Aug. 12, 1941. C. E. JUSTASON 2,252,634

WINDOW SASH OPERATOR

Filed July 8, 1940 2 Sheets-Sheet 1

Fig. 1

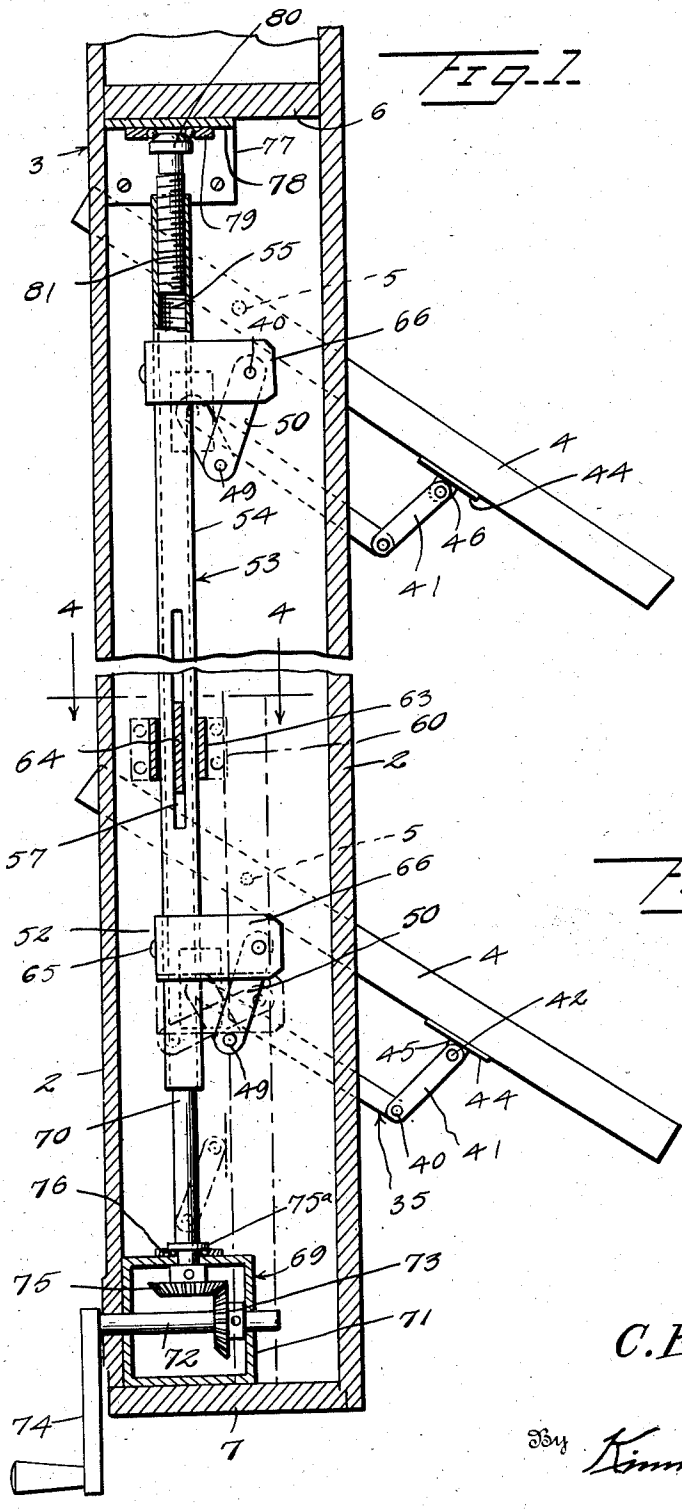


Fig. 3

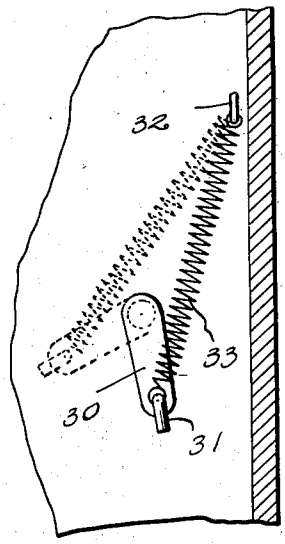
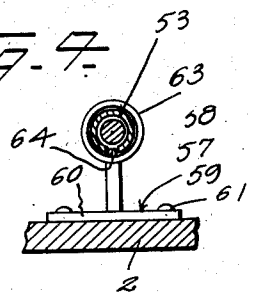


Fig. 4



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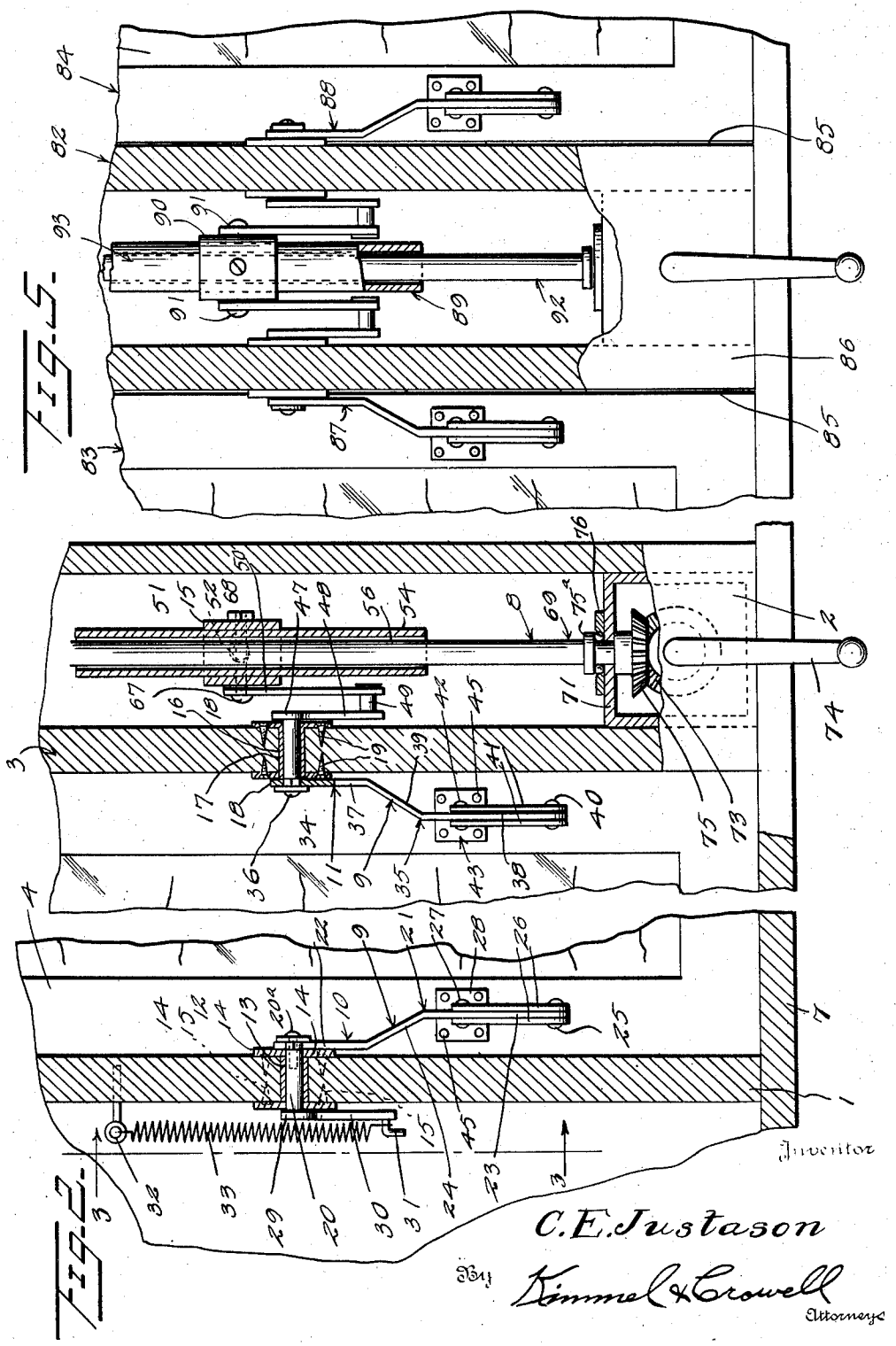


Fig. 2.

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Patented Aug. 12, 1941 2,252,634

UNITED STATES PATENT OFFICE

2,252,634

WINDOW SASH OPERATOR

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Application July 8, 1940, Serial No. 344,423

9 Claims. (Cl. 268—21)

This invention relates to window sash structures and more particularly to an improved means for operating a plurality of sashes or shutters.

An object of this invention is to provide a vertically movable sash operator and means for connecting the operator to a plurality of swingable sashes or shutters for shifting the sashes or shutters to an open or closed position.

Another object of this invention is to provide a sash operator which is adapted to be concealed within the window frame and which is so constructed that the sashes will be locked in any desired position.

A further object of this invention is to provide a sash operator which will readily operate a plurality of sashes with little effort.

A still further object of this invention is to provide a sash operator for a plurality of sashes wherein the sashes are substantially balanced when in opened position and wherein the balancing means also provides a yieldable locking means for retaining the sashes closed.

A further object of this invention is to provide, in a manner as hereinafter set forth, an operator for conveniently opening and closing of any number of awning type windows, and which is simple in its construction, strong, durable, compact, readily installed with respect to a window frame, thoroughly efficient in its use, quickly assembled and comparatively inexpensive to manufacture.

Embodying the objects aforesaid and others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically described and illustrated in the accompanying drawings, wherein are shown embodiments of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a vertical sectional view, broken away of one side of a window frame having correlated therewith window sashes and further showing in side elevation and vertical section, a window sash operator, in accordance with this invention installed relative to the frame and sashes.

Figure 2 is a fragmentary view in rear elevation broken away and partly in vertical section of a window frame having arranged therein the lower window sash of a plurality of superposed sashes and further illustrating installed with respect to the frame and sash in rear elevation the lower portion of the sash opening and closing operator, in accordance with this invention.

Figure 3 is a section on line 3—3, Figure 2.

Figure 4 is a section on line 4—4, Figure 1, and

Figure 5 is a fragmentary view in rear elevation partly in vertical section of a double window showing the adaptation therewith of the lower portion of a modified form of sash opening and closing operator in accordance with this invention.

With reference to Figures 1 to 4 of the drawings, 1 and 2 indicate the hollow sides of a window frame 3 between which is arranged a series of superposed window sashes 4. The number of sashes 4 of the series may be as desired and by way of example but two sashes are shown. The sashes 4 are pivoted at their sides to the frame sides 1, 2 as at 5. The top and the sill of frame 3 are indicated at 6, 7, respectively.

The sash opening and closing operator 8 is common to and functions to simultaneously open and close the sashes 4. The operator 8 will include superposed spaced sash opening and closing mechanisms 9 of like form corresponding in number to the number of sashes 4. Each of said mechanisms will include a pair of aligned spaced sections 10, 11 connected to a sash 4 and with the section 10 being spring controlled. The sections 10 and 11 are connected to the frame sides 1, 2, respectively.

The frame side 1 below the pivots 5 for a sash 4 is formed with an opening 12 having arranged therein and extended from the ends thereof a bushing or bearing 13. Mounted on the ends of the bushing or bearing 13 are inner and outer apertured spacer plates 14 fixedly secured to side 1 by the oppositely disposed holdfast means 15. The frame side 2 below the pivots 5 for a sash 4 is formed with an opening 16 which aligns with the opening 12. Arranged in and having its ends extended from the opening 16 is a bushing or bearing 17. Mounted on the ends of the bushing 17 are inner and outer apertured spacer plates 18 fixedly secured to side 2 by the oppositely disposed holdfast devices 19.

The section 10 is what may be termed a sash holding means and includes a rotatable stub shaft 20 mounted in and extending from each end of the bushing 13. Positioned on the reduced outer end of shaft 20 and bearing against the outer spacing plate 14 is the apertured inner terminal part of a lifting and lowering bar 21 for a sash 4. The said apertured inner terminal part of the bar 21 is secured on the outer end of shaft 20 by the holdfast means 21a. The bar 21 consists of inner and outer end parts 22, 23, respectively, and an intermediate part 24 arranged between, at an angle to and for disposing the parts 22, 23 in offset relation, that is to say, positioning said parts 22, 23 in parallel planes. The part 23 has its outer end arranged between and pivoted as at 25 to the outer ends of a pair of spaced parallel links 26. The inner ends of the links 26 are pivotally connected, as at 27 to a coupler 28 secured to the rear face of one side stile of a sash 4. The inner

end of shaft 20 is formed with a head 29 bearing against the inner spacer plate 18 and provided with a crank arm 30 having a hook 31 at its outer end. Secured to the frame side 1 above the shaft 20 is an eye 32. Arranged between the hook 31 and eye 32 is a coiled controlling spring 33 having one end attached to the hook 31 and its other end to the eye 32. The springs 33 function as controlling means for the mechanisms 9 for counterbalancing the weight of the sashes 4 and also as a latching means for the mechanisms 9 for holding them when adjusted and such adjustment will be presently referred to.

The section 11 is what may be termed a sash shifting structure and includes a rotatable stub shaft 34 mounted in and extending from each end of the bushing 17. Positioned on the reduced outer end of the shaft 34 and bearing against the outer spacing plate 18 is the apertured inner terminal portion of a lifting and lowering bar 35 for that sash 4 to which the bar 21 is coupled. The said apertured terminal part of bar 35 is secured on the end of shaft 34 by the holdfast means 36. The bar 35 consists of inner and outer end portions 37, 38, respectively and an intermediate portion 39 between, at an angle to and for disposing the portions 37, 38 in offset relation, that is to say, positioning said portions 37, 38 in parallel planes. The portion 38 has its outer end arranged between and pivotally connected, as at 40 to the outer ends of a pair of spaced parallel links 41. The inner ends of the links 41 are pivotally connected, as at 42 to a coupler 43 secured to the rear face of the other side stile of the sash 4. The couplers on the side stiles of the sash 4 are arranged in spaced alignment, are of like form and each consists, with reference to Figure 1, of a plate 44 anchored by the holdfast means 45 (Figure 2) to the sash and formed with a shank 46 which extends between a pair of links and to which the inner ends of the latter are pivotally connected. The lifting arms 21, 35 are oppositely disposed.

The section 11 includes the providing of the inner end of shaft 34 with a head 47 which bears against the inner spacing plate 18 and is formed with a crank arm 48 having secured to its outer end, as at 49 an actuating member 50 of link-like form pivotally connected, as at 51 to one of the couplers 52 of a plurality of superposed spaced couplers forming parts of a vertically movable carrier structure 53 which forms an element of the operator 8.

The carrier structure 53 will include spaced superposed couplers 52 corresponding in number to the number of opening and closing mechanisms 9. The carrier structure 53 not only includes the couplers 52, but also a vertical tube 54 of a length less than the height of the window frame and which is arranged in the frame side 2. The upper portion of inner face of the tube 54 is formed with threads 55. Arranged within the tube 54 below the threads 55 is a bushing 56. The tube 54 is provided intermediate its ends and lengthwise thereof with an elongated slot 57. The bushing 56 is also formed with a slot 58 which registers with the slot 57. There is correlated with the tube 55 a stationary combined guide and arrester element 59 which functions to guide the tube 54 and also prevents the revolving of the tube on its vertical axis, as well as prevents the bushing 56 revolving relative to the tube 54. The element 59 is arranged in the frame side 2 and includes a base 60 which is fixedly secured by the holdfast means 61 to the inner face of the body of frame side 2. Formed integral with the base 60 is a shank 62 which merges into a collar 63 encompassing the tube 54. The collar 63 is of materially less length than the slots 57, 58 and has its inner face formed with a key 64 extended into the said slots 57, 58 to arrest the turning of tube 54 on the vertical movement of the latter. The collar 63 constitutes a guide for tube 54. Each coupler 52 surrounds the tube 54, is secured to the latter by the holdfast means 65 and has a portion 66 extended towards the sash 4. The portion 66 has extending therethrough a headed pivot bolt 67 connected to said portions 66 by the nut 68. The bolt 67 forms the pivot for the actuating member 50.

The operator 8 includes an operating mechanism 69 for the carrier structure 53. The mechanism 69 consists of a rotatable vertically disposed elongated shaft 70 which extends through and is of greater length than the tube 54. Arranged within the lower portion of frame side 2 is a stationary gear box 71. Journalled in the gear box 71, as well as extending rearwardly from frame side 2 is a rotatable shaft 72 having fixed thereto a bevel gear 73 disposed in the box 71. The rear end of shaft 72 is provided with a crank handle 74 for the purpose of rotating the shaft 72. The shaft 70 extends into the box 71 and is provided on its lower end with a bevel gear 75 which permanently meshes with the gear 73. Arranged on the top of box 71 and interposed between a collar 75^a on shaft 70 and box 71 is a bearing means 76. The top 6 of frame side 2, within the latter has a depending inverted yoke-shaped member 77 (only half of which is shown). The bight 78 of member 77 has secured to the lower face a bearing means 79 for correlation with a beveled bearing enlargement 80 at the upper end of shaft 70. The latter in proximity to its upper end is formed with peripherial threads 81 for coaction with the threads 55 on the inner face of the tube 54 to provide for the elevating of the latter on the clockwise movement of shaft 70 to open the window sashes and for the lowering of the tube 54 on the anti-clockwise movement of the latter to close the window sashes. The opening movement of the window sashes is had against the action of the springs 33. When the tube 54 is moved upwardly, the couplers 52 of the carrier 53 will act on the sections 11 of the mechanisms 9 to provide for such sections 11 to lift open the window sashes and these in turn will actuate the sections 10 of the mechanisms 9 against the action of the springs 33. These latter, at the end of the desired extent of the upward movement of tube 54 will act to latch the threads 55, 81 whereby the window sashes will be latched on their adjusted open position, and they also act to latch the window sashes closed.

With reference to the structure shown by Figure 5, it illustrates a modified form of sash operator, in accordance with this invention for adaptation with a window 82 having two parallel sets of window sashes 83, 84. The window as shown consists of two like parallel sections 85 one for each set of sashes. Each section will consist of an outer and an inner side frame member. The inner side frame member indicated at 86 is common to both sections. The outer side frame members of the sections of the frame are not shown, but each will accord in structure to the side member 1 heretofore referred to. In the modified form the sashes of one set will laterally align with the sashes of

the other set to form pairs of aligned sashes. Each of the aligned sashes of a pair has correlated therewith a sash opening and closing mechanisms 9 of the form referred to. The sections 10 of the mechanisms 9 are not shown, but the sections 11 are and are indicated generally at 87, 88, Figure 5 and each corresponds in all particulars with respect to their structural arrangement to section 11 of mechanism 9. The sections 87, 88 are of like form and correspond in construction to the section 11, but are oppositely disposed. The sashes 83, 84 will be arranged in the sections 85, pivotally supported from the outer side frame members and from the inner side frame member 86. The modified form shown by Figure 5 includes a carrier 89 of the same form as the carrier 83 with this exception, that the couplers 90 of the carrier 89 will have the sections 87, 88 of the mechanisms 9 pivotally connected to opposite sides thereof as at 91. The carrier 89 is arranged in the inner side frame member 86. The said sections 87, 88 of the mechanisms 9 will be pivotally supported by opposed walls of the inner side frame member 86. The operating means 92 for the carrier 89 is arranged within and extended from the inner side frame member 86. The means 92 corresponds in structure to the means 69. Otherwise than that as stated the modified form shown by Figure 5 and generally indicated at 93 will be of the same construction as the form sash operator shown by Figure 1. The form 93 is employed for simultaneously opening and closing a pair of laterally aligned spaced window sashes, or simultaneously opening and closing superposed pairs of laterally aligned spaced window sashes.

Although the sashes are shown as being shiftably supported from the pivots 5, yet it is to be understood that they may be hinged in lieu of being pivoted.

What I claim is:

1. An operator for a swingable window sash, said operator comprising the combination of a rotatable stub shaft, a stationary bearing for said shaft adapted to be mounted in the body of a window frame, a sash lowering and lifting rod of angle form fixed to and depending from the outer end of said shaft, a pair of spaced parallel inner sidewise aligned coupling links, said rod having its lower end arranged between and pivotally connected to the lower ends of said coupling links, means adapted to be secured to the window sash for pivotally supporting the upper ends of said links, a coupler member, a depending crank arm on the inner end of said shaft, a vertically movable non-revoluble tube adapted to be arranged in the body of the window frame and having said member fixed thereto, a depending attaching link pivoted at its upper end to said member and at its lower end to said arm, and means correlating with said tube to provide a vertical movement for the latter to thereby elevate and lower said lifting rod through said member, attaching link, arm and shaft to swing the window sash.

2. An operator for a swingable window sash, said operator comprising the combination of a rotatable stub shaft, a stationary bearing for said shaft adapted to be mounted in the body of a window frame, a sash lowering and lifting rod of angle form fixed to and depending from the outer end of said shaft, a pair of spaced parallel inner sidewise aligned coupling links, said rod having its lower end arranged between and pivotally connected to the lower ends of said coupling links, means adapted to be secured to the window sash for pivotally supporting the upper ends of said links, a coupling member, a depending crank arm on the inner end of said shaft, a vertically movable non-revoluble tube adapted to be arranged in the body of the window frame and having said member fixed thereto, a depending attaching link pivoted at its upper end to said member and at its lower end to said arm, means correlating with said tube to provide a vertical movement for the latter to thereby elevate and lower said lifting rod through said member, attaching link, arm and shaft to swing the window sash, said coupler links being of less length than said lifting rod, and said crank arm being of less length than said attaching link.

3. An operator for a swingable window sash, said operator comprising the combination of a rotatable stub shaft, a stationary bearing for said shaft adapted to be mounted in the body of a window frame, a sash lowering and lifting rod of angle form fixed to and depending from the outer end of said shaft, a pair of spaced parallel inner sidewise aligned coupling links, said rod having its lower end arranged between and pivotally connected to the lower ends of said coupling links, means adapted to be secured to the window sash for pivotally supporting the upper ends of said links, a coupler member, a depending crank arm on the inner end of said shaft, a vertically movable non-revoluble tube adapted to be arranged in the body of the window frame and having said member fixed thereto, a depending attaching link pivoted at its upper end to said member and at its lower end to said arm, and means correlating with said tube to provide a vertical movement for the latter to thereby elevate and lower said lifting rod through said member, attaching link, arm and shaft to swing the window sash, said member being laterally extended from said tube, said attaching link being connected to the lateral extending portion of said member and being of greater length than said crank arm.

4. An operator for a swingable window sash, said operator comprising the combination of a rotatable stub shaft, a stationary bearing for said shaft adapted to be mounted in the body of a window frame, a sash lowering and lifting rod of angle form fixed to and depending from the outer end of said shaft, a pair of spaced parallel inner sidewise aligned coupling links, said rod having its lower end arranged between and pivotally connected to the lower ends of said coupling links, means adapted to be secured to the window sash for pivotally supporting the upper ends of said links, a coupler member, a depending crank arm on the inner end of said shaft, a vertically movable non-revoluble tube adapted to be arranged in the body of the window frame and having said member fixed thereto, a depending attaching link pivoted at its upper end to said member and at its lower end to said arm, means correlating with said tube to provide a vertical movement for the latter to thereby elevate and lower said lifting rod through said member, attaching link, arm and shaft to swing the window sash, said tube being provided intermediate its ends with a slot lengthwise thereof, and a stationary combined guide and arrestor element adapted to be fixed in the body of the window frame, said element encompassing said tube and including a key extending through the

slot in the tube, said element being of less length than the length of said slot.

5. A swingable sash operator comprising the combination of a pair of inner endwise aligned rotatable stub shafts, bearings for said shafts adapted to be mounted in the body of a window frame, a pair of oppositely disposed sash lowering and lifting rods of angle form fixed to and depending from the outer ends of said shafts, two spaced pairs of parallel spaced inner sidewise aligned coupling links, each arm having its lower end arranged between and pivotally connected to the lower ends of the links of a pair, means adapted to be secured to a pair of window sashes for pivotally supporting the upper end of the links of said pairs, a coupler member, a depending crank arm on the inner end of each of said shafts, a vertically movable non-revoluble tube adapted to be arranged in the body of the window frame and having said carrier fixed thereto, a pair of attaching links, each link being pivotally mounted at its upper end to said member and at its lower end to the lower end of a crank arm, and means correlating with said tube to provide a vertical movement of the latter to thereby elevate and lower said lifting rods through said member, attaching links, arms and shafts to swing the sashes.

6. A swingable sash operator comprising the combination of a pair of inner endwise aligned rotatable stub shafts, bearings for said shafts adapted to be mounted in the body of a window frame, a pair of oppositely disposed sash lowering and lifting rods of angle form fixed to and depending from the outer ends of said shafts, two spaced pairs of parallel spaced inner sidewise aligned coupling links, each arm having its lower end arranged between and pivotally connected to the lower ends of the links of a pair, means adapted to be secured to a pair of window sashes for pivotally supporting the upper end of the links of said pairs, a coupler member, a depending crank arm on the inner end of each of said shafts, a vertically movable non-revoluble tube adapted to be arranged in the body of the window frame and having said carrier fixed thereto, a pair of attaching links, each link being pivotally mounted at its upper end to said member and at its lower end to the lower end of a crank arm, means correlating with said tube to provide a vertical movement of the latter to thereby elevate and lower said lifting rods through said member, attaching links, arms and shafts to swing the sashes, said tube being formed with a lengthwise slot, and a stationary combined guide and arrestor element adapted to be fixed in the body of the frame, said element encompassing said tube and including a key extending through the slot in the tube, said element being of less length than said slot.

7. An operator for upper and lower swingable window sashes comprising the combination of a pair of superposed rotatable stub shafts, stationary bearings for said shafts adapted to be mounted in the body of a window frame, a lifting rod of angle form fixed to and depending from the outer end of each shaft, a pair of parallel spaced inner sidewise aligned coupling links for each rod, each rod having its lower end arranged between and pivotally connected to the lower end of a pair of links, means adapted to be secured to each window sash for pivotally supporting the upper ends of a pair of said coupling links, a pair of superposed coupling members, a depending crank arm on the inner end of each of said shafts, a vertically movable non-revoluble tube adapted to be arranged in the body of the window frame and having said members fixed thereto, a pair of attaching links, each attaching link of a pair being pivotally connected at its upper end to a carrier and at its lower end to a crank arm, and means correlating with said tube to provide a vertical movement for the latter to thereby elevate and lower said lifting rods through said members, attaching links, crank arms and shafts for simultaneously swinging the window sashes.

8. An operator for upper and lower swingable window sashes comprising the combination of a pair of superposed rotatable stub shafts, stationary bearings for said shafts adapted to be mounted in the body of a window frame, a lifting rod of angle form fixed to and depending from the outer end of each shaft, a pair of parallel spaced inner sidewise aligned coupling links for each rod, each rod having its lower end arranged between and pivotally connected to the lower end of a pair of links, means adapted to be secured to each window sash for pivotally supporting the upper ends of a pair of said coupling links, a pair of superposed coupling members, a depending crank arm on the inner end of each of said shafts, a vertically movable non-revoluble tube adapted to be arranged in the body of the window frame and having said members fixed thereto, a pair of attaching links, each attaching link of a pair being pivotally connected at its upper end to a carrier and at its lower end to a crank arm, means correlating with said tube to provide a vertical movement for the latter to thereby elevate and lower said lifting rods through said members, attaching links, crank arms and shafts for simultaneously swinging the window sashes, said tube being formed with a lengthwise slot, and a stationary combined guide and arrestor element adapted to be fixed in the body of the window frame, said element encompassing said tube and including a key extending through the slot of the tube, said element being of less length than said slot.

9. An operator for a swingable window sash comprising the combination of a rotatable shaft adapted to be mounted in the body of a window frame and having its inner end arranged within and its outer end extended from said body, a lifting rod depending from the outer end of said shaft, pivotal coupling means pivotally connected to said rod and adapted to be secured to the window sash, a coupler member adapted to be arranged in the body of the window frame, a crank arm on the inner end of said shaft, a vertically movable non-revoluble tube adapted to be suspended in the body of the window frame, said member being fixed to said tube intermediate the ends of the latter, a pivotal connection between said crank arm and said member, means adapted to be arranged in the body of the window frame and correlating with said tube to provide a vertical movement to the latter to thereby elevate and lower said rod through said member, pivotal connection, coupling means, crank arms and shaft to swing the sash, said tube being formed lengthwise thereof with a slot, and a stationary combined guide and arrestor element adapted to be fixed in said body of the window frame above said member, said element encompassing said tube and including a key extending through the slot of the tube, said element being of less length than said slot.

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