Dec. 27, 1949 M. J. TRACY 2,492,508

WINDOW OPERATING MECHANISM

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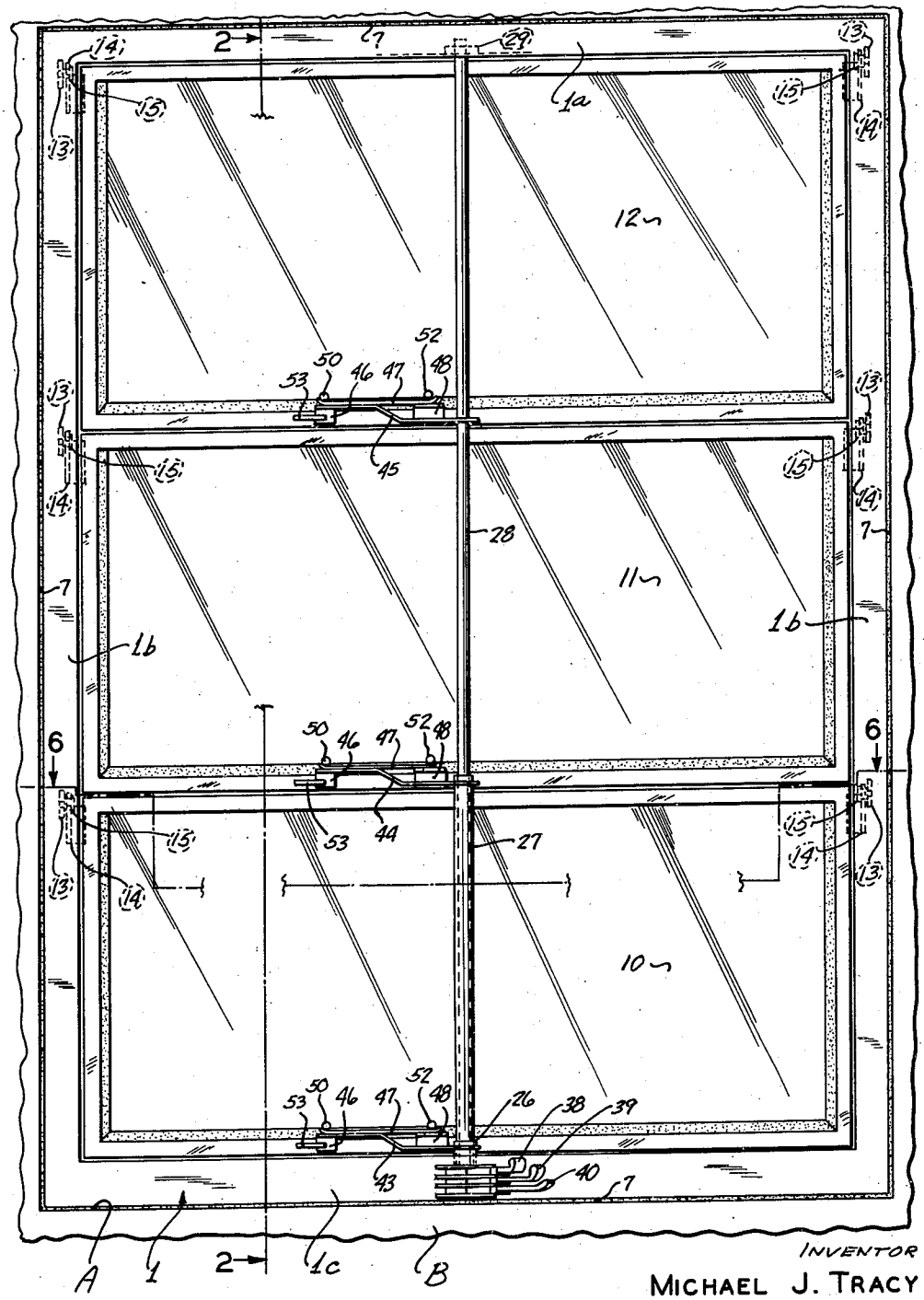


FIG. 1.

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WINDOW OPERATING MECHANISM

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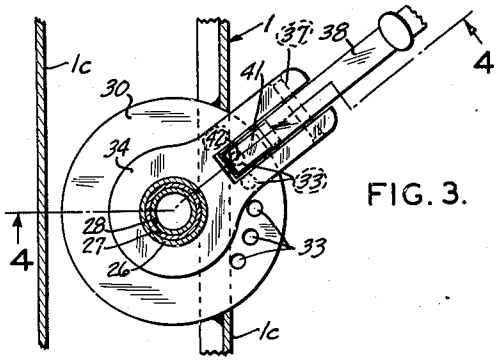


FIG. 3.

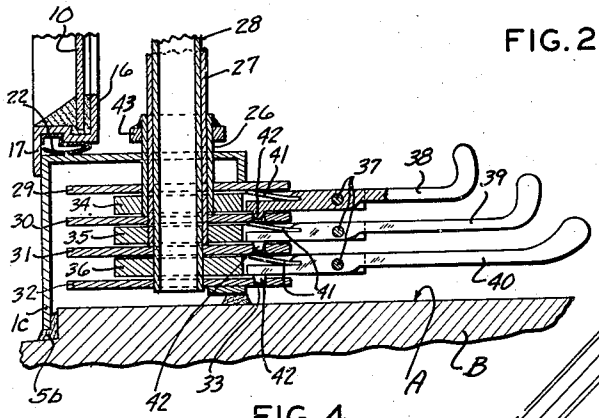


FIG. 4.

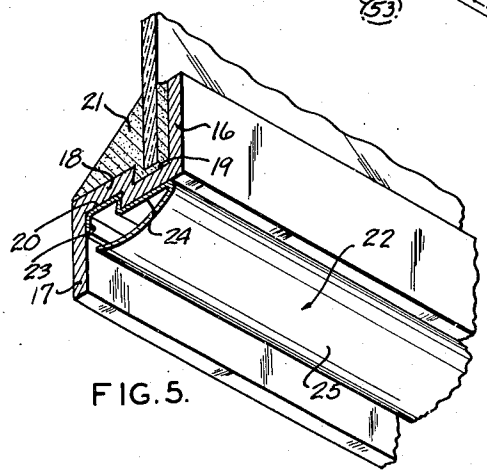


FIG. 5.

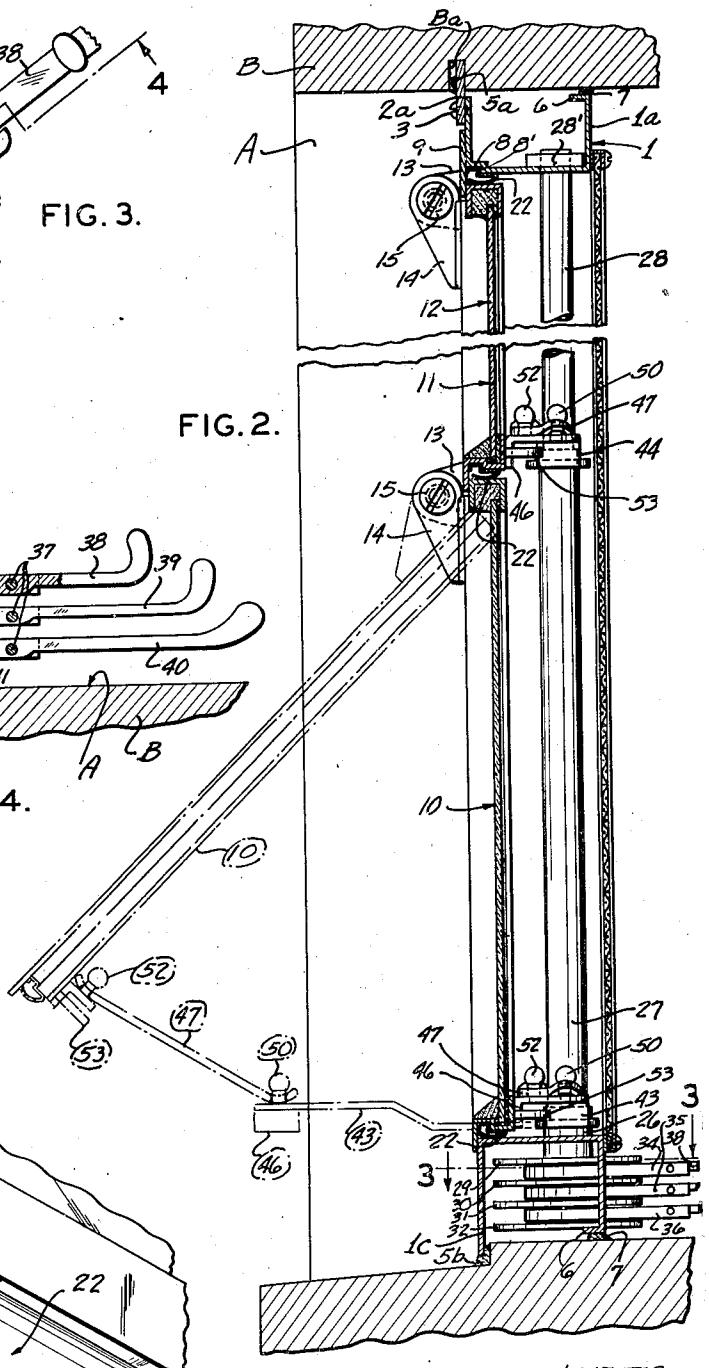


FIG. 2.

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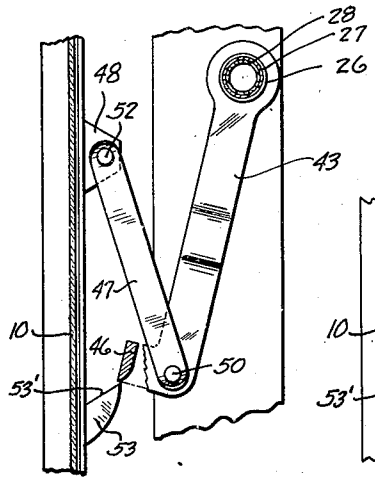


FIG. 7.

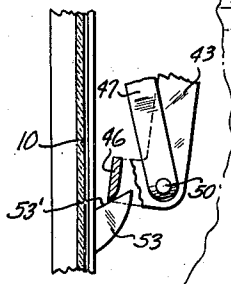


FIG. 8.

FIG. 6.

FIG. 9.

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2,492,508

WINDOW OPERATING MECHANISM

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Application November 9, 1945, Serial No. 627,572

9 Claims. (Cl. 268—21)

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This invention relates generally to window structures, and more specifically to window structures of the multiple sash type wherein the sashes are supported one above the other with pivot means at the tops of the sashes and sash-operating means associated with the sashes at the bottoms thereof for actuating said sashes to open and closed positions, the predominant object of the invention being to provide a window structure of the general type described above which includes improved means for actuating the sashes to open and closed positions and for locking said sashes in various open positions to which they are adjusted, and for weather-sealing the sashes and locking them in their closed positions.

Fig. 1 is an elevational view looking toward the inside of the improved window structure.

Fig. 2 is a vertical section on an enlarged scale taken on line 2—2 of Fig. 1, and with a portion of the structure shown in Fig. 1 broken away, and with the lower sash shown in an open position by dotted lines.

Fig. 3 is an enlarged, fragmentary, horizontal section taken on line 3—3 of Fig. 2.

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

Fig. 5 is a sectional-perspective of the lower portion of one of the sashes shown in Fig. 1.

Fig. 6 is a fragmentary, horizontal section taken on line 6—6 of Fig. 1, with the illustrated window sash shown by full lines in its closed position and by dotted lines in an open position.

Fig. 7 is a fragmentary, horizontal sectional view showing the operating means of a sash of the improved structure as such means appears as the sash approaches its closed position.

Fig. 8 is a fragmentary, horizontal sectional view similar to Fig. 8 but showing the parts illustrated in Fig. 7 as they appear when the closing operation of the illustrated sash has progressed beyond the point illustrated in Fig. 7.

Fig. 9 is an enlarged, fragmentary section taken on line 9—9 of Fig. 6.

In the drawings, wherein is shown for purposes of illustration, merely, one embodiment of the invention, A designates a window opening which is formed in a wall B of a building. Set into the window opening A is a rectangular window frame 1 made up of a horizontal head portion 1*a*, vertical jamb portions 1*b*, and a horizontal sill portion 1*c*, said window frame being shown in the drawings as being constructed of metal, with the head, jamb, and sill portions of the frame being of channel shape in cross-section, as is shown to good advantage in Figs. 2 and 6. The

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window frame 1 is anchored in place within the window opening A by an anchoring structure which includes a horizontal top plate 2*a* and opposed vertical side plates 2*b*, the latter plates extending downwardly from the top plate of the anchoring structure to the sill of the window opening A.

In arranging the window frame 1 in place within the window opening A, the window frame is set in place within said window opening in the approximate position in which said window frame 1 is shown in Figs. 2 and 6. The upper portion of the top plate 2*a* of the anchoring structure is then introduced into an aperture B*a* formed in the wall B at the top of the window opening and the head portion 1*a* of the window frame is secured to said top plate 2*a* by means of suitable fastening devices 3 (Fig. 2). In like manner, the outer portions of the vertical side plates 2*b* of the anchoring structure are inserted into apertures B*b* formed in the wall B at the sides of the window openings and the jamb portions of the window frame are secured to said vertical side plates 2*b* by suitable fastening devices 4 (Fig. 6). The top plate 2*a* and the side plates 2*b* are sealed within the apertures B*a* and B*b* by calking material 5*a*, as is shown in Figs. 2 and 6, while a seal is produced between the lower portion of the outer wall of the sill portion 1*c* of the window frame and the sill of the window opening, by calking material 5*b* (Fig. 2). Additionally, the inner walls of the head, jamb, and sill portions of the window frame 1 are provided with inturned flanges 6 which are spaced slightly with respect to adjacent faces of the window opening A, and these spaces are sealed by calking material 7, as is shown in Figs. 2 and 6.

By referring to the upper portion of Fig. 2 it will be noted that a recess 8 is formed in the lower wall of the head portion 1*a* of the window frame 1. The recess extends longitudinally of the bottom wall of the head portion 1*a* of the window frame 1 from end to end thereof and said recess is provided with an inclined inner wall 8'. The outer portion of the recess 8 is closed by a plate 9 that is secured to the outer wall of the head portion 1*a* of said window frame 1 and which extends downwardly some distance below the lower wall of said head portion of said window frame 1, said recess being intended for a purpose to be hereinafter set forth.

The particular window structure illustrated in Fig. 1 includes three window sashes 10, 11, and 12, although, obviously a greater or lesser number of window sashes may be employed in pro-

ducing a window structure in accordance with this invention, if this should be desired. The window sashes 10, 11, and 12 are pivotally attached at their upper ends to the window frame 1 so that their lower ends may be moved outwardly relative to said window frame to adjust said window sashes to open positions, as is shown by dotted lines in Fig. 2.

The means for pivotally supporting each of the window sashes 10, 11, and 12, with respect to the window frame 1 comprises a pair of opposed hinge elements 13 which extend through openings formed through portions of the outer wall of said window frame and project outwardly beyond the outer face of said outer wall of said window frame, said hinge elements 13 being secured by welding, or otherwise, to the inner face of the outer wall of said window frame, as is shown in Fig. 6. Related to the pair of hinge elements 13 associated with the window frame is a pair of opposed hinge members 14 which are secured by welding, or otherwise, to the frame of the window sash at opposite sides of said window sash. The hinge elements 14 of each of the window sashes 10, 11, and 12, have outwardly extended portions that are disposed immediately adjacent to the related fixed hinge elements of the window frame 1, as is shown in Fig. 6, and headed pivot elements 15 are employed which are provided with screwthreaded shank portions that are screwed into screwthreaded openings formed in the fixed hinge elements 13, portions of said pivot elements being extended through openings formed through the outwardly extended portions of the hinge elements 14 of the window sashes to provide for the pivotal support of the window sash.

The frames of the window sashes 10, 11, and 12, are shaped in cross-section as is shown in Figs. 2 and 6; that is to say the top section of the frame of each window sash is channel shaped in cross-section, while the opposed side sections and the bottom section of each window sash frame are shaped, as is shown in Figs. 2 and 6. By referring to Fig. 5, the exact cross-sectional shape of the opposed side sections and the bottom section of each sash frame will be apparent. In other words, the cross-sectional structure of each of these sections is made up of an inner wall 16 and an outer wall 17 that extend in opposite directions from opposite ends of a cross wall 18. The cross wall 18 has formed therein a recess 19 which is open at one side thereof and is located adjacent to the inner wall 16, and a second recess 20 which is open at the opposite side of the cross wall and is located adjacent to the outer wall 17, each of said recesses having an inclined face at one side thereof which gives said recess a shape of partial dove-tail formation.

Each of the window sashes is provided with a pane of glass which is supported by the frame of the sash, said pane of glass being introduced in place with respect to the frame of the sash by inserting the lower edge portion of said pane of glass into the recess 19 of the lower section of the frame of the sash and by inserting a side edge portion of said pane of glass into the recess 19 of a side section of the frame of the sash. With the lower edge portion and a side edge portion of the pane of glass disposed deep in the recesses 19 of the bottom section and a side section of the frame of the sash, the top edge portion and the opposite side edge portion of the pane of glass may be moved inwardly of the frame of the sash to aline them with the recess of the top section of the sash frame and with the recess 19 of the side

section of the sash frame opposite to the side section of the sash frame in whose recess 19 a side edge portion of the pane of glass is disposed. The pane of glass may then be adjusted to its proper centered position with respect to the sash frame and putty 21 may be applied to secure the pane of glass in position with respect to the sash frame.

The recesses 20 formed in the cross walls of the bottom section and the opposed side sections of the frame of each window sash receive portions of lengths of weatherstripping 22, which are shaped as is shown to good advantage in Fig. 5. In other words each length of weatherstripping 22 includes a portion 23 which is shaped in accordance with the cross-sectional shape of the recess 20 that receives said weatherstripping portion, a portion 24 that parallels the cross wall of the sash frame section that supports said length of weatherstripping, and a bowed contacting portion 25. It is to be noted that because of the partial dove-tail shape of the recesses 20 and the corresponding shape of the portions 23 of the length of weatherstripping 22, said lengths of weatherstripping are firmly secured in place with respect to the sash frames. The bowed portion 25 of the length of weatherstripping 22 at the bottom of the frame of the lowermost sash 10 contacts, when said lower sash is closed, with the top face of the sill portion 1c of the window frame 1, while the bowed portion 25 of the length of weatherstripping 22 at the bottom of the frames of the sashes 11 and 12, contact respectively with the upper faces of the top sections of the sashes 10 and 11 (see Fig. 2). In like manner, the bowed portions of the lengths of weatherstripping 22 arranged at the opposite sides of the frames of the window sashes 10, 11, and 12, contact with the inner faces of the jamb portions of the window frame 1 (see Fig. 6). The recess 8 formed in the lower wall of the head portion 1a of the window frame 1 receives a correspondingly shaped portion of a length of weatherstripping 22, shaped as shown in Fig. 5, and the bowed portion of this length of weatherstripping contacts with the upper face of the top section of the frame of the upper sash 12.

The improved means of the present invention for actuating the pivotally supported window sashes 10, 11, and 12, to open and closed positions comprises a plurality of tubular elements 26, 27, and 28, which are arranged in telescoping relation, as is shown to good advantage in Figs. 1, 2, and 4. The telescopically arranged tubular elements 26, 27, and 28 extend vertically of the window structure at the approximate transverse center thereof, as is shown in Fig. 1, and said tubular elements are adapted for independent rotary movement. The inner tubular element 28 extends, at its upper end, through an opening formed through the lower wall of the head 1a of the window frame 1, said upper portion of said tubular element 28 being rotatable within said opening and having a collar 28' fixed thereto which contacts with the upper face of said lower wall of said head portion of said window frame (Fig. 2).

At their lower ends the tubular elements 26, 27, and 28 are supported in their vertical positions by a plurality of vertically spaced, horizontally disposed plates 29, 30, 31, and 32. The plates 29, 30, 31, and 32 are substantially circular in plan and said plates are disposed partially within and partially outside of the sill portion 1a of the window frame 1, the outwardly projected por-

tions of said plates extending through an opening formed through the inner wall of said sill portion, and said plates being welded, or otherwise secured, to said inner wall of said sill portion of said window frame, as is shown in Fig. 3. By referring to Fig. 4 it will be noted that the telescopic element 26 passes through an opening formed centrally through the upper plate 29 and rests at its lower end on the plate 30. Likewise, the tubular element 27 passes through an opening formed centrally through the plate 30 and rests at its lower end on the plate 31, while the tubular element 28 passes through an opening formed centrally through the plate 32 and is supported in its vertical position by the collar 28' previously mentioned herein. The plates 30, 31, and 32, are each provided with an arcuate row of apertures 33 which serve a purpose to be hereinafter set forth.

Secured to the tubular elements 26, 27, and 28 at the lower ends thereof are operating members 34, 35, and 36, the operating member 34 being fixedly secured to the lower portion of the tubular element 26, the operating member 35 being fixedly secured to the lower portion of the tubular element 27, and the operating member 36 being fixedly secured to the lower portion of the tubular element 28 (see Fig. 4). The operating members 34, 35, and 36 are shaped as is shown in Fig. 3; that is to say each of said operating members includes an end portion of partial circular formation which is apertured centrally to receive the lower end portion of the tubular element with which said operating member is associated, and each operating member includes a bifurcated portion which extends outwardly from said partially circular portion.

Pivotally supported between the spaced legs of the bifurcated portions of the operating members 34, 35, and 36, by pivot elements 37, are operating handles 38, 39, and 40, the operating handle 38 being associated with the operating member 34, the operating handle 39 being associated with the operating member 35, and the operating handle 40 being associated with the operating member 36. The operating handles 38, 39, and 40 are provided with leaf springs 41, the leaf spring 41 of each operating handle being anchored at one of its ends to the operating handle, and contacting at its opposite ends with one of the plates 29, 30, and 31 which is located immediately above the operating handle with which said leaf spring is associated. The leaf springs 41 tend to move the end portions of the operating handles at which they are located in a downward direction, and these end portions of said operating handles are provided with downwardly projected extensions 42 which are adapted to enter the apertures 33 of the plates 30, 31, and 32 for locking the operating handles in positions to which they have been adjusted.

Fixed to the tubular elements 26, 27, and 28, are operating arms 43, 44, and 45, the operating arm 43 being fixed to the tubular element 26, the operating arm 44 being fixed to the tubular element 27, and the operating arm 45 being fixed to the tubular element 28 (see Fig. 1). Each of the operating arms 43, 44, and 45 is provided with an intermediate offset portion which causes the outer portions of said operating arms to be disposed in higher planes than the inner portions of said operating arms, and at its outer end each of said operating arms is provided with a downwardly projected extension 46 which is shaped as is shown to good advantage in Figs. 1, 6, 7, and 8. Each of the operating arms 43, 44, and 45 has associated therewith a link 47, the link of each operating arm being pivotally attached at one of its ends to the arm with which it is associated, and being pivotally attached at its opposite end to a bracket 48 that is welded, or otherwise secured, to one of the window sashes 10, 11, and 12.

Attention is directed to Fig. 9 of the drawings which illustrates the manner in which each of the links 47 is pivotally connected to its associated operating arm 43, 44, or 45. In other words, the end portion of the link is curved upwardly and through this upwardly curved end portion of the link an aperture 49 is formed, a headed pivot element 50 being fixed to the associated operating arm and being extended through the aperture. The diameter of the portion of the pivot element 50 of each operating arm 43, 44, or 45 that extends through the aperture 49 of the associated link 47 is substantially less than the diameter of the aperture so as to provide a loose pivotal connection between the links and their associated operating arms. The opposite ends of the links 47 are loosely connected to the brackets 48 of the window sashes 10, 11, and 12 in a similar manner, these opposite ends of said links being curved upwardly and apertured, and headed pivot elements 52 (Fig. 1) being fixed to the brackets 48 and being extended loosely through said apertures of the links.

In order to provide for weather-sealing the window sashes 10, 11, and 12 when they have been moved to their closed positions, a member 53 is welded, or otherwise secured, to each of the window sashes. This member 53 is shaped as is shown to good advantage in Figs. 6, 7, and 8, and as will presently appear herein, the extensions 46 of the operating arms 43, 44, and 45 engage said members 53 as the window sashes approach their closed positions in a manner to draw the window sashes into tight, weather-sealing contact with the window frame.

In the use of the improved window structure of the present invention the window sashes 10, 11, and 12 are capable of independent actuation to open and closed positions and hence may be actuated in any desired sequence, or without regard for any particular sequence. Assuming that all of the window sashes are in their closed and locked positions and that it is desired to actuate one of said window sashes to its open position, it is necessary to select the operating handle 38, 39, or 40 of the window sash to be actuated. The selected operating handle is then depressed at its outer end to elevate the inner end portion of the operating handle and thereby raise the locking projection 42 of the operating handle out of the aperture 33 of the plate 30, 31, or 32, into which said locking projection was extended. The operating handle, while so depressed, is rotated in the proper direction about the axis of the telescoped tubular elements 26, 27, and 28, such rotary movement of the operating handle being transmitted by the associated link 47 to the associated window sash so as to actuate said window sash to its open position. When the window sash has been actuated to the desired open position downward pressure on the outer end portion of the operating handle is relieved so as to permit the locking projection 42 of the operating handle to enter an aperture 33 of the related plate 30, 31, or 32 so as to lock the window sash in the position to which it has been adjusted.

In like manner, when it is desired to adjust an open window sash to its closed position, the outer

portion of the operating handle operatively associated with said window sash is depressed to raise the locking projection **42** out of the aperture **30** in which it is disposed. The operating handle is then rotated in the proper direction to cause the associated operating arm **43**, **44**, or **45** and link **47** to move the window sash to its closed position. As the window sash being closed approaches its closed position an edge portion of the extension **46** of the operating arm **43**, **44**, or **45** will pass into engagement with the inclined edge **53'** of the member **53** fixed to the window sash being operated, as is shown in Figs. 7 and 8, with the result that the member **53** of the window sash is positively engaged by the extension **46** of the operating arm during the final closing movement of the window sash in such manner that the window sash is drawn into tight, weather-sealing contact with the window frame. When the window sash being moved to a closed position has reached its closed, weather-sealing position the outer portion of the operating handle is permitted to raise in response to action by the leaf spring **41** associated with said operating handle, whereupon the extension **42** of said handle will enter an aperture **33** of the associated plate **30**, **31**, or **32** to lock the window sash in its closed position.

I claim:

1. A window structure comprising a window frame, a plurality of window sashes arranged within said window frame and disposed one above another, means at the upper portions of said window sashes for pivotally supporting said window sashes with respect to said window frame, and sash-operating means for adjusting the lower portions of said window sashes to open and closed positions relative to said window frame, said sash-operating means comprising telescopically arranged elements adapted for independent axial rotation and extended vertically of the window structure at the approximate transverse center thereof, operating members one of which is fixed to each of said telescopically arranged elements for rotation therewith, connecting members each of which is connected at one of its ends to one of said operating members and at its opposite end to one of said window-sashes, and operating handles one of which is associated with each of said telescopically arranged elements for rotating same axially.

2. A window structure comprising a window frame, a plurality of window sashes arranged within said window frame and disposed one above another, means at the upper portions of said window sashes for pivotally supporting said window sashes with respect to said window frame, and sash-operating means for adjusting the lower portions of said window sashes to open and closed positions relative to said window frame, said sash-operating means comprising telescopically arranged elements adapted for independent axial rotation and extended vertically of the window structure at the approximate transverse center thereof, operating members one of which is fixed to each of said telescopically arranged elements for rotation therewith, connecting members each of which is connected at one of its ends to one of said operating members and at its opposite end to one of said window sashes at the lower portion thereof, and operating handles one of which is associated with each of said telescopically arranged elements for rotating same axially.

3. A window structure comprising a window frame, a plurality of window sashes arranged within said window frame and disposed one above another, means at the upper portions of said window sashes for pivotally supporting said window sashes with respect to said window frame, and sash-operating means for adjusting the lower portions of said window sashes to open and closed positions relative to said window frame, said sash-operating means comprising telescopically arranged elements adapted for independent axial rotation and extended vertically of the window structure at the approximate transverse center thereof, operating members one of which is fixed to each of said telescopically arranged elements for rotation therewith, connecting members each of which is pivotally connected at one of its ends to one of said operating members and is pivotally connected at its opposite end to one of said window sashes at the lower portion thereof, and operating handles one of which is associated with each of said telescopically arranged elements for rotating same axially.

4. A window structure comprising a window frame, a plurality of window sashes arranged within said window frame and disposed one above another, means at the upper portions of said window sashes for pivotally supporting said window sashes with respect to said window frame, and sash-operating means for adjusting the lower portions of said window sashes to open and closed positions relative to said window frame, said sash-operating means comprising vertically disposed and telescopically arranged elements adapted for independent axial rotation, operating members one of which is fixed to each of said telescopically arranged elements for rotation therewith, connecting members each of which is connected by a loose pivotal connection at one of its ends to one of said operating members and is connected by a loose pivotal connection at its opposite end to one of said window sashes at the lower portion thereof, and operating handles one of which is associated with each of said telescopically arranged elements for rotating same axially.

5. A window structure comprising a window frame, a plurality of window sashes arranged within said window frame and disposed one above another, means at the upper portions of said window sashes for pivotally supporting said window sashes with respect to said window frame, and sash-operating means for adjusting the lower portions of said window sashes to open and closed positions relative to said window frame, said sash-operating means comprising vertically disposed and telescopically arranged elements adapted for independent axial rotation, operating arms one of which is fixed to each of said telescopically arranged elements for rotation therewith, links each of which is loosely pivoted at one of its ends to one of said operating arms and is loosely pivoted at its opposite end to one of said window frames at the lower portion thereof, pivotally supported operating handles one of which is associated with each of said telescopically arranged elements for rotating same axially, and locking means for locking said operating handles in adjusted positions thereof where the associated window sashes are in open or closed positions relative to said window frame, said locking means comprising locking projections fixedly mounted on said operating handles, and fixedly supported plates which are provided with apertures into which said locking projections are movable.

6. A window structure comprising a window frame, a plurality of window sashes arranged within said window frame and disposed one above

another, means at the upper portions of said window sashes for pivotally supporting said window sashes with respect to said window frame, and sash-operating means for adjusting the lower portions of said window sashes to open and closed positions relative to said window frame, said sash-operating means comprising vertically disposed and telescopically arranged elements adapted for independent axial rotation, operating arms one of which is fixed to each of said telescopically arranged elements for rotation therewith, links each of which is loosely pivoted at one of its ends to one of said operating arms and is loosely pivoted at its opposite end to one of said window frames at the lower portion thereof, pivotally supported operating handles one of which is associated with each of said telescopically arranged elements for rotating same axially, and locking means for locking said operating handles in adjusted positions thereof where the associated window sashes are in open or closed positions relative to said window frame, said locking means comprising locking projections fixedly mounted on said operating handles, fixedly supported plates which are provided with apertures into which said locking projections are movable, and spring elements associated with said operating handles which tend to urge said locking projections of said operating handles into said apertures of said plates.

7. A window structure comprising a window frame, a plurality of window sashes arranged within said window frame and disposed one above another, means at the upper portions of said window sashes for pivotally supporting said window sashes with respect to said window frame, sash-operating means for adjusting the lower portions of said window sashes to open and closed positions relative to said window frame, said sash-operating means comprising vertically disposed and telescopically arranged elements adapted for independent axial rotation, operating members one of which is fixed to each of said telescopically arranged elements for rotation therewith, connecting members each of which is connected at one of its ends to one of said operating members and at its opposite end to one of said window sashes, and operating handles one of which is associated with each of said telescopically arranged elements for rotating same axially, and means for weather-sealing said window sashes when they are moved to their closed positions with respect to said window frame, said weather-sealing means comprising an element on each of said window sashes, and a fixed part on each of said operating members, said parts on said operating members being adapted to engage said elements on said window sashes when the window sashes approach their closed positions to draw said window sashes into weather-sealing contact with said window frame.

8. A window structure comprising a window frame, a plurality of window sashes arranged within said window frame and disposed one above another, means at the upper portions of said window sashes for pivotally supporting said window sashes with respect to said window frame, sash-operating means for adjusting the lower portions of said window sashes to open and closed positions relative to said window frame, said sash-operating means comprising vertically disposed and telescopically arranged elements adapted for independent axial rotation, operating members one of which is fixed to each of said telescopically arranged elements for rotation therewith, connecting members each of which is connected at one of its ends to one of said operating members and at its opposite end to one of said window sashes, and operating handles one of which is associated with each of said telescopically arranged elements for rotating same axially, and means for weather-sealing said window sashes when they are moved to their closed positions with respect to said window frame, said weather-sealing means comprising an element fixed to each of said window sashes, and an extension fixedly formed on each of said operating members, said extensions on said operating members being adapted to engage said elements on said window sashes when the window sashes approach their closed positions to draw said window sashes into weather-sealing contact with said window frame.

9. A window structure comprising a window frame, a plurality of window sashes arranged within said window frame and disposed one above another, means at the upper portions of said window sashes for pivotally supporting said window sashes with respect to said window frame, sash-operating means for adjusting the lower portions of said window sashes to open and closed positions relative to said window frame, said sash-operating means comprising vertically disposed and telescopically arranged elements adapted for independent axial rotation, operating members one of which is fixed to each of said telescopically arranged elements for rotation therewith, connecting members each of which is connected at one of its ends to one of said operating members and at its opposite end to one of said window sashes, and operating handles one of which is associated with each of said telescopically arranged elements for rotating same axially, and means for weather-sealing said window sashes when they are moved to their closed positions with respect to said window frame, said weather-sealing means comprising an element fixed to each of said window sashes which is provided with an inclined edge, and an extension fixedly formed on each of said operating members, said extensions on said operating members being adapted to engage the inclined edges of said elements on said window sashes when the window sashes approach their closed positions to draw said window sashes into weather-sealing contact with said window frame.

MICHAEL J. TRACY.

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