Aug. 5, 1952 T. ARMSTRONG 2,605,825

WINDOW BLIND

Original Filed June 24, 1950 4 Sheets-Sheet 1

Fig_1

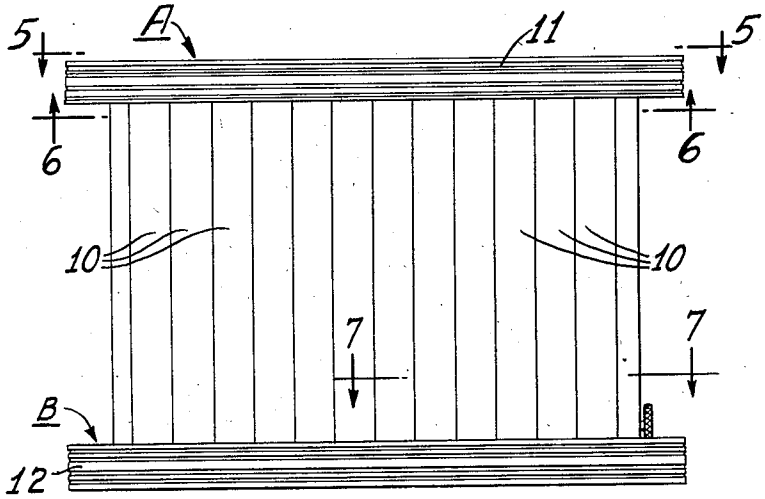
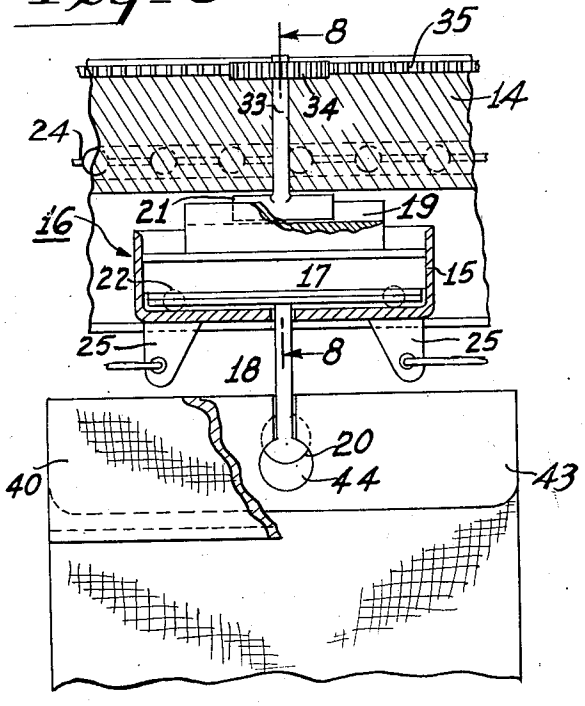


Fig_9



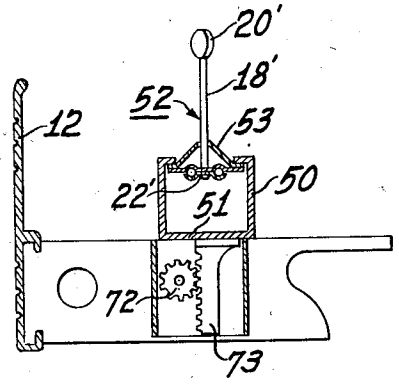


Fig_10

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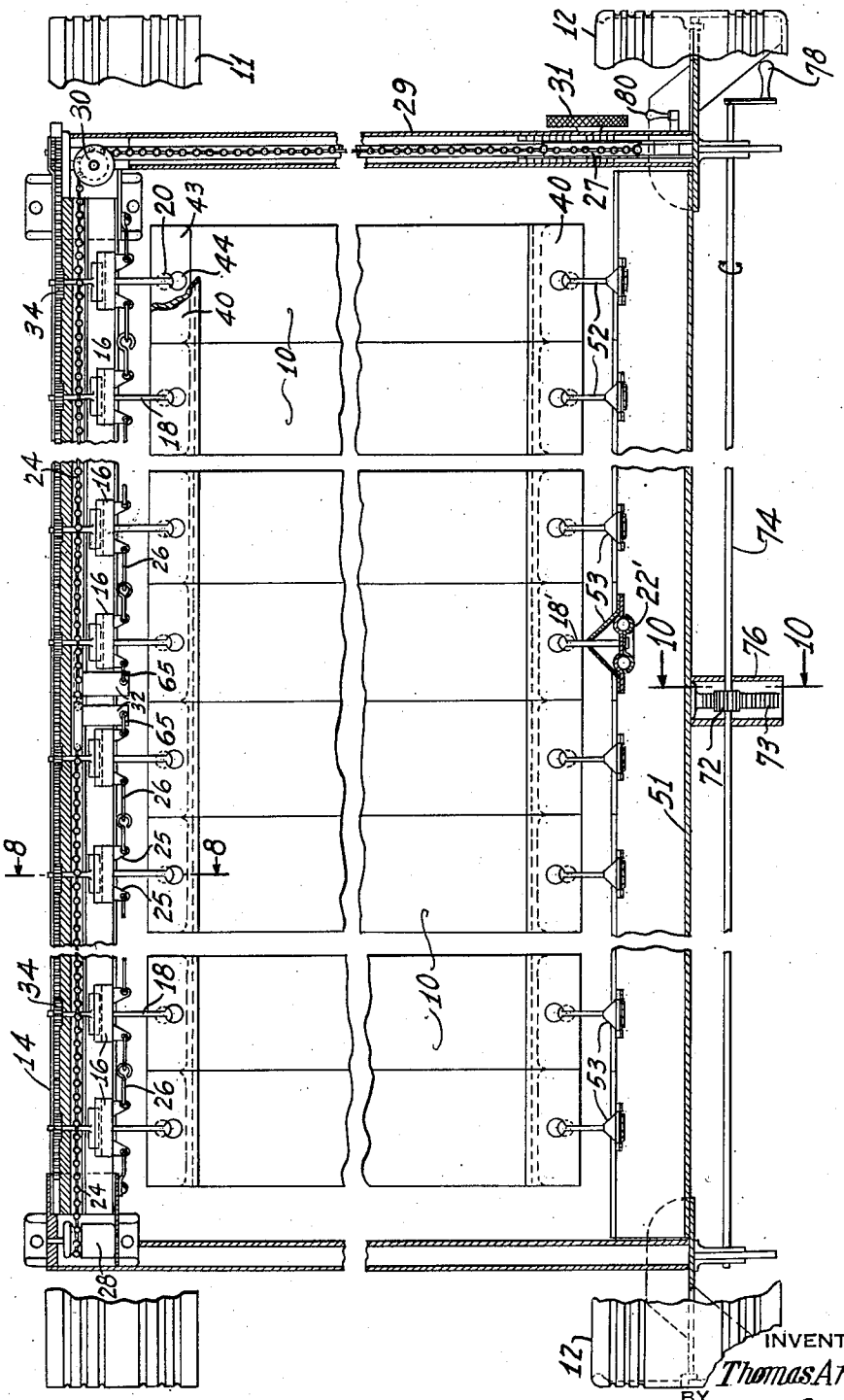


Fig. 2

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WINDOW BLIND

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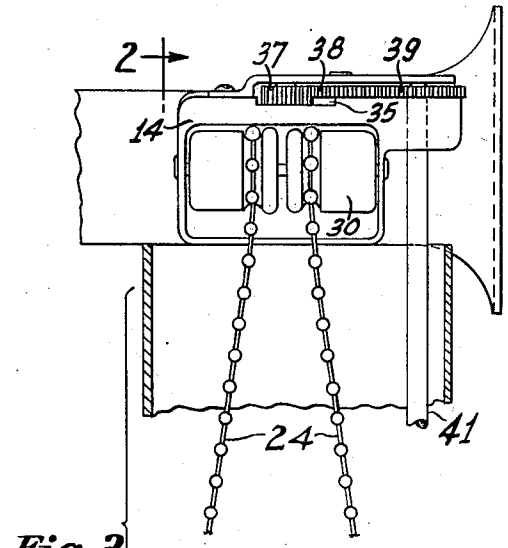
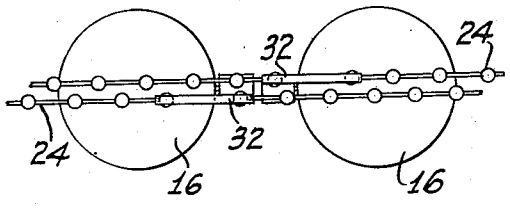
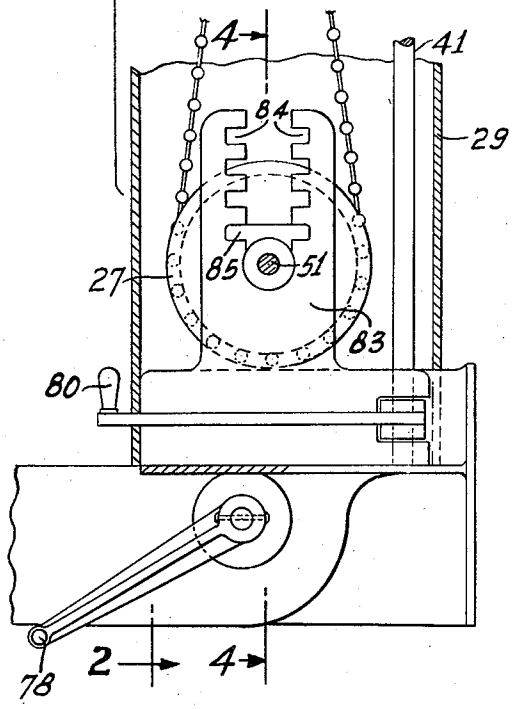


Fig_3

Fig_11





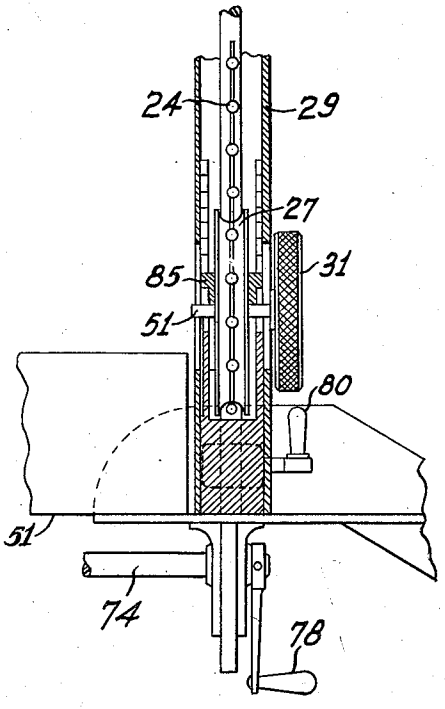


Fig_4

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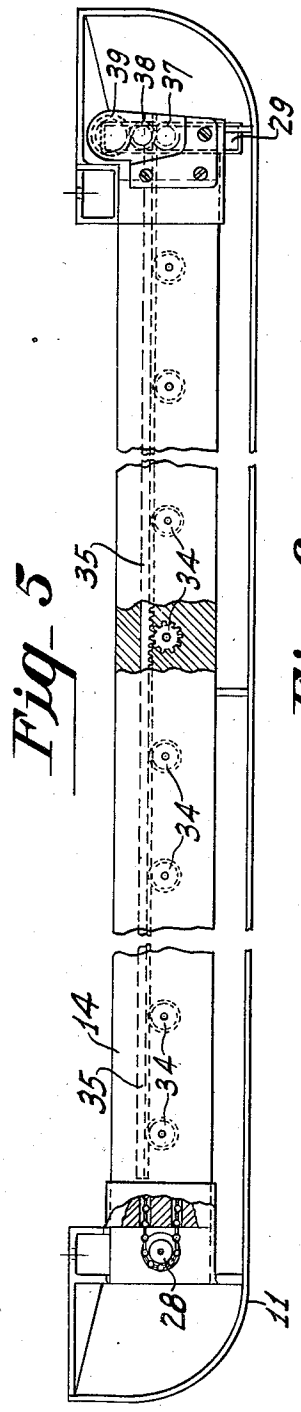


Fig. 5

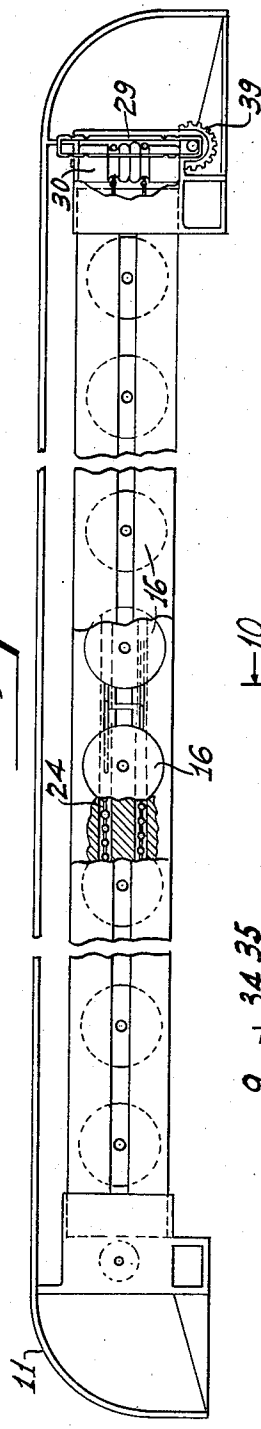


Fig. 6

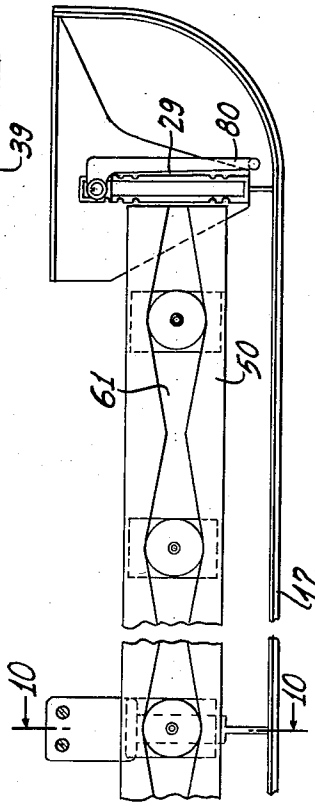


Fig. 7

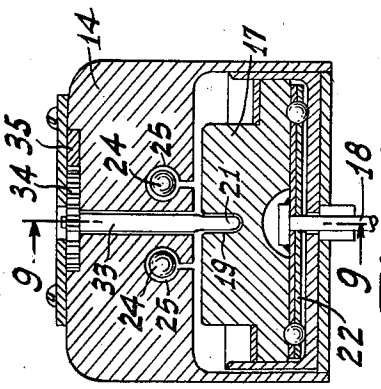


Fig. 8

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UNITED STATES PATENT OFFICE

2,605,825

WINDOW BLIND

Thomas Armstrong, Oakville, Ontario, Canada, assignor to Ruth Armstrong

Application June 24, 1950, Serial No. 170,064

13 Claims. (Cl. 160—172)

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This invention relates to light controlling screens of the window blind type, particularly to such screens having vertically arranged louvers or shutters, and is a continuation-in-part of my copending application Serial No. 159,696, filed May 3, 1950, to which reference is herein made for many common novel features.

An object of the invention is the provision of a novel, efficient and highly attractive screen construction of the foregoing type which may be conveniently disposed to variably intercept a window opening.

A further object is the provision of an improved window blind whose individual louvers are made up of lengths of fabric so suspended in guideways that they can be made to swing more or less freely for movement across the window opening, to thereby collapse the blind, or held taut to control the light and air without removing them from their position intercepting the window opening.

Briefly, the window blind of the invention comprises a series of vertically arranged louvers supported between upper and lower horizontally positioned channeled guideway assemblies. Each louver may consist of a length of cloth attached to the guideway assemblies by means of rigid but removable inserts in hems at both ends of the cloth. The louvers are pivotable by individual gears mounted at the upper end. These gears are simultaneously controlled by a horizontally movable rack mounted in the upper guideway assembly and engaging all the aforesaid gears. Each louver is rotatably mounted in the lower guideway assembly by means of a bearing construction. An adjustable lift rack in association with the lower guideway assembly in one position enables the louvers to be maintained taut, thereby permitting simultaneous tilting or pivotal movement of the louvers on their respective vertical axes, while in another position the lift rack enables the louvers to be suspended more or less freely, thereby permitting collapse of the blind, at the option of the operator. A bead chain passing through guide tubes and looped over pulleys, wheels or rollers positioned at both ends of the upper guideway assembly and fastened to the two centrally positioned louvers controls the collapse of the blind to both sides of the window. Half the number of louvers on one side of blind are link together at one end through collapsing links, while the other half of the louvers on the other side of the blind are also linked together through collapsing links.

A feature of the invention is the upper guideway assembly construction which controls the

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tilting or pivotal rotational movement of the louvers on their vertical axes. Each louver has individual thereto a cup-like container enclosing a slotted or channeled pivotable cap. Associated with each louver there is also provided an actuator or tilter element. The actuator or tilter element is provided at the lower end with a turn key which is adapted to rest in the slot of the pivotable cap, but in slidable relation thereto. The upper end of the actuator or tilter element is provided with an actuator gear. The actuator gear is responsive to movement of a common actuator rack (common to all actuator gears) for pivotally moving the actuator or tilter element. In order to link the upper end of the louver to the actuator or tilter element, there is provided a grip spindle having fixedly attached to the lower end a tab for coupling to the louver and at the upper end a roller bearing construction mounted within the cup but integral with the pivotable cap. At one end of the upper guideway assembly, there are provided three interlinking gears one of which is directly controlled by a lever located near the lower guideway assembly through the intermediary of a vertically positioned rod. The teeth of the common actuator rack engage one of these interlinking gears, as a result of which the common actuator rack moves longitudinally of the window blind in response to movement of this lever.

Another feature of the invention is the lower channeled guideway assembly which has a zigzag shaped centering or locating channel therein for properly centering the louvers when it is desired to simultaneously tilt the same on their respective vertical axes. This lower guideway assembly is movable in a vertical direction by a lift rack. A downward movement of the lower guideway assembly will center the louvers and maintain them taut, thereby permitting tilting of the louvers, provided the blind is not collapsed, while an upward movement of the lower guideway assembly will release the louvers from the taut condition and enable the blind to be collapsed.

A more detailed description of the invention follows, in conjunction with a drawing, wherein:

Fig. 1 is an elevation view of the window blind of the invention;

Fig. 2 is an elevation view of the window blind with the upper and lower face moldings, removed. This figure is also taken along line 2—2 of Fig. 3;

Fig. 3 is an end view of the right hand end of the blind shown in Fig. 2, with the outer portion of the channel removed;

Fig. 4 is a view in section of the bottom portion of Fig. 3 taken along line 4—4;

Fig. 5 is a view of the upper guideway assembly looking down and taken along line 5—5 of Fig. 1;

Fig. 6 is a view of the upper guideway assembly looking up and taken along line 6—6 of Fig. 1;

Fig. 7 is a view of a portion of the lower guideway assembly looking down and taken along line 7—7, of Fig. 1;

Fig. 8 is a view taken in section along the line 8—8 of Figs. 2 and 9;

Fig. 9 is a section of Fig. 8 taken along line 9—9;

Fig. 10 is a section view taken along line 10—10 of Fig. 2; and

Fig. 11 is a view looking down on two centrally located pivot cups in the upper guideway assembly, and shows the manner of connection of the bead chain thereto.

Throughout the figures of the drawing, the same parts are represented by the same numerals.

Referring to the drawings in more detail, the window blind of the invention comprises upper and lower horizontally positioned channeled guideway assemblies A and B respectively; concealed by face mouldings 11 and 12, for supporting and moving a series of vertically positioned louvers or shutters 10.

The louvers, in the closed position of the blind, abut each other at their adjacent edges as shown in Figs. 1 and 2. Each louver comprises a length of cloth and extends between a longitudinally shiftable cup-like carrier element 16 in the upper assembly and a pivotal grip spindle arrangement 52 in the lower assembly. The cloth louvers 10 are each provided at opposite ends with hems 40 through which are inserted folded-over metallic inserts 43. Note Fig. 9. These inserts 43 slide into the hems from the open ends thereof, and have holes 44 registering with correspondingly positioned holes in the hems. The upper end of the louver is supported from the shiftable cup-like carrier 16 by means of a tab 20 fastened to the pivotable grip spindle or shaft 18. The tab 20 projects into the hem and insert as shown in Figs. 2 and 9. The lower end of the louver is similarly secured to a grip spindle 52 in turn associated with the lower guideway assembly.

The upper guideway assembly includes a horizontally positioned channel 14 along the bottom of which is provided a longitudinally extending slotway. Note Figs. 8 and 9. Within channel 14 are mounted cup-like carrier elements 16 for causing the louvers to collapse, a bead chain 24 extending within guide tubes 25, pulley wheels or rollers 28 and 30 at opposite ends thereof and associated means for enabling movement of the louvers.

The shiftable cup-like carrier elements 16 are shown in detail in Figs. 2, 8 and 9, and each comprises a slidable cup housing 15 mounted in the upper slotted channeled guideway 14. The housing 15 of the cup-like carrier 16 contains therein a pivotable cap 17 which is supported by bearing 22. Integral with the pivotal cap 17 is the grip spindle 18 which terminates in the tab or eye 20 for supporting a louver 10. The bearing 22 is of a type well known in the art and includes the usual pivot cap, pivot roller bearing balls and ball locator plates. Each pivotal cap has integral therewith a channel or slot 19 in which the turn key 21 of the actuator or tilter element is adapted to rest. When the blind is being collapsed, longitudinal movement of the carrier 16 causes the cap to travel off the turn key 21. The carrier 16 is provided with a pair of hooks 25 at the bottom thereof to which are fastened collapsible or flexible links 26 for coupling to the adjacent carriers. In this way the carriers (and also the louvers) are successively linked one to another. The two centrally located carriers, however, are each provided with a collapsible link 26 on one side and a fixed link 65 on the other side. The fixed links 65 couple the central two carriers to shiftable anchoring or locator blocks 32. Note Fig. 2. It will thus be seen that longitudinal movement of any one louver 10, such as the central louver, caused by movement of an anchoring element 32, will cause movement in the corresponding direction of the other louvers 10, provided of course, the cup-like carriers are properly positioned to enable them to travel off the turn keys 21, and the lower ends of the louvers are free to move in the lower guideway assembly.

For transmitting longitudinal movement to the louvers 10, there is provided the bead or ball chain 24 which loops over the pulley wheels or rollers 28 and 30 at opposite ends of the slotted channel guideway 14 and also loops over the ball chain sprocket 27 at the right hand end of the window blind. Note Figs. 2 and 3. The bead chain at the right hand end of the window blind extends in a vertical direction and is normally concealed by a channel 29. The sprocket 27 is driven by an operating crank or knurled knob 31. Note Fig. 4. Obviously, the knob 31 can be replaced by a lever. The pulley wheel 28 has a vertical axis and is provided with a single groove, while pulley wheel 30 has a horizontal axis and is provided with two grooves over which the bead chain is looped. Note Figs. 2, 3 and 6. One end of the bead chain is fastened to one shiftable anchoring or locating block 32, while the other end of the bead chain is fastened to the other shiftable anchoring or locating block 32. The manner of fastening the bead chains to the shiftable anchoring or locating blocks is shown in Fig. 11.

The turn key 21 which rests in the slot 19 of each pivot cap forms an integral part of an actuator or tilter element for pivotally moving a louver 10. The actuator or tilter element (there is one for each louver) comprises a shaft 33 one end of which is secured to an actuator gear 34 and the other end of which is integral with the turn key 21. The actuator gears 34 of all actuator or tilter elements engage a common actuator rack 35, in turn, movable longitudinally in response to movement of the gears 37, 38 and 39 positioned at the right hand end of the window blind.

Gears 37, 38 and 39 are of progressively increasing diameter. The common actuator rack 35 meshes solely with gear 37. Note Fig. 3. Gear 39 is controlled by a shaft or rod 41 which, in turn, is controlled by a tilter lever 80. Thus, movement of lever 80 will simultaneously control movement of all actuator or tilter elements through the intermediary of gears 39, 38, 37, common actuating rack 35 and the individual actuator gears 34. The actuator gears 34 control the tilting or pivotal rotational movement of the louvers 10 on their vertical axes.

The lower guideway assembly B includes a horizontally positioned guideway 50 having a longitudinally extending zig-zag shaped slotway 61. Slotway 61 of the lower channeled guideway 50 faces upward. The base of the lower guide-

way 50 is solid, as at 51. Note Figs. 2, 7, and 10. The zig-zag shaped slotway 61 forms a centering or locating channel for the pivotal grip spindle arrangement 52. There are as many grip spindles 52 as there are louvers 10, and each such grip spindle 52 comprises a conical housing 53 through which passes a spindle 18'. The spindle 18' terminates at one end in a tab 20' and at its other end in a bearing 22'. Tab 20' is angularly positioned relative to spindle 18', as shown, to obtain a wide range of tilting or pivotal movement of the louver. A similar tab construction is preferably used for the tabs 20 in the upper guideway assembly. The conical shape of housing 53 enables the grip spindle 52 to slide along the tapering sides of the slideway for exact centering as shown in Figs. 2 and 7, whenever the blind is in the uncollapsed condition and it is desired to maintain the louvers taut for tilting thereof. In this taut condition, any desired tilting or pivotal movement (over a range of 180°) can be fulfilled.

The louvers are enabled to collapse and move to both sides of the window blind (in response to movement of the knurled knob 31) only when the turn keys 21 of the actuator or tilter elements are parallel to the sides of the channels or slots 19 of the pivot cap 17. In this condition, the slots 19 of the different caps 17 are aligned in a straight line. To achieve this condition of collapsing the blind, the louvers 10 and also the lower grip spindle arrangements 52 must be free to move longitudinally in the slotway 61. To enable the louvers to be held taut or freely movable for collapsing, there is provided a lift pinion 72 under control of a torsion shaft 74, in turn, controlled by movement of a lever 78. The two directions of rotational movement of the torsion shaft 74 are shown by the curved bidirectional arrow in Fig. 2. The liit pinion or gear 72 is mounted in a suitable housing 76 and engages a lift rack 73, in turn, secured to the bottom 51 of the lower channeled guideway 50. Note Figs. 2 and 10. Hence, any movement of lever 78 will move the entire lower channeled guideway 50 together with its grip spindles 52 in a vertical direction, up or down as the case may be, at the option of the operator.

An inspection of the right hand view of the window blind, Fig. 3, and the sectional view of Fig. 4, will reveal the presence of an adjusting bracket 83 having a plurality of teeth 84 for enabling the bead chain 24 to have the proper degree of tightness. A removable plug 85 which fits into any desired tooth of the adjusting bracket 83 serves to hold the shaft 51 of the ball chain sprocket 27 in the desired position on the adjusting bracket.

The window blind can be affixed to a window frame at the top and bottom guideway assemblies by suitable head end brackets such as shown in Figs. 3, 5, 6, 7 and 10.

In the operation of the window blind of the invention, let it be assumed that the louvers are in the position shown in Figs. 1, 2 and 7, in which condition, the grip spindles 52 are properly positioned in the slotway 61. With the lever 78 turned in a clockwise direction, the lift gear 72 will exert downward pressure on the lower guideway assembly and on the various louvers 10. The louvers will be held taut, and movement of the common actuator rack 35 via the lever 80 will provide any desired degree of tilt or pivotal movement for all of the louvers, simultaneously. In order to collapse the window blind, the lever 78 is turned in a counter-clockwise direction, thereby causing the lift gear 72 to raise the lower guideway assembly and relieve all pressure on the grip spindles 52 and hence on the louvers. The pivot caps 17 of the different carriers 16 may then slide off the turn keys 21 of the actuator or tilter elements of the upper guideway assembly provided the slots 19 are aligned in the same straight line. Movement of the knurled knob 31 will impart motion to the bead chain 24. The two central louvers, because of their coupling to the anchoring or locator blocks 32, will move in opposite directions and carry with them the other louvers. As previously mentioned, the locator blocks are connected to the louver carriers 16 through the collapsible links 26. Movement of the knob 31 in one direction will collapse or open the blind, while movement of the knob 31 in an opposite direction will close the blind.

Among the many advantages of the invention are: The louvers are each individually and easily attached to the supporting and actuating mechanism by a simple movement, without interfering with the other louvers, thereby permitting individual exchange or replacement thereof; the vertical position of the louvers collects less dust then horizontally positioned louvers, and facilitates thorough cleansing when required; the use of actuators in the upper guideway assembly controlled by a lever near the lower guideway assembly provides an improved construction; the angular position of the tab of the grip device enables a positive control of the louvers and a wide range of tilting or pivotal movement of the louvers; and the window blind provides an extremely attractive appearance. Both sides of the louvers can be differently colored, thereby providing a choice of colors on opposite sides of the blind.

What is claimed is:

1. A window blind comprising upper and lower horizontally positioned channeled guideways adapted to be mounted across a building opening to be served by the blind, said blind having vertically arranged louvers positioned between said guideways and turnable about their vertical axes, means in said upper channeled guideway for pivotally moving said louvers, said means including an actuating gear for each louver, a common longitudinally movable rack engaging the actuating gears of said louvers, and a pivotal cap between each actuating gear and its associated louver, each said cap having a horizontally positioned slot therein, each said gear having secured to its shaft a turn key adapted to rest in the slot of its associated pivotal cap, whereby alignment of said slots in said pivotal caps enables movement over said turn keys and collapse of said blind.

2. A window blind comprising upper and lower horizontally positioned channeled guideways adapted to be mounted across a building opening to be served by the blind, said blind having vertically arranged louvers positioned between said guideways and turnable about their vertical axes, means in said upper channeled guideway for pivotally moving said louvers, said means including a horizontally positioned actuating gear for each louver, a horizontally extending rack engaging all of said actuating gears, an actuator element individual to each louver and controlled by the associated actuating gear thereof, and a pivoting device linking the upper end of each louver with its associated actuator element, collapsible links between adjacent louvers, and an endless chain horizontally positioned within said upper guideway and secured to certain ones of said louvers

for collapsing said vertical louvers in a horizontal direction across the width of said blind.

3. A window blind comprising upper and lower horizontally positioned channeled guideways adapted to be mounted across a building opening to be served by the blind, said blind having vertically arranged louvers positioned between and turnable about their vertical axes, means in said upper channeled guideway for pivotally moving said louvers, said means including a horizontally positioned actuating gear for each louver, a horizontally extending rack engaging all of said actuating gears, an actuator element individual to each louver and controlled by the associated actuating gear thereof, a pivoting device linking the upper end of each louver with its associated actuator element, said lower channeled guideway having a longitudinal slot therein along the length thereof across the width of said blind, a pivoting device individual to the lower end of each louver and passing through said slot, collapsible links between adjacent louvers, and movable means secured to said louvers for imparting horizontal motion to said louvers in the direction of the width of said blind, to thereby cause said louvers to travel along said longitudinal slot for collapsing or closing said blind.

4. A window blind in accordance with claim 3, characterized in this, that said slot is zig-zag in shape, and the pivoting devices for the lower ends of said louvers have conical housings, whereby said housings can rest in the spaced wide portions of said slot.

5. A window blind as defined in claim 3, wherein said slot has converging and diverging sides, the pivoting devices for the lower ends of said louvers have conical housings, and a lift element for raising or lowering said lower channeled guideway without raising or lowering said upper guideway, to thereby variably control the tension on said louvers as a single unit.

6. A window blind comprising upper and lower horizontally positioned channeled guideways adapted to be mounted across a building opening to be served by the blind, said blind having vertically arranged louvers positioned between said guideways and turnable about their vertical axes, means in said upper channeled guideway for pivotally moving said louvers, said means including an actuating gear for each louver and and a common rack enaging the actuating gears of said louvers, and a lift gear engaging said lower channeled guideway for raising and lowering the same without raising or lowering the upper guideway, to thereby variably control the tension on said louvers as a single unit.

7. A window blind comprising upper and lower horizontally positioned channeled guideways adapted to be mounted across a building opening to be served by the blind, said blind having vertically arranged louvers turnable about their vertical axes, means in said upper channeled guideway for pivotally moving said louvers, said means including an actuating gear for the upper end of each louver and a control element engaging all of said actuating gears, a horizontally slidable carrier element between the upper end of each louver and its associated actuating gear, and means for pivotally mounting the other ends of said louvers in said lower channeled guideway, collapsible links between adjacent louvers, and an endless chain secured to certain ones of said louvers for collapsing said louvers across the width of said blind.

8. A window blind comprising upper and lower horizontally positioned channeled guideways adapted to be mounted across a building opening to be served by the blind, said blind having vertically arranged louvers positioned between said guideways and turnable about their vertical axes, means in said upper channeled guideway for pivotally moving said louvers, said means including an actuating gear for the upper end of each louver and a control element engaging all of said actuating gears, and means for pivotally mounting the lower ends of said louvers in said lower channeled guideway, said last means including a thrust bearing for each louver mounted in said lower channeled guideway, means for variably applying tension to all of said louvers as a single unit, and means linked to said louvers and effective when said tension is released for collapsing said louvers across the width of said blind.

9. A window blind comprising upper and lower horizontally positioned channeled guideways adapted to be mounted across a building opening to be served by the blind, said blind having vertically arranged louvers positioned between said guideways and turnable about their vertical axes, means in said upper channeled guideway for pivotally moving said louvers, said means including an actuating gear for the upper end of each louver and a control element engaging all of said actuating gears, and a series of gears at one side of said upper channeled guideway for controlling the longitudinal movement of said control element, and means for pivotally mounting the lower ends of said louvers in said lower channeled guideway, said last means including a thrust bearing for each louver mounted in said lower channeled guideway, and a lift gear engaging solely the lower guideway for raising and lowering the same without moving the upper guideway, thereby to variably control the tension on said louvers as a unit.

10. In a window blind having vertically arranged louvers which are pivotal about their vertical axes, means for pivoting said louvers, said means comprising an actuator element coupled to one end of each louver through a linking device, said actuator element having a gear, a shaft therefor and a turn key at one end thereof, said linking device being pivotal and having a channel for accommodating said turn key, said linking device being provided at its lower part with means for supporting a louver.

11. In a window blind having vertically arranged louvers which are pivotal about their vertical axes, means for maintaining said louvers either taut or limp at the option of the operator, said means including a channeled guideway having a zig-zag shaped slot extending longitudinally over the length of said guideway, individual pivoting devices having conical housings resting in said slot and linking one end of said louvers to said guideway through said slot, said conical housings being larger than the transverse dimension of said slot, and means for raising or lowering said channeled guideway together with said conical housings whereby any desired degree of tension can be simultaneously applied to all of said louvers.

12. In a window blind having vertically arranged louvers which are pivotal about their vertical axes, means for maintaining said louvers either taut or limp at the option of the operator, said means including a channeled guideway having a longitudinally extending slot with regularly recurring diverging and converging sides,

individual pivotal grip elements linking one end of said louvers to said guideway through said slot and resting therein, said grip elements each having a conical housing within and larger than the transverse dimension of said slot, and a lift gear secured to said channeled guideway for raising and lowering the same together with said conical housings, whereby a desired degree of tension can be simultaneously applied to all of said louvers.

13. A window blind as defined in claim 9, including a torsion shaft on the same side of said blind as said series of gears for turning one of said gears.

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