

April 6, 1954

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2,674,451

WINDOW SASH OPERATING MECHANISM

Filed June 5, 1950

4 Sheets-Sheet 1

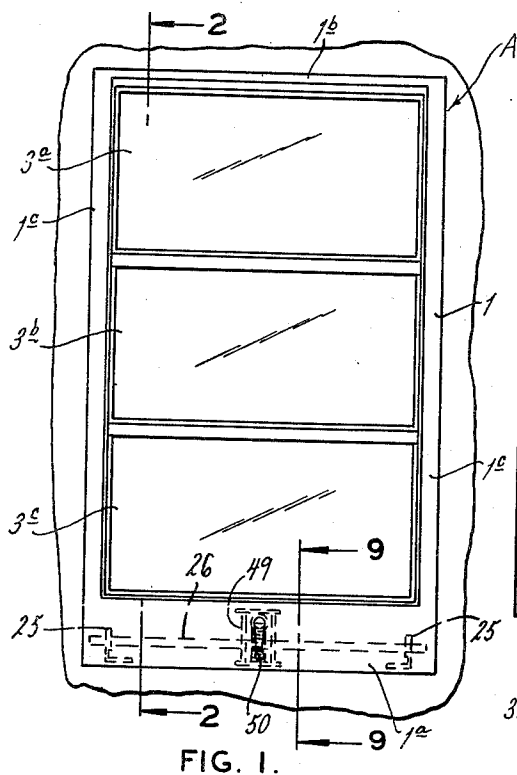


FIG. 1.

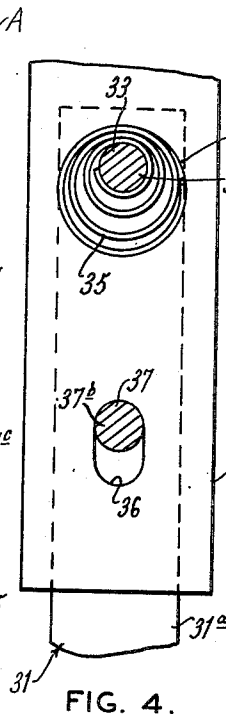


FIG. 4.

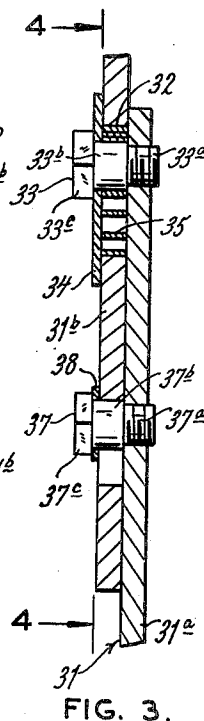


FIG. 3.

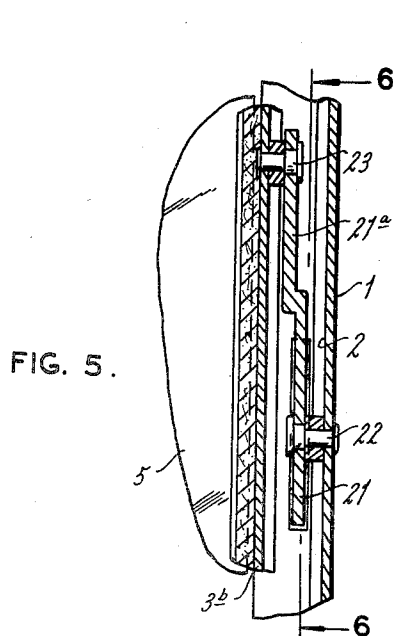


FIG. 5.

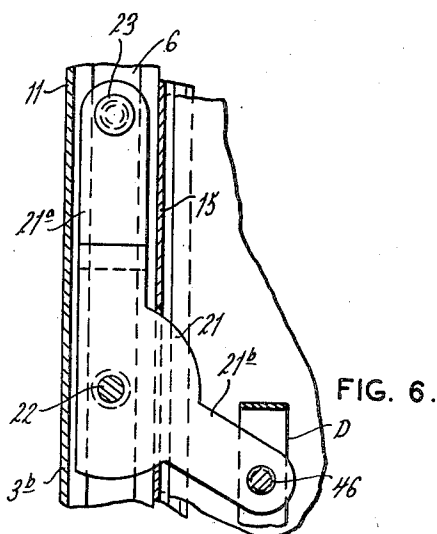


FIG. 6.

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4 Sheets-Sheet 2

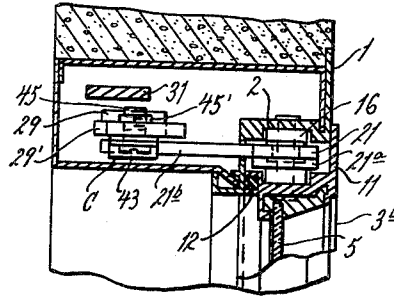
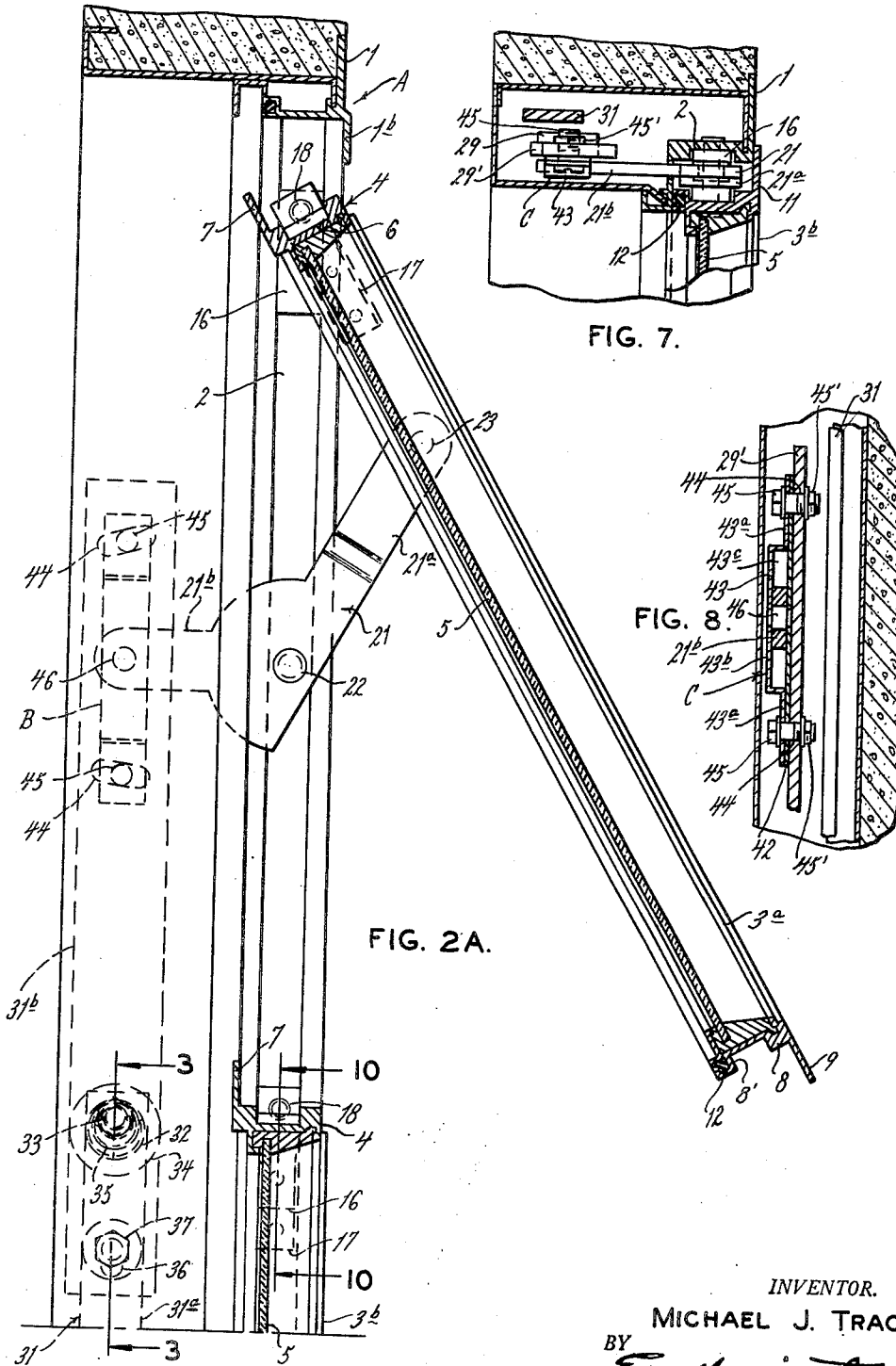


FIG. 7.

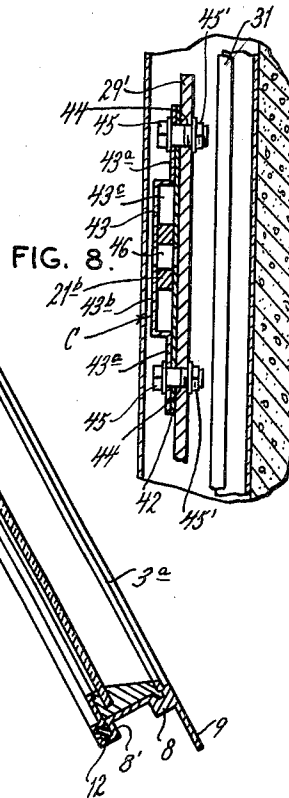


FIG. 8.

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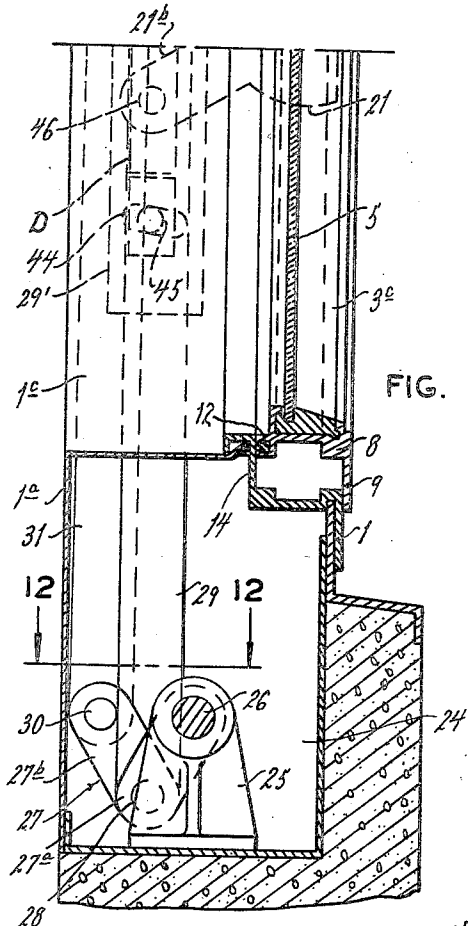


FIG. 2C.

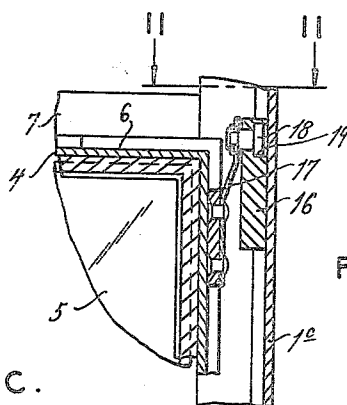


FIG. 10.

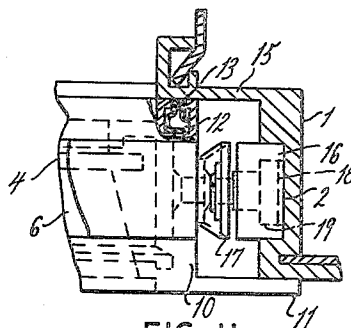


FIG. 11.

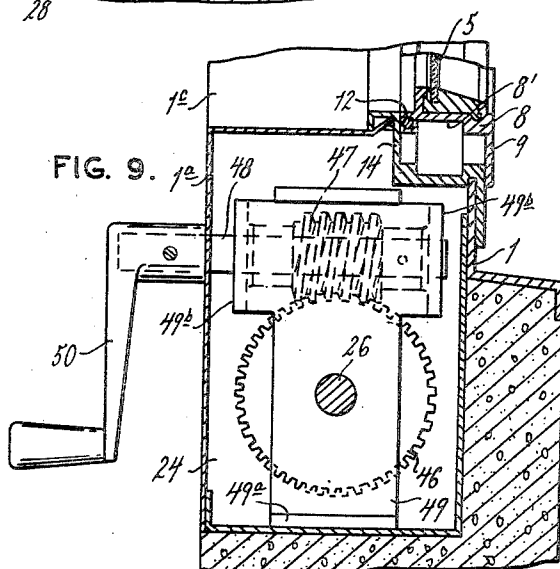


FIG. 9.

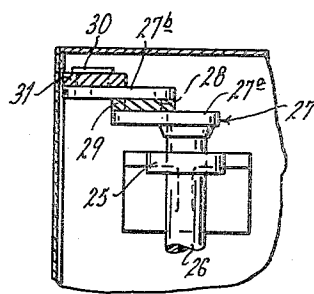


FIG. 12.

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WINDOW SASH OPERATING MECHANISM

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4 Sheets-Sheet 4

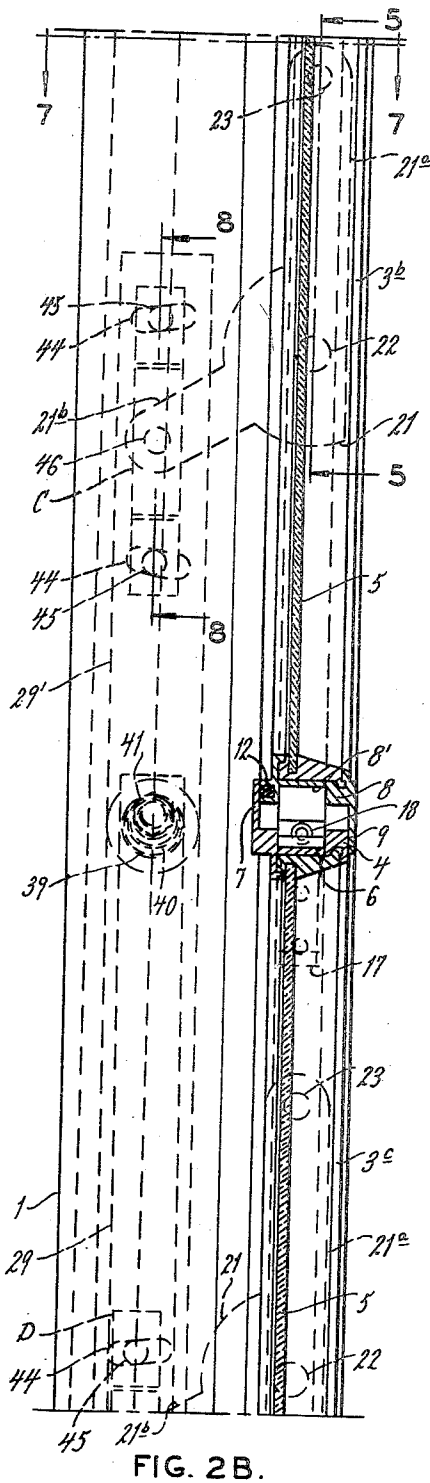


FIG. 16.

FIG. 17.

FIG. 18.

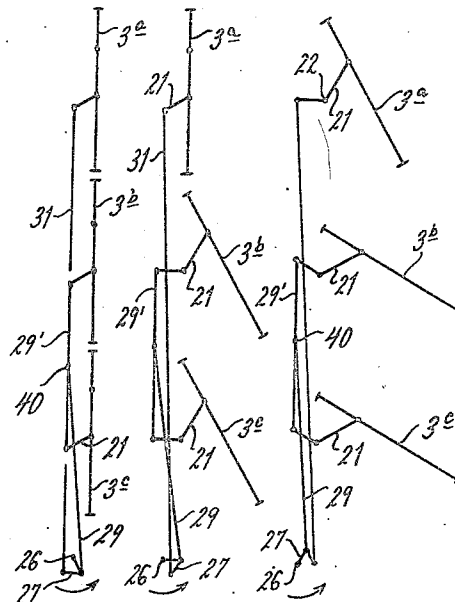
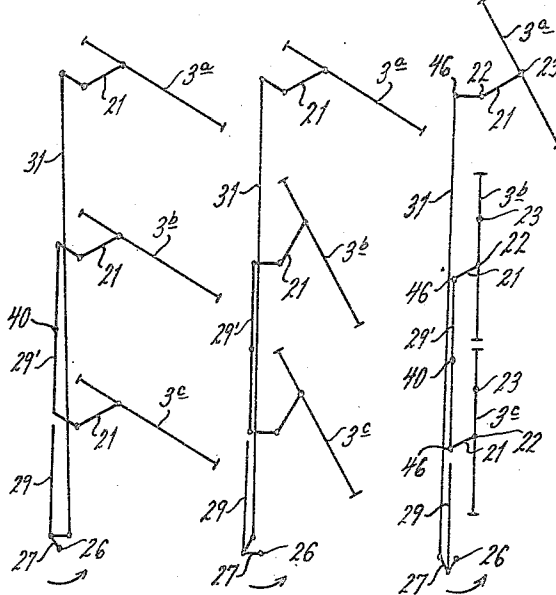


FIG. 13.

FIG. 14.

FIG. 15.

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UNITED STATES PATENT OFFICE

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WINDOW SASH OPERATING MECHANISM

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Application June 5, 1950, Serial No. 166,172

9 Claims. (Cl. 268—23)

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This invention relates generally to window sash operating mechanisms and more specifically to mechanisms for adjusting the sashes of window structures of the type having each a plurality of sashes disposed in louver arrangement and adapted for such adjustment as to provide ventilating openings between portions of various adjacent sashes, the predominant object of the invention being to provide an operating mechanism for the type of window structure referred to which is extremely simple in construction and operation and is capable of performing its intended function in a highly efficient manner.

Fig. 1 is an elevational view of a window structure equipped with a sash operating mechanism constructed and arranged in accordance with this invention.

Fig. 2 is an enlarged, vertical, fragmentary section taken on line 2—2 of Fig. 1, said view being comprised of three fragmentary sectional views which are differentiated one from another by parenthetic designations A, B, and C.

Fig. 3 is an enlarged, fragmentary, vertical section taken on line 3—3 of Fig. 2(A).

Fig. 4 is a fragmentary, vertical section taken on line 4—4 of Fig. 3.

Fig. 5 is a fragmentary, vertical section taken on line 5—5 of Fig. 2(B).

Fig. 6 is a fragmentary, vertical section taken on line 6—6 of Fig. 5.

Fig. 7 is a fragmentary, horizontal section taken on line 7—7 of Fig. 2(B).

Fig. 8 is a fragmentary, vertical section taken on line 8—8 of Fig. 2(A).

Fig. 9 is an enlarged, fragmentary, vertical section taken on line 9—9 of Fig. 1.

Fig. 10 is a fragmentary, vertical section taken on line 10—10 of Fig. 2(A).

Fig. 11 is a fragmentary, horizontal section taken on line 11—11 of Fig. 10.

Fig. 12 is a fragmentary, horizontal section taken on line 12—12 of Fig. 2(C).

Figs. 13, 14, 15, 16, 17, and 18 are diagrammatical views showing the sashes of a window structure and the sash operating mechanism adjusted to different positions.

In the drawings, wherein are shown for purposes of illustration, merely, one embodiment of the invention 1 designates the frame of a window structure which is designated generally by the reference character A. The window frame 1 is of rectangular shape, as is shown in Fig. 1, being composed of a sill portion 1a, a head portion 1b, and opposed jamb portions 1c. The opposed jamb portions 1c have formed therein at

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their inner faces channelways 2 that extend longitudinally of said jamb portions from top to bottom thereof.

In the embodiment of the invention illustrated in the drawings the window frame 1 has associated therewith three window sashes which are designated by the reference characters 3a, 3b, and 3c, said sashes comprising each a sash frame 4 in which is suitably glazed a pane of glass, or other material, 5. The upper and lower frame members of each sash frame are shaped in cross-section as is shown to good advantage in Fig. 2A; that is to say, the upper frame member includes a portion 5 which extends from the inner face to the outer face of said upper frame member and has a recess 6 formed therein that extends longitudinally of said upper frame member, there also being a flange 7 which is located at the inner portion of said upper frame member and projects upwardly from said portion 5 of said upper frame member. The lower frame member of each sash includes a portion 8 which extends from the inner face to the outer face of said lower frame member and has a recess 8' formed therein that extends longitudinally of said lower frame member, said frame portion 8 being provided at its outer portion with a flange 9 which projects downwardly from said portion 8 of said lower frame member. By referring to Fig. 11 of the drawings it will be noted that the opposed side members of each sash frame have a cross-sectional shape which is similar to the cross-sectional shape of the lower member of the sash frame. In other words, the opposite side members of each sash includes a portion 10 from which is extended outwardly a flange 11.

It is to be noted that the lower members of frames of the sashes 3a, 3b, and 3c, and the opposed, side members of said sash frames are provided with cavities 12 which receive weather stripping, as is shown at 13 in Fig. 11. When the window sashes are in closed positions the weather stripping at the lower portion of the sash 3a contacts with the flange 7 of the sash 3b, the weather stripping at the lower portion of the sash 3b contacts with the flange 7 of the sash 3c, while the weather stripping at the lower portion of the sash 3c contacts with an upstanding portion 14 which forms a part of the still portion 1a of the window frame 1 (Fig. 2). In like manner, the weather stripping associated with the opposed, side members of the window sashes contact with the inwardly extended flanges 15 of the window frame 1 when the sashes are in their closed positions.

Each of the window sashes has related thereto a pair of blocks 16 which are arranged adjacent to the upper ends of said sashes and are disposed for sliding movement in the channelways 2 of the jambs 1c of the window frame 1, the blocks 16 at corresponding sides of the sashes being disposed in the channelway 2 of one jamb of the window frame, while the blocks at the opposite, corresponding sides of the sashes are disposed in the channelway 2 of the opposite jamb of the window frame. Each of the window sashes 3a, 3b, and 3c has riveted or otherwise secured thereto at the upper portion of its opposite sides a pair of hinge elements 17, and at their upper ends these hinge elements 17 are hingedly secured to the pair of blocks 16 which are related to the window sash. The hinged connection between the hinge elements 17 of a sash and the blocks related to said sash is produced by headed pins 18, the heads of which are disposed in cavities 19 formed in the blocks 16, as is shown in Fig. 10, and the shank portions of which extend through openings formed in portions of the blocks. The outer end portions of the pins 18 are of reduced diameter and these reduced shank portions extend loosely through apertures formed through upper portions of the hinge elements 17 so that said upper portions of said hinge elements may swing about the reduced shank portions of the pins 18 when the window sashes are moved to open or closed positions.

Associated with each of the window sashes 3a, 3b, and 3c is a lever 21 which is shaped as is shown to good advantage in Fig. 2a, each of said levers being supported for pivotal movement by a portion of the window frame 1 through the instrumentality of a pivot element 22. Each of the levers 21 is provided with a long leg 21a and a short leg 21b and the outer end portion of the long leg of each lever is connected by a pivot element 23 to a side portion of its related window sash. At the base of the window structure A a compartment 24 is provided, as is shown to good advantage in Figs. 2(c) and 9, wherein a plurality of spaced bearing members 25 are disposed. These bearing members support a shaft 26 for rotation which is extended horizontally, as is shown in Fig. 1, and said shaft has fixedly mounted thereon for rotation therewith a crank member 27. The crank member 27 is in the form of a unitary structure comprising a base portion which is fixed to the shaft 26 and from which is extended in substantially V-shaped relation an arm 27a and an arm 27b, these arms being rigid with respect to each other. The arm 27a of the crank member has pivotally attached to the outer end portion thereof, by a pivot element 28, a bar 29, and the arm 27b of said crank member has pivotally attached to its outer end portion, by a pivot element 30, a bar 31.

The bar 29 has pivotally attached at its upper end portion a link 29' which in turn is pivotally attached at its opposite ends to the outer end portions of the short leg 21b of the lever 21 associated with each of the window sashes 3b and 3c, while the bar 31 is pivotally attached at its upper end by means of a pivot element 31' to the outer end portion of the short leg 21b of the lever 21 associated with the window sash 3a. The arrangement of attaching the bars 29 and 31, as described above, is shown to good advantage in Figs. 13 to 18, inclusive. By referring particularly to Figs. 2(A), 2(B), and 2(C), it will be noted that the bar 31 is comprised of a pair of bar sections 31a and 31b. Attention is directed to the fact that

the bar section 31b has formed therein a circular opening 32 (Figs. 3 and 4) through which a bolt 33 is extended, said bolt having a screwthreaded end portion 33a which is screwed into a screwthreaded opening formed in the bar section 31a, a shank portion 33b that is disposed in the circular opening 32 of the bar section 31b and a head 33c, there being a plate 34 which is interposed between the bolt head 33c and the adjacent face of the bar section 31b.

Arranged within the circuit opening 32 of the bar section 31b is a helical coil spring 35 which embraces the portion 33b of the bolt 33, with the inner portion of said helical coil spring contacting with the lower portion of the bolt portion 33b, and with the outer portion of said helical coil spring contacting with the wall of the circular opening 32. It is to be noted that the helical coil spring is so formed that the turns of the helical coil spring at the top of said coil spring are closely gathered while the turns of said helical coil spring at the bottom thereof are spaced apart to a considerable degree (Fig. 4). Also, it will be noted that the bar section 31b has a slot 36 formed therein at a point beneath the circular opening 32 and that a bolt 37 is extended through said slot. The bolt 37 is similar to the bolt 33 in that it comprises a screwthreaded end portion 37a which is screwed into a screwthreaded opening formed in the bar 31a, a portion 37b that is disposed in the slot 36, and a head 37c, beneath which a washer 38 is arranged in contact with a face of the bar section 31b. Because of the arrangement just described the bar sections 31a and 31b are connected together resiliently so as to permit of slight downward movement of the bar section 31a with respect to the bar section 31b for a purpose to be hereinafter set forth, the bolt 33 moving downwardly with said bar section 31a and compressing the widely spaced lower portions of the turns of the helical coil spring 35, and the bar section 31a being returned to its normal position relative to the bar section 31b by the helical coil spring when the force which moved the bar section downwardly has ceased to exist.

The link 29' which is pivotally connected at its opposite ends to the short legs 21b of the levers 21 associated with the window sashes 3b and 3c has a circular opening 39 in which is disposed a helical coil spring 40 (Fig. 2 (B)) which embraces a portion of a bolt 41 that is screwthreadedly connected to the bar 29 at the top thereof. The arrangement of the helical coil spring 40 and the bolt 41 with respect to the link 29' and the bar 29 is the same as the arrangement of the helical coil spring 35 and the bolt 33 with respect to the bar sections 31a and 31b; that is to say, a portion of the bolt 41 is embraced by the helical coil spring 40, with the turns of the coil spring closely gathered at the top and spaced apart at the bottom of the coil spring, and as a result of this situation the bar 29 is capable of moving downwardly slightly relative to the link 29' during operation of the mechanism of this invention, for a purpose which will presently appear herein. Attention is directed to the fact that the bolt 40 serves as a pivot which pivotally attaches the bar 29 and the link 29'.

It has been hereinbefore stated that the short legs of the levers 21 associated with the sashes 3b and 3c of the structure of this invention are pivotally attached to the link 29', while the short leg of the lever 21 associated with the sash 3a is pivotally attached to the upper end portion of the bar 31, and the manner of effecting such con-

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nections will now be described. By referring to Fig. 8 it will be noted that the link 29' has secured to the upper end portion thereof a bracket structure C which comprises a base plate 42 and a plate 43 which has opposed end portions 43a that contact with a face of said base plate and an intermediate U-shaped portion 43b which is projected outwardly from the base plate so as to provide a space 43c between wall portions of said base plate 42 and said plate 43. At opposite ends of the bracket structure the base plate 42 and the portions 43a of the plate 43 are provided with inclined slots 44, the pair of slots at each end of the bracket structure corresponding in size and inclination but the pairs of slots at the opposite ends of the bracket structure being inclined in opposite directions, as is shown by broken lines in Figs. 2(A) and 2(B). The shank of a bolt 45 is extended through the pair of slots 44 at each end of the bracket structure, each of said bolts having a nut 45' mounted thereon which is drawn up on the bolt for securely fixing the bracket structure to the bar 29'. The outer end portion of the short leg 21b of the lever 21 is projected into the space 43c provided by the bracket structure C and a pivot element 46 is extended through an opening formed through the short leg of the lever 21, the opposite end portions of said pivot element 46, which are of reduced diameter, being disposed in openings formed in the base plate 42 and the plate 43 of the bracket structure.

The short leg of the lever 21 associated with the sash 3a and the short leg of the lever 21 associated with the sash 3c are pivotally attached, respectively, to end portions of the bar 31 and the link 29' through the instrumentality of bracket structures B and D which are constructed and arranged in accordance with the bracket structure C as is described above. The function of the bracket structures B, C, and D is to permit of the pivot elements 46, which pivotally connect the short legs 21b of the levers 21 of the sashes 3a, 3b, and 3c, being adjusted vertically in order that said sashes may be brought to tightly closed positions in the operation of the window structure of this invention. This is accomplished by backing up the nuts 45' of the bolts 45 and rotating the bracket structures in one or the opposite direction, the walls of the inclined slots 44 coacting with the shanks of the bolts 45 for moving the bracket structures bodily upwardly or downwardly depending on the direction of rotation of said bracket structures. The adjustments referred to are made at the factory and thereafter the nuts 45' of the bolts 45 are drawn up tight to hold the bracket structures in the positions to which they have been adjusted.

The shaft 23 has fixedly mounted thereon, preferably, though not necessarily, at the approximate longitudinal center thereof, a worm wheel 46 (Fig. 9), and arranged in mesh with the teeth of said worm wheel at the top thereof is a worm 47. The worm 47 is fixedly mounted on a shaft 48 which is supported for rotation by a bracket structure 49, said bracket structure being provided with a base portion 49a that rests on and is suitably fixed to the bottom wall of the compartment 24 and having opposed flange portions 49b provided with bearing openings in which the shaft 48 is supported for rotation. The outer, outwardly extended end portion of the shaft 48 has fixedly mounted thereon a crank arm 50 which is adapted for rotary movement, such rotary movement being transmitted to the shaft 26

through obvious operation of the shaft 48, the worm 47, and the worm wheel 46.

In describing the operation of the window structure of this invention it will be assumed that the sashes are in closed positions, as is shown in Fig. 13. If the shaft 26 is now rotated in a counter-clockwise direction, through the instrumentality of the crank arm 50, the bar 29 will be elevated thus raising the link 29' and moving the sashes 3b and 3c by swinging said sashes on the pivots 22 of the levers 21, this being illustrated diagrammatically in Fig. 14. As rotation of the shaft 26 is continued in the counter-clockwise direction the bar 31 is elevated so as to swing the upper sash 3a about the pivot 22 of its lever 21 (Fig. 15), the sashes 3a, 3b, and 3c eventually reaching their fully opened positions, as is illustrated diagrammatically in Fig. 16. To move the sashes from their open to their closed positions, the crank arm is rotated to rotate the shaft 26 in the same counter-clockwise direction, the sashes 3b and 3c moving toward their closed positions after which the sash 3a moves toward its closed position. If it should be desired to change the sequence of operation of the sashes from that just described where the sashes 3b and 3c opened or closed first and are followed by opening or closing movement of the sash 3a, to a different sequence of sash operation, this may be accomplished by reversing the direction of the crank arm 50 so that the shaft 26 is rotated in a clockwise direction. When this is done the sash 3a will be actuated first to opened or closed position after which the sashes 3b and 3c will be so actuated.

It is important to note that no stop element of any sort is employed for interrupting rotation of the crank arm 50 in either direction, said crank arm being rotated in a single direction for sash opening and closing operations and said crank arm moving from one phase of its operation where the sashes are opened or closed to another phase where the sashes are closed or opened without interruption or change of direction of rotation. This absence of stop means is important because it eliminates the likelihood that children, or other persons, might attempt to force the crank arm beyond its limit of movement, if it had such limit, and thereby do damage to the operating mechanism of the window structure. The helical coil springs 40 also are important because they yieldingly connect the bars 29 and 31 to the sashes 3a, 3b and 3c so as to permit the lower end positions of said bars to pass through the arc at the bottom of the circular travel of the arm 27 when the sashes are closed.

I claim:

1. An operating mechanism for a plurality of window sashes disposed in louver arrangement comprising a rotatable shaft, a crank member fixedly mounted on said shaft for rotation therewith, said shaft and said crank member being rotatable through three-hundred sixty degrees and said crank member being provided with a plurality of arms disposed in permanently fixed substantially V-shaped relation, a plurality of bars each of which is pivotally connected to one of said arms of said crank member and each of which is connected to one of said window sashes, and means for manually rotating said shaft in a single direction for subjecting window sashes related to said plurality of bars to either opening or closing movement, said plurality of bars each being connected at one end to a separate

or different arm of said V-shaped arms and being connected at its opposite end to a separate individual or group of window sashes.

2. An operating mechanism for a plurality of movably supported window sashes disposed in louver arrangement comprising a rotatable shaft, a crank member fixedly mounted on said shaft for rotation therewith, said shaft and said crank member being rotatable through three-hundred sixty degrees and said crank member being provided with a plurality of permanently fixed arms disposed in substantially V-shaped relation, a plurality of bars each of which is pivotally connected to one of said arms of said crank member and each of which is connected to one of said window sashes, and means for manually rotating said shaft in one direction for subjecting window sashes related to said plurality of bars to either opening or closing movement in one sequence of sash operation and for manually rotating said shaft in the opposite direction for subjecting window sashes related to said plurality of bars to either opening or closing movement in a different sequence of sash operation, said plurality of bars each being connected at one end to a separate or different arm of said V-shaped arms and being connected at its opposite end to a separate individual or group of window sashes.

3. An operating mechanism for a plurality of movably supported window sashes disposed in louver arrangement comprising a rotatable shaft, a crank member fixedly mounted on said shaft for rotation therewith, said shaft and said crank member being rotatable through three-hundred sixty degrees and said crank member being provided with a plurality of permanently fixed substantially V-shaped arms, a plurality of bars each of which is pivotally connected to one of said arms of said crank member and each of which is connected to one of said window sashes, means for manually rotating said shaft in one direction for subjecting window sashes related to said plurality of bars to either opening or closing movement in one sequence of sash operation and for manually rotating said shaft in the opposite direction for subjecting window sashes related to said plurality of bars to either opening or closing movement in a different sequence of sash operation, said plurality of bars including each a bar made up of a pair of bar members which bar is the element thereof that is pivotally connected to one of said arms of said crank member, and an element for yieldingly connecting said pair of bar members together, said plurality of bars each being connected at one end to a separate or different arm of said V-shaped arms and being connected at its opposite end to a separate individual or group of window sashes.

4. An operating mechanism for a plurality of movably supported window sashes disposed in louver arrangement comprising a rotatable shaft, a crank member fixedly mounted on said shaft for rotation therewith, said shaft and said crank member being rotatable through three-hundred sixty degrees and said crank member being provided with a plurality of permanently fixed substantially V-shaped arms, a plurality of bars each of which is pivotally connected to one of said arms of said crank member and each of which is connected to one of said window sashes, means for manually rotating said shaft in one direction for subjecting window sashes related to said plurality of bars to either opening or closing movement in one sequence of sash operation and for manually rotating said shaft in the opposite

direction for subjecting window sashes related to said plurality of bars to either opening or closing movement in a different sequence of sash operation, said plurality of bars including each a bar made up of a pair of bar members which bar is the element thereof that is pivotally connected to one of said arms of said crank member, and an element comprising a spring for yieldingly connecting said pair of bar members together, said plurality of bars each being connected at one end to a separate or different arm of said V-shaped arms and being connected at its opposite end to a separate individual or group of window sashes.

5. A window structure comprising a window frame, a plurality of window sashes supported in louver arrangement for swinging movement with respect to said frame, and an operating mechanism for actuating said sashes to open and closed positions, said operating mechanism comprising a rotatably supported shaft, a crank member fixedly mounted on said shaft for rotation therewith, said shaft and said crank member being rotatable through three-hundred sixty degrees and said crank member being provided with a plurality of arms of permanently fixed substantially V-shaped relation, a plurality of bars each of which is pivotally connected to one of said arms of said crank member and each of which is connected to one of said window sashes, levers related to said sashes, there being one lever associated with each of said sashes and each lever being pivotally supported by said window frame and having a pair of legs one of which is pivotally attached to its related window sash, adjustable means for pivotally attaching the other leg of each lever to one bar of said plurality of bars, and operating means for manually rotating said shaft in one direction for subjecting window sashes related to said plurality of bars to either opening or closing movement in one sequence of sash operation and for manually rotating said shaft in the opposite direction for subjecting window sashes related to said plurality of bars to either opening or closing movement in a different sequence of sash operation, said plurality of bars each being connected at one end to a separate or different arm of said V-shaped arms and being connected at its opposite end to a separate individual or group of window sashes.

6. A window structure comprising a window frame, a plurality of window sashes supported in louver arrangement for swinging and vertical sliding movement with respect to said frame, and an operating mechanism for actuating said sashes to open and closed positions, said operating mechanism comprising a rotatably supported shaft, a crank member fixedly mounted on said shaft for rotation therewith, said shaft and said crank member being rotatable through three-hundred sixty degrees and said crank member being provided with a plurality of arms of permanently fixed substantially V-shaped relation, a plurality of bars each of which is pivotally connected to one of said arms of said crank member and each of which is connected to one of said window sashes, levers related to said sashes, there being one lever related to each of said sashes and each lever being pivotally supported by said window frame and having a pair of legs one of which is pivotally attached to its related window sash, adjustable means for pivotally attaching the other leg of each lever to one bar of said plurality of bars, and operating means for manually rotating said shaft in one direction for sub-

jecting window sashes related to said plurality of bars to either opening or closing movement in one sequence of sash operation and for manually rotating said shaft in the opposite direction for subjecting window sashes related to said plurality of bars to either opening or closing movement in a different sequence of sash operation, said plurality of bars each being connected at one end to a separate or different arm of said V-shaped arms and being connected at its opposite end to a separate individual or group of window sashes.

7. A window structure comprising a window frame, a plurality of window sashes supported in louver arrangement for swinging movement with respect to said frame, and an operating mechanism for actuating said sashes to open and closed positions, said operating mechanism comprising a rotatably supported shaft, a crank member fixedly mounted on said shaft for rotation therewith, said crank member being provided with a plurality of arms, a plurality of bars each of which is pivotally connected to one of said arms of said crank member and each of which is operatively associated with one of said window sashes, levers related to said sashes, there being one lever associated with each of said sashes and each lever being pivotally supported by said window frame and having a pair of legs one of which is pivotally attached to its associated window sash, adjustable means for pivotally attaching the other leg of each lever to one bar of said plurality of bars, and operating means for manually rotating said shaft in one direction for subjecting window sashes associated with said plurality of bars to either opening or closing movement in one sequence of sash operation and for manually rotating said shaft in the opposite direction for subjecting window sashes associated with said plurality of bars to either opening or closing movement in a different sequence of sash operation, said adjustable means including opposed portions provided with slots through which fastening devices extend, said plurality of bars each being connected at one end to a separate or different arm of said V-shaped arms and being connected at its opposite end to a separate individual or group of window sashes.

8. A window structure comprising a window frame, a plurality of window sashes supported in louver arrangement for swinging movement with respect to said frame, and an operating mechanism for actuating said sashes to open and closed positions, said operating mechanism comprising a rotatably supported shaft, a crank member fixedly mounted on said shaft for rotation therewith, said crank member being provided with a plurality of arms, a plurality of bars each of which is pivotally connected to one of said arms of said crank member and each of which is operatively associated with one of said window sashes, levers related to said sashes, there being one lever associated with each of said sashes and each lever being pivotally supported by said window frame and having a pair of legs one of which is pivotally attached to its associated window sash, adjustable means for pivotally attaching the other leg of each lever to one bar of said plurality of bars, and operating

means for manually rotating said shaft in one direction for subjecting window sashes associated with said plurality of bars to either opening or closing movement in one sequence of sash operation and for manually rotating said shaft in the opposite direction for subjecting window sashes associated with said plurality of bars to either opening or closing movement in a different sequence of sash operation, said adjustable means including opposed portions provided with inclined slots through which fastening devices extend, said plurality of bars each being connected at one end to a separate or different arm of said V-shaped arms and being connected at its opposite end to a separate individual or group of window sashes.

9. A window structure comprising a window frame, a plurality of window sashes supported in louver arrangement for swinging movement with respect to said frame, and an operating mechanism for actuating said sashes to open and closed positions, said operating mechanism comprising a rotatably supported shaft, a crank member fixedly mounted on said shaft for rotation therewith, said crank member being provided with a plurality of arms, a plurality of bars each of which is pivotally connected to one of said arms of said crank member and each of which is operatively associated with one of said window sashes, levers related to said sashes, there being one lever associated with each of said sashes and each lever being pivotally supported by said window frame and having a pair of legs one of which is pivotally attached to its associated window sash, adjustable means for pivotally attaching the other leg of each lever to one bar of said plurality of bars, and operating means for manually rotating said shaft in one direction for subjecting window sashes associated with said plurality of bars to either opening or closing movement in one sequence of sash operation and for manually rotating said shaft in the opposite direction for subjecting window sashes associated with said plurality of bars to either opening or closing movement in a different sequence of sash operation, said adjustable means including opposed portions provided with slots that are inclined in opposite directions and through which fastening devices extend, said plurality of bars each being connected at one end to a separate or different arm of said V-shaped arms and being connected at its opposite end to a separate individual or group of window sashes.

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