Nov. 18, 1947. W. A. ALBRECHT 2,430,970

CASEMENT WINDOW STRUCTURE

Filed May 13, 1944 3 Sheets-Sheet 1

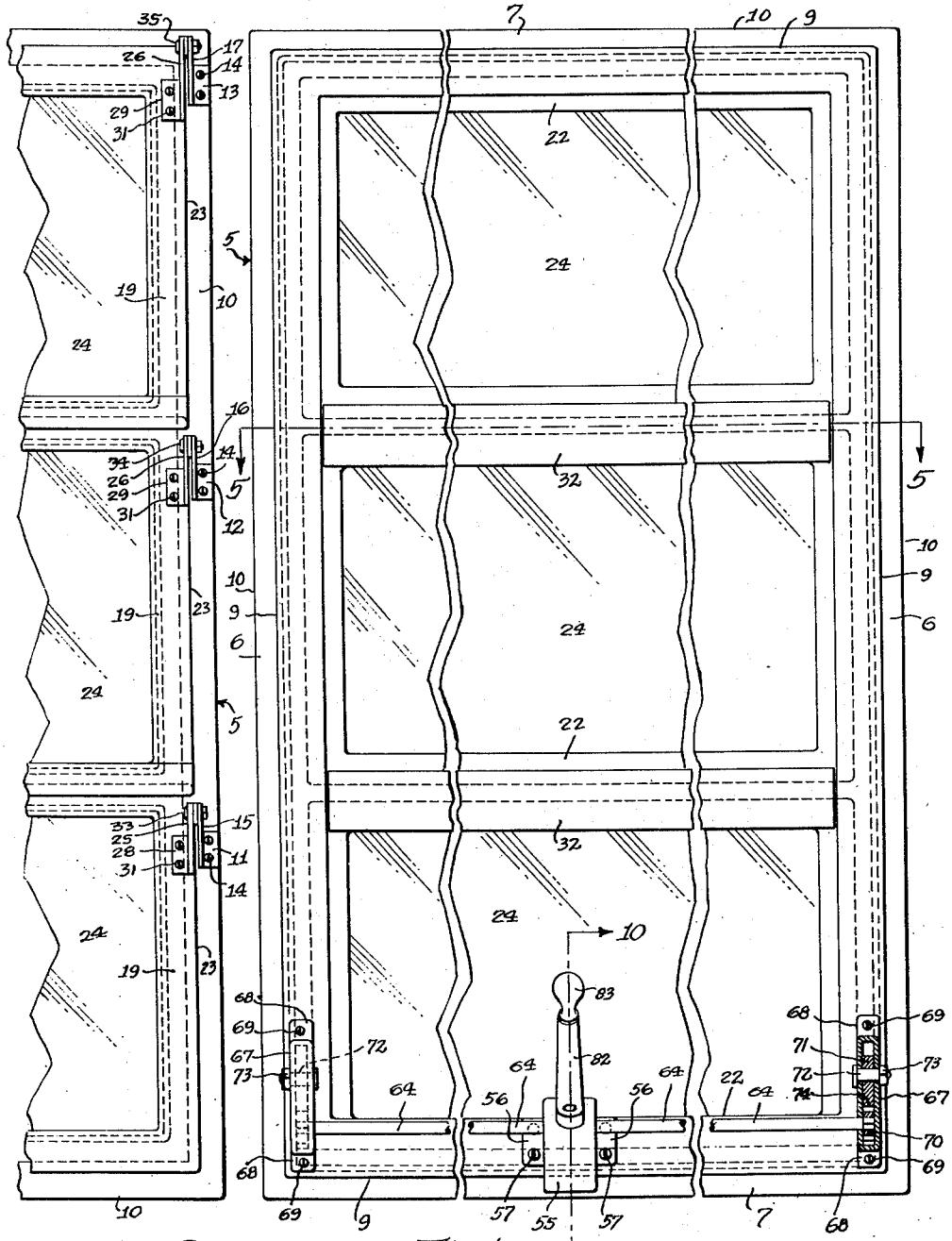


Fig. 2.

Fig. 1.

Inventor
Walter A. Albrecht

By Barthel & Bugbee

Attorneys

Nov. 18, 1947. W. A. ALBRECHT 2,430,970

CASEMENT WINDOW STRUCTURE

Filed May 13, 1944 3 Sheets-Sheet 2

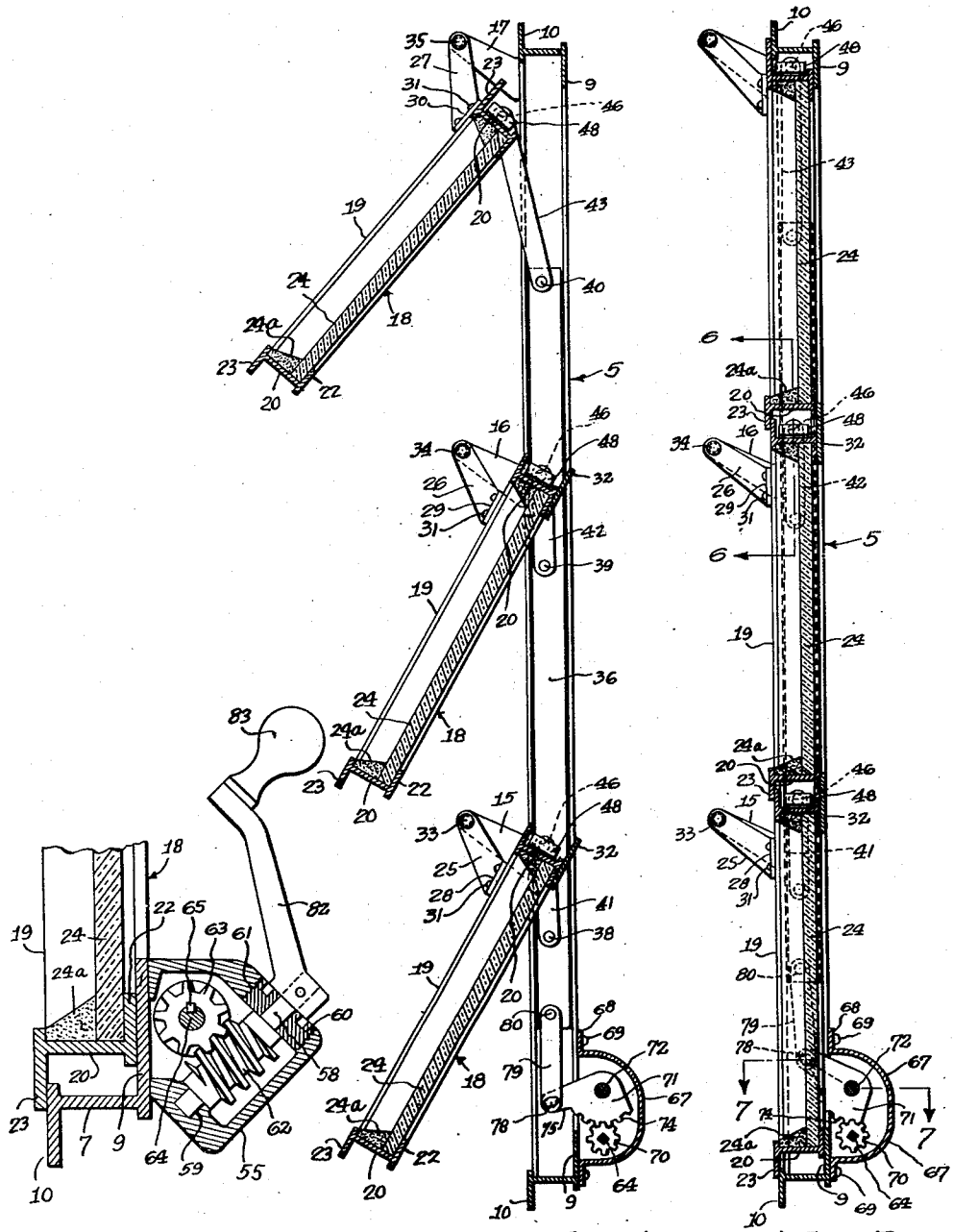


Fig. 10. Fig. 4. Fig. 3.

Inventor
Walter A. Albrecht,
By Barthel + Bugbee
Attorneys

Nov. 18, 1947. W. A. ALBRECHT 2,430,970

CASEMENT WINDOW STRUCTURE

Filed May 13, 1944 3 Sheets-Sheet 3

Fig. 5.

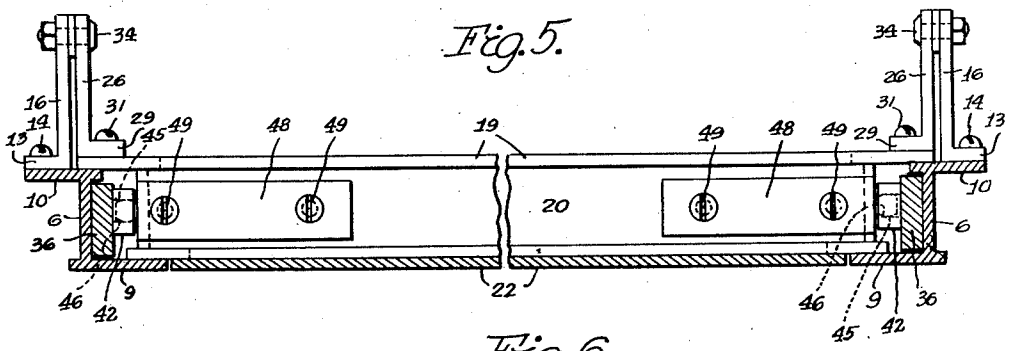


Fig. 6.

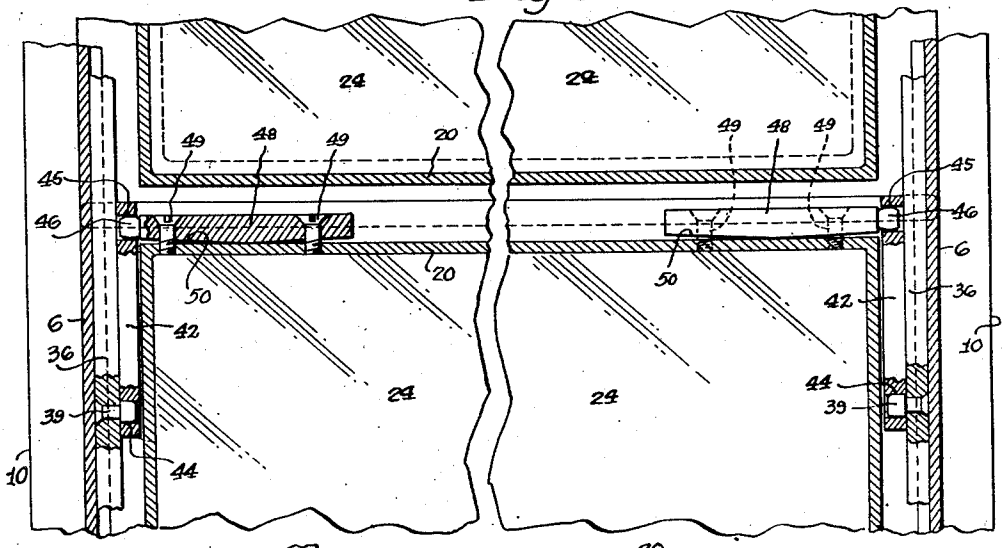


Fig. 8.

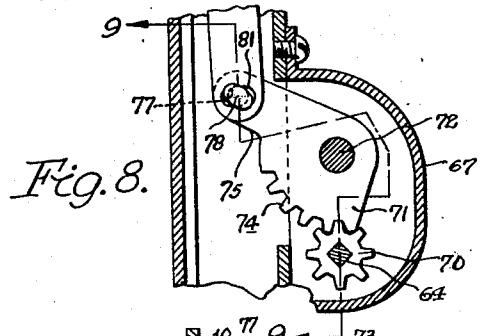


Fig. 9.

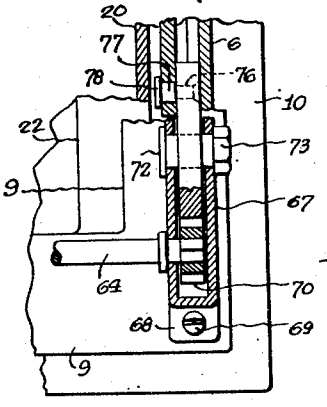
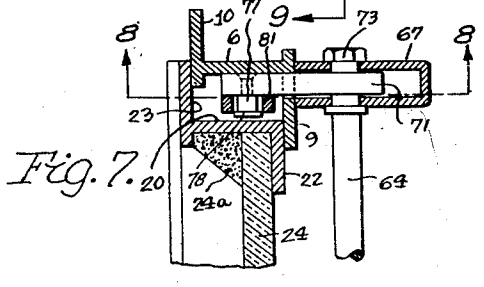


Fig. 7.



Inventor

Walter A. Albrecht

By Barthel & Bugbee

Attorneys

Patented Nov. 18, 1947

2,430,970

UNITED STATES PATENT OFFICE

2,430,970

CASEMENT WINDOW STRUCTURE

Walter A. Albrecht, Grosse Pointe, Mich.

Application May 13, 1944, Serial No. 535,415

8 Claims. (Cl. 189—69)

1

The present invention relates to improvements in metallic casement window construction and more particularly, to a casement window having a series of vertically swinging window sashes and an operator therefor.

The primary object of the invention is to provide a window construction of the above-mentioned type in which the various window sashes may be hinged on a horizontal axis to swing vertically so that said sashes will overhang adjacent lower sashes and provide adequate protection against the entrance of rain when the sashes are in their opened position.

Another object of the invention is to provide a casement window construction having a series of vertically swinging sashes which are adapted to be hinged on a horizontal axis so as to be partially counterbalanced when in an open position whereby to facilitate the easy opening of the window sashes as well as the easy closing thereof.

Another object of the invention is to provide a casement window having a series of vertically swinging sashes which are adapted to be opened and closed in unison by means of a single control operator therefor to enable all of the windows to be simultaneously opened and closed in unison.

Another object of the invention is to provide a metallic casement window structure having a series of vertically swinging sash members in which the lower end of the uppermost sash will be moved at a greater speed and distance from the window frame during operation of the control operator that the lower edge of said upper sash will overhang the remaining lower sash members and extend a considerable distance therebeyond.

Another object of the invention is to provide a metallic window construction in which the various parts of the operating linkage, slide rods and control members may be conveniently assembled to permit quick and easy installation of said window structure and to provide a window structure capable of being dismantled for the purpose of cleaning and repair.

Another object of the invention is to provide a casement window construction of the above-mentioned type in which a series of vertically swinging sash members are hinged to move on a horizontal axis with the sash members of said window construction forming mullions therebetween to give the appearance of a multi-pane window when said sash members are in their closed position.

Another object is to provide a metallic casement window structure of the above-mentioned type in which the various operating links of the

2

sash members may be adjusted to prevent binding of the operating linkage and to control the degree of movement imparted to the window sashes upon operation of the control operator so that said window sashes will overhang adjacent lower sashes when in their open position and thereby produce a canopy or awning effect.

Another object of the invention is to provide a metallic casement window structure having a series of vertically swinging window sashes, the horizontal mullions of which are provided with sealing strips to overlie the edge of an adjacent window so as to form a weatherstrip joint when the windows are closed and prevent the entrance of rain, snow and wind.

Other objects and advantages will become apparent during the course of the following description of the accompanying drawings, wherein:

Figure 1 is a front elevational view of a metallic casement window structure showing the arrangement of the operator therefor;

Figure 2 is an outside view of the window structure illustrating the relative positions of the various hinge members for supporting the window sashes;

Figure 3 is a vertical cross sectional view illustrating the manner in which the casement sashes are arranged with the lower edge of the uppermost sash in overlapping relation with the upper portion of the lower sash when the windows are in their closed position;

Figure 4 is a vertical cross sectional view similar to Figure 3 showing the casement sashes in an open position with the uppermost sash overhanging the one immediately therebelow;

Figure 5 is a horizontal cross sectional view taken on line 5—5 of Figure 1 looking in the direction of the arrows to illustrate the manner in which the hinged sash members are supported on the casement frame and showing the adjustable linkage for the operator;

Figure 6 is a vertical cross sectional view taken on line 6—6 of Figure 3 looking in the direction of the arrows and further illustrating the manner in which the operating linkage adjusting means is secured to the upper rail of the swinging sash member;

Figure 7 is a horizontal cross sectional view taken on line 7—7 in Figure 3 looking in the direction of the arrows to illustrate the operating shaft and the manner in which the same is connected to the linkage;

Figure 8 is a vertical cross sectional view taken on line 8—8 of Figure 7 and looking in the direc-

tion of the arrows to further illustrate the various structural details of the operating mechanism;

Figure 9 is a vertical sectional view taken on the irregular zigzag line 9—9 of Figure 8 looking in the direction of the arrows and further illustrating various structural features of the operating mechanism and the connections therefor; and

Figure 10 is a vertical cross sectional view taken on line 10—10 of Figure 1 looking in the direction of the arrows to illustrate the manual control mechanism for the window operating linkage.

In the drawings, wherein for the purpose of illustrating the invention like reference characters will be employed to designate like parts throughout, the reference character 5 will generally be employed to represent a casement window frame having vertical side rails 6 and horizontal top and bottom rails 7 connected to the upper and lower ends of said side rails. The window frame 5 including the side and horizontal rails 6 and 7 is preferably formed of metallic bars channel-shaped in cross-section to provide inwardly and outwardly directed flanges 9 and 10 extending in opposite directions from the web or side and top rail portions 6 and 7. The window frame 5 may be inserted in a window opening in a building in a conventional manner and secured therein by means of bolts or other fastening means. In order to exclude moisture and provide a tight fitting window, the inwardly directed flanges 9 of the side and horizontal rails 6 and 7 are directed inwardly and disposed on the inside of the building thus forming a seat for the window sash structures which will be more fully described, when such window sash structures are in a closed position.

Secured to the outwardly directed flanges 10 of the side rails 6 and spaced therealong is a series of hinge brackets 11, 12 and 13 which are secured in place by machine screws or bolts 14 and said brackets are provided with outwardly extending arms 15, 16 and 17 for hingedly supporting a series of window sashes with the upper window sash extending slightly beyond the lowermost sash and thereby providing an awning effect so as to exclude rain and moisture when the window sashes are in their open position.

Each of the window sashes comprises a metallic frame structure 18 having vertical stiles 19 and horizontal mullions 20. The stiles 19 and mullions 20 are formed of metal bars which are shaped in cross section similar to the vertical and horizontal rails 6 and 7 of the frame 5, and are provided with inwardly extending flanges 22 at one end of the web portion of said stiles and mullions 19 and 20 respectively and are likewise provided with outwardly directed flanges 23 along the opposite edges of said stiles 19 and mullions 20. A glass pane 24 is supported between the stiles 19 and mullions and is supported on the inwardly directed flange 22 so as to be held therein by means of a glazing strip or the like as at 24a.

Secured to the upper ends of the stiles 19 and adjacent each end of the mullion 20, and connected thereto is a pair of outwardly extending hinge arms as at 25, 26 and 27. The hinge arms are formed integral with hinge brackets 28, 29 and 30 secured to the stiles 19 by means of screws or the like as at 31. It is to be noted that the hinge brackets 28, 29 and arms 25, 26 of the lowermost window sashes 18 and 19 at each side thereof are disposed a greater vertical distance from the adjacent mullion 20 than the bracket 30 of the hinge arm 27 directly above the lower sash. It is intended to mount the hinge brackets on the stiles 19 toward the ends thereof with the hinge pivots of the uppermost sash disposed above and the hinge pivots of the lower sashes disposed below horizontal planes passing through the fulcrums 46 to which the operating mechanism is connected in the closed positions of the sashes (Fig. 3) as described below, so that the uppermost sash frame will slightly overhang the lowermost frame in their open positions and will be balanced in different positions with the uppermost frame balanced in a non-parallel open position by a slightly greater amount than the ones directly therebeneath.

Secured to the inwardly directed flanges 22 of the mullions 20 is a sealing strip 32 which is adapted to overlap the mullion 19 of an adjacent window sash when said sashes are in a closed position so as to exclude moisture and inclement weather conditions. Hinge pins 33, 34 and 35 are provided for connecting the respective pairs of hinge arms 15, 16 and 17, and 25, 26 and 27. With the window sashes hinged in the manner above described to swing vertically on the horizontal pivot pins 34, they will be balanced in such a manner as to permit the easy opening of the window sashes from a closed position and will render the closing of the windows from their open position a relatively simple task due to the fact that the closing movement of the window sashes from the position shown in Figure 4 simply entails the swinging thereof to a vertical position from an inclined position.

A window operating mechanism is provided for swinging the window sashes upon their horizontal axis and said means comprises a pair of reciprocating bars 36 extending substantially the entire length of the window frame side rail 6 and received in the inner channel portion thereof between the inwardly extending flanges 9 at one side thereof and a relatively short inwardly extending flange 37 at the opposite side or edge of the side frame rail 6. The operating bars 36 are provided with oppositely disposed pivot pins 38, 39 and 40 having enlarged end portions (Figure 6) for removably receiving operating links 41, 42 and 43. One end of each operating link is provided with an opening 44 for receiving an enlarged end portion of the pivot pins 38 to 40 inclusive while the opposite ends of the links 41 to 43 inclusive are provided with similar openings 45 for receiving the head portion 46 of an adjustable connecting member 48. Screws or the like as at 49 are provided for fastening the adjustable bars 48 to the horizontal mullions 20 with the head portions 46 thereof projecting slightly beyond the upper edge of the stiles 19. The invention contemplates the positioning of adjusting bars 48 at each end of the mullions 20 with the head portions 46 thereof extending in opposite directions for reception in the openings at one end of the various operating links 41 to 43 inclusive. The underside of each of the adjusting bars 48 is formed with converging angular surfaces as at 50 to permit the tightening or loosening of the screws 49 with the result that the adjusting bar will be rocked about its fulcrum and the positions of the various links 41 to 43 may be altered and adjusted to permit the operating rods or bars 36 which are slidably mounted in each side rail 6 to move in unison without binding or jamming.

In assembling the window structure, the operating links 41 to 43 may be easily detached and

assembled by swinging the window sashes to a partly opened position and laterally shifting the links to displace the ends thereof from engagement with the pivot pins 39 and pivot heads 46, the pivot heads 46 being slightly rounded to permit the easy removal and assembly of the connecting links from engagement therewith.

Mounted on the lower horizontal rail 7 of the window frame is a gear casing 55 having bracket portions 56 for receiving fastening screws or the like as at 57 to hold the gear housing 55 affixed to the inwardly directed flange 9 of said horizontal rail 7. The gear housing is provided with a shaft 58 with one end journalled in a recess 59 and its opposite end journalled in a removable plug 60 threaded in an opening in the gear housing as at 61 to facilitate removal of said shaft 58. Keyed or otherwise secured to the shaft 58 is a worm 62 for drivingly engaging a worm wheel 63 mounted on a horizontal shaft 64 and keyed thereon by means of a gib 65 (Figure 10). The ends of the shaft 64 project on opposite sides of the gear casing 55 and are rotatably mounted in openings therein with the extreme free ends of said shaft 64 projecting into casings 67 having brackets 68 which are adapted to be fastened to the inwardly directed flange 9 of the side rail 6, by screws or the like as at 69. The extreme free ends of the shaft 64 are squared for receiving pinion gears 70 and said pinion gears are adapted to mesh with a sector gear 71 mounted to oscillate upon a pivot pin 72 extending through the side walls of the casing 67. A nut 73 is threaded on one end of the pivot pin 72 to retain the same in place. The sector gear 71 is provided with teeth 74 which are adapted to mesh with the teeth of the pinion gear 70 so that rotation of the shaft 64 will cause the oscillation of the sector gear 71 in the housing at each side of the window frame.

Formed integral with the sector gear 71 is an offset arm 75 which is provided with a pivot pin 76 having an enlarged head portion 77 terminating at its outer end in a flattened oval-shaped portion 78. Secured to the extreme lower end of each of the operating bars 36 is a connecting link 79 having one end removably secured to a pivot pin 80 thereon and the opposite end provided with an elongated slot 81 for receiving the oval shaped flattened head 78 of said pivot pins 76. In assembling the connecting link 79, the sector-shaped gear 71 is rotated so that the flattened head portion 78 of the pivot pin will pass through the slot 81 and when the sector gear is oscillated in reverse direction, the flattened head portion 78 will engage the edges of said slot and prevent separation of the connecting link therefrom.

The rotary operating shaft 58 has one of its ends extending through the screw plug 60 for receiving a crank arm 82 on the outer free end of which is provided a handle 83 to facilitate rotation of said shaft 58 and worm 62. When the worm is rotated the shaft 64 is similarly rotated to cause the sector gears 71 to be operated about their pivot pins 72 so that the arm extension 75 will reciprocate the sliding bars 36 and thereby open or close the window sashes 18 in unison. Upon movement of the sliding bars 36 as above described, the uppermost window will travel at a greater rate of speed than the remaining lower sash members and be swung so that its lower mullion 20 will move outwardly relative to the mullion 20 of the adjacent lower window sash a greater distance so as to overhang said lower sash members. This result is obtained by the positioning of the various hinge arms 25, 26 and 27 with the hinge arms of the uppermost window sash being positioned more closely to the end of the stiles 19 than the hinge arms of the lower window sashes.

Upon rotation of the crank arm 82 in one direction, the reciprocating bars 36 will be moved downwardly to swing the window sashes to an open position as shown in Figure 4 from their closed position as illustrated in Figure 3. When the window sashes have been vertically moved to an open position as illustrated in Figure 4, they are partially balanced on the hinge arms 25, 26 and 27 so that a very slight force will be required to again swing the window sashes to a closed position when the reciprocating bars 36 are moved upwardly.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred embodiment of the same and that various changes may be made in the shape, size and arrangement of parts without departing from the spirit of the invention or the scope of the subjoined claims.

What I claim is:

1. A casement window structure comprising a frame, a series of window sashes hinged at their upper portions to said frame to swing vertically about horizontal axes, the hinge pivots thereof being mounted outwardly beyond said sashes in horizontally spaced relationship therewith, operating bar slidably mounted in said frame and disposed substantially co-planar with said sashes in the closed positions of said sashes, and connecting linkage between the sashes and operating bar for swinging the sashes about said horizontal axes upon reciprocating of said operating bar.

2. A window structure comprising a window frame adapted to be received in a window opening, a series of window sashes for said frame, hinge members secured to said frame and sashes with their hinge pivots disposed outwardly from said sashes in the closed positions thereof, for permitting vertical swinging movement of said sashes, and window sash operating mechanism operatively connected to fulcrums on the upper portions of the window sashes for swinging said sashes on their hinges simultaneously, the hinge pivots of the uppermost sash being disposed above and the hinge pivots of the lower sashes being disposed below horizontal planes passing through their respective fulcrums in the closed positions of said sashes whereby said uppermost sash swings outwardly to an open position out of parallelism with said lower sashes and with its bottom edge extending outwardly beyond and overhanging said lower sashes so as to provide weather protection.

3. A window structure comprising a window frame adapted to be received in a window opening, a series of window sashes for said frame, hinge members secured to said frame and sashes with their hinge pivots disposed outwardly from said sashes in the closed positions thereof for permitting vertical swinging movement of said sashes, and window sash operating mechanism operatively connected to fulcrums on the upper portions of the window sashes for swinging said sashes on their hinges simultaneously, the hinge pivots of the uppermost sash being disposed at a different vertical spacing than the hinge pivots of the lower sashes relatively to horizontal planes passing through their respective fulcrums, whereby said uppermost sash swings outwardly to an

open position out of parallelism with said lower sashes and with its bottom edge extending outwardly beyond and overhanging said lower sashes so as to provide weather protection.

4. A window structure comprising a window frame adapted to be received in a window opening, a series of window sashes for said frame, hinge members secured to said frame and sashes with their hinge pivots disposed outwardly from said sashes in the closed positions thereof for permitting vertical swinging movement of said sashes, and window sash operating mechanism operatively connected to fulcrums on the upper portions of the window sashes for swinging said sashes on their hinges simultaneously, the hinge pivots of the uppermost sash being disposed at a different vertical spacing than the hinge pivots of the lower sashes relatively to horizontal planes passing through their respective fulcrums, the hinge pivots of all said sashes being disposed substantially in the same vertical plane, whereby said uppermost sash swings outwardly to an open position out of parallelism with said lower sashes and with its bottom edge extending outwardly beyond and overhanging said lower sashes so as to provide weather protection.

5. A window structure comprising a window frame having side members of channel-shaped cross section with inwardly facing channels adapted to be received in a window opening, a series of vertically swinging window sashes hinged to said frame and swingable from their open positions into closed positions coplanar with said side channels whereby to cover up said side channels, an operating bar slidably mounted in each of the side channels of said window frame, a series of pivot pins mounted on the operating bars in equidistant spaced apart relation, oppositely disposed pivot pins carried by the side edges of the window sashes with the ends thereof projecting slightly beyond the sides of said sashes, links connecting the pivot pins of each window sash to the pins on said operating bars, and means for reciprocating said reciprocating bars.

6. In a window structure for a window frame adapted to be received in a window opening and having a series of vertically swinging window sashes hinged to said frame, an operating bar slidably mounted on each side of said window frame, and a series of pivot pins mounted on the operating bars in spaced apart relation, an adjustable pivot mechanism comprising oppositely disposed pivot pins carried by the window sashes with the ends thereof projecting slightly beyond the sides of said sashes, certain of said pivot pins being rockably mounted on their respective sashes, and links having sockets receiving said rockable pivot pins, said links operatively connecting the pivot pins of each window sash to the pins on said operating bars.

7. In a window structure for a window frame adapted to be received in a window opening and having a series of vertically swinging window sashes hinged to said frame, an operating bar slidably mounted on each side of said window frame, and a series of pivot pins mounted on the operating bars in spaced apart relation, an adjustable pivot mechanism comprising oppositely disposed pivot pins having oppositely inclined base portions mounted on the window sashes with the ends thereof projecting slightly beyond the sides of said sashes, means for rocking said base portions relatively to said sashes, and links having sockets receiving said rockable pivot pins, said links operatively connecting the pivot pins of each window sash to the pins on said operating bars.

8. A window structure comprising a window frame having side members of channel-shaped cross section with inwardly facing channels adapted to be received in a window opening, a series of vertically swinging window sashes hinged to said frame, an operating bar slidably mounted in each of the side channels of said window frame in the space between the longitudinal flanges thereof, a series of pivot pins mounted on the operating bars in equidistant spaced apart relation, oppositely disposed pivot pins carried by the window sashes with the ends thereof projecting slightly beyond the sides of said sashes, links connecting the pivot pins of each window sash to the pins on said operating bars, and mechanism operatively connected to said operating bars for reciprocating said bars, whereby said channels house and conceal said operating bars and the flanges thereof provide guidance for the reciprocation of said operating bars.

WALTER A. ALBRECHT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,854,005	Walton	Apr. 12, 1932
2,094,990	Lang	Oct. 5, 1937
2,109,973	Moseley	Mar. 1, 1938
2,137,426	Thompson	Nov. 22, 1938
2,267,140	Schottenberg	Dec. 23, 1941
2,313,827	Larson	Mar. 16, 1943
2,327,246	Bunjes	Aug. 17, 1943