Oct. 27, 1964 F. C. OSTEN, SR 3,153,818

WINDOW SASH CONSTRUCTION

Filed March 6, 1961 2 Sheets-Sheet 1

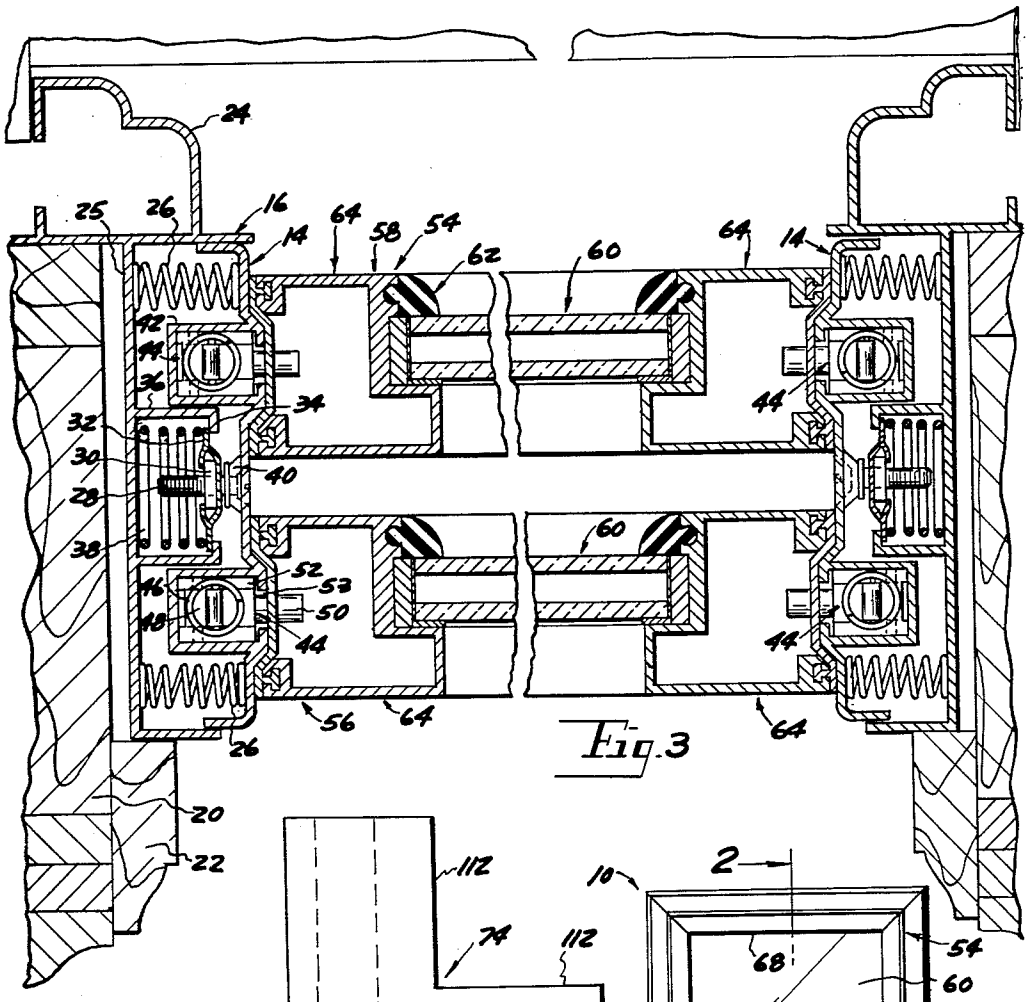


Fig. 3

Fig. 5

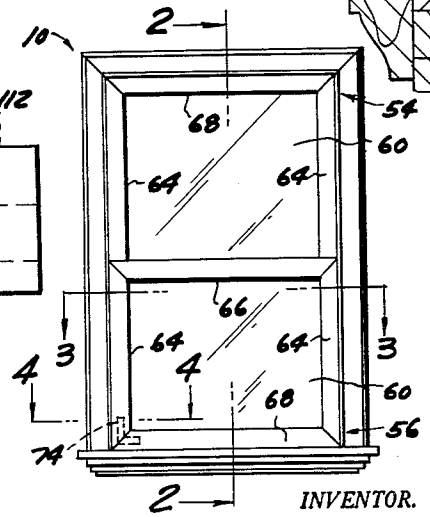


Fig. 1

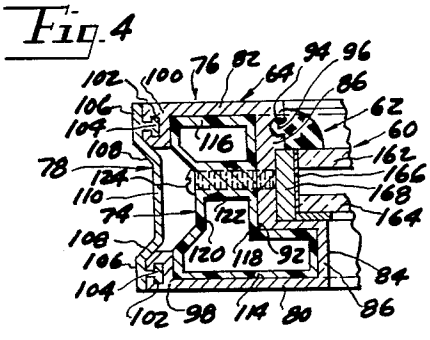


Fig. 4

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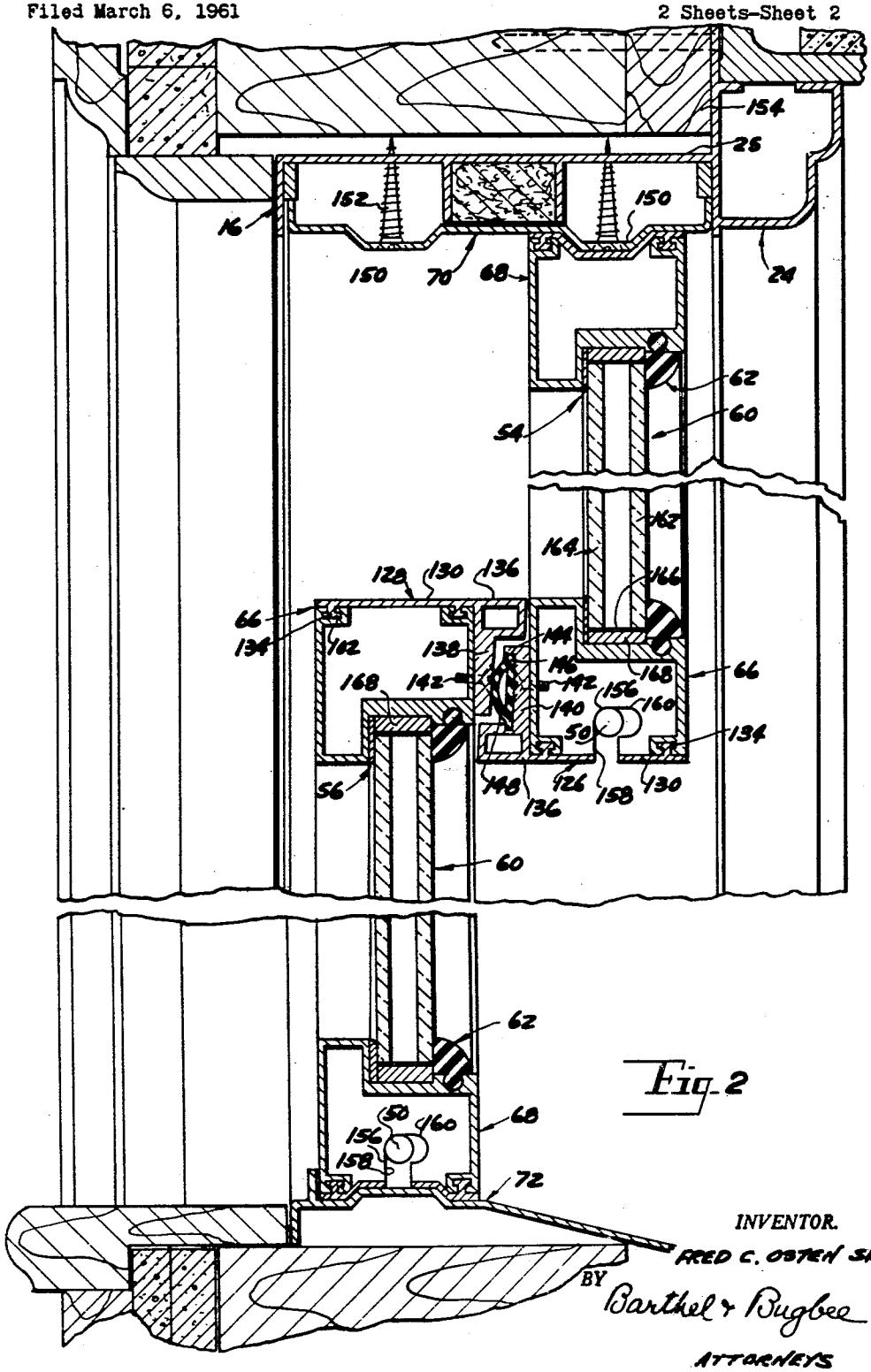


Fig. 2

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WINDOW SASH CONSTRUCTION

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2 Claims. (Cl. 20—42)

This invention relates to building structures and, in particular, to window sash structures.

One object of this invention is to provide a hollow window sash construction wherein the sash frame or border structure is made up of hollow sash rails connected to one another at their corners and providing a light, durable, low heat-conducting and permanently-colored construction which is substantially free from warping, splitting, cracking and other defects of wooden sash constructions but at the same time free from the heavy weight, heat-conduction loss and corrosion defects of metal sash constructions.

Another object is to provide a hollowe window sash construction of the foregoing character wherein the hollow sash rails are made of plastic material preferably by extrusion, which results in an inexpensive yet highly successful article.

Another object is to provide a hollow window sash construction wherein the hollow sash rails are of compound construction consisting of an elongated channel member and an elongated closure plate closely fitting the open side of said chainnel member, thereby further reducing the cost of manufacture of such hollow sash rails.

Another object is to provide a hollow window sash construction as set forth in the object immediately preceding, wherein the closure plate is slidably interlocked with the channel member.

Another object is to provide a hollow window sash construction of the foregoing character which is adapted for use in a removable tilting sash window installation.

Another object is to provide a hollow window sash construction of the foregoing character wherein the meeting rails of the upper and lower sash frames are also of extruded plastic construction, and have overlapping portions disposed in sealing engagement with one another.

Another object is to provide a hollow window sash construction of the foregoing character wherein the hollow sash frame is especially well adapted for reception of dual pane units, and wherein means is provided for effectively retaining such dual pane units in position in the sash frames.

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

FIGURE 1 is a diagrammatic rear elevation of a hollow sash window installation, according to one form of the invention, viewed from inside the building structure looking outward;

FIGURE 2 is an enlarged central vertical section taken along the line 2—2 in FIGURE 1, the central sash portions being omitted to conserve space;

FIGURE 3 is a horizontal section taken along the line 3—3 in FIGURE 1, with the central sash portions omitted to conserve space;

FIGURE 4 is a fragmentary horizontal section through one of the vertical sash rails, taken along the line 4—4 in FIGURE 1, showing a rail and a rail corner coupling member with the adjacent structure omitted; and

FIGURE 5 is a front elevation of the rail corner coupling member removed from the sash.

Referring to the drawings in detail, FIGURES 1, 2 and 3 show a double-hung tiltably-removable sliding sash window installation, generally designated 10, according to one form of the invention as consisting generally of a window frame 12 having on its opposite sides two resiliently-mounted vertical sash guides 14 (FIGURE 3) slidably engaging a stationary channel guide or backing member 16 fastened to the adjacent vertical window frame side members 20 and retained in position by stop bars 22 also secured to the window frame sash members 20. The outer portions of the channel backing members 16 are provided with hollow outer border portions 24 preferably integral with the back plates 25 of the channel members 16 and preferably formed by rolling or extrusion of suitable material, such as aluminum or aluminum alloy.

The sash guides 14 are yieldingly urged away from the window frame side members 20 by helical compression springs 26 (FIGURE 3) and limited in their travel by stop screw 28 threaded through nuts 30 which in turn turn are clamped in vertical plates or strips 32 urged against the flanges 34 of intermediate ribs 36 of the guide channels 16 by central compression springs 38. The bevelled heads of the stop screws 28 are rotatably received in countersunk bosses 40 disposed in vertically-spaced relationship with one another in the midportions of the sash guides 14. Each sash guide 14 is provided with a pair of integral outwardly-extending hollow tubular portions 42 spaced laterally apart from one another and containing automatically self-locking removable sash balances, generally designated 44, of the type disclosed and claimed in my co-pending application Serial No. 61,988 filed October 11, 1960 for Spring-Balance-Mounted Removable Sash Window and beyond the scope of the present invention. Each sash balance 44, for purposes of calarification, may be said to include a sash-balancing helical tension spring 46, the upper end of which is anchored to the sash guide 14, and the lower end of the tension spring 46 is secured to a sash locking member or pawl 48 carrying a trunnion pin or sash pivot 50. The locking pawl 48 is pivotally mounted in a slide block 52 in such a manner that the trunnion pin or sash pivot 50 swings upward in response to the pull of the spring 46 upon removal of the sash from the window frame sash guides 14 for automatically locking the sash balance 44 to the tubular portion 42, as set forth in the above-mentioned Osten application. The trunnion pins or sash pivots 50 project through elongated vertical slots 53 in the front walls of the vertical sash guides 14.

Vertically slidably mounted in and between the opposing resiliently-mounted sash guides 14 are two window sash units, generally designated 54 and 56 of similar construction and hence requiring only a single description. The sash units 54 and 56 constitute the outer and inner or upper and lower sash units of the window sash installation 10. Each sash unit 54 or 56 consists generally of an open-centered sash frame or border frame 58 surrounding and receiving a dual pane unit 60 held in position by retaining sealing strips 62 (FIGURE 3).

Each window sash unit 54 or 56 has its sash frame or border frame 58 composed of vertical side rails 64 interconnected by oppositely-facing meeting rails 66 and horizontal rails 68 which constitute the upper rail of the upper sash 54 and the lower rail or bottom rail of the lower sash 56. The horizontal rails 68 are also of similar construction but face in opposite directions, the upper horizontal rail 68 (FIGURE 2) engaging an upper weather-seal member, generally designated 70, of interfitting construction and the lower horizontal rail 68 engaging and interfitting with a lower sill member, generally designated 72. The vertical rails 64 and horizontal rails 66 and 68 are coupled to one another at their ends by corner coupling members 74 (FIGURES 4 and 5).

Each rail 64, 66 or 68 consists of an elongated stepped channel member 76 and an elongated closure member 78 interfitted therewith (FIGURE 4). Each channel

member **76** in turn consists of opposite plate-like parallel sides **80** and **82** of unequal width interconnected by a stepped side **84**. The stepped side **84** has portions **86** and **88** extending transversely from the edges of the wide and narrow sides **80** and **82** respectively in perpendicular relationship therewith, and are interconnected by a portion **90** disposed parallel to the parallel sides **80** and **82**. The portions **86** and **90** are thus disposed at right angles to one another to form, in effect, a rabbet **92** into and against which the dual pane unit **60** is fitted. The section **86** of the stepped side **84** remote from the corner or rabbet **92** is provided with a groove **94** of slightly greater than semicircular cross-section to receive the correspondingly-shaped rib portion **96** of the sealing strip **62**, which is preferably of elastic deformable material, such as natural or synthetic rubber.

The free edges **98** and **100** of the sides **80** and **82** (FIGURE 4) of the rails **64**, **66** and **68** are thickened to contain T-slots **102** which are slidably engaged by T-ribs **104** integral with and projecting inwardly from the closure members **78** on the inner sides thereof. The closure members **78** in turn possess marginal portions **106** disposed substantially in the same plane and connected by oblique portions **108** to an insert central portion **110** disposed parallel with but spaced inwardly from the marginal portions **106**. Each channel member **76** and closure member **78** is preferably formed by extrusion of synthetic plastic material, such as from a vinyl plastic material, by conventional extrusion processes and apparatus well known to those skilled in the plastic art and beyond the scope of the present invention.

Each corner coupling member **74** (FIGURE 5) is approximately L-shaped and formed from vinyl or nylon plastic or other suitable material. Each corner coupling member or bracket **74** is provided with two hollow tubular arm portions **112** disposed perpendicularly to one another and of substantially the same cross-section as the hollow sash rails **64**, **66** or **68** so as to fit slidably into the interior thereof in telescoping relationship therewith (FIGURE 4). Thus each arm **112** has wide and narrow parallel sides **114** and **116** with their opposite edges interconnected by a stepped side **118** and an inset or trough-shaped side **120**. The opposite sides **118** and **120** are interconnected by a partition rib **122** which is drilled and threaded to receive locking screws **124**. The screws **124** are threaded into the stepped side **84** to retain the adjacent rails **64** and **66** or **68** in assembly with one another. The screws **124** of course are inserted before the closure members **78** are slid into place, or else access holes must be made in the closure members **78**.

The meeting rails **66** (FIGURE 2) differ slightly in the construction of their closure members **126** and **128** in order to provide interfitting and sealing relatively to one another. The closure member **126** of the meeting rail **66** of the upper sash **54** and the closure member **128** of the meeting rail **66** of the lower sash **60** possess substantially flat plate-like main portions **130** and **132** provided with T-ribs **134** adapted to fit and slidably engage the T-slots **102**, and the closure members **126** and **128** have extensions **136** disposed perpendicular to the portions **130** with wedge-shaped portions **138** and **140** facing in opposite directions and secured by screws **142** to their respective rails **66**. The wedge-shaped portion **140** is grooved as at **144** to receive the opposite edges **146** of a sealing strip **148** of arcuate hollow cross-section the sealing strip **148** is preferably of synthetic rubber or synthetic plastic material, adapted to come into sealing engagement with the wedge-shaped portion **138** when the upper and lower sash units **54** and **56** are in their closed positions shown in FIGURE 2.

The upper weather seal member **70** (FIGURE 2) is formed of any suitable material, such as aluminum, by conventional rolling or extruding processes and apparatus and is of channel cross-section possessing inwardly-projecting rib **150** disposed parallel to one another and drilled

and countersunk to receive screws **152** by which, they are secured to the back portions **25** of the upper backing member **16** (FIGURE 2) which is generally similar in construction to the side backing members **16** of FIGURE 3 and similarly is provided with hollow outer border portions **24**. The backing member **16** is in turn secured to the window frame top member **154**.

In order to receive and detachably engage the trunnion pins or sash pivots **50** of the self-locking removable sash balances **44**, the lower ends of the vertical side rails **64** are provided with L-shaped slots **156** having open-ended vertical portions **158** and offset horizontal portions **160**.

The window pane units **60** are conventional, are available on the open market from several manufacturers, and their details are accordingly beyond the scope of the present invention. Each consists of a pair of spaced parallel window panes **162** and **164** having insulating edge strips **166** (FIGURES 2 and 4) which permanently seal the interior space and render it gas-tight and moisture-tight. The interior space is preferably filled with a dry gas which at the same time serves as an insulating layer which impedes the conduction of heat through the dual pane unit **60**. Each window pane unit **60** is surrounded on all sides by cushion strips **168** of vinyl plastic or other suitable mateiral which is capable of a certain amount of expansion or compression in response to the contraction and expansion of the dual window pane unit **60**.

In the manufacture and assembly of the various components of the hollow window sash construction of the present invention: let it be assumed that there are available suitable lengths of channel stock **76** and flat stock **78** (FIGURE 4) from which the components of the sash frame side rails **64**, meeting rails **66** and horizontal rails **68** have been extruded or otherwise prepared. These are cut into the proper lengths for the above-mentioned rails, according to the size of the window for which the sash is intended, with their ends mitered at 45 degrees. The window sash frame or border frames **58** are then formed by interconnecting the vertical side rails **64** to their respective meeting rails **66** and horizontal rails **68** by inserting the arms **112** of the corner coupling member **74** therein in telescoping relationship (FIGURES 1 and 4), and the screws **124** inserted to lock the components of the assembly together. The rails **64**, **66** or **68** are then closed by sliding the T-ribs **134** of the closure plates **126** or **128** into the T-slots **102** in their corresponding channel members **76**.

The dual window pane units **60** (or single panes, if desired) are then inserted into the central openings of the sash frames or border frames **58** and seated in the rabbets **92**. The sealing strips **62**, which have been cut to their proper lengths, are then inserted into the central openings of the sash frames or border frames **58** and seated in the rabbets **92**. The sealing strips **62**, which have been cut to their proper lengths, are then snapped into place by pushing their ribs **96** into the grooves **94**, the ribs **96** yielding slightly because of their resilience due to the use of elastic deformable material for the sealing strips **62**.

The L-slots **156** are then formed in the lower ends of the closure plates **78** of the vertical side rails **64**, in order to accommodate the trunnion pins or sash pivots **50** of the self-locking removable sash balances **44**. The open end of the slot portion **158** is of course extended through the adjacent end portion of the closure plate **126** of the horizontal rail adjacent thereto so as to provide for free entry of the trunnion pins or sash pivots **50**, as explained below in connection with the operation of the invention.

In the operation of the invention, let it be assumed that the resiliently-mounted sash guides **14** have been installed in the window frames **12** as explained in my above-mentioned co-pending application Serial No. 61,-988 filed October 11, 1960 for Spring-Balance-Mounted Removable Sash Window, and that the trunnion pins or

sash pivots **50** have been pulled downward to a convenient location, tensioning the balancing springs **46**. The operator then inserts the window sash units **54** and **56** by pushing their lower ends into the space between the sash guides **14**, wedging them apart by the camming action of their bevelled portions adjacent the slots **53** through which the trunnion pins or sash pivots **50** project, at the same time aligning the open ends of the L-slots **156** with the trunnion pins or sash pivots **50** so that the latter enter the former. When the L-slots **156** have been pushed onto the trunnion pins or sash pivots **50** to their greatest extent, so that the trunnion pins or sash pivots **50** are seated in the horizontal portions **160** of the L-slots **156**, the operator swings the sash unit **54** or **56** upward into a vertical position, the weight of the sash unit pushing the trunnion pins or sash pivots **50** downward around their respective pivots in their slide blocks **52**. This action rotates the locking pawls **48** so as to release them from gripping engagement with the rearward or inner walls of the tubular portions **42** of the sash guides **14**, as explained in the above-mentioned application Serial No. 61,988, releasing the tension springs **46** to pull upward upon the slide blocks **52** and trunnion pins or sash pivots **50**, which are now in horizontal positions, counterbalancing the weights of the window sash units **54** and **56** to the desired extent, as determined by the tension springs **46**. Meanwhile, the sash units **54** and **56** are pushed into their completely vertical positions so as to be vertically slidable in the sash guides **14** for ordinary opening and closing of the window for ventilation or other purposes.

For removal of the window sash units **54** and **56**, the foregoing operations are reversed by the operator grasping the horizontal sash rail **68** or **66** remote from the slotted horizontal sash rail **66** or **68** and pulling the former toward himself, at the same time pushing the resiliently-mounted sash guides **14** apart from one another by the camming action of the relatively bevelled parts mentioned above (FIGURE 3), until the sash unit **54** or **56** being removed is in an almost horizontal or slightly inclined position. The operator then disengages the trunnion pins or sash pivots **50** from the locking notches at the ends of the horizontal portions **160** by pushing horizontally against the slotted horizontal sash rail **66** or **68**. He then pulls the sash unit **54** or **56** toward himself by applying a force in the plane of the window pane unit **60**, drawing the L-slots **156** away from and out of engagement with the trunnion pins or sash pivots **50**, which pass outward through the open ends of the slot portions **158** (FIGURE 2).

What I claim is:

1. In a spring-balanced removable sliding sash window installation wherein a rectangular window frame is provided on opposite sides with elongated sash guides at least one of which is yieldably mounted thereon and both of which contain self-locking spring sash balances carrying inwardly-projecting normally coaxial lock-actuating sash pivots, the combination with said pivots of a quickly-removable pivoting window sash construction, comprising

a sash frame including side, top and bottom rails disposed in an open-centered substantially rectangular arrangement and secured to one another at their adjacent ends,

a window pane unit mounted in the open center of said arrangement with its edges engaging said rails,

and means for retaining and sealing said window pane unit in said sash frame,

said sash frame near the lower corners thereof having open-ended pivot-receiving slots disposed in horizontal alignment with one another whereby to quick-detachably mount said sash frame upon the coaxial pivots in the window frame.

2. In a spring-balanced removable sliding sash window installation having pivoting window sash construction according to claim 1, wherein said slots are approximately L-shaped with the open ends thereof horizontally aligned with one another and with the portions of said slots containing said open ends extending outwardly substantially to the outer edge of said sash frame.

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