Feb. 4, 1969 H. K. LORENTZEN ET AL 3,425,479

VENETIAN BLIND CONSTRUCTION SUITABLE FOR LOW HEADS AND NARROW SLATS

Filed Aug. 29, 1966

Sheet 1 of 2

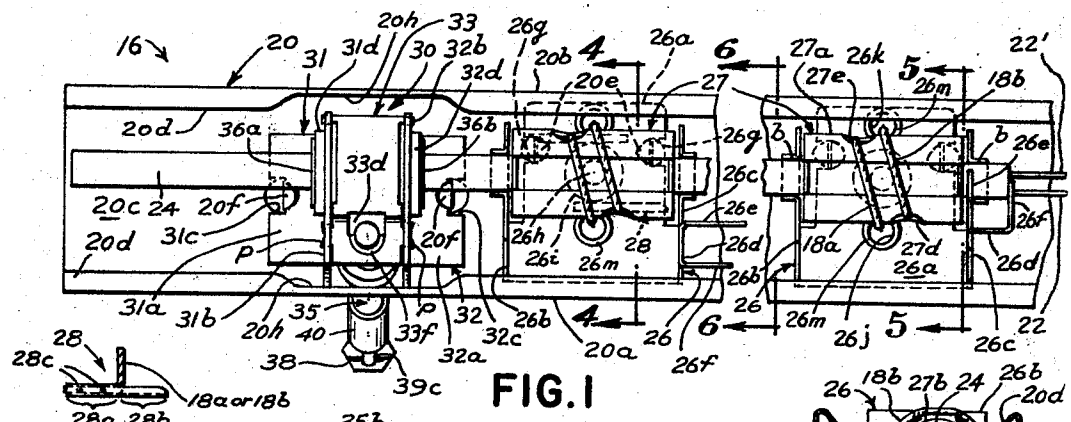


FIG. 1

FIG. 3

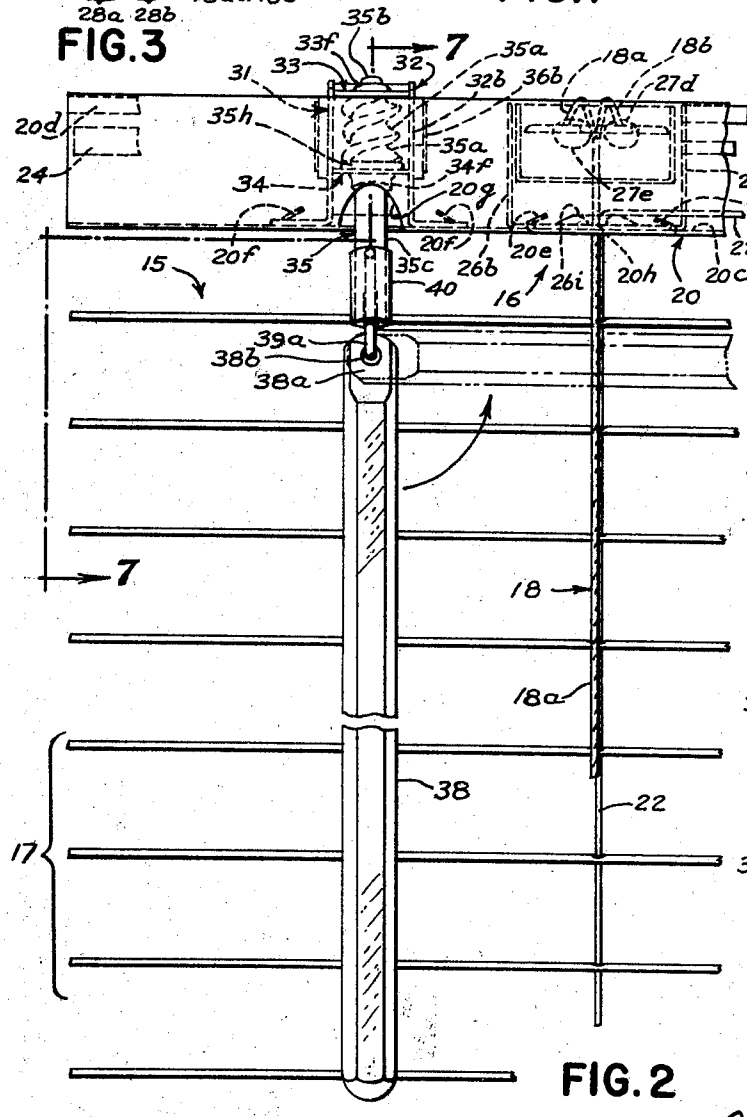


FIG. 2

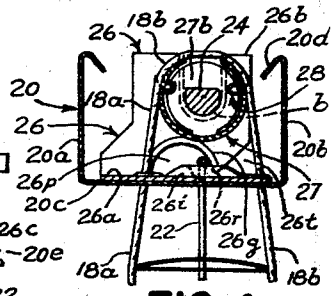


FIG. 4

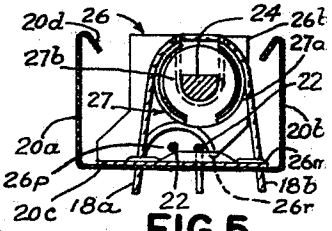


FIG. 5

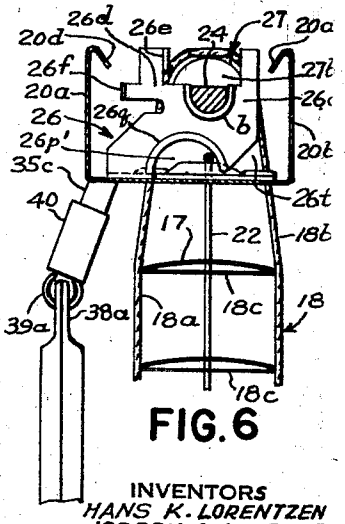


FIG. 6

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Sheet 2 of 2

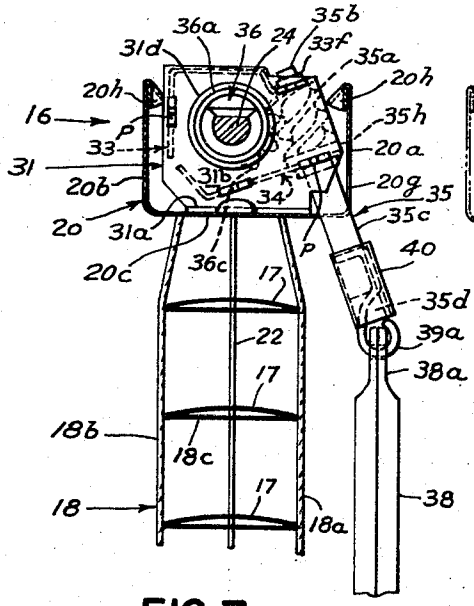


FIG. 7

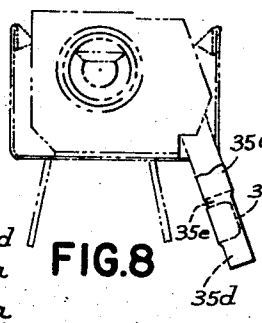


FIG. 8

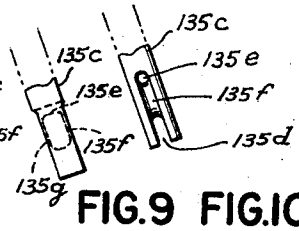


FIG. 9

FIG. 10

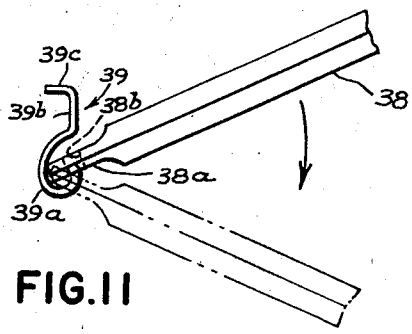


FIG. 11

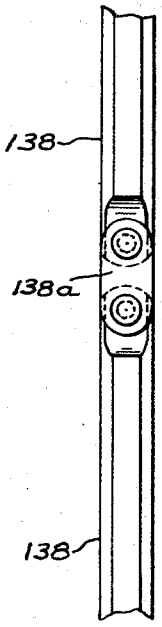


FIG. 13

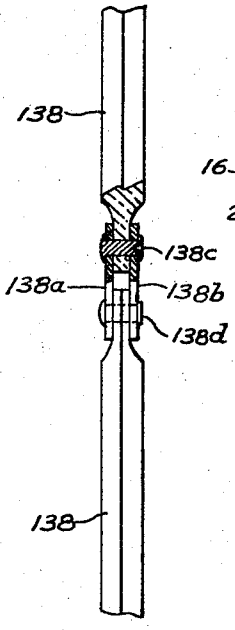


FIG. 14

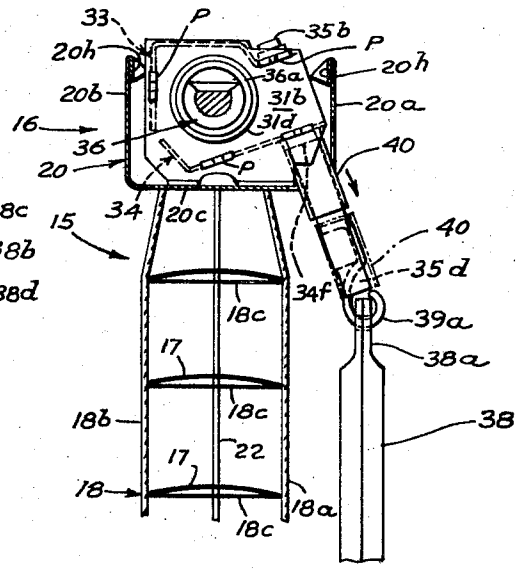


FIG. 12

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3,425,479

VENETIAN BLIND CONSTRUCTION SUITABLE FOR LOW HEADS AND NARROW SLATS

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Filed Aug. 29, 1966, Ser. No. 575,632
U.S. Cl. 160—176 12 Claims
Int. Cl. E06b 9/308

ABSTRACT OF THE DISCLOSURE

The height of the worm-and-gear tilter is reduced by placing the worm of the tilter between the gear and the front wall of the head channel of the blind. The worm shaft extends through an opening in the head channel that is spread over an area which includes the juncture of the front and bottom walls of the head channel. The projecting end of the worm shaft is provided with a quick-detachable hook on which a baton or wand of hexagonal cross section is swingably hung, the baton or wand being rotatable to tilt the slats of the blind. The diameter of the rockers which transmit the tilting motion to the ladders of the blind is reduced; and the rockers are rendered effective through an increased angle of oscillation by the sidepieces of the ladders extending across the tops of the rockers when the slats are untilted, the front sidepieces of the ladders being secured to the rear of the rockers, and the rear sidepieces of the ladders being secured to the front of the rockers.

Background of the invention

In most present-day Venetian blinds, the ladder-and-slat assembly is suspended beneath an enclosed metal head. The head consists primarily of a sheet-metal channel and the mechanism contained therein, including means for supporting the ladder-and-slat assembly and manipulating the ladders to tilt the slats of the blind. Such means may include a tilt rod, cradles on which the tilt rod is mounted for tilting movement, a worm-and-gear tilter for oscillating the tilt rod, and rockers mounted on the tilt rod and to which the upper ends of the sidepieces of the ladders are attached.

Most Venetian blinds have been made with so-called wide slats, which are approximately 2" wide and wider. Blinds made with wide slats normally have had a head channel which is approximately 2" wide and often approximately 2" high. Such a head channel provides ample room for the tilter, cradles and rockers. Because of space limitations and also because of appearance, it is sometimes desired to make blinds with narrow slats, for example only 1⅜" wide or even as litle as 1" wide. Because of space limitations and also because of appearance, a head channel may be desired which is low and sometimes narrow as well. Also, less metal is required to make a low channel, particularly if it is narrow as well.

The present invention provides a Venetian blind construction which is suitable for blinds in which, if desired, the slats may be only 1" wide or even narrower and the head channel may be as little as 1½" in width and may have a height of somewhat less than 1".

Description of the preferred embodiment

The side or face of the blind which is toward the room will be considered to be the front of the blind, and the other side or face will be considered to be the rear of the blind.

The blind includes a ladder-and-slat assembly, the slats being vertically spaced when the blind is extended and

the slats are untilted. The slats rests on the rungs of ladderlike elements, and tilting of the slats is effected by manipulating the upper ends of the ladderlike elements in known manner. In the trade different nomenclatures, and even conflicting nomenclatures, are applied to the ladderlike element and the parts thereof. The term "ladder" is used herein to designate the entire ladderlike element. The longitudinal members of the ladder, one of which extends vertically in front of the series of slats and the other of which extends vertically in the rear of the series of slats, are designated herein as "sidepieces." The members of the ladder which interconnect the sidepieces and on which the slats rest are referred to herein as either "crosspieces" or "rungs."

In addition to the above specific names, other specific names may at times be used in the description and claims to conveniently identify other parts, but all such nomenclature is to be understood as having the broadest meaning consistent with the context and with the concept of the invention as distinguished from the pertinent prior art. Except as otherwise indicated, the description hereinafter refers to the particular form or forms of the invention shown in the drawings; it does not necessarily refer to any other form 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 herein disclosed. Nevertheless the disclosure is by way of illustration and example, since other specific modes are possible, and in some instances it may be sufficient to realize only some of the advantages of the invention.

FIGURE 1 is a top plan view of the blind, the ladder-and-slat assembly being concealed by the head bar. Portions of the blind are broken out to fit the view to the sheet.

FIGURE 2 is a fragmentary front elevation of the blind, showing a portion of the ladder-and-slat assembly and showing the portion of the head that lies to the left of the left-hand break line in FIGURE 1.

FIGURE 3 is a detail view showing an end portion of a sidepiece of a ladder, equipped with a barb that is used to attach the sidepieces to the rocker or bottom bar of the blind as the case may be.

FIGURE 4 is a fragmentary vertical section on the line 4—4 of FIGURE 1. No parts are shown which lie wholly to the left of the cradle through which the line 4—4 passes.

FIGURE 5 is a fragmentary vertical section on the line 5—5 of FIGURE 1. No parts are shown which lie wholly to the left of the cradle through which the line 5—5 passes.

FIGURE 6 is a fragmentary vertical section on the line 6—6 of FIGURE 1. This view shows the portion of the tilter worm-shaft which projects outside of the head channel and shows the connection of that shaft to the baton or wand but, within the head channel, no parts are shown which lie wholly to the left of the cradle that is on the left of the line 6—6.

FIGURE 7 is a fragmentary view in sectional elevation, taken generally on the line 7—7 of FIGURE 2. The ladder, slats and baton are shown in elevation, and the tilter including the worm shaft thereof is also shown in elevation.

FIGURE 8 is a detail elevational view showing in full lines the lower end-portion of the worm shaft with the baton and connector removed. To show the relationship to the head, the head is indicated in phantom lines and the end-portion of the worm-shaft is extended to the head in phantom lines.

FIGURE 9 is a detail elevational view showing a modification of the lower end-portion of the worm shaft.

FIGURE 10 is a view of the end-portion of the worm shaft shown in FIGURE 9 with the shaft rotated 90° with respect to FIGURE 9.

FIGURE 11 is a largely diagrammatic view showing the manner of attaching the baton to an S-shaped member which, with a connecter sleeve, connects the baton to the lower end of the worm shaft.

FIGURE 12 is the same type of view as FIGURE 7 but showing the connector sleeve in full lines in elevated position for attachment or detachment of the baton. The dotted-line showing of the worm and gear that appears in FIGURE 7 is omitted in FIGURE 12.

FIGURE 13 is a fragmentary elevation showing a joint that is introduced into the baton in some instances where the blind is very tall and the baton is correspondingly long.

FIGURE 14 is a fragmentary elevation, partially in section, corresponding to FIGURE 13 but with the baton rotated through 90° as compared to FIGURE 13.

A ladder-and-slat assembly designated as a whole by **15** is positioned beneath a head which is designated as a whole by **16**. The ladder-and-slat assembly includes a series of slats **17** that are supported and articulated together in known manner by two or more ladders **18**. Each ladder **18** has a front sidepiece **18***a* and a rear sidepiece **18***b*, the two sidepieces being interconnected by vertically spaced crosspieces or rungs **18***c* on which the slats **17** rest. The ladder shown is of the "string" type, the sidepieces **18***a* and **18***b* being braided cords and each crosspiece **18***c* being a plurality of filaments which may be braided or twisted into one or more strands.

The head **16** consists primarily of a sheet-metal channel **20** and the mechanism that is contained therein. The channel **20** has a front wall **20***a*, a rear wall **20***b* and a bottom wall **20***c*. Along the upper edges of each of the front and rear walls **20***a* and **20***b* there is a longitudinally-extending flange **20***d* which is folded inwardly and downwardly. The bottom wall **20***c* is pierced in customary manner for the passage into the channel **20** of each sidepiece **18***a* or **18***b* of the ladders and each lift cord **22** and **22'**.

A steel tilt-rod **24** of D-shaped cross section is journalled in two or more cradles **26**, the bearings of the cradles being low so as to position the tilt rod abnormally close to the bottom **20***c* of the head channel. Each cradle is a 1-piece sheet-metal stamping a base **26***a* and spaced vertical legs **26***b* and **26***c*. Each leg is formed with a semicylindrical bearing at *b* (FIGURES 6, 4 and 1) in which the tilt rod **24** is journalled. The vertical leg **26***c* is provided with an arm **26***d* (FIGURES 6 and 1) which has two fingers **26***e* and **26***f*. As is shown in connection with the left-hand cradle **26** in FIGURE 1, the arm **26***d* initially projects perpendicularly to the tilt rod **24** and the fingers **26***e* and **26***f* initially project parallel to the tilt rod **24**. Viewed as in FIGURE 1, the finger **26***e* can be bent 90° counterclockwise from its left-hand-cradle position to its right-hand-cradle position. In its right-hand-cradle position the finger **26***e* is disposed over the tilt rod **24** and thereby holds the tilt rod in the upwardly-opening semicylindrical cradle-bearings *b*. If the cradle **26** be adjacent to the right-hand end of the tilt rod, as is the right-hand cradle **26** in FIGURE 1, the arm **26***d* may be bent as a whole 90° counterclockwise from the left-hand-cradle position; this disposes the finger **26***e* above the tilt rod **24** to hold it in the bearings *b* and disposes the finger **26***f* across the end of the tilt rod to act as a stop which limits longitudinal movement of the tilt rod to the right in FIGURE 1. For a better understanding of the arm **26***d*, see FIGURE 6 which shows the arm in elevation before it is bent.

To obviate too many reference characters on the drawing in connection with the cradle and associated parts, certain reference characters hereafter are omitted in a number of instances in some of FIGURES 1, 2, 4, 5 and 6. Parenthetical notes will help the reader find each such reference character where it does appear on the drawing.

The base **26***a* of each cradle (see FIGURES 4 and 1) rests against the bottom **20***c* of the head channel (see FIGURES 1, 2 and 5) and is secured thereto in any suitable manner, e.g., by sheet-metal fingers **20***e* (see FIGURE 2 and left-hand cradle of FIGURE 1). The fingers **20***e*, which are struck up from the bottom **20***c* of the head channel, interlock with edge notches **26***g* in the base of the cradle (see left-hand cradle in FIGURE 1) and are clinched against the top surface of the base of the cradle as is shown in FIGURES 2 and 1.

The base **26***a* of the cradle is provided with a central hole **26***h* (see left-hand cradle in FIGURE 1) which registers with a hole (not shown) in the bottom **20***c* of the head channel to afford vertical passage of the lift cord **22**. The metal surrounding the hole **26***h* in the base of the cradle is embossed at **26***i* (see FIGURES 1 and 4) in the manner shown at **27** in Lorentzen U.S. Patent 2,872,976; this provides a smooth bearing surface for the lift cord **22**, which comes up through the hole **20***h* and then proceeds horizontally toward the end of the head channel. Midway between the legs **26***b* and **26***c* the base **26***a* of the cradle is provided with front and rear holes **26***j* and **26***k* (see right-hand cradle in FIGURE 1) which register with holes (not shown) in the bottom **20***c* of the head channel and provide passage for the front and rear side pieces **18***a* and **18***b*, respectively, of the ladder **18**. In forming each hole **26***j* and **26***k* the metal is drawn upwardly into a short thimble and flared outwardly in the manner of an eyelet as shown at **26***m* to provide a smooth bearing surface for the sidepiece of the ladder (see FIGURES 1 and 5).

At each cradle **26** the tilt rod **24** is provided with a rocker **27**, which is a one-piece sheet-metal stamping that substantially spans the space between the legs **26***b* and **26***c* of the cradle. The rocker **27** has a generally drum-shaped body **27***a* (see FIGURE 5 and right-hand drum **27** in FIGURE 1) which is coaxial with the cradle bearings *b*. At each end of the drum-shaped body **27***a* there is an integral washer-shaped piece **27***b* (see FIGURES 4 and 5) which is folded into the end of the drum formation. These washer-shaped pieces **27***b* have D-shaped holes which mate with the D-shaped tilt rod **24** and cause the rocker to follow the oscillating movement of the tilt rod without objectionable lost motion.

One or more lift cords of the blind extend longitudinally in the head channel beneath each rocker **27**. With space allowed for such passage of the lift cord or cords, and with the tilt rod **24** positioned abnormally close to the bottom **20***c* of the head channel, the diameter of the rocker **27** is considerably reduced, being in actual practice approximately 5/8". A rocker 5/8" in diameter, if conventionally connected to the ladder, would not impart a desirably large amount of vertical movement to the sidepieces of the ladder. In accordance with the present invention the rockers are rendered effective through an increased angle of oscillation to thereby impart desirably large vertical movement to the sidepieces of the ladder.

The drawings show the rocker **27** in mid position, i.e., in the position corresponding to the slats of the blind having no tilt. Considering the rocker to be in mid position as shown, the rocker-hole **27***d* is in the front of the rocker and the rocker-hole **27***e* is in the rear of the rocker. The front sidepiece **18***a* of the ladder comes up through hole **26***j* in the base of the cradle, extends across the top of the rocker, thence into the hole **27***e* in the rear of the rocker, and is secured to the rocker on the inside thereof. Conversely the rear sidepiece **18***b* of the ladder comes up through the hole **26***k* in the base of the cradle, extends across the top of the rocker, thence into the hole **27***d* in the front of the rocker, and is secured to the rocker on the inside thereof.

When the rocker **27** is in mid position, as shown in the drawing, the center of the rear rocker-hole **27***e* (see right-hand cradle in FIGURE 1) lies substantially in a plane which includes both the common axis of the rocker

and tilt rod and the center of front hole **26***j* in the base **26***a* of the cradle. Likewise, the center of front rocker-hole **27***d* lies substantially in a plane which includes both the common axis of the rocker and tilt rod and the center of rear hole **26***k* in the base **26***a* of the cradle. The net result is that with the rocker **27** in mid position the ladder-sidepieces **18***a* and **18***b* extend halfway around the rocker in passing from the holes **26***j* and **26***k* in the base of the cradle to the rocker-holes **27***e* and **27***d*, respectively.

If the tilt rod is oscillated forwardly from the mid position to tilt the slats of the blind forwardly by winding up the rear sidepiece **18***b* of each ladder and paying out the front sidepiece **18***a*, such movement can continue until the rocker has made substantially one-half turn. With a drum-shaped rocker 5/8" in diameter, one-half turn will pay out nearly 1" of the front sidepiece **18***a*. Meanwhile the rear sidepieces **18***b* has been wound up substantially 1". Thus with a rocker only 5/8" in diameter, nearly 2" of relative movement between the front and rear sidepieces **18***a* and **18***b* of the ladder is available to tilt the slats forwardly from the no-tilt position. If the slats are to be tilted rearwardly from the no-tilt position substantially 2" of relative movement is also available, the front sidepiece **18***a* being wound up and the rear sidepiece **18***b* being paid out.

The end of each sidepiece **18***a* and **18***b* of the ladder is provided with a sheet-metal fitting **28** (FIGURE 3) which will be called a barb. Viewed as in FIGURE 3 the left-hand half **28***a* of the barb is tubular and the right-hand half **28***b* is channel-shaped. The tubular half **28***a* is crimped around the end portion of the cordlike sidepiece **18***a* or **18***b* of the of the ladder, and is also provided with a pair of sharp indentations as at **28***c* which augment the attachment of the barb to the sidepiece **18***a* or **18***b*. To attach the end of the sidepiece to the rocker, the barb **28** is inserted lengthwise through the hole **27***e* or **27***d*, the sidepiece **18***a* or **18***b* moving into prolongation of the barb and lying in the channel-shaped half **28***b* of the barb. Once the barb is on the inside of the drum-shaped body **27***a* of the rocker, pull on the sidepiece **18***a* or **18***b* restores the barb to the crosswise position shown in FIGURE 3 and thereby secures the sidepiece of the ladder to the body **27***a* of the rocker.

The holes **27***d* and **27***e* are off center with respect to the axial length of the drum. The center of each of these holes is at a distance from one end of the drum that is substantially equal to the length of the barb **28**, and at a distance from the opposite end of the drum that is substantially equal to one-half the length of the barb **28**. This shortens the axial length of the drum **27** to 1½ times the length of the barb **28**. With the drum **27** in place in the head **16**, the full length of the barb **28** can be inserted through the hole **27***d* or **27***e* when the barb is pointed toward the far end of the drum. Once the barb **28** is within the drum, the half-length **28***b* of the barb (see FIGURE 3) can occupy the space between the center of the hole **27***d* or **27***e* and the near end of the drum; see the dotted-line showing of barb **28** within the left-hand drum **27** of FIGURE 1.

Being nested in the cylindrical concavity within the drum, the barb **28** doesn't spin and twist the ladder sidepiece **18***a* or **18***b* as the blind is opened and closed. In connection with the off-center arrangement of holes **27***d* and **27***e* the placing of hole **27***d* closer to one end of the drum and hole **27***e* closer to the opposite end of the drum keeps the sidepieces **18***a* and **18***b* separated as they are reeled in and paid out by the drum.

The tilter, which is designated as a whole by **30** (FIGURE 1) is composed of six pieces. Four of the pieces are body members **31**, **32**, **33** and **34** (see FIGURES 1, 2, 7 and 12), each of which is a sheet-metal stamping. The fifth piece **35** is a worm and worm-shaft molded in one piece from suitable plastic such as hard nylon. The sixth piece is a cast-metal gear **36**.

The body members **31** and **32** are alike except for being of opposite hand. These are angle-shaped stampings having horizontal feet **31***a* and **32***a* and vertical walls **31***b* and **32***b*. The feet, which are positioned against the bottom **20***c* of the head channel, are notched at **31***c* and **32***c* to receive sheet-metal fingers **20***f*, **20***f* which are struck up from the bottom **20***c* of the head-channel and clinched over the feet **31***a* and **32***a* as is seen in FIGURE 1 to secure the tilter to the bottom of the head channel. The walls **31***b* and **32***b* of the body members **31** and **32** of the tilter are pierced and formed with integral short thimbles **31***d* and **32***d* which are coaxial with the cradle bearings *b* and which constitute bearings for the projecting hubs **36***a* and **36***b* of the gear **36**.

The space between the housing walls **31***b* and **32***b* of the tilter is bridged by the upper housing member **33** and the lower housing member **34**, each of which has two two-pronged projections *p* extending from each of its opposite edges. These projections mate with and pass through slots in the walls **31***b* and **32***b*, and one or both prongs of each projection are suitably bent or swaged into holding connection with the walls **31***b* and **32***b*.

The body of the gear **36** is provided with teeth which extend for 360° around its circumference, a portion of the teeth being shown in dotted lines in FIGURE 7 and being designated by the reference character **36***c*. The hubs **36***a* and **36***b* of the gear, which have already been referred to, project axially from the body of the gear and extend slightly beyond the ends of the bearing thimbles **31***d* and **32***d* as is seen in FIGURE 1. Because the gear is cast, the D-shaped tilt-rod hole in the center of the gear is tapered, being largest at the outer end of each hub of the gear and being smallest in a zone that lies midway between. Where it is the smallest, this D-shaped hole in the gear **36** makes a sliding fit with the tilt rod **24**, whereby the rod **24** will be oscillated in response to oscillation of the gear **36** without objectionable lost motion.

The molded plastic piece **35** includes a double-thread worm **35***a* (FIGURES 2 and 7). A short boss **35***b* projects axially from the upper end of the worm, and a worm-shaft **35***c* projects axially from the lower end of the worm. The upper housing member **33** is formed with an opening **33***d* (FIGURE 1) on one side of which the metal is drawn to form a short half-thimble **33***f* which receives the boss **35***b* and acts as a bearing at one end of the worm. The bottom housing member **34** is pierced and formed with a short thimble **34***f* (FIGURES 2 and 12) which is pierced by the shaft **35***c* and which acts as a bearing at the other end of the worm. The worm **35***a* is confined, axially, between the housing members **33** and **34**, being provided with a collar **35***h* (FIGURES 2 and 7) which bears against housing member **34**.

As seen in FIGURES 2 and 7, for example, the worm shaft **35***c* projects through an opening **20***g* in the head channel which is spread over an area that includes the juncture of the front wall **20***a* and the bottom wall **20***c* of the head channel **20**. At its end the worm shaft **35***c* is provided with a diametrical slot **35***d* (FIGURE 8); this slot is the same as the slot **135***d* shown in FIGURE 10 but extends parallel to the plane of the paper, instead of perpendicularly to the plane of the paper as does slot **135***d*. At a distance above the slot **35***d* the shaft **35***c* is diametrically pierced by a hole **35***e*, which parallels the slot **35***d*. This hole is the same as the hole **135***e* that is seen in FIGURE 10, but extends parallel to the plane of the paper. A longitudinal groove at **35***f* connects the slot **35***d* with the hole **35***e*, the groove **35***f* being the same as the groove **135***f* seen in FIGURES 9 and 10. The diametrical slot **35***d*, the diametrical hole **35***e* and the longitudinal groove **35***f* interfit with a connecter as hereinafter explained for attachment of a baton or wand to the end of the worm shaft **35***c*.

FIGURES 9 and 10 show a modification of the end of the worm shaft, and in each of these figures the worm shaft is designated by **135***c*. The only difference between the end of the shaft **35***c* shown in FIGURE 8 and the

end of the shaft **135***c* shown in FIGURES 9 and 10 is that the end of shaft **135***c* has, diametrically opposite the longitudinally groove **135***f*, a duplicate longitudinal groove at **135***g* which connects the end slot **135***d* with the transverse hole **135***e*.

To provide ample clearance for the entry of the tilter **30** into the head channel, the longitudinal flanges **20***d* (FIGURES 1 and 6) at the upper edges of the head channel are locally collapsed and flattened at **20***h* as is best seen in FIGURE 1 and as is also seen in FIGURES 7 and 12. When the tilter **30** is installed in the head channel, the gear **36** is low to the bottom of the channel, being coaxial with the bearings *b* of the cradles. In addition the height of the tilter is reduced by the worm **35** being located between the gear **36** and the front wall **20***a* of the head channel, the worm shaft **35***c* depending from the worm **35** as is seen in FIGURES 2 and 7. Since the rocker **27** is of small diameter, an increment of angular movement of the rocker effects only small longitudinal movement of the sidepieces **18***a* and **18***b* of the ladder. By providing the tilter with a double-thread worm **35***a*, the gear **36** is advanced two teeth for each complete turn of the worm shaft **35***c* and correspondingly greater movement is imparted to the rockers.

The worm shaft **35***c* is adapted to be rotated by a baton or wand **38** which is attached thereto by a quick-detachable connection. This connection serves as a universal joint whereby the operator can rotate the baton when it is swung to various convenient positions. The baton is of hexagonal cross section which facilitates effective grasping of the baton by the operator. The baton has been made of clear cellulose acetate, and a brand thereof that has been used is on the market under the name of "Butyrate."

The quick-detachable connection of the baton to the worm shaft **35***c* includes a generally S-shaped piece of wire **39** (FIGURE 11), the lower portion of which is formed as a hook **39***a* and the upper portion of which includes a longitudinal portion **39***b* and a transverse portion **39***c*. The upper end of the baton **38** is thinned at **38***a* and provided with a hole **38***b*, whereby the baton is adapted to be hung on the hook **39***a* in the manner indicated in FIGURE 11 and then be allowed to hand down as in FIGURES 2, 6, 7 and 12.

With the baton in the hook **39***a* and ready for attachment to the shaft **35***a*, a sleeve **40** of soft nylon is telescoped onto the shaft **35***c* and brought to the position shown in full lines in FIGURE 12. Then the S-shaped piece of wire **39** is applied to the shaft **35***c*, the transverse portion **39***c* being inserted into the transverse shaft hole **35***e* (FIGURE 8). The longitudinal portion **39***b* of the wire lies in the longitudinal groove **35***f*. Below the groove the wire swings into and across the end-slot **35***d*, as is seen in FIGURES 7 and 12. The sleeve **40** is then brought downwardly from the full-line position of FIGURE 12 to the phantom-line position of that figure, which is the same as the position shown in FIGURES 1, 2, 6 and 7. The longitudinal portion **39***b* of the wire bulges somewhat from the groove **35***f* and the sleeve **40** makes frictional engagement with this bulging portion of the wire member **39**.

It will be seen that the weight of the baton **38** is carried by the transverse wire-portion **39***c* which is in the hole **35***e* in the worm shaft; also that a rotative driving connection between the wire member **39** and the worm shaft **35***c* is established by the portion of the wire member which lies in and angles across the end-slot **35***d* in worm shaft **35***c*. To detach the baton **38** it is merely necessary to slide the sleeve **40** upwardly so that the wire member **39** can be disengaged from its interfitting relationship with the worm shaft.

Since the end of the worm shaft **35***c* has only a single longitudinal groove **35***f*, the transverse portion **39***c* of the wire **39** must be inserted into the hole **35***e* from the end thereof to which the groove **35***f* leads. In the modification shown in FIGURES 9 and 10 there is a second longitudinal groove **135***g* which leads to the outer end of the hole **135***e*. Thus the transverse portion **39***c* of wire **39** can be inserted into the hole **135***e* from either end of the hole, and the longitudinal portion **39***b* of the wire will be alternatively in groove **135***f* or **135***g*.

When the baton **38** is connected to the worm shaft longitudinal groove **135***g* which leads to the other end of the shaft as is seen in FIGURES 2, 6 and 7, thereby preventing accidental unhooking of the baton. In packing a blind for shipment the baton may be swung parallel to the head channel **20** as is indicated in phantom lines in FIGURE 2. In the case of a blind in which the baton would project beyond the end of the head channel if folded to the phantom-line position shown in FIGURE 2, the baton **38** may be replaced by a jointed baton **138** shown in FIGURES 13 and 14. Baton **138** is made in two or more sections connected together as shown by links **138***a* and **138***b* that are pivotally connected as shown to the adjacent sections of the baton by rivets **138***c* and **138***d*. When the blind is packed for shipment, the links **138***a* and **138***b* permit the adjacent section of baton **138** to be folded alongside one another.

The blind will be considered to have only the two cradles **26** that are shown in FIGURE 1. Referring to FIGURE 2, the lift cord **22** extends upwardly through the central hole **26***h* in the cradle immediately above and then extends horizontally within the head channel **20** as shown in dotted lines. In its horizontal run in the head channel, the lift cord **22** passes through an opening in the leg **26***c* of the cradle **26** (left-hand cradle in FIGURE 1), thence through aligned openings in the legs **26***b* and **26***c* of the right-hand cradle **26** in FIGURE 1, and continues to the right as is indicated at the very right-hand edge of FIGURE 1. A second lift cord **22'** comes up through the central hole in the bottom of the right-hand cradle **26** in FIGURE 1 (see FIGURE 5), thence horizontally through an opening in the leg **26***c* of that cradle, and continues on to the right as is indicated at the right-hand edge of FIGURE 1.

The lift-cord opening in cradle-leg **26***b* is designated **26***p* (FIGURES 4 and 5) and the lift-cord opening in leg **26***c* is designated **26***p'* (FIGURE 6). These openings are alike, each being substantially semicircular. The edge of each opening **26***p* and **26***p'* extends from the cradle-bottom **26***a* toward the front of the cradle to a nose **26***r* that is spaced somewhat from the cradle-bottom at a point toward the rear of the cradle. To obviate chafing of the lift cords, each hole **26***p* and **26***p'* is formed with a welt edge **26***q*. This welt edge is an integral bead that is formed from the metal of the cradle-leg and which extends around the edge of the opening in the cradle-leg.

Each cradle-leg **26***b* and **26***c* merges with the bottom **26***a* of the cradle on the left side of the leg as the leg is viewed in FIGURES 4, 5 and 6, but not on the right side of the leg. The right side of each leg **26***b* and **26***c* ends at the nose **26***r*, which is somewhat above the cradle-base **26***a* but which is at a level somewhat below the embossment **26***i* that surrounds the central lift-cord hole **26***h* in the cradle-base. Extending inwardly from the rear edge of each cradle-leg **26***b* and **26***c* there is a funnel-shaped cutout at **26***t*. With the cradles **26** in place in the head **16**, and before the rear sidepieces **18***b* of the ladders are brought up into the head, the horizontal-extending branches of lift cords **22** and **22'** can be inserted sidewise into the openings **26***p* and **26***p'* in the cradle-legs by being shifted through the cutouts at **26***t* and under the noses **26***r*. As will be understood from the top view of the cradles in FIGURE 1, each nose **26***r* is spaced longitudinally of the head from the embossment **26***i*, since the nose **26***r* is on a cradle-leg **26***b* or **26***c*. By reason of the lift cords passing on top of the embossments **26***i* and the noses **26***r* extending below these embossments, the horizontal runs of the lift cords are effectively confined

in the openings **26***p* and **26***p'* once the cords have been inserted in the openings as above outlined.

Referring to FIGURE 1, the lift cords **22** and **22'** continue to the right to a suitable cord lock (not shown). After passing through the cord lock the lift cords hang down in front of the blind for grasping to raise and lower the blind, all as is well-known in the art. Since the head channel **20** is low, a low cord lock is needed; and one that can be used is the cord-lock portion of the fitting shown in Lorentzen U.S. Patent 2,872,976. The cord-lock portion may be cut from that fitting by severing the base of the fitting on a line extending approximately from the reference character **24** to the reference character **45** in FIGURE 2 of Patent 2,872,976. The base of the cord-lock may then be pierced, near the line of cut, for riveting of the cord lock to the bottom of the head channel. To brace the cord lock in our head channel **20** the front flange **25** of the cord lock (in Patent 2,872,976) may be made of proper height to nest fully and snugly between our front flange **20***d* and the front wall **20***a* of our head channel. The cord lock will then be secured in our channel by the cord-lock flange **25** of Patent 2,872,976 being held against the front wall **20***a* of our head channel and the base of the cord-lock fitting being riveted to the bottom **20***c* of our head channel.

We claim:

1. A Venetian blind comprising a ladder-and-slat assembly positioned beneath a head channel having front, rear and bottom walls with a tilt rod, rockers and a worm-and-gear tilter within the head channel, the tilter affording but a single oriented position for the worm and gear, the tilter including a stationary housing secured to the bottom wall of the head channel and within which the worm and the gear are rotatably mounted, and the upper ends of the sidepieces of the ladders being attached to the rockers for supporting and tilting the slats; wherein the improvement comprises:

(a) the gear of the tilter being lower to the bottom of the head channel, (b) the height of the tilter being reduced by the worm thereof being located between the gear thereof and the front wall of the head channel, (c) the tilter housing including upper and lower members having portions which are fixedly aligned with the space between the gear and the front wall of the channel, (d) the worm being on a worm-shaft which is journalled in said portions which are fixedly aligned with the space between the gear and the front wall of the head channel, and (e) the worm-shaft extending beyond and depending from the lower of said portions which are fixedly aligned with the space between the gear and the front wall of the head channel.

2. A Venetian blind as in claim **1** in which the sidepieces of the ladders are front and rear vertical cords; and the rockers are rendered effective through an increased angle of oscillation by such vertical cords of the ladders extending across the tops of the rockers when the slats are untilted, the front vertical cords of the ladders extending to the rear of the rockers and being secured to the rear of the rockers and the rear vertical cords of the ladders extending to the front of the rockers and being secured to the front of the rockers.

3. A Venetian blind as in claim **2** in which each rocker is drum-shaped and has two holes in the cylindrical wall thereof, the holes extending radially to the interior of the rocker, the holes being off-center in opposite directions with respect to the axial length of the rocker; and the front and rear vertical cords of the associated ladder being secured to the rocker by elongated barbs which are attached to the ends of these cords and are inserted radially through said holes and then tipped to extend each barb lengthwise of the rocker in opposite directions from its associated hole.

4. A Venetian blind as in claim **1** in which:

the worm-shaft projects through an opening in the head channel that is spread over an area which includes the juncture of the front and bottom walls of the head channel,

and operating means is connected to the projecting end of the worm-shaft for rotation of the shaft and worm.

5. A Venetian blind as in claim **4** in which the worm of the tilter is a plural-thread worm and the operating means is a baton that is hexagonal in cross section.

6. A Venetian blind as in claim **1** in which the worm-shaft projects through an opening at the bottom of the head channel, and a baton is connected to the projecting end of the worm shaft for rotation of the shaft and worm.

7. A Venetian blind as in claim **6** in which:

the lower end of the worm-shaft is provided with a hook,

a baton is swingably hung on the hook and is rotatable to tilt the slats of the blind,

and shiftable means associated with the hook is operative to retain the baton on the hook and is shiftable to afford detachment of the baton.

8. A Venetian blind as in claim **7** in which:

the hook is the lower portion of a generally S-shaped piece of wire,

the S-shaped piece of wire is adapted to interfit complementarily with the lower portion of the worm-shaft and, when interfitted, to make driving connection therewith,

and a sleeve is slidable longitudinally of the worm shaft and in one position retains the S-shaped piece of wire in interfitting relation with the worm shaft and in another position releases the piece of wire for quick detachment of the baton from the worm shaft.

9. A Venetian blind as in claim **7** in which:

the hook is the lower portion of a generally S-shaped piece of wire,

the worm-shaft has a hole extending into it from the side of the shaft,

the upper end of the generally S-shaped piece of wire extends into said hole,

and means is selectively operable to either hold the end of the wire in said hole or release the wire for detachment of the baton.

10. A Venetian blind as in claim **7** in which:

the lower end of the worm-shaft has a transverse slot,

the hook is the lower portion of a generally S-shaped piece of wire,

a portion of the wire lies in said transverse slot and makes driving connection to the worm-shaft,

and quick detachment means is operable to either hold the wire in driving relation to the worm-shaft or release it for disconnection of the baton from the shaft.

11. A Venetian blind as in claim **10** in which

the worm-shaft has a longitudinal groove extending upwardly from the slot and leading to a hole which extends sidewise into the worm shaft,

and, above the hook, the generally S-shaped piece of wire extends along said groove and into said hole.

12. A Venetian blind comprising a ladder-and-slat assembly positioned beneath a head channel having front, rear and bottom walls with a tilt rod, rockers and a worm-and-gear tilter within the head channel, the upper ends of the sidepieces of the ladders being attached to the rockers for supporting and tilting the slats; wherein the improvement comprises:

the sidepieces of the ladders being front and rear vertical cords; and

the rockers being rendered effective through an increased angle of movement by such vertical cords of the ladders extending across the tops of the rockers when the slats are untilted, the front vertical cords of the ladders extending to the rear of the rockers and being secured to the rear of the rockers, and the rear vertical cords of the ladders extending to the front of the rockers and being secured to the front

of the rockers; each rocker being drum-shaped and having front and rear holes in the cylindrical wall thereof, the holes extending radially to the interior of the rockers, the holes being off-center in opposite directions with respect to the axial length of the rocker; and the front and rear vertical cords of the associated ladder being secured to the rocker by elongated barbs which are attached to the ends of these cords and are inserted radially through said holes and then tipped to extend each barb lengthwise of the rocker in opposite directions from its associated hole.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,425,479 February 4, 1969

Hans K. Lorentzen et al.

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 46, after "stamping" insert -- having --. Column 8, line 2, "outer" should read -- other --; line 8, "longitudinal groove 135g which leads to the other end of" should read -- 35c the end of the hook 39a is close against the end of --.

Signed and sealed this 24th day of March 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents