April 3, 1956

E. A. WESTMAN

2,740,170

WINDOW STRUCTURE

Filed June 5, 1952

2 Sheets-Sheet 1

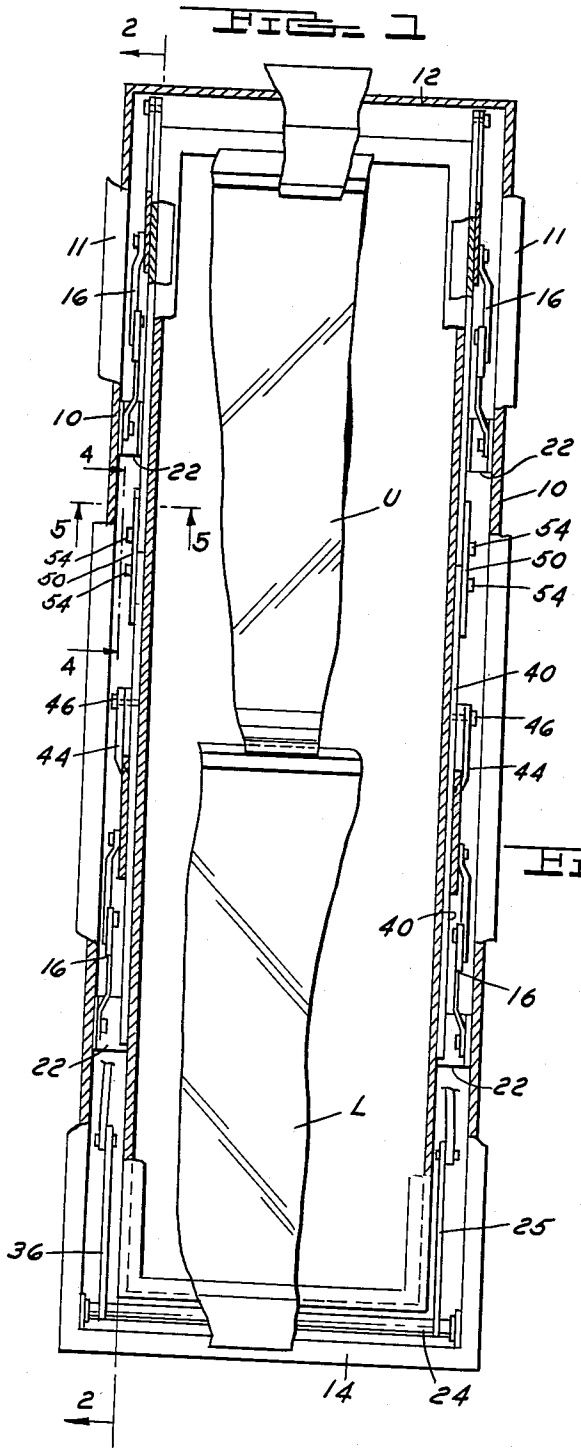


FIG. 4

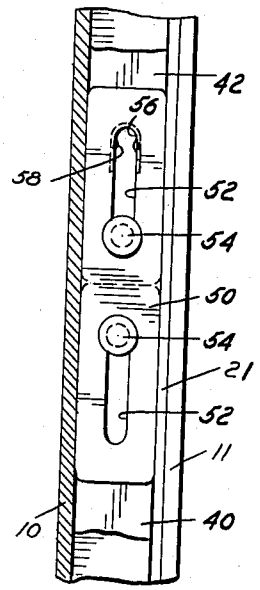


FIG. 6

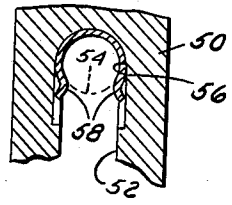
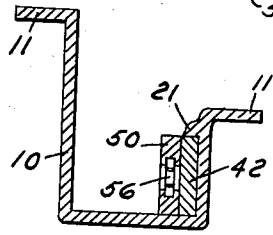


FIG. 5



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FIG. 3

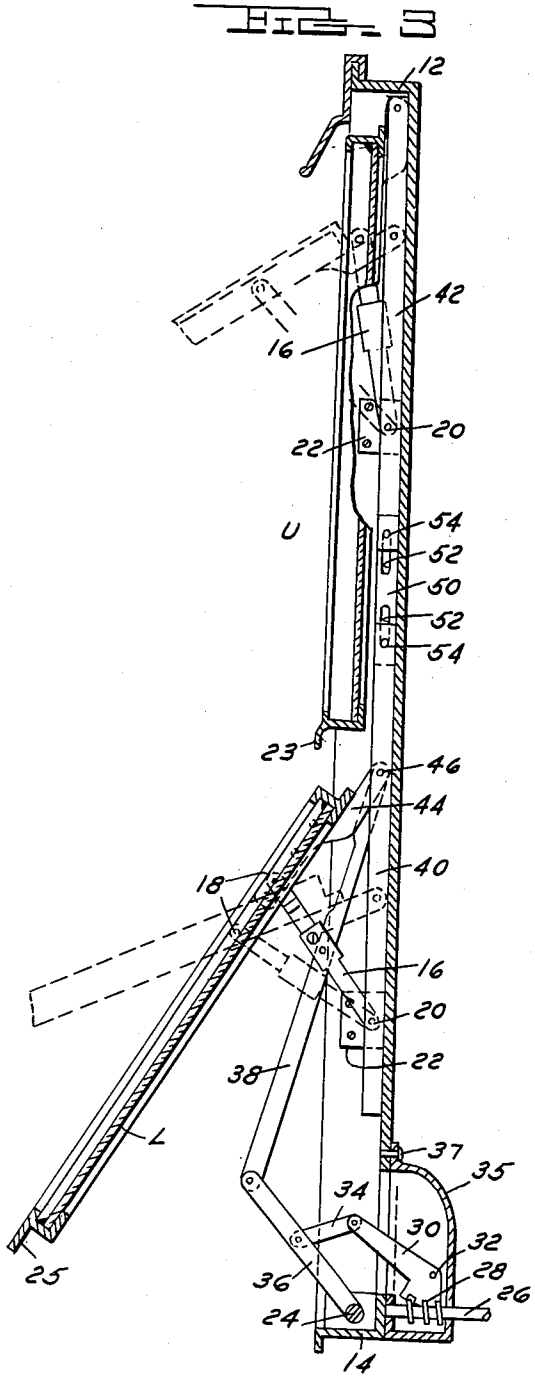
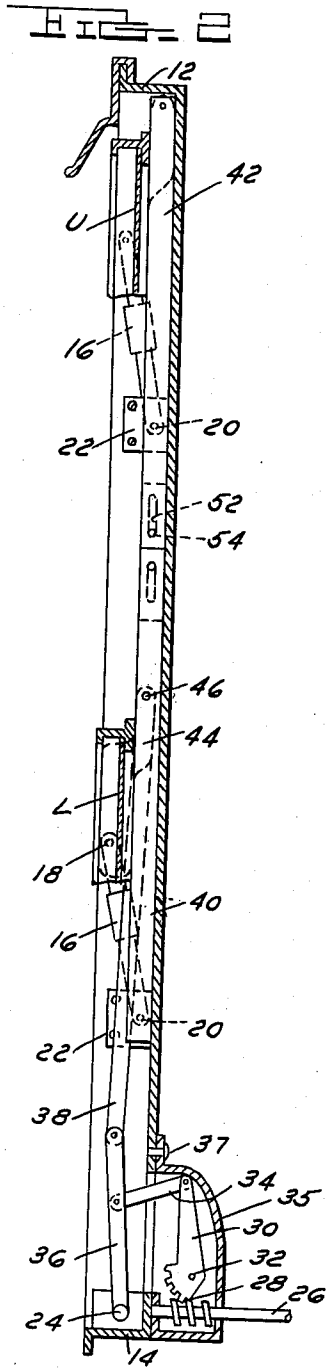


FIG. 2



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WINDOW STRUCTURE

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Application June 5, 1952, Serial No. 291,849

2 Claims. (Cl. 20—42)

This invention relates to a window structure and particularly to a window construction of the awning type of swingable sash. In the awning type of window one or more sash elements are pivotally mounted between the side frame members of the window for swingable movement of the sash. The sash are swingably actuated by operating mechanism which commonly includes a crank actuated rotatable shaft coupled by linkage with the sash to swing the sash upon rotation of the shaft.

As conventionally constructed, the swingable sash open simultaneously. If the window comprises upper and lower sash, both of these sash swing open at the same time and close at the same time. It is frequently desirable to be able to open merely the lower sash for a slight distance without opening the upper sash. This invention relates to the provision of operating mechanism which is so constructed and so coupled with the sash that upon initiation of the opening movement the lower sash will swing partially open before the upper sash is opened. Following the initial partial opening movement of the lower sash both sash elements swing open simultaneously.

An object of this invention is to provide a window structure of the awning type having upper and lower swingable sash with operating mechanism so constructed and coupled with the sash that the lower sash may be partially opened without any resulting opening of the upper sash and following such partial opening movement both sash may be swung simultaneously to the open position.

Another object is the provision of a window structure of the character described wherein there is a lost motion connection in the linkage between the sash and the shaft which permits actuation of that part of the linkage which swings the lower sash prior to actuation of that part of the linkage which swings the upper sash and the construction is such that when both sash are opened they are held in the open position against rattle or looseness notwithstanding the provision of the lost motion connection.

A further object is the provision of mechanism of the character set forth which is simple, sturdy, inexpensive and easily operable.

Other objects, advantages and meritorious features will more fully appear from the following description, claims and accompanying drawings, wherein:

Fig. 1 is a front elevation of a window structure embodying the invention and partly broken away to illustrate the working parts of the operating mechanism;

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional view taken on the same line as that of Fig. 2, but showing the lower window sash partially open in solid line and showing in dotted outline both the lower and the upper sash in the open position;

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1;

Fig. 6 is a fragmentary sectional view through one end of the link which forms part of the lost motion connection between the two sections of a slide bar.

In the window structure illustrated there are two side frame members which are indicated as **10**. These side frame members are complementary and are disposed in opposed spaced apart relationship being connected at the top by a header **12** and at the bottom by a bottom cross member **14**. Each side frame member is channel-shaped in cross section, as illustrated in Fig. 5, and its side walls are turned outwardly providing flanges **11**, as shown in Fig. 5. An upper sash indicated generally as U and a lower sash indicated generally as L are pivotally mounted between the side frame members. Each sash is independently swingably pivoted between the side frame members upon a pair of links. These links are indicated as **16**. Each link consists of two end sections which are adjustably extensibly connected together so as to vary the length of each link. The links shown are those which are described and claimed in applicant's application Serial No. 218,031, filed March 28, 1951, now Patent No. 2,688,779, patented September 14, 1954, though any adjustable type of link might be used and such forms no part of the instant invention. Each link is pivoted at one end as at **18** to its sash spaced from the top of the sash and is pivoted at the opposite end as at **20** to a side frame member **10**. The pivotal connection **20** is made with a bracket portion **22** which bracket **22** is secured to the side frame member and also serves to form a guide for a slide bar hereinafter described. Each sash swings upon its pair of links as a fulcrum with respect to the window frame. The upper sash has a depending flange portion **23** which overhangs the lower sash to form a weather seal therealong and the lower sash has a depending flange portion **25** which overhangs the bottom cross frame member for a similar purpose.

The operating mechanism is provided to swing the sash and this operating mechanism includes a shaft **24** which extends transversely across the bottom of the window frame and is rotatably mounted for rotation by a hand crank **26**. This hand crank is connected by gearing **28** with the lever arm **30**, which arm is pivoted to a support as at **32**. The outer end of the arm is connected by a link **34** with an arm **36** fixed to the shaft **24**. The outer end of the arm **36** is connected by a long link **38** with a slide bar which slide bar is coupled with the sash to swing the sash. A housing **35** surrounds the operating linkage, as shown, and is secured to the frame by screws **37**, or the like.

A pair of slide bars are provided for each window frame, one for each side frame member. Each slide bar is mounted within the channel of its frame member to extend along the inside thereof, as shown. As hereinafter stated, the bracket **22** forms a guide for the slide bar, but the frame member itself is provided with an inwardly projecting portion **21**, as shown in Fig. 5, which also serves to guide the slide bar. Each bar is divided into upper and lower sections, as illustrated. Each upper section is indicated by the numeral **42**. The two lower sections **40** are pivoted to the lower sash L, as shown. Each lower sash L has a pair of brackets **44** secured thereto adjacent its top margin. The ends of these brackets are pivotally coupled by pivots **46** to the lower sections **40** of the slide bars. Upon rotation of the crank **26** the slide bars are reciprocated. When the crank is rotated to lower the lower sections **40** of the two slide bars the top of the lower sash will be pulled downwardly and this will swing the bottom of the lower sash outwardly, all as shown in dotted line in Fig. 3.

The two lower sections **40** of the two slide bars are connected with upper sections **42** of the two slide bars by lost motion linkage. This lost motion linkage comprises

a link 50 which is shown as provided adjacent each end with a slot 52. A pin 54 is carried by each slide bar section and extends through the slot 52, all as shown in Figs. 2 and 3. In Fig. 2, the sash are shown as closed and the pins 54 are disposed at the adjacent ends of the slots 52 in the link 50. When the lower sash is partially opened and the lower sections 40 of the slide bars are drawn downwardly the pins move to the remote ends of the slots 52 before the upper sections of the slide bars pick up the movement of the lower sections and move therewith. This lost motion permits independent partial opening of the lower sash before the upper sash is opened. Once the lost motion is taken up continued opening movement imparted from the crank will now swing the upper sash and the same will swing simultaneously with the lower sash.

In order that the upper sash when swung to an open position will not rattle or move up and down in a wind, means is provided to restrain the accidental play of the lost motion connection. The link 50 is provided at one end of the upper slot 52 with a spring clip 56 which is shaped to provide opposed protuberances 58 through which the shank of the pin 54 passes to enter the clip and reach the end of the slot 52. This spring clip then grips the pin releasably so that relative movement between the upper section 42 and the link 50 is restrained and the upper sash is held against accidental vibration. When it is desired to close the window, rotation of the crank to effect such closing movement will readily serve to withdraw the pin from the clip 56 so as to permit the pin to occupy the positions shown in Fig. 4 when the sash are closed.

What I claim is:

1. In a window structure, a window frame having a pair of opposed complementary spaced apart side frame members, upper and lower sashes therebetween, a pair of links for each sash, one link of each pair pivoted at one end to a side frame member and pivoted at the opposite end to the adjacent side of a sash spaced below the top of the sash, the other link of the pair correspondingly pivoted at one end to the other side frame member and correspondingly pivoted at its opposite end to its adjacent side of the sash, a pair of slide bars, one for each side frame member, each slide bar disposed along its side frame member for lengthwise movement therealong, each bar comprising an upper section and a lower section, a lost motion linkage coupling said two sections together comprising a link for each bar, each link overlapping the adjacent ends of the upper section and the lower section of the bar with which it is associated, the upper end of each link coupled through a pin and slot lost motion connection with the lower end of the upper bar section, the lower end of each link coupled through a pin and slot lost motion connection with the upper end of the lower bar section, the upper sash pivotally coupled at the top to the upper sections of the two bars, the lower sash pivotally coupled at the top to the lower sections of the two bars, and an operating mechanism coupled with the lower ends of the two bars to move the bars downwardly to swing the sashes toward an open position and to move the bars upwardly to swing the sashes toward a closed position, said pin and slot lost motion connection of each end of each link with the adjacent ends of the upper section and the lower section of its bar being such that the two pins are disposed in adjacent ends of the slot when both bar sections are moved upwardly and into opposite ends of the two slots when both bar sections are moved downwardly.

2. In a window structure, a window frame having a pair of opposed complementary spaced apart side frame members, upper and lower sashes therebetween, a pair of links for each sash, one link of each pair pivoted at one end to a side frame member and pivoted at the opposite end to the adjacent side of a sash spaced below the top of the sash, the other link of the pair correspondingly pivoted at one end to the other side frame member and correspondingly pivoted at its opposite end to its adjacent side of the sash, a pair of slide bars, one for each side frame member, each slide bar disposed along its side frame member for lengthwise movement therealong, each bar comprising an upper section and a lower section, a lost motion linkage coupling said two sections together comprising a link for each bar, each link overlapping the adjacent ends of the upper section and the lower section of the bar with which it is associated, the upper end of each link coupled through a pin and slot lost motion connection with the lower end of the upper bar section, the lower end of each link coupled through a pin and slot lost motion connection with the upper end of the lower bar section, the upper sash pivotally coupled at the top to the upper sections of the two bars, the lower sash pivotally coupled at the top to the lower sections of the two bars, and an operating mechanism coupled with the lower ends of the two bars downwardly to swing the sashes toward an open position and to move the bars upwardly to swing the sashes toward a closed position, each pin and slot lost motion connection of each end of each link with the adjacent ends of the upper section and the lower section of its bar being such that the two pins are disposed in adjacent ends of the slot when both bar sections are moved upwardly and into opposite ends of the two slots when both bar sections are moved downwardly, the upper slot in each link being provided at its upper end with a spring clip mounted therein, said clip adapted to releasably grip the pin in the slot when the pin is moved into the upper end of the slot.

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