June 9, 1953 N. W. SNOW 2,641,465

LOUVER WINDOW AND ACTUATING MECHANISM THEREFOR

Filed June 30, 1951

Fig. 1

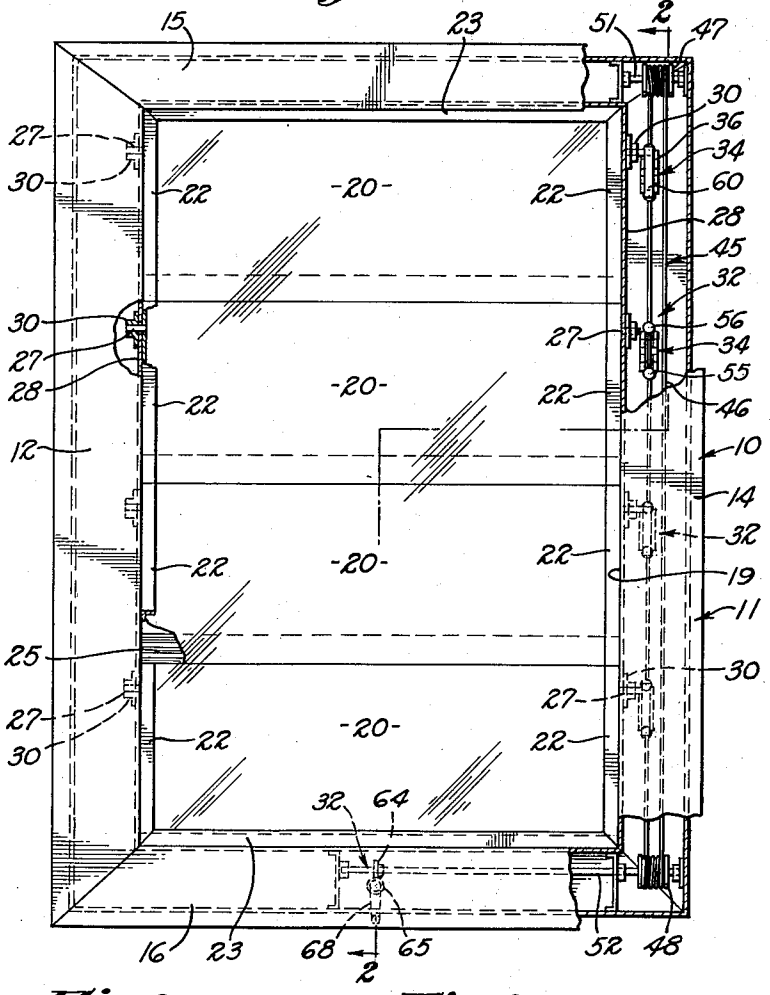


Fig. 2

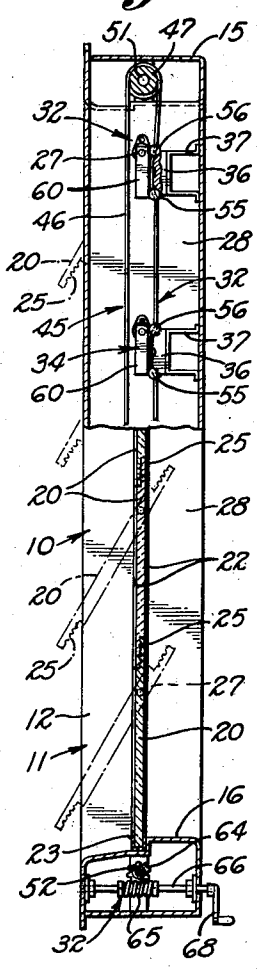


Fig. 3

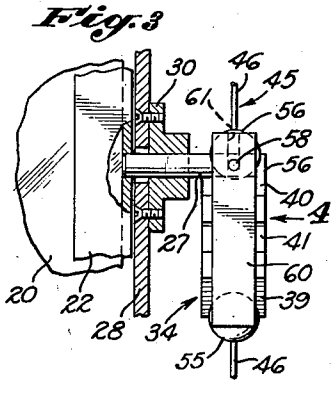


Fig. 4

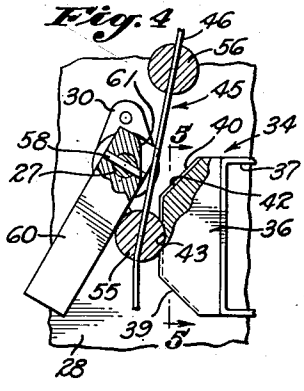


Fig. 5

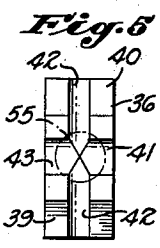
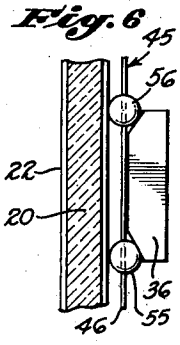


Fig. 6



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LOUVER WINDOW AND ACTUATING MECHANISM THEREFOR

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15 Claims. (Cl. 268—23)

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This invention relates to louver windows and, more particularly, to a louver window the individual louvers of which are readily actuable by a mechanism constituted of a small number of relatively simple parts. Although the invention is described as applied to a louver window, the mechanism could be applied to any louver construction.

Louver windows conventionally consist of a plurality of rectangular panes which are mounted in a frame and which are adapted to be simultaneously opened and closed by linkages of various types attached to individual louvers of the window. In conventional louvers, various types of linkages have been provided to accomplish the concomitant opening or closing of the louvers of the window, such linkages incorporating levers attached to the edges of the louvers to accomplish the extension or retraction thereof and such levers being both unsightly and necessitating the provision for the attachment thereof to the edges of the louvers.

It is, therefore, a primary object of my invention to provide a louver window having an actuating mechanism which eliminates the necessity for the attachment to the individual louvers of the window of levers or other unsightly mechanisms which detract from the appearance of the window.

Another object of my invention is the provision of a louver window which includes an actuating mechanism for the individual louvers of the window which is concealed entirely within the jamb of the window, thus eliminating the necessity for the use of excrescences, such as levers or other expedients, which detract from the appearance of the window.

An additional object of my invention is the provision of a louver window which incorporates an actuating mechanism consisting of a relatively small number of simple component parts which can be readily and quickly installed and which require little or no servicing to maintain it in optimum operating condition.

A further object of my invention is the provision of a louver window incorporating an operating mechanism which includes cam means disposable adjacent one edge of each of the louvers and operative on an element on each of said louvers to cause the opening and closing of each of said louvers.

Another object of my invention is the provision of a louver window which incorporates an actuating mechanism constituted, in part, by cam means juxtaposed to the louver pivots at one

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edge of each of the louvers and operative on means mounted on said pivots to open and close said louvers.

An additional object of my invention is the provision of a louver window of the aforementioned character in which said cam means includes a first cam follower for opening a louver associated therewith and a second cam follower for closing and securing in closed position a louver associated therewith.

A further object of my invention is the provision of a louver window of the aforementioned type which includes a louver actuating mechanism incorporating cam actuating means operable, if desired, directly upon elements of individual louvers, such as an edge thereof, to cause the positive opening and closing of said louvers.

Other objects and advantages of my invention will be apparent from the following specification and the accompanying drawing which is for the purpose of illustration only, and in which:

Fig. 1 is a partly sectional view of a louver window constructed in accordance with my invention;

Fig. 2 is a vertical, partly sectional view taken from the broken line 2—2 of Fig. 1;

Fig. 3 is an enlarged, fragmentary view of the cam means of the actuating mechanism of my invention;

Fig. 4 is a side elevational view taken in the direction of the arrow 4 of Fig. 3;

Fig. 5 is a front elevational view of a portion of the cam means of my invention taken on the broken line 5—5 of Fig. 4; and

Fig. 6 is an enlarged fragmentary view of an alternative embodiment of my invention.

Referring to the drawing, and particularly to Figs. 1 and 2 thereof, I show a louver window 10 which includes a frame 11 which may be formed of metal, such as aluminum, wood, or similar material. The frame 11 includes vertical jamb members 12 and 14 which are connected at their tops by a transverse rail 15 and at their bottoms by a sill 16. The frame 11 defines a window opening 19 in which is disposed a plurality of louvers 20 formed of glass, plastic, or similar translucent or transparent material and acting, when closed, as best shown in Figs. 1 and 2 of the drawing, to seal the window opening 19. In the present embodiment of my invention, the louvers 20 are formed of a hard surfaced plastic material which tends to resist abrasion and whose translucent qualities equal those of glass. Each of the louvers 20 has its lateral edges encased in a

metal trim 22 and the upper and lower edges of the top and bottom louvers, respectively, are similarly encased in metal trim, as indicated at 23.

In order to insure that an airtight seal will be achieved between adjacent lower and upper edges of adjacent louvers, I have provided the lower and upper edges of adjacent louvers with interengaging, longitudinal serrations 25, as best shown in Figs. 1 and 2 of the drawing, the provision of such serrations also permitting the upper and lower edges of adjacent louvers to interengage and present flush or substantially flush interior and exterior surfaces.

Each of the louvers 20 has a pivot 27 secured in the trim 22 on each opposite, lateral edge adjacent the upper edge thereof. The pivots 27 project through the side walls 28 of the jambs 12 and 14 into the interiors of the jambs and are supported therein for rotation by means of bearings 30 secured to the interiors of the side walls 28 of the jambs, as best shown in Fig. 3 of the drawing. Although the pivots 27 are shown as secured in the edge trim 22 which mounts the louvers 20, it is conceivable that the edge trim 22 be dispensed with and that the pivots 27 be mounted directly in the edges of the louvers 20.

In order that the louvers 20 may be opened or closed simultaneously and to the same extent, I provide a louver actuating mechanism 32 which is partially housed in the sill 16 and which has the majority of its operating components housed within the interior of the jamb 14. The actuating mechanism 32 is constituted, in part, by cam means indicated generally at 34 and best shown in Figs. 1–4 of the drawing. The cam means 34 includes a plurality of cam blocks 36, each cam block being mounted on a bracket 37 secured to the interior of the jamb 14 adjacent one of the pivot pins 27 of the louvers 20 which projects into the interior of the jamb 14. The cam blocks 36, as best shown in Figs. 4 and 5 of the drawing, are each provided with a lower angular rise portion 39 and an upper angular rise portion 40 between which is located a dwell portion 41. Provided in the rises 39 and 40, respectively, and in the dwell portion 41 of each cam block 36 are longitudinal grooves 42 of arcuate cross section which intersect with a transverse groove 43 of arcuate cross section provided in the dwell portion 41.

Support means 45 constituted by one leg 46 of an elongated, flexible cable is disposed in the interior of the jamb 14, as best shown in Figs. 1 and 2 of the drawing, and is maintained upon drums 47 and 48 disposed, respectively, at the top and the bottom of the jamb 14. The drum 47 is mounted upon a rotatable spindle 51 secured in the top of the jamb 14 while the drum 48 is mounted for rotation by a rotatable drive shaft 52 supported in the lower end of the jamb 14 and running to the center of the sill 16 through the interior thereof. The elongated, flexible cable may be formed of wire or similar material and several turns of the cable are wound about each drum 47 and 48 to insure that the rotation of the drive shaft 52 will cause vertical movement of the leg 46 in an appropriate direction, for a purpose to be described in greater detail below.

Mounted for vertical movement on the support means 45 adjacent each cam block 36 are vertically spaced first and second cam followers 55 and 56, respectively, the vertical spacing of the cam followers 55 and 56 being such that, when the first cam follower 55 lies in contact with the lower rise 39 of the cam block 36 the second cam follower 56 lies in contact with the upper rise 40 of the cam block 36. The cam followers 55 and 56 are substantially spherical in shape, as best shown in Figs. 1–4 of the drawing, and may be formed of hard rubber or metal beads which are pressed onto or otherwise fixedly secured about the periphery of the elongated, flexible cable leg 46.

Fastened on the ends of the pivots 27 which protrude into the interior of the jamb 14, as by means of pins 58, are elongated, rectangular actuating elements 60, the major portions of the lengths of which depend below the longitudinal axes of the pivots 27 and small portions of the lengths of which protrude above the longitudinal axes of the pivots 27, for purposes which will be described in greater detail below. Formed in the upper portions of the actuating elements 60 in the sides of the actuating elements which face toward the cam blocks 36 are recesses 61, as best shown in Fig. 4 of the drawing.

Secured to the end of the drive shaft 52 is a pinion 64, which, as best shown in Fig. 2 of the drawing, is in engagement with a worm 65 mounted upon a rotatable shaft 66 whose longitudinal axis is normal to the longitudinal axis of the drive shaft 52 and one of whose ends projects through the forward wall of the sill 16. Mounted on the projecting end of the shaft 66 is a crank 68 whose rotation is adapted to cause the rotation of the shaft 66 and the worm 65 mounted thereupon to cause the concomitant rotation of the drive shaft 52 and its associated drum 48. When such rotation of the drum 48 occurs, the vertical translation of the elongated, flexible cable leg 46 will be accomplished, the movement of the crank 68 in a clockwise direction causing the cam followers 55 and 56 to be carried upwardly on the cable leg 46 and the movement of the crank 68 in a counterclockwise direction causing the cam followers 55 and 56 to be carried downwardly on the cable leg 46.

When it is desired to cause the simultaneous opening of the louvers 20 of the louver window 10, the crank 68 is rotated in a clockwise direction, to cause the upward movement of the cam followers 55 and 56 from the position shown in Fig. 3 of the drawing, which is the position assumed by the cam followers 55 and 56 when the louvers 20 are in closed position, to the position shown in Fig. 4 of the drawing, whereby the louvers 20 will be maintained in maximum open position. As the upward movement of the flexible cable leg 46 causes the upward movement of the first cam follower 55, the cam follower 55 is carried upwardly along the lower rise 39 in the arcuate groove 42 provided in the surface of the lower rise 39. The arcuate groove 42 in the lower rise 39 prevents lateral mislocation of the cam follower 55 with respect to the under side of the actuating element 60 and, as the first cam follower 55 moves upwardly in the groove 42, it engages the under side of the actuating element 60 to force the actuating element 60 outwardly in the direction shown in Fig. 4 of the drawing, to cause the concomitant rotation of the pivot 27 by the outward movement of the actuating element 60 and the simultaneous pivoting of its associated louver 20 of the window 10 in an outward direction to cause the opening thereof.

As the first cam follower 55 is moved upwardly by the upward movement of the flexible cable leg 46, the actuating element 60 is moved farther and farther outwardly in a direction away from the cam block 36 until the first cam follower 55

reaches the transverse arcuate groove 43 in the dwell portion of the cam block 36 wherein it is then seated. The seating action of the first cam follower 55 in the transverse groove 43 of the cam block 36 is transmitted through the flexible cable leg 46 and is felt by the operator through the drive shaft 52, the shaft 66 and the crank 68, to indicate to the operator that the maximum adjustment of the louvers 20 of the window 10 has been accomplished. Furthermore, when the crank 68 is released subsequently to the seating of the first cam follower 55 in the transverse groove 43 of the cam block 36, the groove 43 maintains the first cam follower 55 in position and prevents inadvertent dislocation of the louver associated therewith from its open position.

It will be noted that, as the first cam follower 55 is moved upwardly by the upward movement of the flexible cable leg 46, the second cam follower 56 also moves upwardly to prevent it from impeding the rotational movement of the actuating element 60 on the pivot 27. As the rotation of the actuating element 60 induced by the first cam follower 55 continues, the upper portion of the actuating element is rotated toward the cam block 36 causing the walls of the recess 61 therein to pass over the portion of the length of the cable leg 46 between the first and second cam followers 55 and 56 to prevent the cable leg 46 from wedging against the upper edge of the actuating element 60.

When it is desired to close the louvers 20 of the louver window 10, the crank 68 is rotated in a counterclockwise direction to cause the cable leg 46 to be shifted downwardly. Such downward shifting of the cable leg 46 causes the first cam follower to be unseated from the transverse, arcuate groove 43 in the dwell portion 41 of the cam block 36 and carries the cam follower 55 downwardly along the lower rise portion 39 of the cam block 36 in the groove 42 until it assumes the position shown in Figs. 1–3 of the drawing. Simultaneously, the second cam follower 56 is carried downwardly on the flexible cable leg 46 until it reaches a position in which it engages the upper rise portion 40 of the cam block 36 and the arcuate groove 42 formed therein.

When such engagement between the upper rise portion 40 of the cam block 36 and the second cam follower 56 occurs, the second cam follower 56 enters the recess 61 formed in the upper end of the actuating element 60 to cause the actuating element 60 to be rotated in a direction which will cause the simultaneous rotation of the louver 20 associated therewith toward a closed position. When the second cam follower 56 reaches its lowermost position, as best shown in Figs. 1–3 of the drawing, it is seated in the groove 42 in the upper rise portion 40 of the cam block 36 and the recess 61 provided in the upper end of the actuating element 60. When so positioned, the second cam follower 56 locks the louver with which it is associated against inadvertent opening by preventing the rotation of the actuating element 60 on the pivot 27 with which it is associated. Thus, in addition to serving as a means for causing the positive closure of the louver with which it is associated, the second cam follower also serves to lock the louver against inadvertent opening.

Although I have shown and described the cam means 34 of my invention as including first and second cam followers 55 and 56, it is conceivable that the louver window actuating mechanism 32 be provided with either a first cam follower 55 or a second cam follower 56. For instance, the louver window could be provided with first cam followers 55 to cause the opening of the louvers 20 of the window and the closing of the louvers 20 would be accomplished by the force of gravity and, perhaps, a spring associated with each of the louvers to cause the positive closure thereof as the first cam followers 55 were moved downwardly on the flexible cable leg 46.

In addition, it would be feasible to operate the louver window by the use of second cam followers 56 only. For instance, the louvers might be sprung in such a manner that they would open unless restrained against opening movement by the locking action of the second cam followers 56. Therefore, if it were desired to open such a window, it would be merely necessary to raise the second cam followers 56 to release the louvers 20 of the window to permit the springs associated therewith to move the louvers into open positions and to move the second cam followers 56 downwardly to move the louvers into closed positions against the opening bias of the springs associated therewith.

Shown in Fig. 6 of the drawing is an alternative embodiment of my invention in which the cam means 34 thereof is directly operative upon an edge of a louver 20 with which it is associated or upon the metal trim 22 encompassing said edge. A construction such as this eliminates the necessity for mounting the cam means 34 in the interior of the jamb of the window and the necessity for providing for actuating elements 60 mounted on the pivots 27 since the first and second cam followers 55 and 56 engage the edge of the louver with which they are associated and cam the louver outwardly by direct operation thereupon.

I thus provide by my invention a louver window which dispenses with the necessity of opening the louvers of the window by the provision of levers attached to the edges thereof which detract materially from the appearance of the window and which require that space be provided for their accommodation. In addition, my invention utilizes cam means adapted both to cause the positive opening and closing of the louvers of the window and to maintain the louvers in either open or closed position. In addition, the actuating mechanism which constitutes my invention is exceedingly simple in construction and can be easily and readily installed at moderate cost.

I claim as my invention:

1. In a louver window constituted by a plurality of louvers, the combination of: a fixed cam juxtaposed to an edge of each of said louvers and mounted on a frame member of said window; longitudinally shiftable supporting means disposed in said frame member adjacent said cam; a cam follower positioned adjacent said cam and supported on said supporting means for longitudinal movement over said cam; an element on said edge of each of said louvers engageable by said follower; and an actuator operatively connected to said supporting means for moving said follower over said cam to urge each of said louvers outwardly simultaneously in a direction away from said cam.

2. In a louver window constituted by a plurality of louvers, the combination of: a fixed cam juxtaposed to an edge of each of said louvers and mounted on a frame member of said window; longitudinally shiftable supporting means adjacent said cam; a cam follower positioned adjacent said cam and supported on said supporting

means for longitudinal movement over said cam on said frame member and for engagement with an element of each of said louvers; and an actuator operatively connected to said supporting means for moving said follower over said cam to urge each of said louvers outwardly simultaneously in a direction away from said cam.

3. In a louver window constituted by a plurality of louvers, the combination of: a fixed cam juxtaposed to an edge of each of said louvers and mounted on a frame member of said window; supporting means adjacent said cam; a cam follower positioned adjacent said cam and supported on said supporting means for longitudinal movement over said cam; an element on said edge of each of said louvers engageable by said follower; and an actuator operatively connected to said supporting means for moving said follower over said cam to urge each of said louvers inwardly simultaneously in a direction toward said cam.

4. In a louver window constituted by a plurality of louvers, the combination of: a cam juxtaposed to an edge of each of said louvers; supporting means adjacent said cam; a first cam follower positioned adjacent said cam and supported on said supporting means; a second cam follower positioned adjacent said cam and supported on said supporting means; an element on said edge of each of said louvers engageable by said followers; and an actuator operatively connected to said supporting means for moving said first follower over said cam to urge each of said louvers outwardly in a direction away from said cam and for moving said second follower over said cam to urge each of said louvers inwardly in a direction toward said cam.

5. In a louver window constituted by a plurality of louvers, the combination of: a cam juxtaposed to an edge of each of said louvers; supporting means adjacent said cam; a first cam follower positioned below said cam and supported on said supporting means; a second cam follower positioned above said cam and supported on said supporting means; an element on said edge of each of said louvers engageable by said followers; and an actuator operatively connected to said supporting means for moving said first follower over said cam to urge each of said louvers outwardly in a direction away from said cam and for moving said second follower over said cam to urge each of said louvers inwardly in a direction toward said cam.

6. In a louver window constituted by a plurality of louvers, the combination of: a cam juxtaposed to an edge of each of said louvers; elongated, flexible supporting means adjacent said cam; a cam follower positioned adjacent said cam and supported on said supporting means for engagement with an element of each of said louvers; and an actuator operatively connected to said supporting means for moving said follower over said cam to urge each of said louvers outwardly in a direction away from said cam.

7. In a louver window, the combination of: a window opening defined in part by laterally spaced jambs; a plurality of louvers pivotally mounted in said jambs; a cam disposed in one of said jambs adjacent each of said louvers; supporting means positioned in said one jamb adjacent said cam; a cam followed positioned adjacent said cam and supported on said supporting means; an element on an edge of each of said louvers engageable by said follower; and an actuator operatively connected to said supporting means for moving said follower over said cam to urge each of said louvers outwardly in a direction away from said cam.

8. In a louver window, the combination of: a window opening defined in part by laterally spaced jambs; a plurality of louvers pivotally mounted in said jambs; a cam disposed in one of said jambs adjacent each of said louvers; supporting means positioned in said one jamb adjacent said cam; a cam follower positioned adjacent said cam and supported on said supporting means; an element on an edge of each of said louvers engageable by said follower; and an actuator operatively connected to said supporting means for moving said follower over said cam to urge each of said louvers inwardly in a direction toward said cam.

9. In a louver window, the combination of: a window opening defined in part by laterally spaced jambs; a plurality of louvers pivotally mounted in said jambs; a cam disposed in one of said jambs adjacent each of said louvers; supporting means positioned in said one jamb adjacent said cam; a first cam follower positioned adjacent said cam and supported on said supporting means; a second cam follower positioned adjacent said cam and supported on said supporting means; an element on an edge of each of said louvers engageable by said followers; and an actuator operatively connected to said supporting means for moving said first cam follower over said cam to urge each of said louvers outwardly in a direction away from said cam and for moving said second cam follower over said cam to urge each of said louvers inwardly in a direction toward said cam.

10. In a louver window, the combination of: a window opening defined in part by laterally spaced jambs; a plurality of louvers pivotally mounted in said jambs; a cam disposed in one of said jambs adjacent each of said louvers; supporting means positioned in said one jamb adjacent said cam; a first cam follower positioned below said cam and supported on said supporting means; a second cam follower positioned above said cam and supported on said supporting means; an element on an edge of each of said louvers engageable by said followers; and an actuator operatively connected to said supporting means for moving said first cam follower over said cam to urge each of said louvers outwardly in a direction away from said cam and for moving said second cam follower over said cam to urge each of said louvers inwardly in a direction toward said cam.

11. In a louver window, the combination of: a window opening defined, in part, by laterally spaced jambs; a plurality of louvers mounted on pivots journalled in said jambs; a cam mounted in one of said jambs adjacent each of said pivots in said one jamb; supporting means positioned in said one jamb adjacent said cam; a cam follower positioned in said one jamb adjacent said cam and supported on said supporting means; an element mounted on each of said pivots in said one jamb engageable by said follower; and an actuator operatively connected to said supporting means for moving said follower over said cam to urge each of said louvers outwardly in a direction away from said cam.

12. In a louver window, the combination of: a window opening defined, in part, by laterally spaced jambs; a plurality of louvers mounted on pivots journalled in said jambs; a cam mounted in one of said jambs adjacent each of said pivots in said one jamb; supporting means positioned

in said one jamb adjacent said cam; a cam follower positioned in said one jamb adjacent said cam and supported on said supporting means; an element mounted on each of said pivots in said one jamb engageable by said follower; and an actuator operatively connected to said supporting means for moving said follower over said cam to urge each of said louvers inwardly in a direction toward said cam.

13. In a louver window, the combination of: a window opening defined, in part, by laterally spaced jambs; a plurality of louvers mounted on pivots journalled in said jambs; a cam mounted in one of said jambs adjacent each of said pivots in said one jamb; supporting means positioned in said one jamb adjacent said cam; a first cam follower positioned in said one jamb adjacent said cam and supported on said supporting means; a second cam follower positioned in said one jamb adjacent said cam and supported on said supporting means; an element mounted on each of said pivots in said one jamb engageable by said followers; and an actuator operatively connected to said supporting means for moving said first follower over said cam to urge each of said louvers outwardly in a direction away from said cam and for moving said second follower over said cam to urge each of said louvers inwardly in a direction toward said cam.

14. In a louver window, the combination of: a window opening defined, in part, by laterally spaced jambs; a plurality of louvers mounted on pivots journalled in said jambs; a cam mounted in one of said jambs adjacent each of said pivots in said one jamb; supporting means positioned in said one jamb adjacent said cam; a first cam follower positioned in said one jamb below said cam and supported on said supporting means; a second cam follower positioned in said one jamb above said cam and supported on said supporting means; an element mounted on each of said pivots in said one jamb engageable by said followers; and an actuator operatively connected to said supporting means for moving said first follower over said cam to urge each of said louvers outwardly in a direction away from said cam and for moving said second follower over said cam to urge each of said louvers inwardly in a direction toward said cam.

15. In a louver window, the combination of: a window opening defined, in part, by laterally spaced jambs; a plurality of louvers mounted on pivots journalled in said jambs; a cam mounted in one of said jambs adjacent each of said pivots in said one jamb; elongated, flexible supporting means mounted in said one jamb adjacent said cam; a cam follower positioned in said one jamb adjacent said cam and supported on said supporting means; an element mounted on each of said pivots in said one jamb engageable by said follower; and an actuator operatively connected to said supporting means for moving said follower over said cam to urge each of said louvers outwardly in a direction away from said cam.

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