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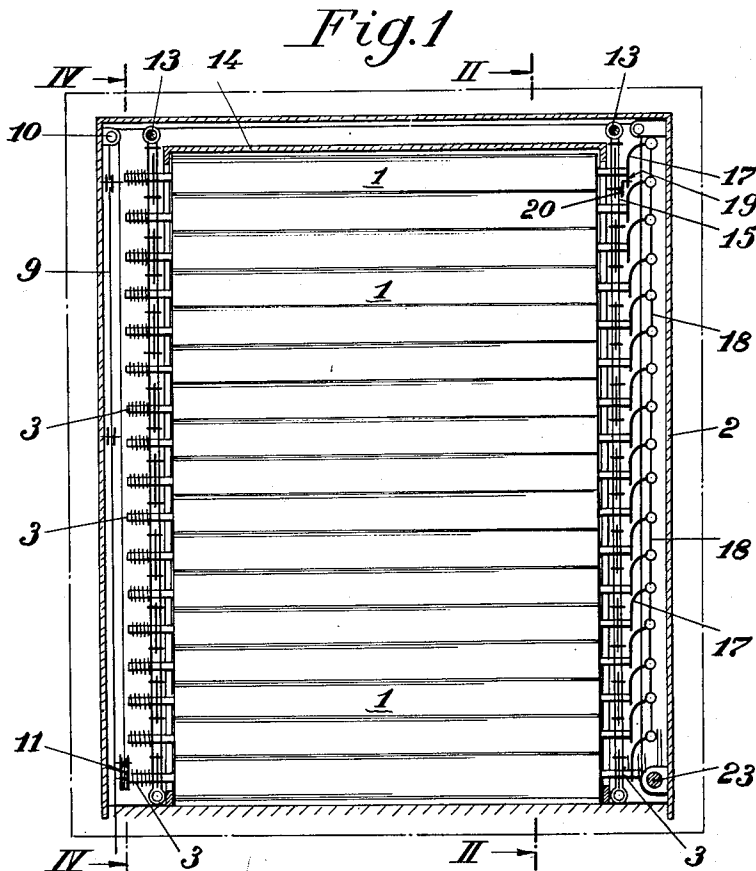
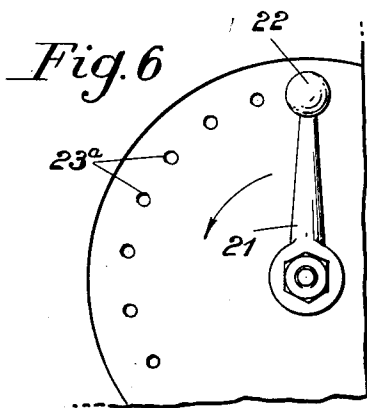
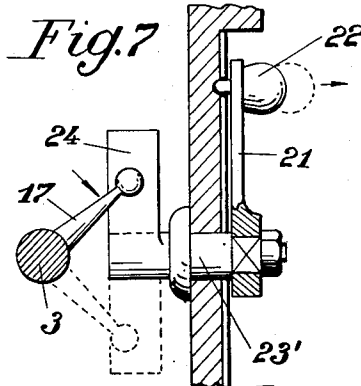
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2,654,427

CONTROL SYSTEM FOR WINDOW SHUTTERS

Filed Aug. 27, 1951

3 Sheets-Sheet 1



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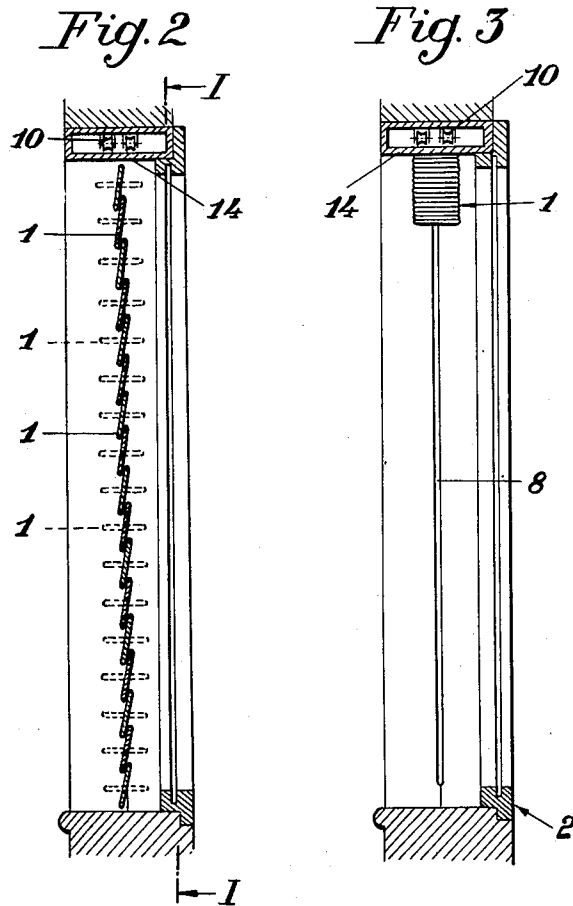
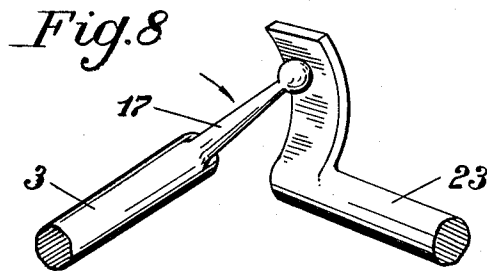
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CONTROL SYSTEM FOR WINDOW SHUTTERS

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3 Sheets-Sheet 2



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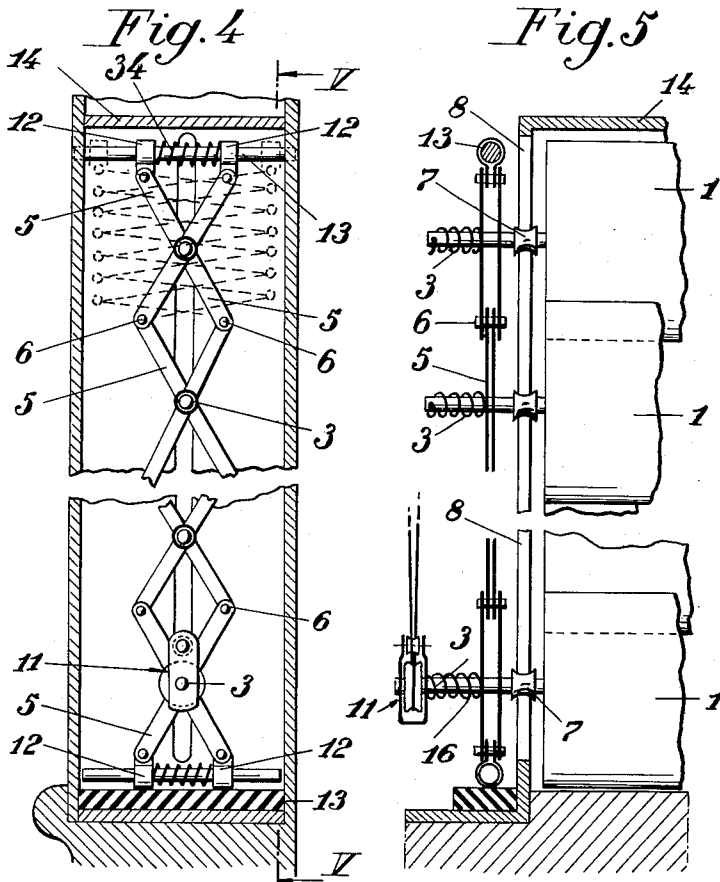
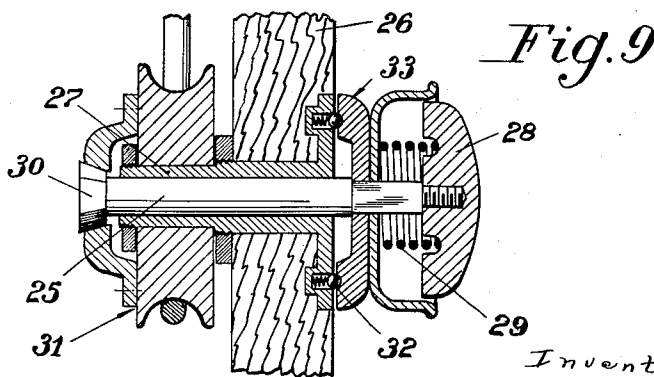
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CONTROL SYSTEM FOR WINDOW SHUTTERS

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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CONTROL SYSTEM FOR WINDOW SHUTTERS

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4 Claims. (Cl. 160-172)

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This invention relates to a control system for window shutters of the type having vanes which may rotate around an axis.

A purpose of this invention is that of providing a control system allowing the vanes to be totally lifted, or oriented, when the shutter is lowered, with mechanically simple means and of safe operation.

A further purpose of this invention is that of embodying a system allowing all the shutter and the lifting and orienting means for the vanes to be assembled in the sole fixture of the window.

According to the invention it is provided to control a shutter formed by a series of rectangular flat elements made of a plastic substance, wood, light metal or the like, having each the possibility of rotating around a shaft parallel to its greater side, while in their turn the shafts may be vertically lifted upwards, rotating in the meantime the vanes in order to assemble them in the minimum space. The various shafts are preferably connected by a system of articulated parallelograms which form, on each side of the shutter, a lazy tong. The system comprises therefore substantially the means for displacing along a guide contained in the fixture the vane shafts, and the means for rotating all together the different vanes, each around its own shaft.

The invention is shown in a preferred form of embodiment in the attached drawings, wherein:

Fig. 1 shows a front elevation of the lowered shutter;

Fig. 2 shows the cross-section of Fig. 1 along the line II-II wherein the position of maximum opening of the vanes is shown in dotted line;

Fig. 3 shows a cross-section similar to that of Fig. 2, with the vanes assembled upwards;

Fig. 4 shows in an enlarged scale the cross-section of Fig. 1 along the line IV-IV;

Fig. 5 shows the cross-section of Fig. 4 along the line V-V;

Fig. 6 shows a front detail elevation of the control system for the inclination of the vanes;

Fig. 7 shows the side view of the system of Fig. 6;

Fig. 8 shows in perspective view the control means for the inclination of the vanes, and

Fig. 9 shows a cross-section of a different form of embodiment of the control system of the vanes.

With reference to the drawing, the shutter consists in a series of vanes or shutter slats 1, contained, together with their control systems, in a fixture frame substantially rectangular 2, comprising also the leafed window (Figs. 2 and 3). Each vane 1, rectangular, is mounted on a central shaft 3 parallel to the greater side of the rectangle, which shaft is supported at its ends (Fig. 4) from the crossing points of the lazy-tong elements 5, these connected between themselves at the fulcrum or pivot 6 so as to form a lazy-tongs lever comprising a series of articulated parallelograms. The lazy-tongs arrange-

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ment ensures the perfect equidistance between the different shafts 3, in accordance with the deformations to which the various articulated parallelograms of the lazy-tongs lever are subjected when the shutter is lifted. Inside the articulated arms 5, each shaft 3 is provided with a roller 7 which may glide along the guide 8. The lifting of the various shafts 3 and therefore the opening of the shutter is obtained by means of a system of non-elastic but flexible ties, substantially strings or the like 9, which wind along pulleys 10 placed externally to the vertical line of the lateral end of the vanes and which are fixed in a point 11 (Figs. 1 and 4) of the shaft 3 of the lower element, so as to lift it, gliding its roller 7 along the central vertical guide 8. Thus the contemporaneous deformation of all the parallelograms formed by the elements 5 is obtained, and the different shafts are lifted remaining all-equidistant between themselves, until the complex of the articulated parallelograms reaches the position shown in dotted line in Fig. 4 and the vanes assume the position of Fig. 3.

In order to allow the deformation of the articulated parallelograms the upper and lower terminal elements 5 end each by a bushing 12. The two upper bushings 12, as well as the two lower bushings 12, are inserted on a shaft 13 along which they glide in order to allow the widening of the elements 5 allowing the higher of the shafts 3 to come near the upper surface 14 of the fixture.

The vanes are brought close to one another by means of their rotation until they are all parallel in horizontal planes. Said rotation occurs owing to the mutual action of the vanes, while the upper vane is rotated by an arm 15 which at the moment of the lifting of the system rotates said upper vane as it will be better disclosed here below.

The rotation of the vanes, each around its own shaft, is counterbalanced by helical springs 16 inserted on one of the ends of each shaft 3. To the other end of each shaft 3 is fixed an arm 17 which rotates the vanes 1, when the shutter is lowered, against the action of the aforementioned spring 16. All the various arms 17 are connected between themselves by an inextensible element or vertical rod 18 which may be formed by separately connected flexible elements or by rigid articulated elements provided with a stop member ensuring the correct articulation of the two elements. This way, when the lower or upper arm is actuated, it drives all the other arms orienting thus the different vanes 1 so as to allow all the positions comprised between the outward subvertical position and the inward subvertical position (totally closed shutter), passing through the horizontal position (totally open shutter). It is to be noted that the arm 17 controlling the upper vane 1 is provided with a downwards extending projection 19, on which acts a lever 20

controlled by one of the arms of the immediately lower parallelogram. When the vanes are lifted, i. e. when the lateral parallelograms are widened, the arm 20 acts on the projection 19 of the arm 17 rotating the uppermost vane 1 so that its upper edge does not hit the surface 14 of the fixture.

For the inclination control of the vanes it is provided to apply outside the fixture a small handle 21 (Fig. 6) provided with a pommel 22 with a shaft which may be inserted in a series of holes 23 so as to establish definitely the various rotations of the handle 21. Said handle controls inside the fixture and by means of the shaft 23a a member 24 acting on the arm 17 corresponding to the shaft 3 of the lower vane, so that the different rotations of the shaft 23a correspond to lowerings of the arm 17. Owing to the tie existing between the different arms 17, to each position of the shaft 23 corresponds an inclination of the various vanes. In order to lift the shutter it is sufficient to bring the vanes back to their vertical position.

A different form of embodiment of the control system for the vanes 1 is shown in cross-section in Fig. 9, wherein by 25 has been marked a shaft inserted in the fixture 26 within a tube 27 forming a guide for said shaft.

Said shaft has at one end a handle 28 which may rotate the shaft. The shaft 25, furthermore, may glide in axial direction, into the fixed tube 27, against the action of a spring 29. The end of the shaft 25 remote from the handle 28 is provided with a key 30 which may engage a pulley 31 rotating on said tube 27. The engagement between the pulley and the key 30 occurs when the spring 29 is expanded and in said condition it is possible, by rotating the handle 28, to rotate the pulley 31 whereon winds the flexible element for the control of the vanes. In order to glide the shaft 25 in respect of the tube 27, it is sufficient to operate the handle so as to compress the spring 29; this way the disengagement of the key 30 from the pulley 31 is obtained and the pulley is free to rotate allowing the vanes to come back to their vertical position owing to the springs acting on their shafts 3.

The stop of the handle is obtained by means of a certain number of elastic pins 32 acting on a small plate 33 solidal with the handle 28. The return in vertical position of the vanes may also be obtained by rotating the handle, instead of axially displacing the handle and the shaft controlled by this latter.

The arrangement aforesaid may be varied without issuing from the scope of this invention; for instance the lifting control of the shutter, instead of a flexible element, may be obtained by means of a rigid drive acting on two articulations corresponding to the shafts 3 nearing them in order to lift the shutter. In the figure is shown an helical spring 34 inserted on the shaft 13, acting between the two bushings 12 in order to space them away, cooperating thus to the lifting of the shutter; such spring may be abolished, and also the upper arms of the last articulation may be abolished, by providing a U-shaped guide suitable to allow the lifting of said last articulation.

Also the helical springs 16 placed on the ends of the shafts 3 may be substituted by springs of a different type, and the rollers 7 may be abolished, by substituting them by means of a gliding element suitable to guide the movements of the shafts 3 along the guide 8.

I claim:

1. A control system for Venetian blind com-

prising, in combination, a plurality of shutter slats each slidably and resiliently mounted on a central horizontal shaft at each end thereof in a framework, each slat being provided at its two ends with a pivot by which the slats are each connected to the corresponding pivot at the center of articulated parallelogram elements of a lazy-tongs lever which is slidably movable up a vertical guide and connected to the top of the guide at the top of the framework, resilient spring means mounted at one end of the pivot of each slat to urge the slat in a substantially vertical position, a lever means at the other end of the pivot of each slat to rotate the slats against the action of said resilient spring means through the successive positions from the vertical to the horizontal, each of said lever means being connected to a common vertical rod to transmit the rotation from the lower slat to the upper slats, manually operated lever means cooperating with the lever means at the end of the pivot of the lowest slat to rotate the lowest slat and the remaining slats, and lifting means to vertically lift the plurality of slats.

2. A control system for Venetian blind comprising, in combination, a plurality of shutter slats each slidably and resiliently mounted on a central horizontal shaft at each end thereof in a framework, each slat being provided at its two ends with a pivot by which the slats are each connected to the corresponding pivot at the center of articulated parallelogram elements of a lazy-tongs lever which is slidably movable up a vertical guide and connected to the top of the guide at the top of the framework, resilient spring means mounted at one end of the pivot of each slat to urge the slat in a substantially vertical position, a lever means at the other end of the pivot of each slat to rotate the slats against the action of said resilient spring means through the successive positions from the vertical to the horizontal, each of said lever means being connected to a common vertical rod to transmit the rotation from the lower slat to the upper slats, manually operated lever means cooperating with the lever means at the end of the pivot of the lowest slat to rotate the lowest slat and the remaining slats, lifting means to vertically lift the plurality of slats, and a projection means at the ends of the slats which limits the rotary movement of the lever means at the ends of each of the slats.

3. A control system as in claim 1 wherein the lazy-tongs lever is slidably connected to a horizontal shaft at the top of the framework which urges the upper slat into a horizontal relationship when the slats are lifted, and the manually operated lever means cooperating with the lever means at the end of the pivot of the lowest slat is provided with an indicating perforated plate to indicate the manual rotation of the lever.

4. A control system as in claim 1 wherein the manually operated lever means to rotate the lowest slat comprises a knob rotating in a shaft which is movable axially in a fixed tube to press against a spring and engage a pulley which winds the resilient spring means to rotate the slats.

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