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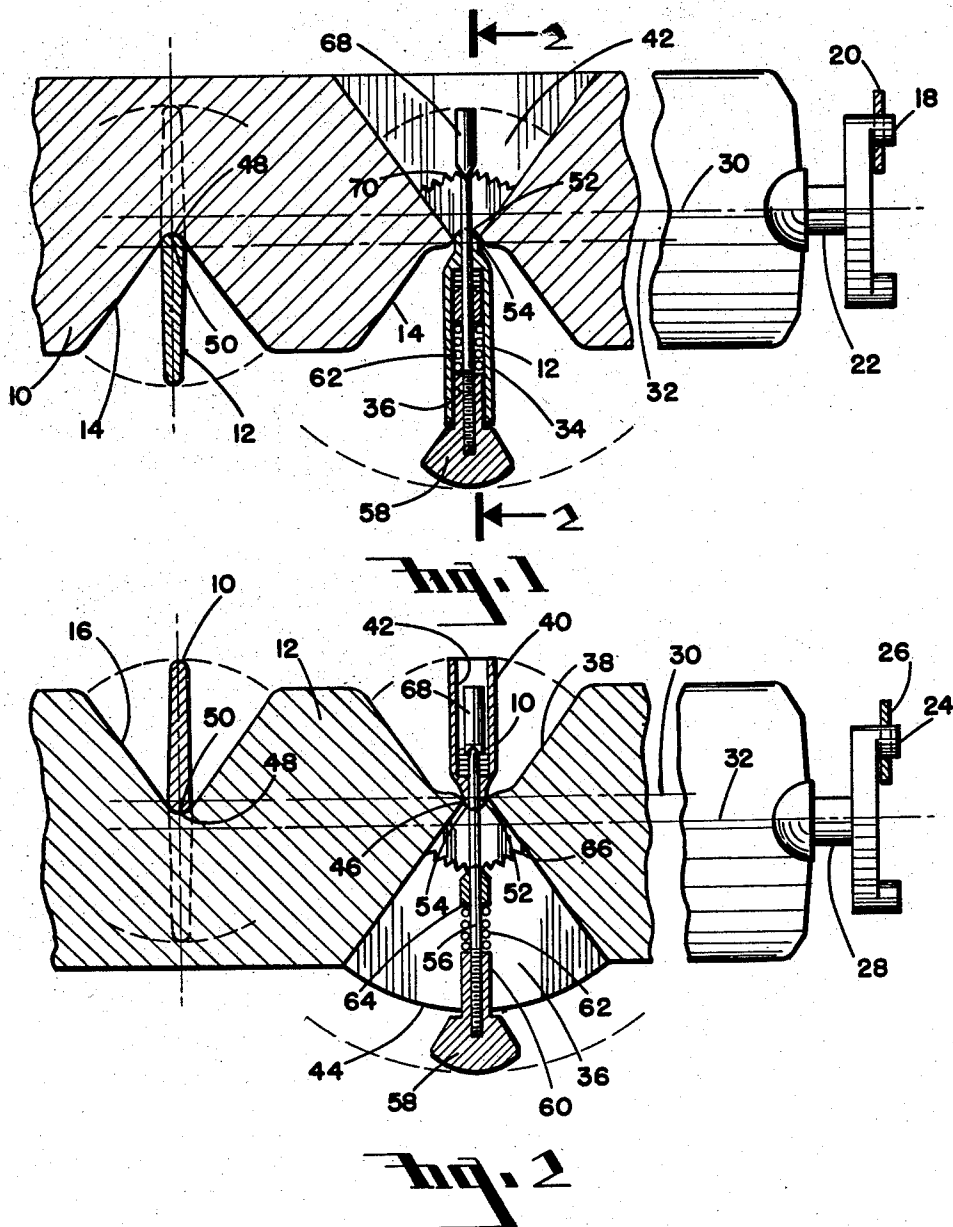
A. D. GOETTL

2,874,626

ACTUATOR FOR LOUVER SLATS

Filed June 19, 1957

2 Sheets-Sheet 1



INVENTOR.
ADAM D. GOETTL

BY
Wm. H. Dean
AGENT

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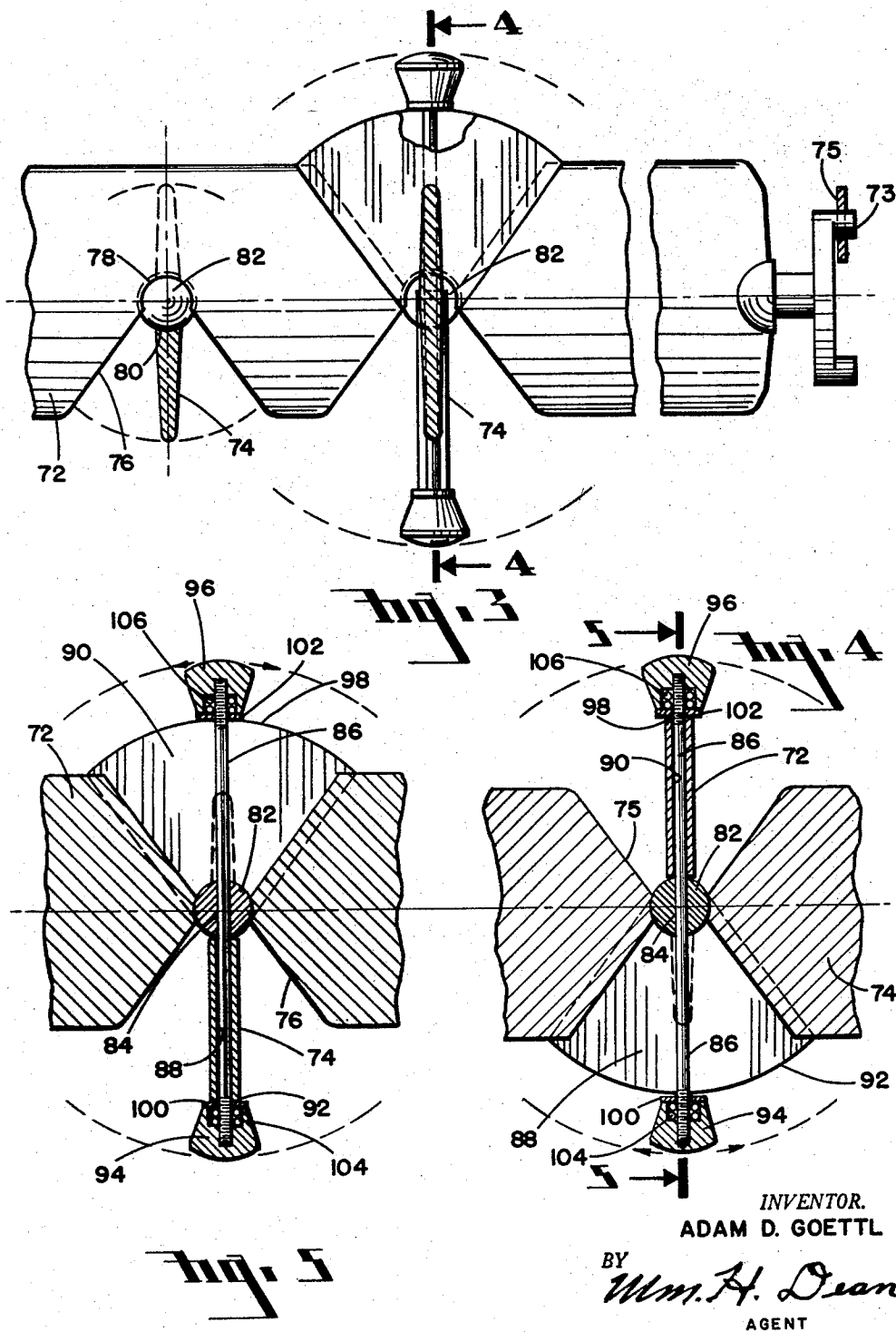
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2,874,626

ACTUATOR FOR LOUVER SLATS

Adam D. Goettl, Phoenix, Ariz.

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9 Claims. (Cl. 98—40)

This invention relates to an actuator for louver slats and more particularly for actuator for use in pivotally adjusting louver slats which are arranged in angularly intersecting relationship with each other.

Various devices have been utilized for controlling and actuating louver slats and it has been recognized that a single common control is desirable for pivoting all of the slats in a louver frame wherein said slats intersect and are disposed in angular dispositions relative to each other. In louver frames wherein slats intersect at substantially right angles to each other and wherein these slats are also pivotally adjusted within substantially V shaped meshing notches of each other, the air may be projected in various directions through the louver frame into a room. It has been a problem to adjust all of the intersecting slats of such a louver grill by means of a single common control.

Accordingly, it is an object of the present invention to provide an actuator for louver slats which, by means of a single control member, will pivotally adjust the positions of all of the slats in a louver frame wherein such slats intersect each other at substantially right angles.

Another object of the invention is to provide a very simple actuator for louver slats wherein a pair of intersecting slats are provided with substantially fan shaped slots communicating with each other at the intersection of the slats whereby an actuator member projecting through the slots of both intersecting slats may be pivoted in several directions thereby adjusting the slats relative to each other within the angular limits of substantially V shaped meshing notches which are opposed to the substantially V shaped slots in the slats.

Another object of the invention is to provide a very simple actuator which is particularly adapted for use in pivotally adjusting slats having V shaped notches which mesh with each other at the intersection of the slats.

Another object of the invention is to provide an actuator for louver slats which engages the slats of the louver at the intersection of such slats whereby a single common control is capable of pivoting two of the intersecting slats which are pivotally linked to other slats of the louver so that the entire group of louver slats may be pivoted into a variety of positions by a single control member which is provided with a manually engageable handle.

Another object of the invention is to provide an actuator for louver slats which is particularly adapted for use in connection with plastic slats which are made by the injection molding process.

Another object of the invention is to provide an actuator for louver slats which is very compact and simple to construct.

Another object of the invention is to provide an actuator for louver slats which is unobtrusive and also attractive in appearance.

Further objects and advantages of the invention may be apparent from the following specification, appended claims and accompanying drawings in which:

Fig. 1 is a fragmentary sectional view taken through a

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louver having slats intersecting each other at substantially V shaped intermeshing notch portions therein and showing the actuator of the present invention within the intersecting portions of two of the slats.

Fig. 2 is a sectional view taken from the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary sectional view taken through the slats of a louver and showing a modification of an actuator for louver slats in accordance with the present invention.

Fig. 4 is a sectional view taken from the line 4—4 of Fig. 3, and

Fig. 5 is a sectional view taken from the line 5—5 of Fig. 4.

As shown in Fig. 1 of the drawing slats 10 and 12 of a louver are disposed in intersecting relationship and these slats are provided with substantially V shaped notches which mesh with each other and permit pivotal movement of these slats relative to each other and within the V shaped notches of each other. The slats 10 are provided with V shaped notches 14 which mesh with V shaped notches 16 of the slats 12. The louver includes a plurality of the slats 10 and a plurality of the slats 12. The slats 10 as shown in Fig. 1 of the drawings are provided with bell crank elements 18 on their ends and a link 20 pivotally interconnects all of these bell crank elements 18 so that the slats 10 may pivot in unison with each other about axle portions 22 of each of these slats 10.

As shown in Fig. 2 of the drawings the present invention includes a plurality of slats 12 having bell crank elements 24 pivotally interconnected by a common link 26 which permits all the slats 12 to pivot about axle elements 28. The axle elements 22 pivot on axes 30 while the axle elements 28 pivot on axes 32 which are laterally offset relative to the axes 30 as shown in Figs. 1 and 2 of the drawings. Lateral spacing of the axes 30 from the axes 32 corresponds with the thickness of the slats at their intersections wherein the notches 14 and 16 mesh with each other.

One of the slats 12 is provided with an intersecting portion 34 which is somewhat thicker than that of the remaining slats 12 and this intersecting portion is provided with a substantially fan shaped slot 36 therein the included angle of the fan shaped slot 36 substantially corresponding to an opposed V shaped notch 38 which is slightly wider than the remaining V shaped notches 16 in the slat 12 whereby it is capable of accommodating a thickened intersecting portion 40 of one of the slats 10. This thickened portion 40 is provided with a slot 42 therein and this slot 42 as shown in Fig. 1 of the drawings is substantially fan shaped and openly communicates with a notch 14 which is slightly wider than the remaining notches 14 of the slat 10 in order to accommodate the thickened intersecting portion 34 of the slat 12. It will be seen that the slot 36 is open at the outer edge of the slat 12 and terminates in an arcuate portion 44 which extends in a convex form slightly protruding from the edge of the slat 12. The inner end of the slot 36 is provided with an opening 46 communicating directly with the substantially V shaped notch 38 which is similar to but slightly wider than the remaining notches 16 in the slat 12.

It will be noted that the slats 10 and 12 at the apices of the V shaped notch portions are provided with bearing surfaces having compound curvature. The apices of the notch portions 14 are provided with arcuate bearing portions 48 having compound curvature as shown in Figs. 1 and 2 while the apices of the notch portions 16 are provided with bearing portions 50 having compound curvature as shown in Figs. 1 and 2. Likewise, the slats 10 and 12 through which the slots 42 and 36 extend also have intersecting bearing portions 52 and 54 of compound

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curvature. These bearing portions 52 and 54 communicate with the slots 42 and 36 while the slots 42 and 36 both communicate directly with each other at any pivoted positions of the slats 10 and 12 about the pivotal axes 30 and 32.

An actuator rod or, actuator member, 56 extends into the slots 36 and 42 and screw threadably connected to a projecting end of the rod 56 is a manually engageable knob 58. Abutted to a shank 60 of the knob 58 is a detent spring 62 which exerts force on a detent member 64 which is engageable with arcuate rows of detent teeth 66 and these arcuate rows of detent notches are disposed on an arc having a center coinciding with the axis 30 of one of the slats 10.

Connected to the opposite end of the rod 56 from the knob 58 is another detent member 68 which engages arcuate rows of detent notches 70 which are on an arc around a center coinciding with the axis 32 of one of the slats 12. It will be seen that the rod 56 is free to reciprocate relative to the slots 36 and 42 and that the spring 62 serves to load both detent members 54 and 68 relative to the arcuate rows of detent notches 66 and 70 which are cast in the side walls of the slots 36 and 42. The present slats 10 and 12 may be cast of plastic material or any other suitable material as desired.

The operation of the actuator for louver slats according to the present invention is substantially as follows:

When it is desired to pivot either the slats 10 or 12 about their respective axes 30 or 32 the manual actuator knob 58 is grasped and moved in a direction transversely of the axes of the slats which it is desired to pivot. Further, it may be desirable to pivot both the slats 10 and 12 at once in which case the manual control knob 58 may be moved at an angle to the axes of both the slats 10 and 12, for example, the control knob 58 may be moved at an angle other than ninety degrees to both the pivotal axes of the slats 10 and 12.

For example, when it is desired to pivot the slats 10 only about their axes 30 the actuator member 56 is moved by means of a manual control knob 58 within the slot 36 whereupon the slats 10 may be pivoted about their axes in either direction within the limits of the notches 16 of the slats 12. Since only one of the slats 10 is provided with a slot 42 which receives the actuator rod 56, the bell crank elements 18 of the slats 10 are interconnected by a link 20 which transmits pivotal motion to the remaining slats 10. The link 26 of the bell crank member 24 transmit motion to the slats 12 when the slat 12 having the slot 36 therein is pivoted by the actuator rod 56. During pivotal movement of the actuator rod 56 in the slot 36 of the slat 12 the detent member 64 slides over the detent notches 66 under compression of a spring 62 which tends to hold the detent member 64 in adjusted position in one of the notches 66 and to thereby maintain adjustment of the slats 10 in certain desired position. Likewise, when the actuator member 56 is pivoted in the slot 42 of the slat 10 the detent member 68 slides over the detent notches 70 and spring 62 also acts to maintain engagement of the detent member 68 with the individual notches 70 in order to fix the slats 12 in any one of several desired angular positions which lie within the notches 14 of the slats 10.

It will be obvious that the actuator member 56 may be moved in a combination of directions within the limits of the slots 36 and 42 in order to accomplish combined angular pivotal adjustment of the slats 10 and 12 within the angular limits of the V shaped notches 14 and 16 of these respective slats.

In the modification of the present invention as shown in Fig. 3 of the drawings slats 72 and 74 correspond with the slats 10 and 12 respectively of the structure shown in Fig. 1 of the drawings. The slats 72 are provided with substantially V shaped notches 76 having spherical socket portions 78 in their apice portions. Likewise, the slats 74 are provided with spherical socket portions 80 in their

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V shaped notch portions 75 at the apices thereof. The spherical sockets in these notch portions each extend slightly more than one hundred eighty degrees about spherical bearing members 82 which form pivotal axes 84 for the slats so that they may pivot within the angular limits of the V shaped notches of intersecting slats.

While there are many of the spherical bearing members 82 in the present louver grill one of the bearing members 82 as shown in Fig. 4 of the drawings is provided with a central bore 84 which extends therethrough. Positioned in this bore is an actuator rod 86 which extends through V shaped or fan shaped slots 88 and 90 in the respective slats 74 and 72. The outer edge portions of the slats 74 at opposite sides of the slot 88 forms an arc 92 adjacent to which a manual control knob 94 moves in connected relation with the control rod 86. Likewise, a manual knob 96 engages arcuate portions 98 at opposite sides of the slot 90 in the slat 72 as shown in Fig. 5 of the drawings.

Between the manual control knobs 94 and 96 and the respective arcuate portions 92 and 98 are washers 100 and 102, respectively. These washers 100 and 102 are engaged by springs 104 and 106, respectively, which are retained in recesses in the knobs 94 and 96. These knobs 94 and 96 are screw threaded on the ends of the actuator rod 86 and are therefore adjustable to slightly compress the springs 104 and 106 in order to maintain tension of the washers 100 and 102 on the arcuate surfaces 92 and 98 of the slats 74 and 72, respectively.

In operation pivotal movement of the actuator rod 86 in the slot 90 of the slat 72 causes pivotal movement of the slats 74 about the axes of the spherical bearing members 82 whereby pivotal linkage at the ends of these slats tie them together and causes them to move in unison. Likewise, pivotal movement of the actuator rod 86 in the slot 88 of the slat 74 causes pivotal movement of the slats 72 about the axes of the spherical bearing members 82 whereby these slats move in unison due to the interconnecting linkage similar to that as shown in Figs. 1 and 2 of the drawings, it being noted that the slats 72 are provided with bell crank elements 73 interconnected by links 75. A similar arrangement is provided to interconnect the slats 74, however this linkage is not shown in the drawing.

It will be understood that the actuator member 86 may be pivoted in the slots 88 and 90 parallel with the slats 74 and 72, respectively, or the actuator rod 86 may be pivoted in any of several directions at other than right angles to the axes of these slats whereby a combined movement or pivotal adjustment of the slats of the slats 72 and 74 may be accomplished, such adjustments being made within the angular limits of the notches 76 and 75 in the slats 72 and 74, respectively.

Various modifications of the present invention may be resorted to in a manner limited only by a just interpretation of the following claims.

I claim:

1. In an actuator for louver slats the combination of: a plurality of first pivoted slats in spaced parallel relation to each other; first linkage pivotally interconnecting said slats for pivotal action in unison with each other; a plurality of second pivoted slats in spaced parallel relation to each other; second linkage pivotally interconnecting said second slats for pivotal action in unison with each other; said first slats having substantially V-shaped notches; said second slats having substantially V-shaped notches intersecting and meshing with the V-shaped notches of said first slats; one of said first slats having a substantially V-shaped first slot therein; said V-shaped slot converging inwardly from one edge of said first slat and communicating with one of said V-shaped notches which diverges to the opposite edge of said first slat; one of said second slats having a second V-shaped slot therein, said second V-shaped slot converging inwardly from one edge of

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said second slat and communicating with one of said V-shaped notches therein which diverges to the opposite edge of said second slat; said V-shaped slots extending longitudinally of and enclosed by the sides of the respective slats; said first and second slots communicating with each other at the convergence and meshing juncture of said notches in said first and second slats; and an actuator member slidably positioned in both said first and second slots whereby said actuator member may be pivoted in several directions within said slots to actuate and pivot said first and second slats within the angular limits of the V-shaped notches therein.

2. In an actuator for louver slats the combination of: a plurality of first pivoted slats in spaced parallel relation to each other; first linkage pivotally interconnecting said slats for pivotal action in unison with each other; a plurality of second pivoted slats in spaced parallel relation to each other; second linkage pivotally interconnecting said second slats for pivotal action in unison with each other; said first slats having substantially V-shaped notches; said second slats having substantially V-shaped notches intersecting and meshing with the V-shaped notches of said first slats; one of said first slats having a substantially V-shaped first slot therein; said V-shaped slot converging inwardly from one edge of said first slat and communicating with one of said V-shaped notches which diverges to the opposite edge of said first slat; one of said second slats having a second V-shaped slot therein, said second V-shaped slot converging inwardly from one edge of said second slat and communicating with one of said V-shaped notches therein which diverges to the opposite edge of said second slat; said V-shaped slots extending longitudinally of and enclosed by the sides of the respective slats; said first and second slots communicating with each other at the convergence and meshing juncture of said notches in said first and second slats; and an actuator member slidably positioned in both said first and second slots whereby said actuator member may be pivoted in several directions within said slots to actuate and pivot said first and second slats within the angular limits the the V-shaped notches therein, a handle on said actuator member disposed outwardly of the edges of said slats.

3. In an actuator for louver slats the combination of: a plurality of first pivoted slats in spaced parallel relation to each other; first linkage pivotally interconnecting said slats for pivotal action in unison with each other; a plurality of second pivoted slats in spaced parallel relation to each other; second linkage pivotally interconnecting said second slats for pivotal action in unison with each other; said first slats having substantially V-shaped notches; said second slats having substantially V-shaped notches intersecting and meshing with the V-shaped notches of said first slats; one of said first slats having a substantially V-shaped first slot therein; said V-shaped slot converging inwardly from one edge of said first slat and communicating with one of said V-shaped notches which diverges to the opposite edge of said first slat; one of said second slats having a second V-shaped slot therein, said second V-shaped slot converging inwardly from one edge of said second slat and communicating with one of said V-shaped notches therein which diverges to the opposite edge of said second slat; said V-shaped slots extending longitudinally of and enclosed by the sides of the respective slats; said first and second slots communicating with each other at the convergence and meshing juncture of said notches in said first and second slats; and an actuator member slidably positioned in both said first and second slots whereby said actuator member may be pivoted in several directions within said slots to actuate and pivot said first and second slats within the angular limits of the V-shaped notches therein, the outer edge portion of each of said slats at the outwardly diverging portions of said slots being arcuate and forming a convex edge portion in opposed relationship to the substan-

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tially V-shaped notch divergingly disposed toward the opposite edge of the slat.

4. In an actuator for louver slats the combination of: a plurality of first pivoted slats in spaced parallel relation to each other; first linkage pivotally interconnecting said slats for pivotal action in unison with each other; a plurality of second pivoted slats in spaced parallel relation to each other; second linkage pivotally interconnecting said second slats for pivotal action in unison with each other; said first slats having substantially V-shaped notches; said second slats having substantially V-shaped notches intersecting and meshing with the V-shaped notches of said first slats; one of said first slats having a substantially V-shaped first slot therein; said V-shaped slot converging inwardly from one edge of said first slat and communicating with one of said V-shaped notches which diverges to the opposite edge of said first slat; one of said second slats having a second V-shaped slot therein, said second V-shaped slot converging inwardly from one edge of said second slat and communicating with one of said V-shaped notches therein which diverges to the opposite edge of said second slat; said V-shaped slots extending longitudinally of and enclosed by the sides of the respective slats; said first and second slots communicating with each other at the convergence and meshing juncture of said notches in said first and second slats; and an actuator member slidably positioned in both said first and second slots whereby said actuator member may be pivoted in several directions within said slots to actuate and pivot said first and second slats within the angular limits of the V-shaped notches therein, the outer edge portion of each of said slats at the outwardly diverging portions of said slots being arcuate and forming a convex edge portion on each respective slat in opposed relationship to the substantially V-shaped notch divergingly disposed toward the opposite edge of the slat, manually engageable knobs on opposite ends of said actuator member; and washers inwardly of said knobs spring loaded against said convex edge portions.

5. In an actuator for louver slats the combination of: a plurality of first pivoted slats in spaced parallel relation to each other; first linkage pivotally interconnecting said slats for pivotal action in unison with each other; a plurality of second pivoted slats in spaced parallel relation to each other; second linkage pivotally interconnecting said second slats for pivotal action in unison with each other; said first slats having substantially V-shaped notches; said second slats having substantially V-shaped notches intersecting and meshing with the V-shaped notches of said first slats; one of said first slats having substantially V-shaped first slot therein; said V-shaped slot converging inwardly from one edge of said first slat and communicating with one of said V-shaped notches which diverges to the opposite edge of said first slat; one of said second slats having a second V-shaped slot therein, said second V-shaped slot converging inwardly from one edge of said second slat and communicating with one of said V-shaped notches therein which diverges to the opposite edge of said second slat; said V-shaped slots extending longitudinally of and enclosed by the sides of the respective slats; said first and second slots communicating with each other at the convergence and meshing juncture of said notches in said first and second slats; and an actuator member slidably positioned in both said first and second slots whereby said actuator member may be pivoted in several directions within said slots to actuate and pivot said first and second slats within the angular limits of the V-shaped notches therein, said slats having arcuate detent edge portions in opposite sides thereof; and a spring loaded detent member movably positioned on said actuator member and engageable with the detent portions in the slots of the slats.

6. In an actuator for louver slats the combination of: a plurality of first pivoted slats in spaced parallel relation to each other; a first linkage pivotally interconnect-

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ing said slats for pivotal action in unison with each other; a plurality of second pivoted slats in spaced parallel relation to each other; second linkage pivotally interconnecting said second slats for pivotal action in unison with each other; said first slats having substantially V-shaped notches; said second slats having substantially V-shaped notches intersecting and meshing with the V-shaped notches of said first slats; one of said first slats having a substantially V-shaped first slot therein; said V-shaped slot converging inwardly from one edge of said first slot and communicating with one of said V-shaped notches which diverge to the opposite edge of said first slot; one of said second slats having a second V-shaped slot therein; said second V-shaped slot converging inwardly from one edge of said second slot and communicating with one of said V-shaped notches therein which diverges to the opposite edge of said second slot; said V-shaped slots extending longitudinally of and enclosed by the sides of the respective slats; said first and second slots communicating with each other at the convergence and meshing juncture of said notches in said first and second slats; and an actuator member slidably positioned in both said first and second slots whereby said actuator member may be pivoted in several directions within said slots to actuate and pivot said first and second slats within the angular limits of the V-shaped notches therein; spherical bearing members at the intersections of the V-shaped notches in the first and second slats; spherical sockets in said slats at said intersections retaining said spherical bearing members, said actuator member extending through the middle of one of said spherical bearing members whereby said bearing member forms a pivotal axes for the slats and is disposed between the substantially V-shaped slots and the V-shaped notches of the first and second slats.

7. In an actuator for louver slats the combination of: a plurality of first pivoted slats disposed in spaced relation to each other; first linkage pivotally interconnecting said slats for pivotal action in unison with each other; a plurality of second pivoted slats disposed in spaced relation to each other and intersecting said first slats; second linkage pivotally interconnecting said second slats for pivotal action in unison with each other, one each of said first and second slats having a V-shaped slot extending longitudinally thereof and enclosed by the sides thereof, said slots of said first and second slats communicating with each other at the intersection juncture of said first and second slats; and an actuator member slidably positioned in slots of both said first and second slats; whereby said actuator member may be pivoted in several directions within said slots to actuate and pivot said first and second slats relative to each other.

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8. In an actuator for louver slats the combination of: a plurality of first pivoted slats disposed in spaced relation to each other; first linkage pivotally interconnecting said slats for pivotal action in unison with each other; a plurality of second pivoted slats disposed in spaced relation to each other and intersecting said first slats; second linkage pivotally interconnecting said second slats for pivotal action in unison with each other, one each of said first and second slats having a V-shaped slot extending longitudinally thereof and enclosed by the sides thereof, said slots of said first and second slats communicating with each other at the intersection juncture of said first and second slats; and an actuator member slidably positioned in slots of both said first and second slats; whereby said actuator member may be pivoted in several directions within said slots to actuate and pivot said first and second slats relative to each other, said first and second slats being pivoted about axes rear to the intersections of said slats.

9. In an actuator for louver slats the combination of: a plurality of first pivoted slats disposed in spaced relation to each other; first linkage pivotally interconnecting said slats for pivotal action in unison with each other; a plurality of second pivoted slats disposed in spaced relation to each other and intersecting said first slats; second linkage pivotally interconnecting said second slats for pivotal action in unison with each other, one each of said first and second slats having a V shaped slot extending longitudinally thereof and enclosed by the sides thereof, said slots of said first and second slats communicating with each other at the intersection juncture of said first and second slats; and an actuator member slidably positioned in slots of both said first and second slats; whereby said actuator member may be pivoted in several directions within said slots to actuate and pivot said first and second slats relative to each other, said first and second slats being pivotal about axes near to the intersections of said slats and spherical bearings engaging said first and second slats at the intersections thereof; said actuator member extending through one of said spherical bearing members.

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