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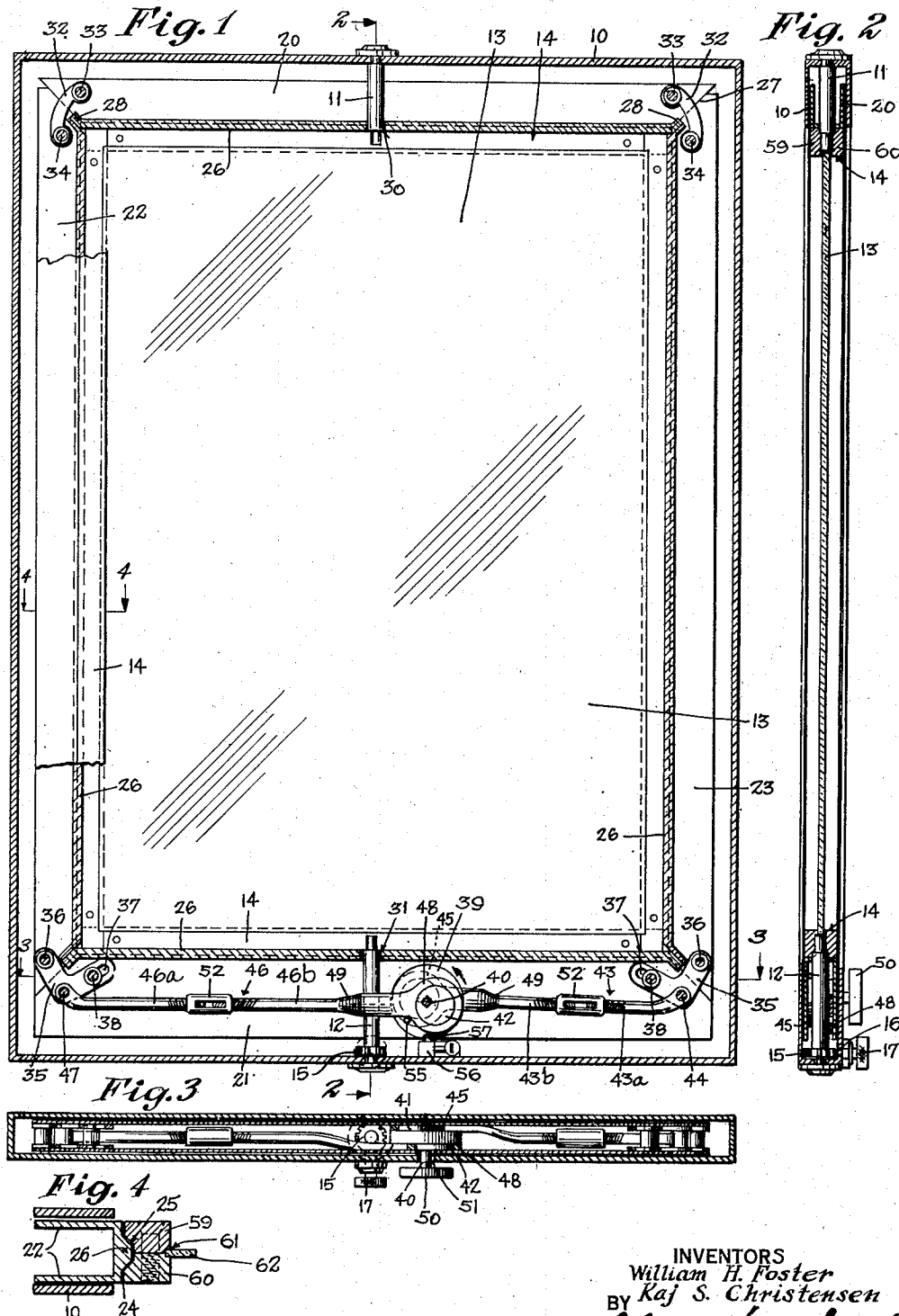
W. H. FOSTER ET AL

2,268,114

CLOSURE, SEALING, AND LOCKING MEANS

Filed May 3, 1939

2 Sheets-Sheet 1



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Fig. 5

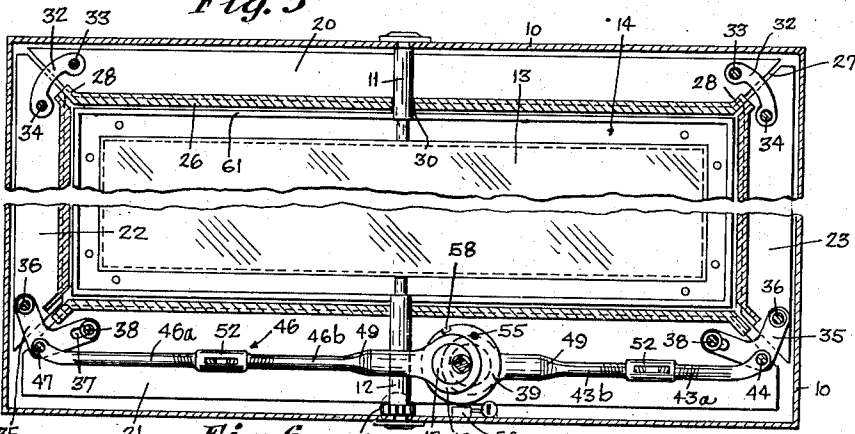


Fig. 6

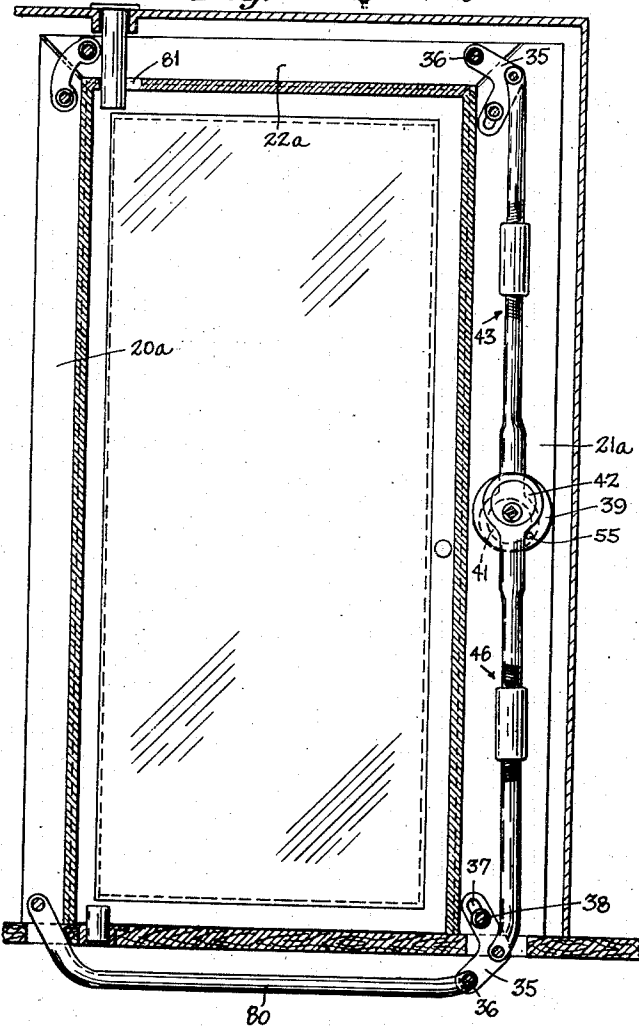


Fig. 7

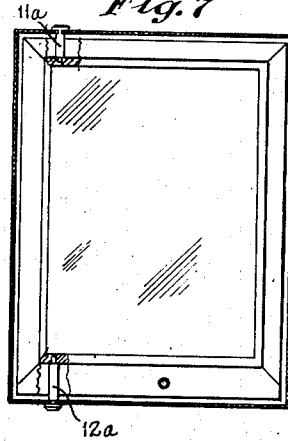
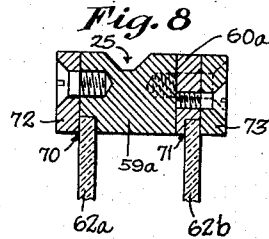


Fig. 8



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CLOSURE, SEALING, AND LOCKING MEANS

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11 Claims. (Cl. 20—53)

The present invention relates to closures, and, more particularly, to a locking and sealing means therefor.

In prior constructions for sealing closure members, efforts have been made to interlock the closure member and its frame adjacent their edges to hold them against movement and to seal the opening. These efforts have been ineffectual inasmuch as they usually do not grip the closure member, and, therefore, cannot securely hold the closure member in place and cannot form a complete seal or weather stripping.

An object of the present invention is to provide a sealing and locking means which completely encircles the closure member and grips the same along all of the edges thereof and interlocks with the closure member to hold it against casual movement, said sealing and locking strips being so arranged that any effort to move them by pressure on the strips would operate through the strips to cause the actuating means to move into tighter locking engagement.

This object is accomplished by providing a frame in which the closure member is mounted, and slidably mounting in the frame in juxtaposition to the edges of the closure member and in the plane of the closure member when in closed position, a plurality of strips suitably interconnected at their ends by links. The links and strips are operated by an actuator which moves them into and out of gripping relation with the closure member.

When the strips are in gripping position, the actuator rests against a stop member which is located past dead center with respect to its actuating elements. With this construction, any pressure on the strips tending to move them to release position will tend to move the actuator in a direction which would cause it to be pressed against the stop and would prevent the strips from being moved outwardly.

In the preferred form of the present invention, the strips are channel-shaped and completely enclose and conceal the connecting links and the actuating mechanism. The web of the channel is adapted to engage the edge of the closure member in abutting relation, and the abutting surfaces are provided with a groove and a cooperating portion which effectively interlock, when the strips are moved into gripping or interlocking position, to hold the closure member against movement on its pivot and also seal the joint between the closure member and strips.

The operating means for the strips, according to the present invention, may be adjustable so

that tight gripping engagement can always be had between the strips and the closure member.

The locking and sealing means of the present invention can be applied to closures of various types. For example, it can be prevented on windows which are pivotally mounted in their frame, either about a central axis or about an axis along one margin of the closure member; or it can be used to lock doors or other similar closures for openings.

If desired, unauthorized operation of the operating means for the strips by persons having access to the means can be prevented by providing a locking means for the operating means, which interlocks with the actuator or a part thereof to hold it against movement.

When the closure member is in the form of a window, it can be made up of two sections having a groove formed in the line of jointure of the sections for receiving the pane of glass, and the outer edge of the sash cut away to receive a tongue on the locking and sealing strip, or it may comprise two pane-carrying sections secured together to form a double window having an air space therebetween, with the sections removable for the purpose of cleaning the inside surfaces of the two panes of glass.

If desired, the closure member can comprise a door which is held in closed position by the locking and sealing strips.

Other features and advantages of the invention will be apparent from the specification and claims when taken in connection with the drawings, in which:

Figure 1 is a longitudinal view, partly in section, of a window.

Fig. 2 is a longitudinal sectional view, taken along line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view, taken along line 3—3 of Fig. 1.

Fig. 4 is a sectional view, taken along line 4—4 of Fig. 1.

Fig. 5 is a longitudinal sectional view, partly broken away, showing the sealing strips in retracted position.

Fig. 6 shows a longitudinal section of the invention as applied to a door.

Fig. 7 shows a longitudinal sectional view of a window pivoted at one side.

Fig. 8 is a fragmentary sectional view, showing a sash for a double window.

As shown in Figs. 1 and 2, a frame member 10, preferably channel-shaped, has mounted therein a pair of aligned pivot pins 11, 12 projecting from the opposite sides thereof for pivotally

mounting the closure member, herein illustrated as a window 13, for movement therein.

The pivot pins have their free ends secured to the sash 14 of the window to turn therewith so that the window can be swung about the pivots into open position.

When the window is moved to the desired position, it is held in this position by means of a ratchet 15, secured to the pivot pin 12, and a cooperating pawl 16 carried by the frame. The pawl is of the usual type which is normally urged into engagement with the ratchet and is provided with a handle 17 by which it can be retracted when it is desired to move the window. The pawl may be retained in retracted position by suitable means when desired.

A feature of the present invention resides in the novel means, in addition to the ratchet and pawl, for locking the window in closed position, which means will also function as a weather strip to seal the window. In the illustrated form of the invention, this means comprises four strips, 20, 21, 22, 23, one for each side of the window, which completely encircle the window, and have their ends interconnected by suitable link means to be described. The strips can be of any desired construction, but, preferably, they are hollow and house the links and actuating means therefor.

As shown, the strips are mounted for movement in the frame in the plane of the window, when closed, and are provided with surfaces 24 adapted to engage the edges of the window, preferably in abutting relation, and are interlocked therewith.

The interlock is formed by having a groove 25 on one of the contacting surfaces and a cooperating portion 26 on the other. In the present preferred form of the invention, the groove 25 is formed in the sash while the projection 26 is formed on the strips, although they can be reversed if desired. As shown in the drawings, this interlock extends all around the window and completely seals the joint between the strips and the window, and the ends of the strips are mitered as shown at 27 and have a short sealing flange 28 so that they have a tight fit when in sealing position, thus forming an effective weather stripping.

In order to move the strips into and out of engagement with the window, a novel linkage mechanism is utilized, which mechanism includes the strips themselves. As shown in Fig. 1, the top and bottom strips 20, 21 are apertured at 30 and 31 to slide along in pivot pins. The ends of the top strip 20 and the adjacent ends of the side strips 22, 23 are secured together by curved links 32. The links 32 are fixedly pivoted at one end of the top strip at 33 and at the other end to the side strips at 34. The bottom ends of the side strips 22, 23 and the bottom strip 21 are connected together to bell cranks 35. Each of the bell cranks 35 has one end fixedly pivoted to a side strip as at 36, and the other end provided with a slot 37 operating on a pivot pin 38 on the bottom strip 21, whereby the link has limited relative movement with respect to the bottom strip.

The strips are moved into and out of engagement with the window by means of a disk 39 mounted on a shaft 40 rotatably supported in the strip 21 and is provided with a pair of oppositely disposed eccentrics or pivot pins 41, 42. A connecting rod 43 has one end connected to one of the bell cranks 35 at a point 44 intermediate

its ends, and has a strap 45 at the other end disposed about eccentric 41 so that movement of the eccentric shifts the link. Similarly, a connecting rod 46 is connected to the other bell crank 35 at 47 and has a strap 48 surrounding the eccentric 42. The connecting rods are bent slightly at 49 so that they fit around the pivot pin and also are flush with the surface of the disk as shown in Fig. 3. The disk can be rotated by means of an actuator or handle 50 secured to the end of the shaft 40 which projects through an opening 51 in the frame. The eccentrics are so positioned on the disk that rotation thereof simultaneously moves the connecting rods toward or away from one another.

When the actuator is rotated in a counterclockwise direction, as shown in Fig. 1, the eccentrics operate to move the sealing strips into open position in the following manner: Initial movement of the eccentrics will cause the connecting rods to travel outwardly and move the bell crank levers 35 about the pivots 36 and pull the bottom strip 21 out of engagement with the sash. The bottom strip slides along the pivot pin 12 until it reaches the limit of its movement. Due to the slotted connection between the bell cranks and the bottom strip, further movement of the actuators will cause the bell cranks to move relative to the bottom strip and push the side strips outwardly from the sash until the ends of the slots engage the pivot pins 38, whereupon the bell cranks pivot thereabout and impart a longitudinal upward movement to the side strips, which, through the links 32, will cause the upper strip 20 to slide out of engagement with the sash. The strips will then be in the position shown in Fig. 5, and the window will be free for turning movement.

As shown in Fig. 1, the connecting rods can be split into sections 43a, 43b and 46a, 46b with the ends threaded, and a turnbuckle 52 utilized to adjust the ends of the connecting rod to insure a tight seal when the strips are moved into sealing relation.

To control the locking action of the strips, a pin 55 is positioned on the operating disk to engage the connecting rod when the eccentric has been thrown to the position shown in Fig. 1, wherein it is slightly beyond dead center. With this construction, any effort to pry the strips out of engagement with the window sash will operate through the links to pull the pin more tightly in engagement with the connecting rod.

As a further precaution against unauthorized opening of the window, a lock 56 can be provided which will project a keeper 57 into a notch 58 formed on the disk 39 to hold it against unauthorized rotation.

As will be seen in Fig. 4, the sash, in this form of the invention, comprises a pair of cooperating sections 59, 60, suitably secured together and having at their jointure a groove 61 formed for the reception of a pane of glass 62. By so making the sash, the groove 25, for receiving the projection on the sealing strip and the groove 61, can be readily formed before the sash is assembled.

If it is desired to use a double pane window having an air space between the panes, the sash may be made of two cooperating sections 59a, 60a, suitably secured together, in the manner shown in Fig. 8. Each of the sections has a groove formed therein, as at 70 and 71, in which is mounted the panes of glass 62a, 62b which are locked in place thereon by beading strips 72, 73. In this form of the invention, the section 59a is thicker than section 60a and is provided with the

groove 25 for cooperating with the projection on the strips. With this construction, the two sections can be assembled separately and then joined to form the sash; and it is a relatively simple matter to separate the glasses when it is desired to clean the inside surfaces thereof.

In the preferred form of the invention, the window sash is shown pivoted along its longitudinal axis. This enables the window to be completely revolved and facilitates the cleaning of the window, inasmuch as both sides can be turned to the inside to be washed. However, if it is desired to have the window swing about one side thereof, the pivots 11a, 12a can be located in the manner shown in Fig. 7 without in any way interfering with the operation of the locking strips.

Up to now, the closure member has been considered as being a window. However, it is clear that the locking and sealing means can be used on doors of various types, for example, safe doors, or even doors in dwellings.

When the device is used for safe doors, or the like, the arrangement similar to that shown for the window can be used for locking the door in place. However, if it is to be used for a dwelling, the movable locking member along the bottom of the door may be eliminated, if desired, to avoid any objectionable projection which might be there due to the movable locking member.

This is accomplished, as shown in Fig. 6, by moving the actuating means to the side of the door and replacing the bottom strip with a link 80 which extends under the floor or sill so as to connect the two strips 20a and 21a. The strips 20a and 21a, and the top strip member 22a are similar to those shown in the window construction, and interlock with the edge of the door in the same manner as do the strips in the window construction. These strips, together with the links 80, surround the door and operate upon movement of the actuating member to grip the sides and top of the door.

The system of linkages used to connect the strips and link are the same as used in the window construction, with the exception that the link 80 is connected directly to the strip 20a opposite the strip 21a having the actuating means, inasmuch as the link does not have to move outwardly from the door.

The operation of the locking means is similar to that described in connection with the window construction. Initial movement of the disk 39 will cause the eccentrics 41, 42 to push the connecting rods 43, 46 outwardly and cause the bell cranks 35 to pivot about the pivots 36 so as to slide the strip 21a outwardly along the flooring and out of engagement with the edge of the door. Continued movement of the connecting rods will cause the top strip to shift out of engagement with the edge of the door and also shift link 80. When the ends of the slots engage the pivot pins 38, the bell cranks will move the top strip 22a and link 80 laterally to slide the strip 20a out of engagement with the edge of the door.

As noted in Fig. 6, the top strip is provided with an elongated aperture 81 to receive the upper pivot member, whereby the upper strip can move relative thereto during its lateral movement. When the strips are completely free of the door, the door is then free to move about its pivots.

As in the prior described construction, the disk is provided with a pin 55 for engaging the connecting rod when the eccentrics have moved

slightly beyond dead center, and an effort to move the strips outwardly will only tend to bind the pin against the connecting rod. Suitable means may be provided, if desired, for holding the disk against unauthorized rotation, as has been previously described.

From the foregoing, it will be seen that the present invention, provides an interlock and seal for a closure member such as a door, window or the like, which grips and securely holds the closure member in place and effectively seals the opening.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

We claim:

1. A closure comprising a frame; a closure member pivotally mounted in the frame; a plurality of sealing and locking strips mechanically interconnected at the ends thereof by link means, said strips being floatingly carried by the frame independently of any connection with said frame for free sliding movement with reference to the frame in the plane of the closure member when said member is in closed position; means for simultaneously and positively moving said strips into and out of abutting relation with the edges of the closure member solely by cooperation with the mechanical interconnections of said strips; and means for locking the strips in said abutting relation.

2. A closure comprising a frame; a closure member pivotally mounted in the frame; a plurality of strips carried within the frame for movement in the plane of the closure member when said member is in closed position; means for simultaneously moving the strips into and out of abutting relation with the edges of the closure member, including a bell crank member having a lost motion connection with one of said strips; and interlocking means on the abutting surfaces for sealing the joint between the closure member and the strips and holding the closure member against pivotal movement.

3. A closure comprising a frame; a closure member movably mounted in the frame; a plurality of sealing and locking strips freely carried for sliding movement within the frame; link means including bell cranks and lost motion connections interconnecting the ends of the strips; and means connected to at least one of the link means and cooperating solely with the interconnecting link means for causing simultaneous and positive movement of the strips into and out of gripping engagement with the closure member.

4. A closure comprising a frame; a closure member pivotally mounted in the frame; a plurality of channel-shaped strips freely carried for sliding movement within the frame; link means disposed within the channel and connecting the ends of the strips; operating means disposed within the channel and operable solely through the interconnecting link means for positive movement of the strips into and out of engagement with the closure member, said operating means comprising a pair of eccentrics; connecting rods interposed between the eccentrics and the link means for operating the link means upon movement of the eccentrics; and means for limiting the movement of the eccentrics to a point wherein the eccentrics are beyond dead center and the connecting rods are out of alignment.

5. A closure comprising a frame; a closure member pivotally mounted in the frame; a plu-

ality of channel-shaped strips freely carried for sliding movement within the frame; link means disposed within the channel-shaped strips and connecting the ends of the strips; and operating means disposed within the channel-shaped strips for operating the interconnecting link means, at least one pair of adjacent links comprising bell cranks having one end connected to said strips by a lost motion connection for imparting lateral and longitudinal movement to the opposite strips connected to said bell cranks, whereby the strips are positively moved into and out of engagement with the closure member by the operating means, both operations of said operating means depending solely upon cooperation with said interconnecting link means.

6. A closure comprising a frame of channel-shaped members; a closure member pivotally mounted in the frame; a plurality of channel-shaped strips freely carried for sliding movement within the channel of the frame; link means disposed within the channel-shaped strips and connecting the ends of the strips; and operating means disposed within the channel-shaped strips and operable through the interconnecting link means for positively moving the strips into and out of engagement with the closure member, said channel-shaped strips concealing and protecting the link means and operating means, and both operations of said operating means depending solely upon cooperation with said interconnecting link means.

7. A closure comprising a frame; a closure member pivotally mounted in the frame; a plurality of interconnected strips freely carried for sliding movement within the frame; and means for mounting the strips for simultaneous movement in the plane of the closure member, when said member is in closed position, into and out of abutting relation with the edges of the closure member, at least one pair of opposed strips being disposed about and in sliding engagement with the pivotal mounting of said closure member for movement therealong laterally of the closure and the other intermediate strips moving laterally and longitudinally of the closure, the strips and edges of the closure member being provided with a groove and coacting portion to seal the joint between the closure member and the strips and to hold the closure member against pivotal movement from closed position, interconnection of said strips constituting the sole means for their cooperation for simultaneous inward and outward motion.

8. A closure comprising a frame; a closure member pivotally mounted in the frame; a plurality of channel-shaped strips freely carried for sliding movement within the frame; link means disposed within the channel and connecting the ends of the strips; and operating means disposed within the channel and operable to actuate the link means, at least one pair of adjacent links comprising bell cranks having lost motion connections for imparting lateral and longitudinal movement to the opposite strips connected to

said bell cranks, whereby the strips are positively moved into and out of engagement with the closure member, said operating means comprising a single actuator and adjustable connectors interconnecting the two bell cranks for simultaneous movement with the actuator, both inward and outward motion of said strips depending solely upon cooperation of said operating means with said interconnecting link means.

9. A window comprising a frame; a window sash pivotally mounted in the frame; a plurality of channel-shaped strips movably carried for free sliding movement by and within the frame for movement in the plane of the window sash when said window sash is in closed position; means for simultaneously moving the strips into and out of abutting relation with the edge of the sash comprising link means including bell crank members having lost motion connections with said strips; and interlocking means on the abutting surfaces of said strips and window sashes for sealing the joint between the sash and the strips and holding the sash against pivotal movement.

10. A window comprising a frame; a window sash; pivots mounted in opposite sides of the frame for pivotally mounting the sash therein; a plurality of strips freely carried for sliding movement within the frame, one strip for each edge of the sash; link means connecting the ends of the strips, the links at the bottom of the window comprising bell cranks; an actuator mounted at the bottom of the window; and adjustable connecting rods having one end connected to the actuator and the other end pivotally connected to the bell cranks to operate the strips and link means, movement of the actuator in one direction positively moving the bottom strip away from the window and the side strips to move outwardly and then longitudinally with respect to the window, the longitudinal movement of the side strips raising the top strip out of engagement with the edge of the window, reverse motion of the actuator causing positive reverse operation of the strips, said motion of the strips in either direction depending solely upon cooperation of the actuator with said interconnecting link means.

11. A window comprising a frame; a window sash pivoted in the frame; a plurality of mechanically interconnected channeled strips floatingly carried for free sliding movement within the frame, one strip for each edge of the sash; means disposed within the channeled strips for positively moving the strips into and out of locking engagement with the edges of the sash comprising a pair of eccentrics and connecting rods; and means for limiting the movement of the eccentrics to a position past dead center, whereby the strips are locked against outward movement, operation of said means for moving the strips in either direction depending solely upon the mechanical interconnection of said strips.

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CERTIFICATE OF CORRECTION.

Patent No. 2,268,114.

December 30, 1941.

WILLIAM H. FOSTER, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, second column, line 38, claim 10, strike out "to move"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3rd day of March, A. D. 1942.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.