-glazed window, and the ladder-and-slat assembly being between the glazings in the case of a double-glazed window. In FIGS. **20** and **21** the framing and glazings of a double-glazed window with which the blind may be combined are indicated diagrammatically in dot-dash lines, the framing being fabricated metal framing. The lintel of the framing is a channel **381** having its open side facing downwardly, and the jambs of the framing are channels **382** and **383** having their open sides facing toward one another. The head **344** of the blind is nested in the lintel-channel **381,** being attached to the lintel by screws through the holes **345***d* and **345***e* as has been explained. The window has inside and outside glazings which are indicated diagrammatically, the inside glazing being designated by **385** and the outside glazing being designated by **386.**

The blind of FIGS. **20** and **21** is adapted to be combined with a window having the fabricated metal framing that is shown in FIG. **7** being substituted for the blind that is shown in FIG. **7.** The head **344** is attached by screws, as hereinbefore mentioned, to lintel **130** of FIG. **7.** Preparatory to attaching the head **344** to the lintel **130,** the cord guide **361** and at least a portion of the cord guide SC (FIGS. **20** and **21**) are inserted through a suitable opening that has been provided through the bottom wall **131***a* (FIG. **7**) of the channel

formation of the jamb channel adjacent to the top of the jamb, the opening corresponding to the hole **131d** in FIG. **7.** The cord-operating unit **390** (FIGS. **20** and **21**) is substituted for the cord-operating unit **90** of FIG. **7,** the unit **390** being attached to the front wall **131***b* of the jamb channel by screws that correspond with screws **101** and **102** in FIG. **7** and one of which is indicated at **301** in FIG. **20.**

The Venetian blind of FIGS. **20** and **21** hereof may also be combined with windows having other specific metal framings, e.g., the fabricated metal framings that have been referred to and have been discussed in connection with FIGS. **12-15, 17** and **19** in which figures the same are illustrated—the blind of FIGS. **20** and **21** hereof being substituted for the blinds there disclosed.

The cord-operating unit **390** is considered to be part of the Venetian blind. The unit **390** has a tilt-cord spool-member **391** which is individual to the tilt cord **368,** and it has a lift-cord spool-member which is individual to the lift cords **378.** These two spool members, which are cylindrical, are portions of a one-piece metal shaft **393.** There is slippage between the tilt-cord spool-member **391** and the tilt cord **368** while the ladder-and-slat assembly of the blind is being raised Or lowered, as will be explained. Integral cheeks **394, 395** and **396,** having circular inner and outer peripheries, complete the two spools.

The spools shaft **393** is journalled in a bearing block **400** that has a cylindrical boss **400***a* which projects through a circular hole that has been provided previously in the front wall of the jamb channel **383.** Screws (one indicated at **301**) attach the bearing block to the jamb channel. The disc-like cheek **396,** which is integral with the shaft **393,** has a flat face which confronts the inner end-face of the bearing block. The shaft **393** extends through and beyond the bearing block **400.** In front of the bearing block the shaft carries a resilient friction-washer **398,** a crank **410,** and nuts **303, 304, 305** and **306** all of which are threaded onto the shaft.

The nut **303** adjustably clamps the axially-resilient washer **398** against the flat outer face of the bearing block **400.** The nut **304** is a lock nut for the nut **303.** The crank **410** includes a radial arm **410***a* which is pierced adjacent to its inner end by the shaft **393.** The arm **410***a* is essentially a flat strip of flexible but relatively hard nylon. The nut **305** adjustably clamps the nylon arm **410***a* against the nut **304.** The nut **306** is a lock nut for the nut **305.** Those faces of the nuts **304** and **305** which confront the crank arm **410***a* are made flat and smooth or, alternatively, metal washers that are flat and smooth are interposed between those faces and the crank arm **410***a*. The crank-arm hole **410***b* which receives the shaft **393** is preferably lined with a metal bushing (not shown) that has an axial length which is somewhat less than the thickness of the crank arm.

For reasons which will be explained, one or two quick connectors **321** or **322** are included in the tilt cord **368.** The connectors **321** and **322** are alternatives, and one of each is shown in FIG. **21** merely by way of illustrating each one. Each of these connectors is a shallow channel that is stamped in one piece from sheet steel, the channel formation of the two connectors being the same (see also Ser. No. 269,372). The connectors **321** and **322** are each symmetrical about a central cross-sectional plane. Adjacent to each end of each of the connectors **321** and **322** there is a hole *h* the diameter of which is only a little larger than the diameter of the cord that is to be connected. At its center point the connector **321** is drilled and tapped to receive a round-head machine-screw **321***a*. THe head of the screw is adapted to enter the channel formation of the connector, with the periphery of the head extending close to the side walls of the channel as shown in FIG. **21.** The connector **322** is provided with upper and lower pairs of edge notches, "upper" and "lower" referring to the various dispositions as they are seen in the drawing. One notch of each pair is designated by *n* and the other by *n'*. As the notches are traversed from their open ends to their closed ends they incline toward their companion holes *h*. THe connectors **321** and **322** suitably connect the confronting upper and lower cords, variations in the specific manner of connection being feasible.

Referring to the connector **321** as shown, the upper and lower cords are threaded from the back through the upper and lower holes *h*. The upper cord end is then knotted at *k* to prevent withdrawal. The lower cord is drawn through the lower hole *h* as desired by way of reducing the effective length of cord, and then the lower cord is looped around the stem of screw **321***a*. The screw is then tightened down to secure the lower cord by clamping the cord within the channel formation of the connector **321.**

Referring to the connector **322** as shown in FIG. **21,** the upper and lower cords are threaded from the front through the upper and lower holes *h*. The upper cord end is then knotted at *k* to prevent withdrawal. The lower cord is drawn through the lower hole *h* as desired by way of reducing the length of cord and then the lower cord is secured by being wound as follows: from the back of lower hole *h*, around the lower end of the connector **322** at a point that is to the left of hole *h*, upwardly on the front of the connector to the lower notch *n'*, through the lower notch *n'* adjacent to the closed end thereof, downwardly on the back of the connector and around the lower end of the connector at a point that is to the right of the hole *h*, and upwardly on the front of the connector and thence through the lower notch *n* adjacent to the closed end thereof. The notches *n* and *n'* are of decreasing width as traversed from their open ends to their closed ends, the cord freely entering the notches at their open ends but being grippingly held by the sides of the notches when the cord is forced sidewise to a position adjacent to the closed ends of the notches.

Sheet steel 0.050 inch thick has been used for connector **321,** which has a tapped hole for screw **321***a*. Sheet steel 0.050 inch thick has been used for connector **322** also, but thinner sheet steel is contemplated.

The head **344** of the blind is attached to the soffit or lintel of the window framing, and the cord-operating unit **390** is ordinarily installed in a jamb channel at a distance from the head. The connection of the lift cords **378** to the lift-cord spool-member **392** can be such as to leave a little slack in the lift cords when the bottom bar **341***a* rests on the window sill. The lower end of the cord **378***b* (FIG. **21**) is threaded through a diametrical hole **392***a* at the inner end of the lift-cord spool-member **392** and then the lower end of the cord is knotted at **378***d* to prevent withdrawal. The knot is drawn into an appropriate counterbore at the end of hole **392***a*. The upper end of the cord **378***b* is fished up-

wardly and is suitably attached to the pulley frame **388***a*, undue slack being eliminated and excess length of the cord **378***b* being cut off. Rotation of the crank **410** winds the cord **378***b* on the lift-cord spool-member **392,** taking up any slack and then raising the blind.

THe eyelet-carrying portion **3368'** of the tilt cord has terminal eyelets E and E', each of which is lined with a smaller eyelet *e* to prevent possible cutting of cord that is tied to the eyelets E and E'. In the particular arrangement shown in the drawing the tilt cord **368** includes (a) the eyelet-carrying portion **368'**, (b) portions **368***d* and **368***e* which are tied to the eyelets E and E' and extend to the connectors **321** and **322,** (c) the connectors **321** and **322,** and (d) a portion **368''** which extends from the connectors **321** and **322** and which is wrapped a plurality of turns bout the tilt-cord spool-member **391.** In FIG. **20** the cord portion **368''** is shown as being wrapped approximately six turns about the tilt-cord spool-member **391.** The tilt-cord spool-member **391** constitutes a friction drive to th tilt cord portion **368''** and hence a friction drive to the entire tilt cord **368** to tilt the slats of the blind. Therefore the tilt cord **368** of the installed blind needs to be taut.

The tilt cord portions **368***d* and **368***e* are made of such length that the connectors **321** and **322** will be in an accessible location when the head **344** of the blind has been attached to the soffit or lintel of the window framing. The mid portion of the tilt cord portion **368''** is wrapped the desired number of turns about the tilt-cord spool-member **391** and, in connection with the installation of the cord-operating unit **390** in the jamb channel, the two branches of the tilt cord portion **368''** are fished upwardly for attachment to the connectors **321** and **322.** The branch of cord portion **368''** which confronts the cord portion **368***d* is secured to the connector **321** in the manner that has been explained. Then the cord portion **368***e* and the confronting branch of cord portion **368''** are drawn toward each other to pull the tilt cord **368** taut, whereupon the confronting branch of the cord portion **368''** is secured to the connector **322** in the manner that has been explained. It will be seen that the attachment of the branches of tilt cord portion **368''** to the connectors **321** and **322** are of such characters that the connectors afford quick release of the confronting cord portions for readjustment and quick reconnection of the confronting cord portions in readjusted relation.

With some installations there is sufficient accessibility to make it feasible to use but a single quick connector in the tilt cord **368.** In such case the cord portion **368''** is omitted. The depending end of tilt cord portion **368***d* is attached to the top of a connector, a connector per connector **322** being presently preferred over a connector per connector **321** regardless of whether one or two connectors is being used. The tilt cord portion **368***e* is continued to and wrapped the desired number of turns around the tilt-cord spool-member **391,** being then continued back up and into confronting relation to the cord portion **368***d*. The confronting runs of the cord portions **368***d* and **368***e* are then drawn toward each other to pull the entire tilt cord **368** taut, whereupon the confronting run of cord portion **368***e* is secured to the lower part of the connector in the manner that has been explained.

The tilt-cord spool-member **391** with the tilt cord portion **368''** wrapped around it is a friction drive which is operatively interposed between the tilt cord **368** and the shaft **393** and its crank **410.** With the slats **341** untilted, and upon rotation of the crank **410** in either direction, this friction drive shifts the tilt cord **368** longitudinally of itself and tilts the slats **341** by pulling up the ladder side-pieces **342***a* or **342***b* that are at one face of the blind and paying out the ladder sidepieces **342***b* or **342***a* that are at the other face of the blind. The slats having been fully tilted in either direction, movement of the tilt cord **368** will be brought to a halt. Any continued movement of the tilt cord **368** will be brief; it will raise the ladder-and-slat assembly **340** until the top slat **341,** now fully tilted though shown untilted in FIG. **21,** will strike the bottom **345***a* of the head channel and prevent further movement of the tilt cord **368.** Slippage between the tilt-cord spool-member **391** and the convolutions of tilt cord portion **368''** will permit continued rotation of the crank **410** to raise (or lower) the blind if that be desired.

The friction drive provided by the tilt-cord spool-member **391** serves as a brake also. The slats **341** having been tilted to any desired extent or left untilted, and the crank **410** released, fortuitous rotation of the crank **410** and shaft **393** is obviated by a brake which will be explained. The friction drive provided by the tilt-cord spool-member **391** now serves as a brake; it prevents fortuitous longitudinal movement of the tilt cord **368,** thereby preventing fortuitous tilting movement of the slats **341.**

To raise or lower the blind the cord **378***b* is reeled in or payed out by the lift-cord spool-member **392** which is part of the shaft **393.** Full tilting of the slats **341** is effected by a relatively small amount of rotative movement of the tilt-cord spool-member **391,** and thereupon further tilting movement of the tilt cord **368** is brought to a halt as has been explained. During such full tilting of the slats **341** the lift-cord spool-member **392** effects only insignificant raising or lowering of the slats as a result of rotation of the crank **410** and shaft **393** to tilt the slats. Sufficient continued rotation of the crank **410** and shaft **393** effects the reeling in or paying out of cord **378***b* which is needed for whatever raising or lowering of the blind that is desired. The crank **410** is a common operator for rotating the tilt-cord and lift-cord spool-members **391** and **392,** and the crank is in continuous torque-imparting relation to both of these spool members. The tilt and lift cord spool-members **391** are in continuous cord-operating relation to the tilt and lift cords and afford movement of these cords so long as they are free to move.

As the tilt cord portion **368''** is driven by the spool member **391** an end convolution of the cord portion **368''** may move against the cheek **394** or **395.** Moving against the cheek **394** or substantially against it, the end convolution drops into peripherial groove **391***a* (FIG. **20**); this inhibits the next-to-the-end convolution from moving under the end convolution, which could start the convolutions piling up against the cheek **394.** Similarly if the convolution at the opposite end moves substantially against the cheek **395;** that end convolution then drops into the peripherial groove **391***b*.

As the cord **378***b* is reeled in by the spool member **392** it can be expected to move closely adjacent to cheek **395** at times and closely adjacent to cheek **396** at other times. These cheeks are provided with hemispherical projections **395***b* and **396***b* which, when the cord **378***b* moves closely adjacent to the cheeks, strikes

the cord and pushes it away to thereby inhibit the cord from piling up against the cheek.

The bearing block **400** may be made of suitable metal or plastic, hard nylon being presently preferred. The spool cheek **396** confronts the inner flat face of the bearing block, being separated therefrom by a friction disc or washer **397.** A flat-faced clamping nut **303** is threaded onto the shaft **393** from the outer end of the shaft and confronts the flat outer face of the bearing block **400,** being separated therefrom by a friction disc or washer **398.** The friction discs or washers **397** and **398** are brake means which impose a drag upon the rotation of the crank **410** and the shaft **393.** When the crank is released after partially or fully raising the blind, the drag imposed by the friction discs **397** and **398** prevents reverse rotation of the shaft **393** and crank **410** and thereby obviates fortuitous lowering of the blind, i.e., the ladder-and-slat assembly thereof, due to its weight.

The friction discs or washers **397** and **398** are each of suitable type and made of suitable material. At least one of these washers, for example the washer **398,** is of a type which affords resilient yielding in an axial direction to a marked extent when the washer is axially loaded. By sufficiently tightening the clamping nut **303** and locking it with the nut **304** the discs or washers **397** and **398** are axially loaded and held loaded to the extent needed to cause the drag which they exert to be sufficient to obviate fortuitous lowering of the blind, even when the blind is fully raised.

The nut **305** is tightened against the outer face of nylon crank arm **410***a* and locked by nut **306.** Sufficient clamping pressure is applied by nut **305** to obviate slippage between the crank arm **410***a* and the shaft **393** while the blind is being fully raised. However, this clamping pressure is set low enough to enable the crank to slip in the event that rotation of the crank **410** be forcibly continued after the blind has been fully raised. Thus the clamped inner end of the crank arm **410***a* constitutes a friction drive which protects the lift cords of the blind against breakage in the event of forcible continued rotation of the crank after the blind has been fully raised.

As cord for the tilt cords and the lift-cord means of the blinds herein disclosed, use may be made of suitable non-metallic commercial cord of small diameter and high breaking strength. In this category braided cord such as is sometimes used for fishing lines, having a diameter of approximately 0.050 inch and which is scarcely stretchable, is presently preferred. However, the slats of the blind may fail to maintain parallelism if the tilt cord undergoes slight stretch in the eyelet-carrying portion thereof, to which the ladders are attached; and objectionable stretch in the eyelet-carrying portion of the tilt cord is likely to occur in the case of a blind which is tall and heavy and/or has long slats requiring more than two ladders, for example four or more ladders. As protection against objectionable stretch in the eyelet-carrying portion of the tilt cord, it is preferred that this portion of the tilt cord be made of metal; finely stranded stainless steel is preferred at present for the eyelet-carrying portion **368'**. Alternatively the eyelet-carrying portion **368'** of the tilt cord may be partly non-metallic, having core strands or other strands which are of metal.

With a blind which has a very heavy ladder-and-slat assembly it is likely that there will be heavy upward pull at times on the lift cord spool. To better support the shaft **393** in case of heavy upward pull, an end bearing **393***a* (FIG. **20**) may be provided for the shaft. The bearing **393***a* is mounted in any suitable manner on the rear wall of the jamb channel **383.**

FIGS. **22–24** show an additional installation in which the Venetian blind, i.e., the ladder-and-slat assembly thereof, is between glazings. Vertical and horizontal breaks are used to keep these figures to manageable size. The outer framing and its glazings are indicated, fragmentarily, in phantom lines in FIG. **23** and are omitted in FIGS. **22** and **24.** The blind is shown sketchily, being the blind of FIGS. **20** and **21** with the cord connector **321** omitted. Various reference characters have been carried over from FIGS. **20** and **21** and most of the same will be referred to. The window framing is fabricated aluminum framing having an inner glazing **800** that is mounted in and suitably sealed to inner framing **803,** and having an outer glazing **801** that is mounted in and suitably sealed to outer framing **802.** The outer framing **802** lines the opening in the building wall (not shown). The window frame may be opened, the inner framing **803** being so hinged at **804** to the outer framing **802** that the inner framing may be swung inwardly for access to the space between the glazings. The head **344** of the blind is attached to the lintel **830** of the inner framing and, therefore, the blind swings inwardly with the inner framing when the window frame is opened. When the window frame is closed the inner framing **803** is sealed to the outer framing **802** by a gasket **805** which is similar to the gasket on a refrigerator door and which extends entirely around the inner face of the framing, close to the outer edge thereof.

The window opening is designated by **829** in FIGS. **22** and **23.** The lintel **830** of the inner framing **803** extends horizontally adjacent to the top of the window opening. Jamb channels **831, 831** (FIG. **23**) extend vertically downward from the opposite ends of the lintel **830,** these jamb channels being part of the fabricated structure of the inner framing **803.** The two jamb channels are alike except for being of opposite hand; and their cross sectional configuration will be best understood from the left-hand jamb channel in FIG. **23,** that jamb channel being empty. Each of the jamb channels affords a vertical passageway at **831***a* that is separated from the window opening **829** by a jamb wall **831***b*.

Screws pass vertically upward through the head channel **345** of the blind and are threaded into the lintel **830,** thereby securing the head of the blind to the lintel. One screw **835** is shown adjacent to the left-hand end of the head channel in FIG. **22,** and another screw **835** is shown adjacent to the opposite end of the head channel in FIG. **24.** However any appropriate number of screws may be used, adjacent to the ends of the head channel and also in intervening positions along its length. At a level corresponding to the level of the head **344** of the blind there is a rectangular entrance **831***c* (FIGS. **22** and **24**) through the jamb wall **831***b* that is on the right-hand side of the window opening in FIG. **22.** The cord-guide unit **356** (see FIG. **22**) projects through the entrance **831***c* and guides the tilt and lift cords **368** and **378** (FIG. **22**) between horizontal runs lengthwise of the head **344** and vertical runs in the vertical passageway **831***a* (FIG. **23**) afforded by the right-hand jamb channel **831.** The cord-operating means **390** is mounted on the right-hand jamb channel **831** and extends into the associated vertical passage-

way **831***a* at a lower level, the tilt and lift cords being connected thereto and operated thereby as explained in connection with FIGS. **20** and **21.**

In the installation of FIGS. **22–24** a single length of cord is used for the tilt cord connection from eyelets E and E′ (FIG. **20**) to the cord-operating unit **390.** This single length of cord provides the confronting end portions at **368***d* and **368***e* in FIG. **24,** which are pulled toward each other to draw the tilt cord taut and are then united by the connector **322** in the manner that has already been explained.

Each blind herein disclosed is thin, and is well suited for combination with a double-glazed window. The slats may be 1 inch wide and the head channel may be 1 inch wide and three-eighths inch high. Suitable known materials are used throughout. Rolled aluminum slats are presently preferred for the ladder-and-slat assembly of the blind. Rolled sheet steel is presently preferred for the head channel and bottom bar. Stamped sheet steel is presently preferred for the bodies of the cord-guide units that are affixed to the head channel. Standard components are used where applicable.

See my application Ser. No. 269,372 filed July 6, 1972 for additional disclosure concerning the Venetian blind of FIGS. **20** and **21,** the cord connectors **321** and **322,** the eyelets E and E′, and equipment and procedure which may be used to affix the eyelets E and E′ to the front and rear horizontal runs of the tilt cord.

In some installations tilting of the slats of the Venetian blind is desired without any capability of raising the slats. In such installations the lift cords are omitted. However, the friction drive to the tilt cord, whether the friction drive of FIGS. **7** and **10** or the friction drive of FIGS. **20–24,** affords the same slippage upon full tilting of the slats being reached—with the same consequent protection of the tilt cord against breakage.

I claim:

1. A Venetian blind installation in which (a) a window opening has a lintel along its top and jambs along its vertical edges, (b) at least one of the jambs affords a vertical passageway that is separated from the window opening by a jamb wall, (c) a ladder-and-slat assembly is within the window opening, being suspended from a head which extends lengthwise of the lintel, and (d) the ladders are connected to horizontal runs of a tilt cord, which runs extend lengthwise of the head—wherein the improvement comprises:

an entrance leading into or in alignment with said vertical passageway, at a level corresponding to the level of the head,

cord-operating means which is jamb mounted and extends into said vertical passageway at a lower level,

cord-guide means which is part of said head and which projects through said entrance,

said cord-guide means guiding the tilt cord between the horizontal runs lengthwise of the head and vertical runs in said vertical passageway,

and a driving connection between the cord-operating means and the tilt cord to shift the tilt cord lengthwise of itself and tilt the slats of the blind in response to operation of the cord-operating means.

2. A Venetian blind installation as in claim **1** in which the head includes a head channel that is mounted contiguous to the lintel and embraces the horizontal runs of the tilt cord—wherein the improvement additionally comprises:

a cord-guide unit is affixed to said head channel and projects beyond the end thereof, and such cord-guide unit provides said cord-guide means that guides the tilt cord between the horizontal runs lengthwise of the head and vertical runs in said vertical passageway.

3. A Venetian blind installation as in claim **1** wherein the improvement additionally comprises:

slippage is provided at the cord-operating means upon full tilting of the slats being reached.

4. A Venetian blind installation as in claim **1** wherein the improvement additionally comprises:

cord means, which functions as part of the tilt cord, operatively connects the horizontal runs of the tilt cord with the cord-operating means,

said cord means including (a) confronting cord portions which can be pulled toward each other to draw the tilt cord taut, and (b) a quick connector for functionally uniting the confronting cord portions after the tilt cord has been drawn taut.

5. A Venetian blind installation as in claim **4** wherein the improvement additionally comprises:

the quick connector affords quick release of the confronting cord portions for re-adjustment and quick reconnection of the confronting cord portions in re-adjusted relation.

6. A Venetian blind installation as in claim **1** wherein the improvement additionally comprises:

the cord-operating means and the tilt cord driving connection, considered jointly, include a friction drive to the tilt cord.

7. A Venetian blind installation as in claim **6** wherein the improvement additionally comprises:

the friction drive is a spool member about which cord is wrapped a plurality of convolutions.

8. A Venetian blind installation as in claim **7** wherein the improvement additionally comprises:

in each direction axially from the convolutions of the cord, the spool member is provided with a peripherial groove into which the end convolution drops when the end convolution shifts axially thereto.

9. A Venetian blind having a ladder-and-slat assembly suspended beneath a support, and having the ladders connected to a tilt cord which extends horizontally adjacent to the support and is shiftable lengthwise of itself to tilt the slats, the shifting of the tilt cord being in response to rotation of a tilt-cord spool-member to which the tilt cord is operatively connected—wherein the improvement comprises:

the tilt cord is wound a plurality of convolutions about the spool member and is in slip relation to the spool member, whereby, once full tilting of the slats has been effected, continued rotation of the tilt-cord spool-member is afforded without further movement of the tilt cord and with consequent protection of the tilt cord against breakage.

10. A Venetian blind as in claim **9** in which there are cheeks at the opposite ends of the tilt-cord spool-member—wherein the improvement additionally comprises: two peripherial grooves on the spool member, each groove being companion to one of the cheeks and contiguous thereto whereby, when an end convolution of the tilt cord moves closely adjacent to a cheek, the end convolution drops into the companion peripherial

groove and inhibits the next-to-the-end convolution from moving under the end convolution.

11. A Venetian blind having a ladder-and-slat assembly suspended beneath a support, having the ladders connected to a tilt cord which extends horizontally adjacent to the support and is shifted lengthwise of itself to tilt the slats, and having lift-cord means comprising lift cords which are shiftable lengthwise of themselves to raise and lower the slats, the shifting of the tilt and lift cords being in response to rotation of tilt-cord and lift-cord spool-members that are individual to the tilt and lift cords and to which the tilt and lift cords are operatively connected, and the tilt-cord and lift-cord spool-members being rotated by a common operator—wherein the improvement comprises: the tilt cord being wound about the tilt-cord spool-member and being in slip relation thereto,

the lift cords being operatively connected to the lift-cord spool-member and being pulled in and payed out in response to rotation of the lift-cord spool-member, and

the common operator being a hand-grapsed rotatable-member that is in continuous torque-imparting relation to both the tilt-cord spool-member and the lift-cord spool-member, and requires no adjustment to render it operable for either and tilting of the slats or raising and lowering of the slats,

the slip relation of the tilt cord to the tilt-cord spool-member affording continued rotation of the tilt-cord spool-member without further movement of the tilt cord once full tilting of the slats has been effected.

12. A Venetian blind as in claim **11** wherein the improvement additionally comprises:

a friction drive which is operatively interposed between the common operator and both of the spool members to afford slippage between the common operator and the lift-cord spool-member when the slats of the blind have been fully raised.

13. A Venetian blind as in claim **11** wherein the improvement additionally comprises:

braking means which imposes a drag and obviates fortuitous lowering of the slats due to their weight.

14. A Venetian blind for attachment to and support by window-frame structure, the blind having a ladder-and-slat assembly suspended beneath a head which has a sheet-metal head-channel, and the blind also having tilt cords and lift cords extending longitudinally within the head channel and extending to one end of the head—wherein the improvement comprises:

a head-channel-attached fitting adjacent to said end of the head,

an end portion of the fitting being adapted for entry into or in vertical alignment with the vertically extending space within a jamb-channel of the window-frame structure,

and said fitting having guide means for guiding the tilt and lift cords to hang down in the vertically-extending space within the jamb channel.

15. A Venetian blind as in claim **14** wherein the improvement additionally comprises:

the head-channel-attached fitting having a cord guide under which the tilt cord passes and over which the lift cords pass.

16. A Venetian blind as in claim **14** wherein the improvement additionally comprises:

the head-channel-attached fitting having a cord guide under which the lift cords pass and over which the tilt cord passes.

17. A Venetian blind as in claim **14** wherein the improvement additionally comprises:

a movable pulley-frame and pulley are located below the head-channel-attached fitting,

the down-hanging lift cords pass around the pulley and thence back upwardly and have their ends secured to the head of the blind,

and a cord extends downwardly from the pulley frame for shifting the pulley vertically to raise and lower the slats of the blind.

18. A Venetian blind as in claim **16** wherein the improvement additionally comprises:

a movable pulley-frame and pulley are located below the head-channel-attached fitting,

the lift cords pass around the pulley and thence back upwardly and have their ends merging at a bight that is above and supported by the cord guide over which the tilt cord passes,

and a cord extends downwardly from the pulley frame for shifting the pulley vertically to raise and lower the slats of the blind.

19. A Venetian blind as in claim **14** in combination with a double-glazed window which has a jamb channel that extends along a vertical edge of the space between the glazings, a wall of such channel being toward such space—wherein the improvement additionally comprises:

the head-channel-attached fitting has a projecting portion through which the tilt and lift cords pass,

the ladder-and-slat assembly is in the space between the glazings,

said wall of the jamb channel is provided with an opening at a level close to the top of the space between the glazings,

and the projecting portion of the head-channel-attached fitting extends through said opening.

20. A Venetian blind as in claim **14** in combination with a double-glazed window which has a jamb channel that extends along a vertical edge of the space between the glazings—wherein the improvement additionally comprises:

the ladder-and-slat assembly is in the space between the glazings,

the tilt and lift cords extend downwardly within the jamb channel,

and means for manipulating the tilt and lift cords is located at a lower level within the jamb channel.

21. A Venetian blind as in claim **14** in combination with a double-glazed window which has a jamb channel that extends along a vertical edge of the space between the glazings—wherein the improvement additionally comprises:

the ladder-and-slat assembly is in the space between the glazings,

the tilt and lift cords hang down within the jamb channel, a movable pulley-frame and pulley are located in the jamb channel below the level of the head of the blind,

the down-hanging lift cords pass around the pulley and thence back upwardly and have their ends secured to the head of the blind,

cord-manipulating means is located in the jamb channel at a level below the pulley-frame and pulley,

and the tilt cords and the pulley-frame are operatively connected to the cord-manipulating means whereby, in response to the operation of the cord-manipulating means, the slats of the blind may be tilted and may be raised and lowered.

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