Aug. 13, 1940. C. E. LYON 2,211,473

WINDOW

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FIG. 1.

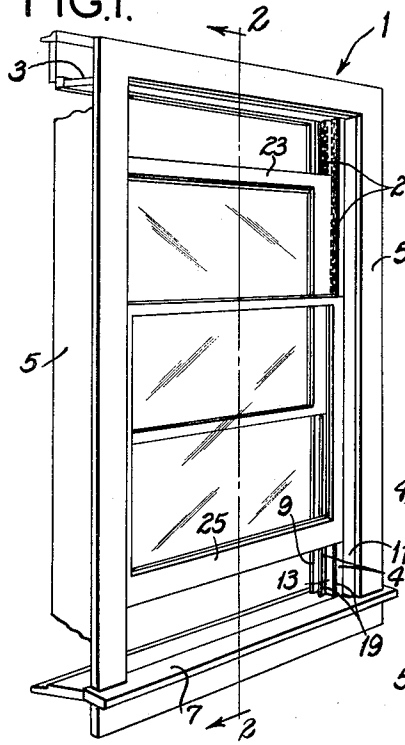


FIG. 2.

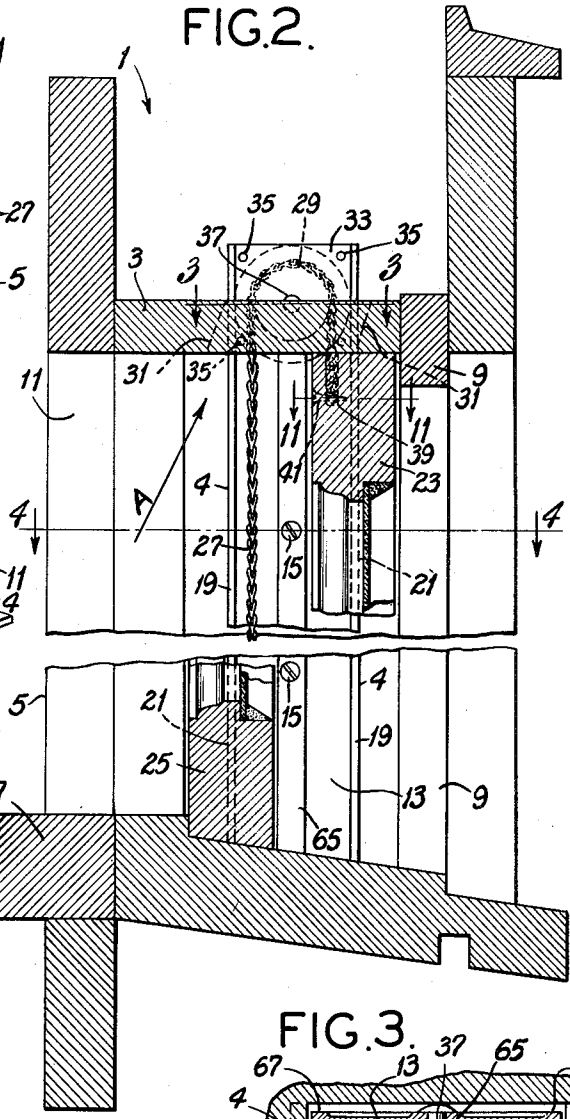


FIG. 11.

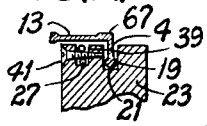


FIG. 3.

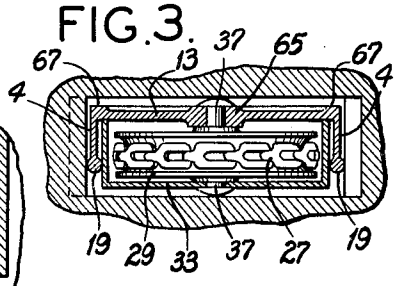
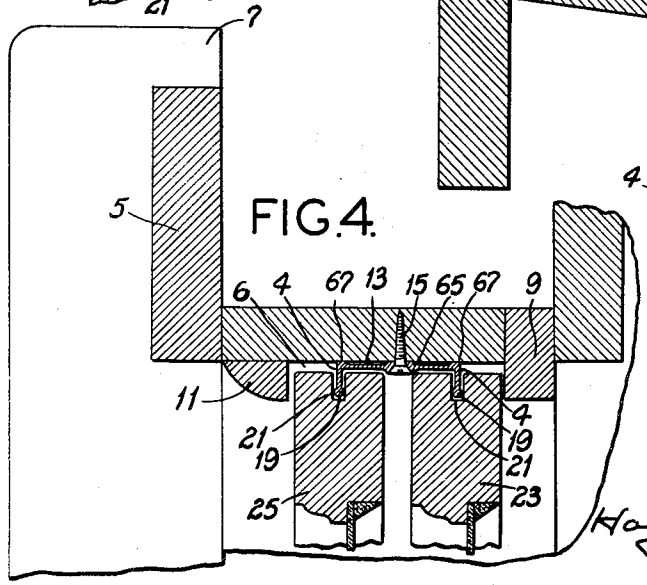


FIG. 4.



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WINDOW

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FIG.5.

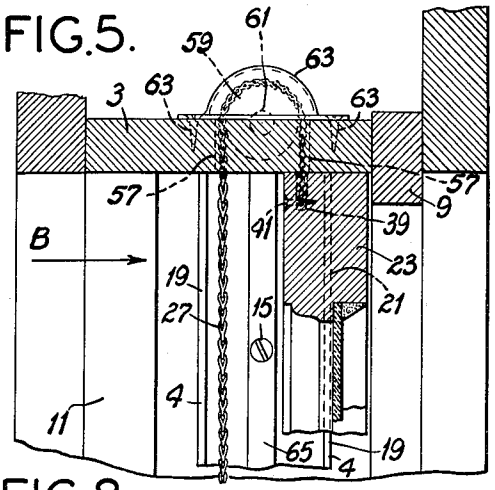


FIG.6.

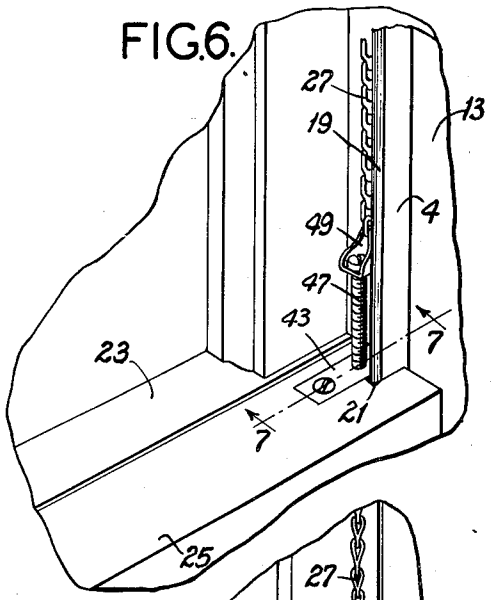


FIG.8.

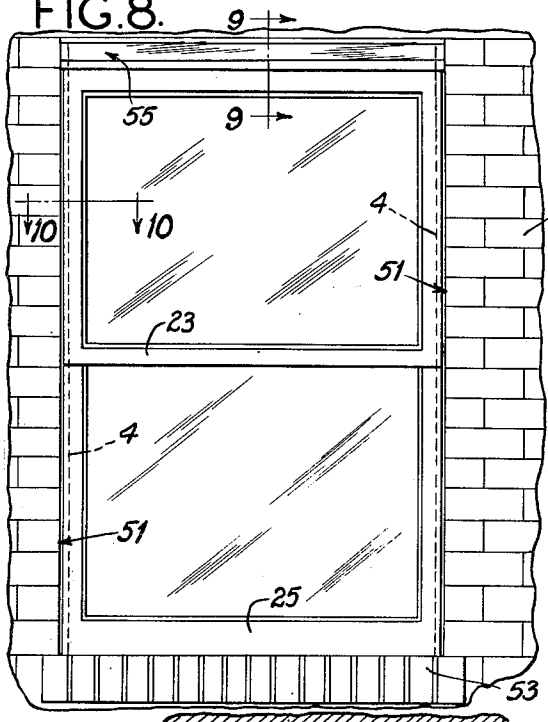


FIG.7.

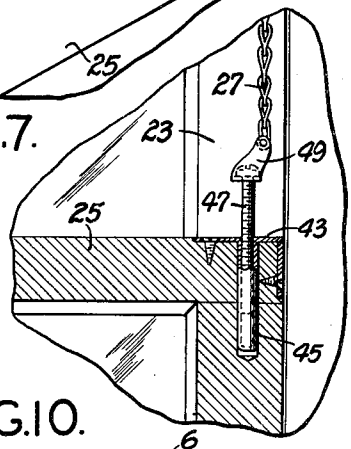


FIG.10.

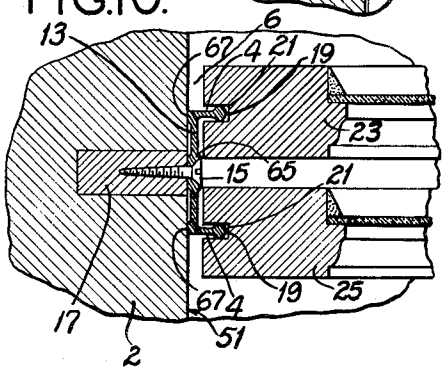
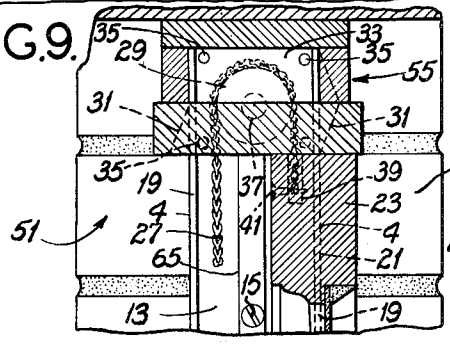


FIG.9.



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UNITED STATES PATENT OFFICE

2,211,473

WINDOW

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Application December 17, 1938, Serial No. 246,307

5 Claims. (Cl. 20—52)

This invention relates to windows, and with regard to certain more specific features, to windows for use in building openings in which are used two sashes.

Among the several objects of the invention may be noted the provision of a window which presents more glass area in a given wall opening; the provision of a window of this class in which the sashes counterbalance one another and easily slide on a rigid guide which also functions as a weatherstrip, said guide being removable to permit the sashes to be readily removed for painting, repair and like purposes; the provision of a window of the class described in which one sash functions as a counterweight for the other and in which a feature is employed for permitting proper closure of both windows at the same time; the provision of a window of the class described which may be applied to window openings without the use of a window frame, if desired; and the provision of a combination of said guide and counterweighting features in which is eliminated the necessity for the ordinary counterweights and counterweight compartments. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which are illustrated several of various possible embodiments of the invention,

Fig. 1 is a perspective view from the inside showing the application of the invention to a window opening in which a surrounding window frame is used, the two sashes which are used being shown open;

Fig. 2 is an enlarged vertical section taken on line 2—2 of Fig. 1 but showing the sashes closed;

Fig. 3 is a still further enlarged horizontal section taken on line 3—3 of Fig. 2;

Fig. 4 is a horizontal section taken on line 4—4 of Fig. 2;

Fig. 5 is a fragmentary vertical section corresponding to the upper portion of Fig. 2 but showing an alternative construction;

Fig. 6 is a detail perspective view showing the mode of attachment of a counterbalance chain to the top rail of a sash;

Fig. 7 is a vertical section taken on line 7—7 of Fig. 6;

Fig. 8 is an outside elevation of the invention as applied to a frameless window-opening in a brick building;

Fig. 9 is an enlarged vertical section taken on line 9—9 of Fig. 8;

Fig. 10 is an enlarged horizontal section taken on line 10—10 of Fig. 8; and

Fig. 11 is an enlarged detail section taken on line 11—11 of Fig. 2.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Although window constructions are known in which one of a pair of window sashes counterbalances the other, it is believed that the improvements disclosed herein make such constructions more practical for actual use than they were heretofore.

Referring now more particularly to Fig. 1, there is shown at numeral 1 a known type of window frame, composed of wood. This frame consists of a casing header 3, side jambs 5, and a sill 7. The jambs 5 are ordinarily provided with an outside blind stop 9 and an inside trim 11, neither of which is necessary to the proper operation of the present invention, but which are shown because they are ordinarily included in what is known as a window frame and because they may serve decorative purposes with this invention.

One feature of the present invention is the provision of a rigid guide channel 13 which is adapted to be fastened by screws 15 or the like to the jamb 5. In the modification of the invention shown in Figs. 8–10, this guide channel 13 is screwed directly to dowels 17 which may be imbedded directly in the wall 2 of a house, as in a brick wall. In this event, no window frame is used.

The central rib 65 of the channel 13, and edge ribs 67 are thick enough to stiffen the channel 13 so that it functions as a true guide. The flanges 4 of the channel are provided with bulb-like sections or beads 19 which permit of a close fit with respect to a plowed channel 21 located respectively in outer and inner window sashes 23 and 25. This is because of the tangent relationship between the bulb-like or beaded section and the channel which provides substantially line contact. Each web with its bead 19 acts as a guide and as a weatherstrip for one sash. Each sash may slide from its uppermost to its lowermost position and vice versa along its respective guide 19, as is apparent from Fig. 1. The bulb-like sections or beads 19 are exemplary of any thickened and convex edges for contact within the grooves 21 so as to provide contact

along areas narrow enough that upon raising one window the other will fall freely by gravity, but at the same time to effect a sealing contact which will act as a weatherstrip.

The beads 19 of the channel strips 13, because of the line contact, will permit of a snug fit without binding the windows, thereby permitting easy sliding by gravity alone. Each bead 19 is sufficiently removed from the framed opening surfaces (which from time to time require paint) and thus at all times ensure a smooth, non-smeared sliding strip. Furthermore, the window parts can be loosely fitted in the window opening (at the edges 6, stop 9 and trim 11) without being loosely fitted to the slides, thereby assuring a non-sticking condition without disturbing the snugness with which the window parts fit the guide strips 13.

Each sash 23, or 25, as the case may be, is used as a counterbalance for the other. This is accomplished by providing between the sashes 23 and 25 a chain 27, one chain being on each side. Other flexible connectors may be used, such as ropes. Each of these chains passes over a pulley 29, which is held within the confines of the upper end of the respective channels 13.

As shown in Fig. 2, the channel 13 is extended up through an opening 31 which is formed through the lower surface of the header 3. This opening 31 is angled and is directed inwardly and downwardly so that the channels 13 may be applied endwise in the general direction shown by the arrow A in Fig. 2 and then angled to a vertical position and fastened by screws 15. This allows easy application of the channels into the relatively large opening 31, which openings are automatically caused to fit the channels 13 after angling.

Each pulley 29 is enclosed by a cap portion 33 which is held in the upper end of the channel 13 by means of fasteners 35. The cap 33, with the upper end of the channel 13, serves as a support for the bearing 37 upon which the respective pulley 29 rotates.

In the top rail of the upper and outside sash 23, the chain 27 is fastened simply by placing the last link in a small recess such as shown at 39 (Fig. 11) wherein it is held by means of a fastener 41. Other means of making this fastening may also be used.

At the other end, each chain 27 is fastened to the upper rail of the lower window 23 by means of the construction shown in Figs. 6 and 7 wherein the corner of the lower window is shown as being provided with a corner plate 43 which holds in a threaded socket 45. A screw 47 threads into the socket 45 and passes through a saddle 49 which is pinned to the chain 27. Thus the windows 23 and 25 may be relatively adjusted so that when either acts as a counterweight for the other, there is still a condition of proper closure for both windows when the outer window 23 is as high as it will go or the lower window 25 is down as far as it will go. This adjusting feature also permits both chains 27 to be equally tensioned.

In Fig. 5 is shown another way in which a pulley may be applied without attaching it to the upper end of a channel 13. In this case, each channel 13 is cut off flush with the bottom surface of the upper header 3. The channels may then be applied in the direction of the arrow B shown in Fig. 5 and then fastened, providing trim 11 is removed; or, there may be no trim.

Directly above the channel 13 (Fig. 5) is an opening 51 in the bottom of the casing header 3 which accommodates the passage of the two reaches of the chain 27, as well as the lower portion of a pulley 59 which is supported upon a pin 61 in a semi-circular holder 63. The holder is held to the top of the bottom of casing header 3 by means of screws 63.

In Figs. 8–10 is shown the application of the invention to a wall opening in which no window frame is used around the sashes. In these figures the wall opening is shown at numeral 51. Dowels 17 are inserted into the walls for the purpose of fastening on the channels 13. It will be understood that a brick or masonry sill may be used as shown at 53, or a suitable wood sill may be used over this.

At the top, a header is in the form of a box 55 again having an entry opening 31 into which the channel 13 is inserted as above described in connection with Fig. 2, so as to place the top pulley in the end of box header 55. This is shown in Fig. 9. The advantage of this construction is that the frame is eliminated and hence there is also eliminated about one-half the cost of placing a window in a wall. This is useful in cases where windows are to be applied to buildings such as garages, screened porches, barns, and the like, wherein external and internal trim is not so necessary, but wherein heretofore it has been necessary to use such trim with the necessary window frame.

When repairs are to be made, it is only necessary to remove the screws 15 and the trim 11 (if used), whereupon the channels 13 may be moved laterally, together with the windows 23 and 25. This does not require disconnection of the chains 27, except in the case of the construction of Fig. 5. Thus the windows may be repaired and be easily replaced.

The manner of applying the pulley to the upper ends of the channels 13, such as shown in Figs. 1–4 and 9, is preferable, inasmuch as the pulley may be removed from the window frame, along with the channels 13.

It will be understood that the invention is useful whether the sashes or screening are used, and whether the parts are made of wood or of metal.

The fact that the weight pockets for counterbalancing weights are eliminated makes it possible to use a very narrow interior wall trim, as well as a minimum of mullion strip if multiple window openings are desired in a single wall opening. The elimination of weight pockets makes possible a maximum amount of glass area in the available wall opening. Also it permits of a snug fit of the jamb opening into the wall openings to minimize infiltration of air between sash opening and wall opening.

It should be understood that, while the channel 13 with its guide 19 functions as a weatherstrip, it is not a flexible piece. For example, it may be composed of extruded aluminum, or the like. The central rib 65 and lateral ribs 67, as well as the flanges which carry the beads 19 insure a substantial stiffness. The outer faces of the ribs 65 and 67 also assure a proper support which insures accurate alignment.

The line-contact relationship between the beads 19 and the window channels 21 is of some importance in view of the fact that one window counterbalances the other. In an ordinary window which is counterbalanced by a weight, there is almost no frictional resistance to movement of the weight. It freely moves in the vertical

boxes next to the windows. In the present case one window acts as a counterbalance for the other, and it is important that the guides for each window be arranged to permit as free a motion as is possible under the circumstances. Such free motion is obtained by providing a relatively stiff or non-springing guide and by line contact, or at most a very small area of contact, between the non-springing plowed wall portions and beads. This construction reduces friction and at the same time allows minimum air leakage. The sealing contact between the plowed portions and the guides is such as to provide a substantial seal against air infiltration. All other portions of the windows are non-sealingly spaced from adjacent framed portions (see Fig. 4). Thus, all of the weatherproofing and guide functions are concentrated in the anti-friction beads of the channel 13.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a window opening, a pair of laterally grooved windows positioned to move adjacent one another, at least one channel having a sliding engagement with the grooves, a pulley attached to the upper end of said channel, and a chain passing over the pulley and fastened to said windows to permit one window to function as counterweight for the other and vice versa, a hollow lintel above the windows, said lintel having an opening therein through which extends the upper portion of said channel, including the pulley therewith.

2. In a window opening, a pair of laterally grooved windows positioned to move adjacent one another, at least one channel having a sliding engagement with the grooves, a pulley attached to the upper end of said channel, and a chain passing over the pulley and fastened to said windows to permit one window to function as a counterweight for the other and vice versa, a hollow header above the windows, said header having an opening therein through which extends the upper portion of a channel including the pulley therewith, said opening being laterally sloped to permit angled application of said channel and subsequent positioning of the same vertically, the opening and the channel being so related that the opening substantially aligns the channel when the channel is vertical.

3. In a window opening, a pair of laterally grooved windows positioned to move adjacent one another, at least one channel having a sliding engagement with said grooves, pulleys attached to the upper ends of said channels, and chains passing respectively over the pulleys and fastened to said windows to permit one window to function as a counterweight for the other and vice versa, a hollow header above the windows, said header having an opening therein through which extends the upper portion of said channel, including the pulley therewith, said opening being laterally sloped to permit sloping application of said channel and subsequent positioning of the same vertically, the opening and the channel being so related that the opening is substantially closed when the channel is vertical, and box-like means covering the pulley.

4. In an opening, a pair of windows having lateral grooves and movable adjacent one another, a header above the windows, U-shaped guides having flanges extending into the window grooves respectively, pulleys carried respectively by the guides at their upper ends, flexible connectors between the windows passing over said pulleys respectively, the upper ends of said guides being insertable into openings in said header, said guides being flush with the sides of the opening whereby the guides, pulleys, flexible connectors, windows, may be moved in a unitary way when desired from the opening.

5. In a window opening, a pair of windows having lateral grooves which have substantially non-springing walls, said windows being positioned for movement adjacent one another, a flexible connector connected between windows, each window being adapted to counterbalance the other, means above the windows over which the connector passes to support the windows, a pair of substantially non-springing one-piece guides having flanged portions extending into said grooves respectively, said flanged portions having thickened and convex edges within said grooves respectively, said convex edges being adapted sealingly to contact within the grooves along areas narrow enough that upon raising one window the other falls substantially freely by gravity, the windows being guided only by said narrow areas on the guides, and being non-sealingly spaced from the frame portions at all other points, said guide beig flush with the sides of the window opening for lateral removal as a unit with the windows.

CARLOS E. LYON.