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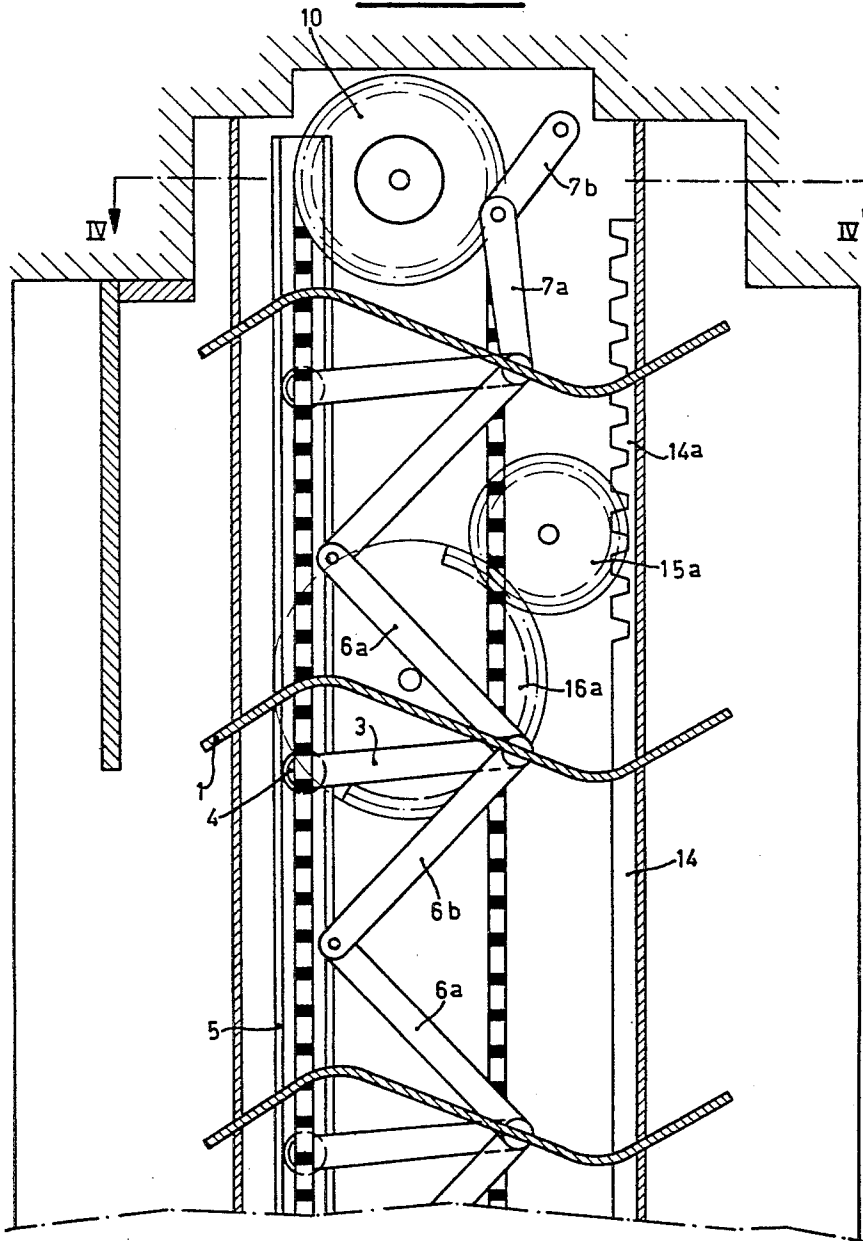
J. CHEVAUX
BLIND AND MEANS FOR CONTROLLING THE ROCKING OR TIPPING
OF THE SLATS THEREOF

3,473,597

Filed April 22, 1966

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FIG. 1



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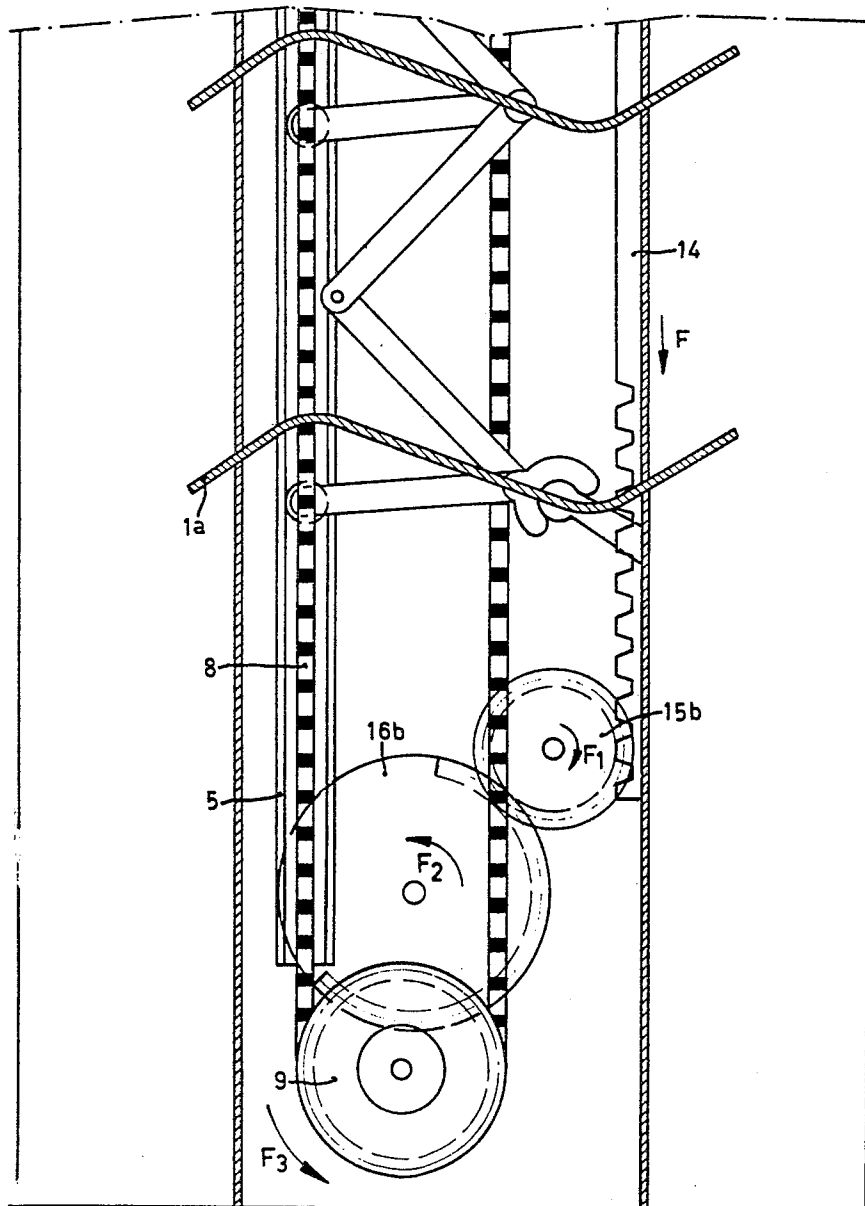
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FIG. 2



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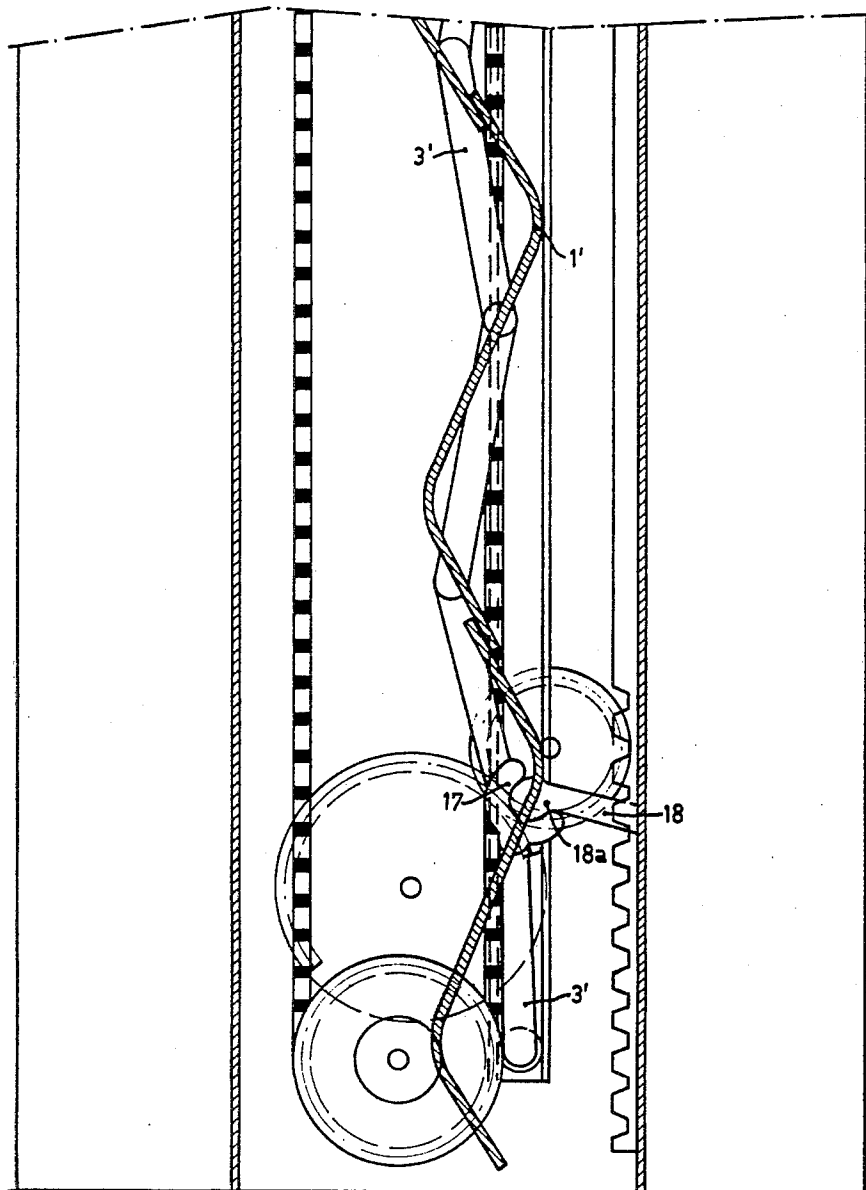
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FIG. 3



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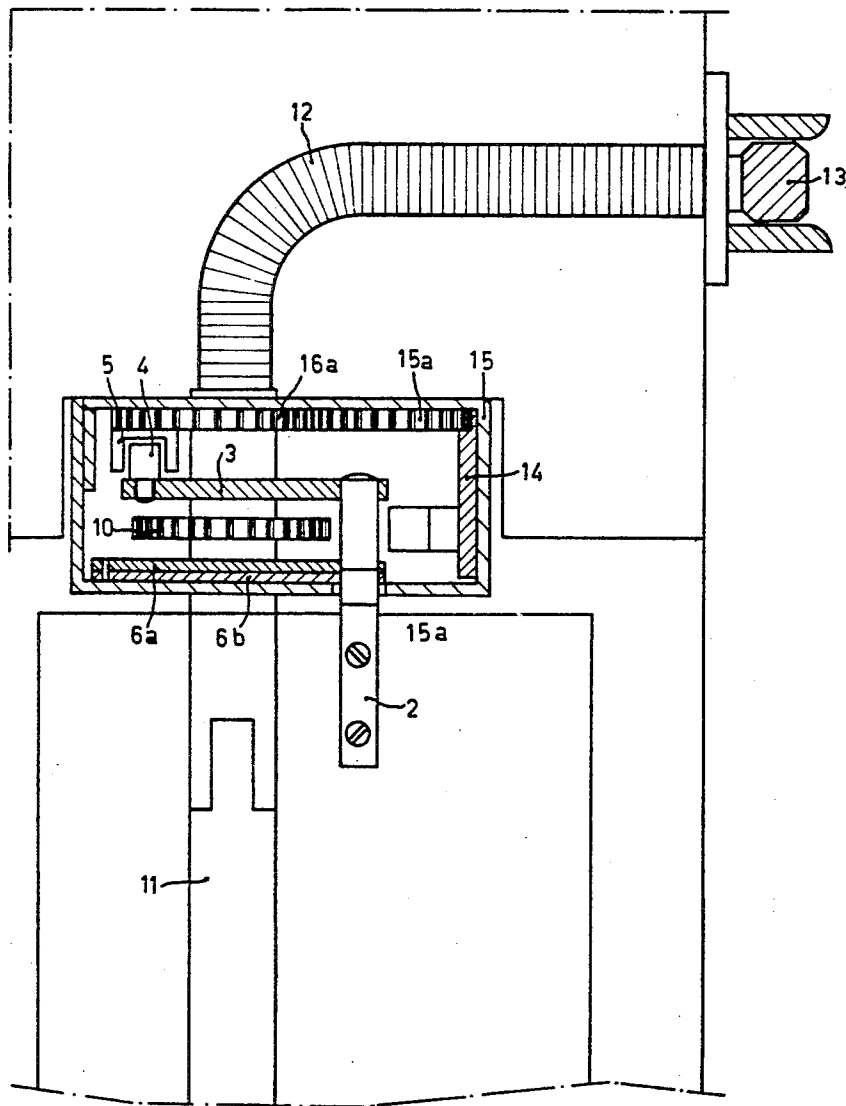
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FIG. 4



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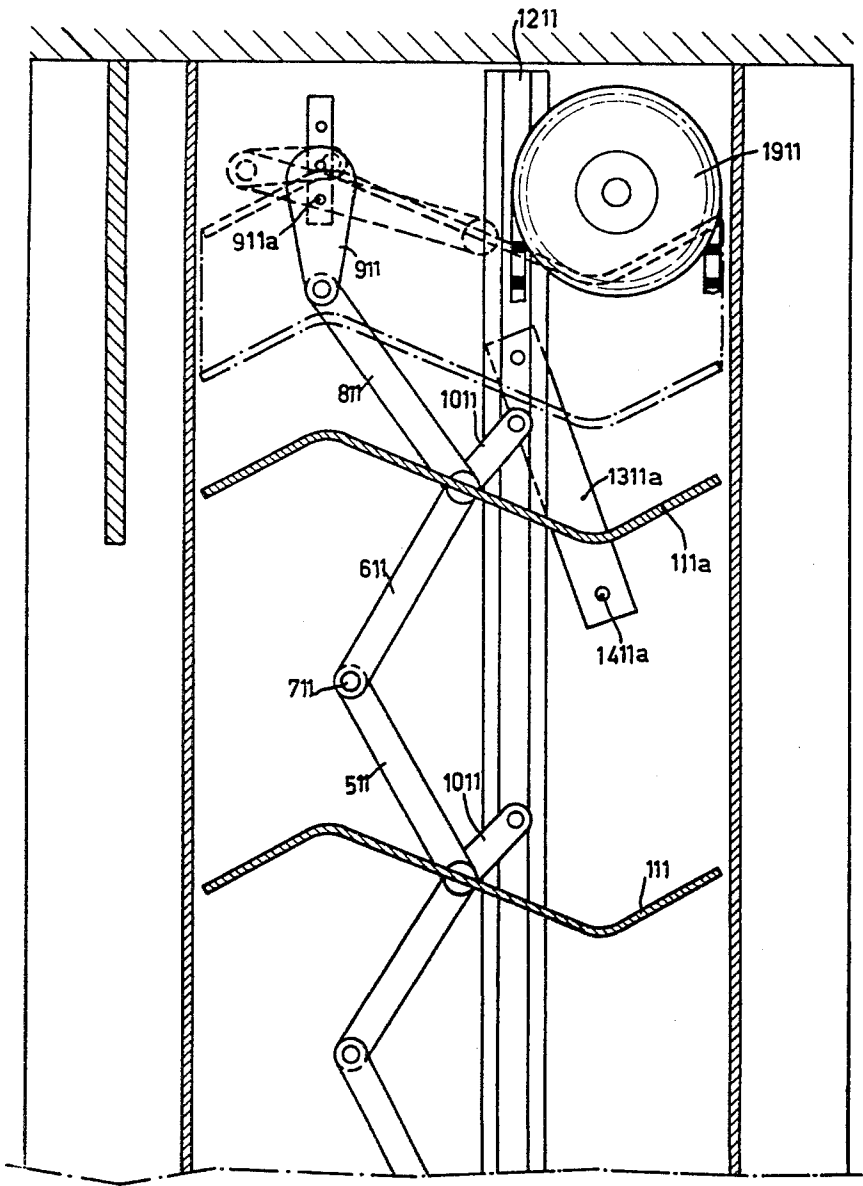
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FIG. 5



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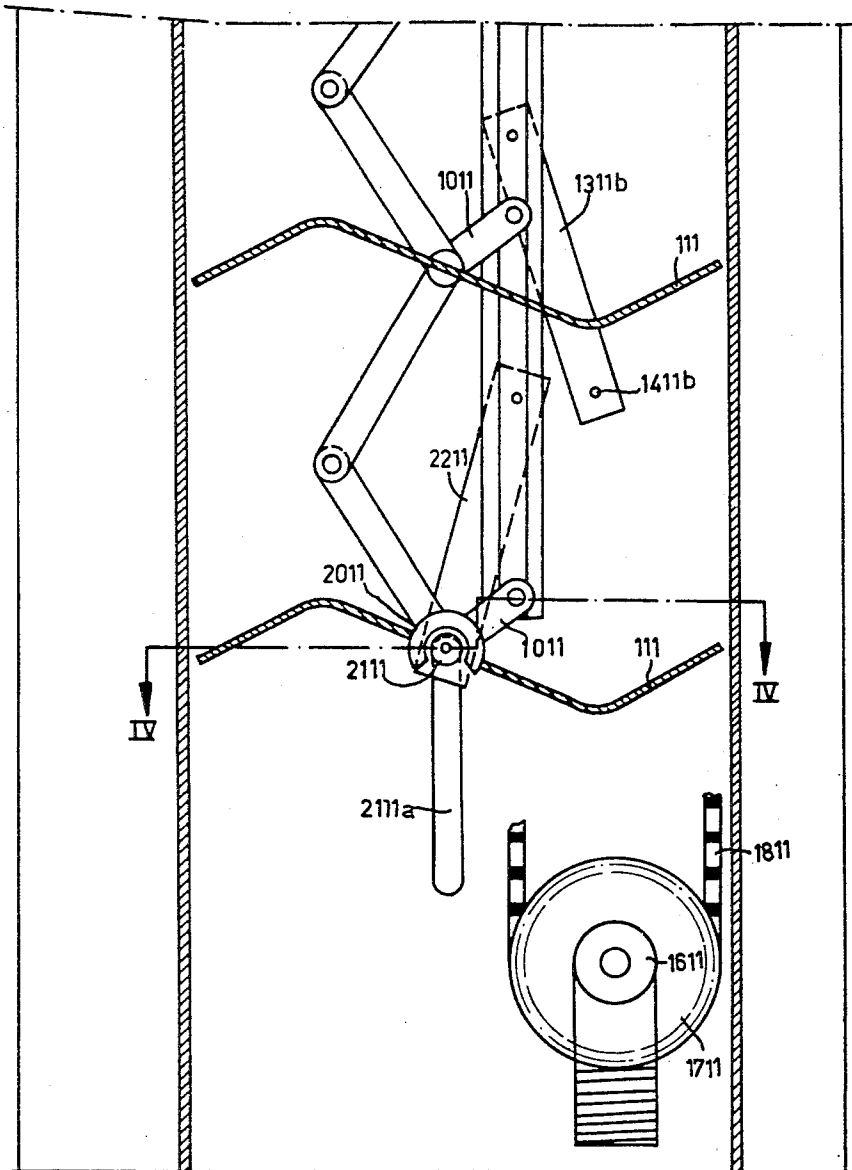
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FIG. 6



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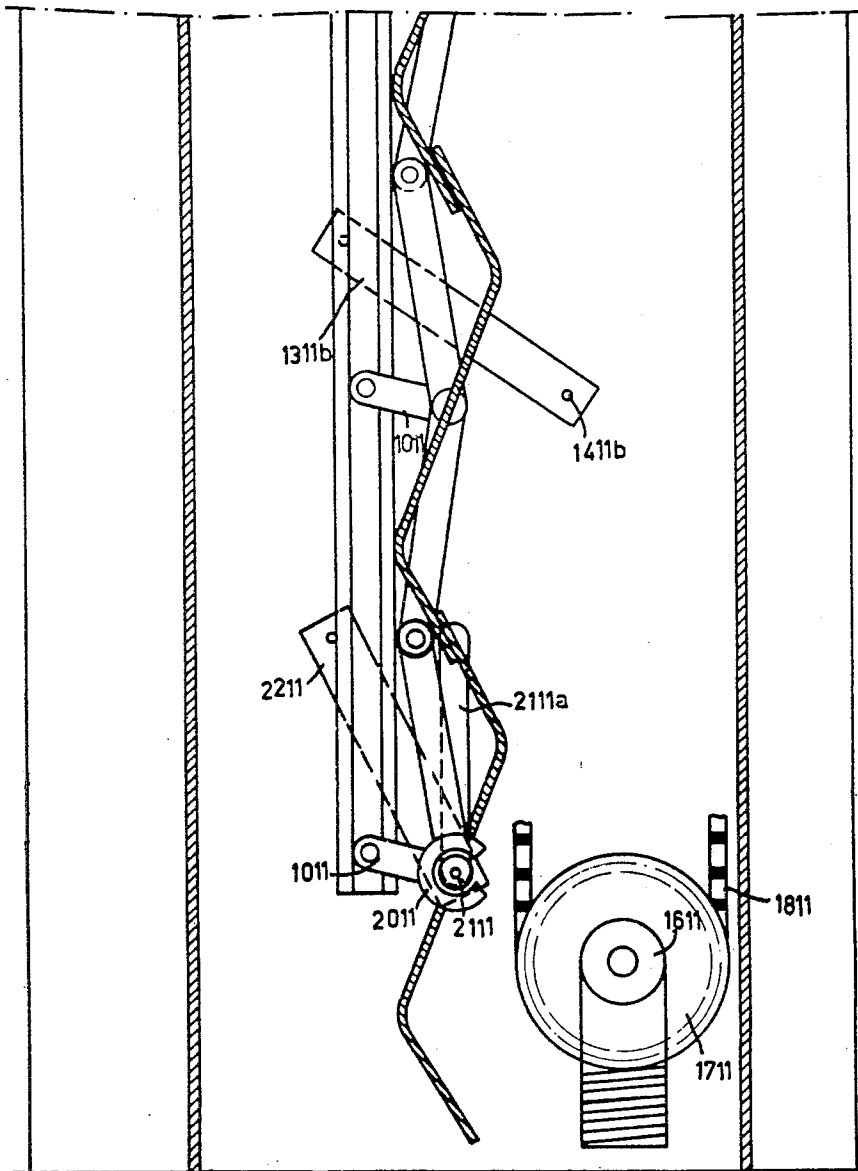
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FIG. 7



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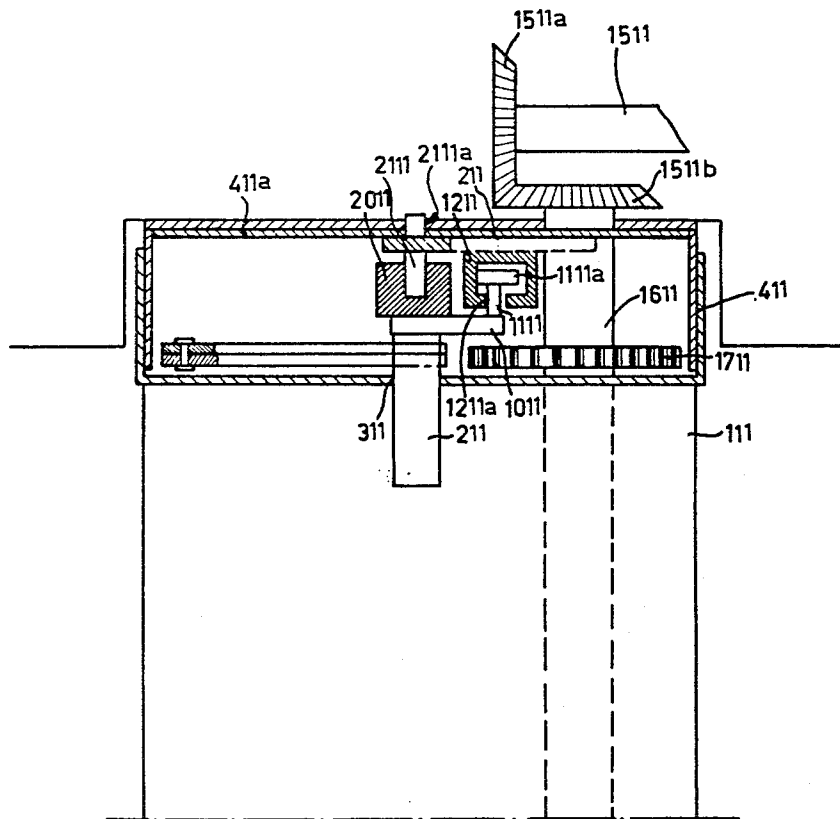
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FIG. 8



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BLIND AND MEANS FOR CONTROLLING THE ROCKING OR TIPPING OF THE SLATS THEREOF

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Int. Cl. E06b 3/02, 9/32

U.S. Cl. 160—172

13 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure concerns a window blind which has a plurality of rockable slats which form a stack at the upper part of the window when the blind is raised, a drive mechanism connects the slats for moving them in a vertical direction, a control device connected to the slats for controlling the rocking of the slats and a casing disposed on both sides of the window adjacent the ends of the slats which casings encase the drive mechanism and the control device.

The present invention relates to a blind and to means for controlling the rocking or tipping of the slats thereof. One of the objects of the present invention is a blind having a series of tipping slats each articulated on at least one element linking it with the adjoining slats, at least one actuating chain for the blind forming a loop strung along the trajectory followed by said slats between at least two return gears at least one of which is a motor gear, at least the lower slat of said series being rigid with the chain, and means controlling the tipping of the slats when the blind is on the way to be completely lowered.

The claimed blind is further characterised by the fact that said means comprise at least one vertical slide disposed near one of the extremities of the slats, on the side of their connecting axis, and with which cooperates a block at least a part of whose surface is cut so as to form at least one rack, at least one rod disposed parallel to the slide but on the other side of said axis, with which mesh in a linking way the extremities of a series of levers each rigid with one of the slats, at least one stop rigid with the block, at least one pusher rigid with the chain and adapted to act on said stop organ in order to drive the block during at least a part of the run of the chain, at least one gear meshing with the rack of the block and at least one device transforming all angular movement of the wheel in a translation movement of the rod parallel to the slide, such that said levers tip and drive with them the slats of the blind.

Another object of the present invention consists in an improved device for controlling the tipping of the slats of a blind comprising at least one control bar extending along a plane perpendicular to the tipping axis of the slats and in a groove of which is slidingly mounted the free end of a series of levers each associated with a given

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slat, means permitting to move said bar parallel to itself to angularly drive these levers in order to tip the blinds of the blind, the means controlling the tipping only when the lower end of the blind is moved during the lowering or the raising of the same in a zone immediately adjacent the lower part of the window provided with the blind.

Broadly stated, the invention resides in a window blind for closing a blind which blind comprises a plurality of rockable slats, said slats forming a stack at the upper part of the window in the raised position of the blind, a drive mechanism connected to the slats for moving them in a vertical direction, a control device connected to the slats and adapted to control the rocking of the slats, two casings, one casing being disposed at one side part of the window adjacent to one end of the slats, and the other casing being disposed at the other side part of the window adjacent to the other end of the slats with the two casings encasing the drive mechanism and the control device.

The annexed drawing represents by way of example embodiments of the objects of the present invention in which:

FIGURE 1 is a vertical cross-section of the upper part of a blind in accord with the invention;

FIGURES 2 and 3 are views similar to that of FIGURE 1 but of the lower part of the blind in two different positions of the slats;

FIGURE 4 is a cross-sectional view taken along lines IV—IV of FIGURE 1;

FIGURE 5 shows a modification of the blind of FIGURE 1;

FIGURE 6 is a view similar to FIGURE 5 for the lower part of the blind, the slats being in a horizontal position;

FIGURE 7 is a view similar to FIGURE 6 in which the slats are in their turned down position;

FIGURE 8 is a cross-sectional view along line VI—VI of FIGURE 6.

The blind shown in FIGURES 1—4 comprises a series of slats 1 at each end of which is secured a rod 2 (FIGURE 4) bearing a lever 3 which carries a roller 4 slidable in channel 5 for example made of plastic material, the use of which will become evident hereinbelow and which is formed by a vertical piece having a cross-section in the form of a U.

FIGURE 1 shows links or levers 6a secured to the rod 2 of the lower slat at one end and to lever 6b at the other, lever 6b being connected to the rod of the next adjacent upper slat.

The first slat of the assembly is suspended to the upper ledge of the window to be equipped with the blind by means of two articulated tie rods 7a and 7b, tie rods 7a being articulated on the rod 2 of this slat.

The scissors arrangement of levers 6a and 6b makes it possible to vary the distance between each slat, the scissors being completely open as shown in FIGURE 3, when the slats are at their maximum separation, or being on the contrary entirely closed when the slats of the blind are piled up at the upper part of the assembly, when the blind is completely opened.

The lower slat 1a is connected at each extremity thereof with chains 8 forming two loops disposed each along

one of the edges of the blind and which are stretched between two gears 9 and 10 (FIGURE 4), gear 9 being pivoted in the window casing and the two gears 9, 10 being keyed on the same pivoting shaft 11 linked by flexible arm 12 to a control device 13 permitting the user to rotate this shaft and consequently to raise or lower the blind.

It is evident that all rotation of chains 8 in one direction or the other is translated by a movement of the lower slat in a direction corresponding to the right-hand segment of the loop formed by each of the chains. When the blind is raised, all the slats rest in a stack on the lower slat and will go down with this slat as the same goes down, the movement of the slats being successively interrupted as soon as levers 6a and 6b which link them to the slat immediately above take the opened position visible on FIGURE 3. When on the contrary, the blind is entirely lowered, and the device 13 is actuated in the direction tending to raise them, it is first the lower slat which moves upwards, this slat taking with it the following slat as soon as levers 6a and 6b are entirely folded and this slat will be in contact with the other.

Generally speaking, it is always the slat below a given slat which controls the movement of the latter toward the upper slat.

The slats can also be tipped in the position shown on FIGURE 3 in particular when the blind is on the way to be closed.

To this effect, the blind comprises two vertical members 14 disposed on both sides of the blind in a slide formed by a part of a housing 15 in which are enclosed levers 3, channel 5, gears 9 and 10 and the pair of levers 6a, 6b and the wall of which is cut by a vertical slot 15a permitting the passage of the axes 2 of the slats.

At the two ends of each sliding member 14 is cut a rack 14a and 14b, meshing with a pinion 15' and 15'' respectively pivoted on a shaft and secured to the wall parallel to shaft 11. Pinions 15' and 15'' are in turn enmeshed with the teeth of a plate 16a and 16b respectively to which is secured in articulated fashion, the channel 5 previously mentioned.

For this arrangement, all movement of sliding member 14 in the direction F (FIGURE 2) is translated into a rotation in direction F1 for pinions 15' and 15'' and by an angular movement in the direction F2 for the plates 16a and 16b which drive rod 5 in a translational movement in direction F3.

If plates 16a and 16b are subjected to an angular displacement of 180°, the new position occupied by channel 5 after this movement is as shown on FIGURE 3. The translational movement of the rod provokes an angular movement of levers 3 which occupy at the end of their movement the position shown by reference character 3' on the same figure, movement which it will be understood occasions a corresponding tipping of slats 1 to position 1'.

All movement in the opposite direction on the part of plates 16a and 16b, that is of sliding rack member 14, lead automatically to the raising of the slats into the position shown on FIGURE 2.

The movement of sliding member 14 is possible in the blind as a result of the contact of pusher 17 associated with lever 3 of the lower slat when the blind is on the way to attaining its lowest position, with a stop 18 secured to the sliding member.

As shown, pusher 17 has a semi-annular form and meshes through its opening with a ball and socket joint, the ball of which has a diameter corresponding to the opening and which is fixed on stop 18. From the moment when the pusher meets this stop and that, consequently, sliding member 14 moves in the direction F, the pusher tips around the ball 18a in a counter clockwise direction to take the final position shown on FIGURE 3 when the slats of the blind are entirely lowered.

This angular movement of pusher 17 is necessary in order that the same can permit the upward movement

of stop 18 when it is desired to bring the slats back to a horizontal position.

Additionally, in order to regulate the tension of the chain, it is helpful to mount gears 9 on adjustable arms not shown. These arms can be secured elastically.

The arrangement of the slats ensures a better protection against wind and bad weather.

In FIGURES 5 to 8 is shown an improved device for controlling the tipping of the slats. For this purpose the blinds have been shown as consisting of a series of slats 11 having at each end a rod 211 (FIGURE 8) slidably mounted in a slot 311 cut vertically in a housing 411 disposed along each of the vertical walls of the opening that this blind must close.

These slats are linked to one another by pairs of levers 511 and 611 mounted in each housing 411 and articulated among one another at 711 as well as around the rods 211 of the slats. This series of levers 511 and 611 is suspended to the upper part of housing 411 by a tie rod 811 and a handle 911 joined at 911a. In FIGURE 5 can be seen the position occupied by the handle and the tie rod when the blind is lowered (drawing in full lines) and when it is raised (drawing in mixed lines) the different slats 111 piling up one on the other to form a bundle the upper and lower slats of which have been shown in dotted lines on FIGURE 5. On each rod 211 of the slats is secured a lever 1011 having a rivet 1111 and mounted by a head 1111a by means of which each lever 1011 is connected with a tubular bar 1211 having a squared section and cut by a slot 1211a in which is freely engaged the rivet 1111. This rivet and its head 1111a are smaller than slot 1211a and the opening of bar 1211, respectively, so it is possible to transversely move the bar without obstacle from levers 1011.

Bar 1211 is vertical and extends practically along the entire length of the blind, when the same is lowered it is secured in articulated fashion to two arms 1311a (FIGURE 5 and 1311b (FIGURE 6) articulated in turn to housing 411 at 1411a and 1411b. These levers can then be tipped over in order to be brought to an angular position corresponding to that visible on FIGURES 5 and 6 and into another position shown on FIGURE 7. It is this movement of arm 2111a and 1311b which moves bar 1211 and tips levers 1011 associated to the various slats from its position visible on FIGURES 5 and 6 to that shown on FIGURE 7. Tipping to which corresponds a similar movement of slats 111 which are then in their lowered position.

Control of the ascending or descending movements of the blind and of the tipping of the slats is effected by turning a shaft 1511 to which is associated a pinion 1511a meshing with a gear 1511b keyed on a shaft 1611 parallel to the different slats 111. On this shaft are mounted two gears 1711, one in the first housing 411 shown on FIGURE 8, and the other in the second not shown in the drawing, each gear 1711 meshing with a chain 1811 with which meshes a gear 1911 positioned in the lower part of each casing 411. The lower slat of the blind is moved by chain 1811 and it is this slat which controls the movements of the ones above.

On each of the shafts 211 of the lower slat is secured a pusher 2011 having the form of a segment of a ring and which is adapted to act, as soon as the lowest part of the blind is in the lower zone of the opening to be closed, on a stop 2111 secured at the end of a lever 2211 articulated on bar 1211, this lever being intended to draw down this bar when pusher 2011 is driven in the same direction by chain 1811. Such a movement by lever 2211 and by bar 1211 however cannot take place without corresponding angular movement of arms 1311a and 1311b so that bar 1211 is then driven simultaneously at the left of the drawing causing the angular movement of lever 1011 associated to each slat and which have been described before. Since this angular movement cannot take place except by a corresponding movement of rods

211 to which they are fixed, the slats 111 tip in the indicated direction as they go down and pusher 2011 moves angularly around stop 2111, the limit of the pusher being that shown on FIGURE 7. In this position, the blind is then lowered and levers 511 and 611 are in their most stretched position.

A movement of stop 2111 under the action of pusher 2011 is controlled by engagement of this stop in a vertical slot 2111a provided in plate 411a mounted against the wall of the housing (FIGURE 8).

Movement in the opposite direction by chain 1811 produces, when pusher 2011, lever 2211 or 1211 and arms 1311a and 1311b are in the position shown on FIGURE 7, the raising of the lower slat 111 and consequently that of stop 2111, movement which can only take place by means of an angular movement of arms 1311a and 1311b in a direction contrary to the previous one, that is to say bringing in the arms from the position drawn on FIGURE 7 to that shown by FIGURES 5 and 6 so that the slats tend to take again their horizontal position as the lower slat moves upwardly.

From the moment when pusher 2011 again assumes the position shown on FIGURE 6, it no longer contacts stop 2111 and the slat associated therewith ascends, the rivet 1111 and the head 1111a of levers 1011 corresponding thereto, slide inside bar 1211 and the other slats remain stationary. The next to last slat will begin to rise as soon as the lower slat reaches its height; the one before the next to last will not begin its ascending movement until the two lower slats have reached its height and so on.

It will be understood that the slats can have shapes very different to those indicated up to now; the same is true for pusher 2011, for stop 2111 and oscillating arms 1311a and 1311b. Furthermore, the raising of the blind can be controlled by another member of the chain such as an endless screw and a nut associated to the screw rigid with the lower slat of the blind.

Furthermore it will be understood that the means for controlling the tipping of the slat can comprise linking members formed by pairs of levers mutually articulated to one extremity and fixed rigidly and articulated by the other extremity each to one of two neighbouring slats, these levers being such that when the blind is in its lowered position the points of articulation of each pair of levers are disposed along a broken line. In this variant, each slat is rigid with one lever associated with the pivoting axes the extremity of which bears a finger engaged in the opening of a U-shaped section, this section forming the rod-handle assembly forming at least one part of said device for tipping the slats; the pivoting axes of the slats being contained in a vertical plane bearing the tipping axes of all the slats.

What is claimed is:

1. A window blind for obturating a window having an upper part, a lower part and two side parts, said blind having a raised position and comprising:

- (a) a plurality of rockable slats, said slats forming a stack at the upper part of the window in the raised position of the blind,
- (b) a drive mechanism connected to the slats and adapted to move the slats in a vertical direction,
- (c) a control device connected to the slats and adapted to control the rocking of the slats,
- (d) two casings, one casing being disposed at one side part of the window adjacent to one end of said slats, and the other casing being disposed at the other side part of the window adjacent to the other end of said slats,
- (e) said two casings encasing said drive mechanism and said control device; each casing having a face directed inwardly of the window, said face being provided with a longitudinal slot, each slat having at each end a terminal element by which said slat is engaged in said casings, through the said slots, each terminal element comprising a pivot pin about

which a corresponding slat can rock, a drive engaging with the said terminal elements of each slat; said drive mechanism engaging with the last of said slats, a single actuating member for actuating both said mechanism and said drive, said actuating member being adapted to actuate said device before the blind is entirely lowered; said device further comprising at least one control bar having a longitudinal slot and extending at one end of the slats in a plane perpendicular to the pivoting axes of the slats, means for moving this bar in translation, transversely to its axis, from a first limit position to a second position and vice versa, and in which the pivot pin of each slat carries an actuating lever provided with a head engaged in the slot of the control bar, in contact with the sides of said slot, said slats being substantially horizontal in said first limit position of the control bar, and being folded one on another in the second position of said control bar.

2. A blind according to claim 1, in which said control bar is hinged on at least two supports mounted pivotably in the plane of translation of the bar and in which said blind includes means adapted to cause the pivoting of the said supports before the blind is entirely lowered.

3. A blind according to claim 1 in which the slats are connected to one another by means permitting the slats to be stacked in the raised position of the blind, and to be disposed spaced apart in the lowered position of the blind, said means comprising at least one pair of levers connected to each pair of slats, these levers being hinged to each other at one end, and being hinged to a slat at the other end about the axis of pivoting of the slat.

4. A blind according to claim 1 in which the length of the said levers is such that when the blind is in the lowered position, the mutual hinge points of each pair of levers and the hinge points of the slats are disposed along a broken line.

5. A blind according to claim 2 in which said means comprises at least one push rod rigid with the lower slat of the pile of slats, and at least one stop element connected with the said control bar disposed on the trajectory of the push rod and adapted to be driven by the latter when the said lower slat reaches the position from which the slats of the blind should pivot.

6. A blind according to claim 5, having means for controlling the displacement in translation of the control bar comprising at least one rack mounted slidably vertically, to which is fixed the said stop element, at least one gear train whose first gear is in contact with the slat and on the last gear of which is hinged the bar, any vertical displacement communicated to the rack corresponding to a translation of the control bar.

7. A blind according to claim 6 in which the rack controls two identical gear trains disposed, one near the upper part of each casing, and the other near the lower part of each casing, the last gear of each gear train forming one of the said rocking supports to which is fixed the control bar.

8. A blind according to claim 7 in which the last wheel of each gear train is constituted by a pivoting disc, toothed on a part of its edge and in contact with the first gear of the gear train.

9. A blind according to claim 5 in which the push rod is rigid with the actuating lever of the lower slat of the pile of slats.

10. A blind according to claim 9 in which the push rod has a semi-angular form and the stop bears a spherical head of diameter corresponding to that of the opening of the push rod.

11. A blind according to claim 2 in which the said means comprises at least one push rod rigid with the pivot pin of the lower slat of the blind and at least one stop element on said bar disposed on the trajectory of the push rod and adapted to be driven by this push rod, said stop element being rigid with a crank hinged to the said bar,

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driving means being provided for driving said stop element in vertical rectilinear movement.

12. A blind according to claim 11 in which said driving means comprise at least one vertical slider connected to the casing and at least one sliding member rigid with the lever and in contact with said vertical slider.

13. A blind according to claim 11 in which said push rod is rigid with a lever connected to one end of the last slat of the blind.

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