Aug. 15, 1939. G. A. E. KAUL 2,169,343

WINDOW CONSTRUCTION

Filed Dec. 30, 1936 2 Sheets-Sheet 1

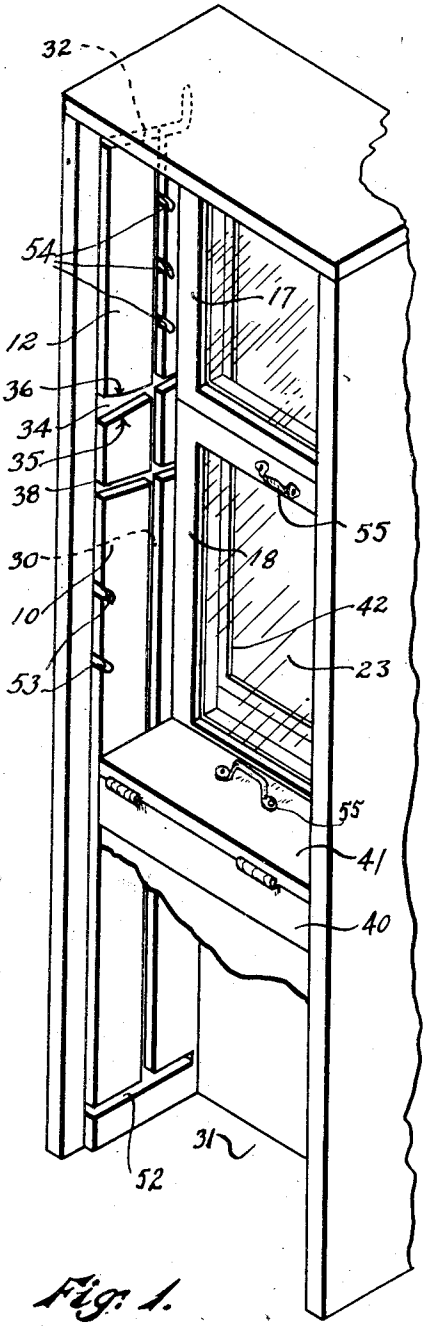



Fig. 1.

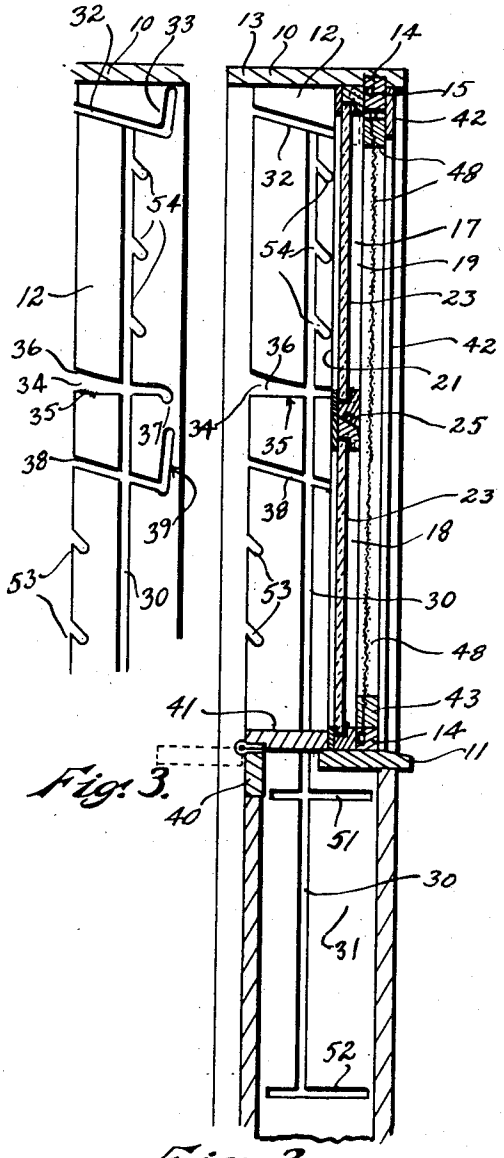



Fig. 3.

Fig. 2.

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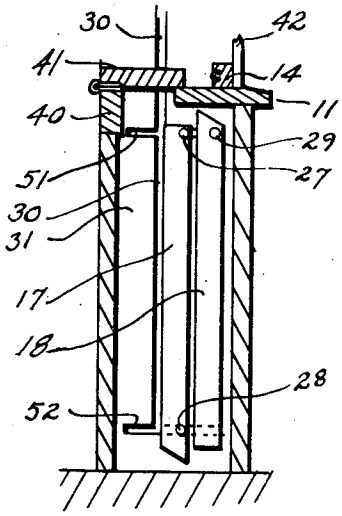



Fig. 4.

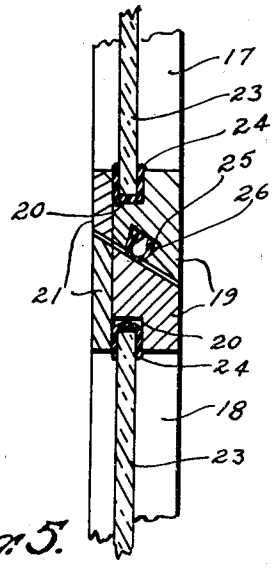



Fig. 5.

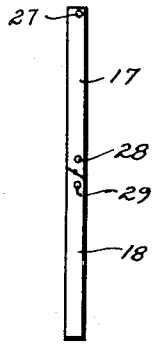



Fig. 6.

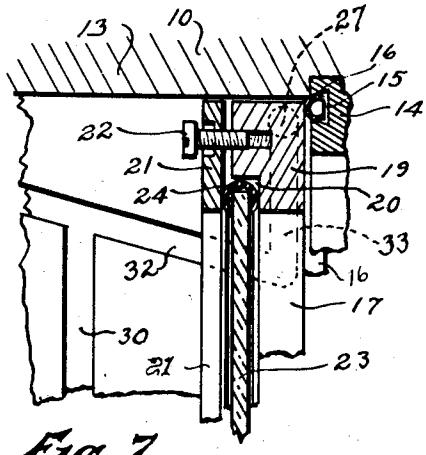



Fig. 7.

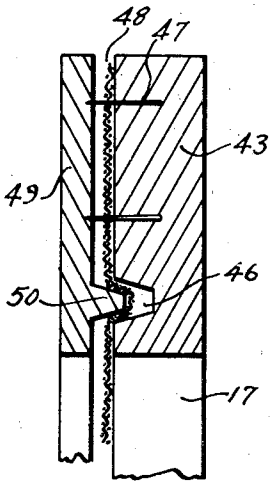



Fig. 8.

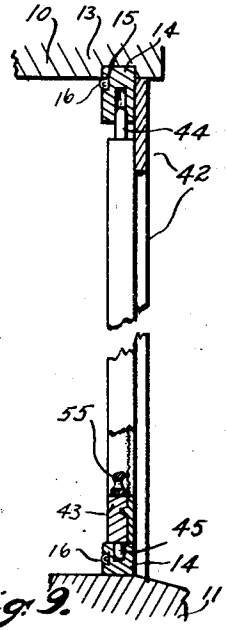



Fig. 9.

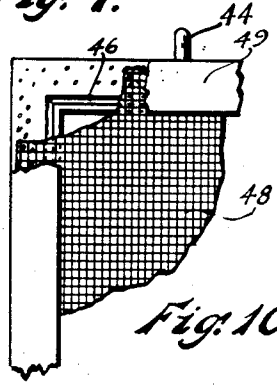



Fig. 10.

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# UNITED STATES PATENT OFFICE

2,169,343

## WINDOW CONSTRUCTION

Gustav A. E. Kaul, Hackensack, N. J.

Application December 30, 1936, Serial No. 118,405

8 Claims. (Cl. 20—52.1)

The invention relates to window and sash construction, and more particularly to means to permit ready adjustment, removal, replacement, and locking of sash in place, and permitting entire clearance of the window opening while retaining the sash in the frame work, freely movable back to closure position.

The invention relates to that type of window in which the sash are provided with projecting pins or lugs at the sides, slidable in channels provided permanently on the inner sides of the window frame, and it is an important purpose of the present invention to enable the embodiment of such a window without requiring retractable pins, locks, latches or sliding bolts to enable it to be fastened securely against burglarous entry.

It has long been sought to present such a window in practicable form, because of its exceptional appeal to the housewife, due to the great ease with which the sash may be washed, and also because of its advantages in enabling more ventilation than obtainable with the ordinary sliding sash, as well as other advantages. The present invention seeks to eliminate objections found in prior devices of the general kind and to simplify its manufacture and installation.

An important object of the invention is to so construct the window that the sash in place will interlock without fastenings, in a way to perform the double function of prevention of opening casually and especially from without, and also as a weather seal and water shedding means. Another purpose is to present a novel means for effecting a weather-tight fit of the sash to the frame and to each other. A still further object is to present a sash specially suitable to construction in metal, and to enable quick, safe and easy replacement of glass lights in the sash. An additional object is to present a construction in which the sash will automatically tend to move to a good weather-tight engagement in the window frame, and to provide for novel adjustments of the sash.

Another important object of the invention is to provide a construction permitting the ready emplacement of a fly screen without impairing the utilization of the regular sash for all its uses, movements, and adjustments. It is a special purpose to present a desirable novel construction in the screen.

A specific object of the invention is to provide a novel coordination of a pocket to receive the sash clear of the window opening, a simple cover therefor, and the sash, whereby closure of the cover will lock sash in operative position.

Additional objects, advantages and features of invention reside in the construction, arrangement, and combination of parts involved in the embodiment of the invention, as will appear from the following description and accompanying drawings, wherein

Figure 1 is a perspective view of a window construction exemplifying the invention.

Figure 2 is a vertical sectional view thereof.

Figure 3 is a fragmentary view of the side of the window frame, showing the forms of the channels therein.

Figure 4 is a section of the pocket showing the sash contained therein.

Figure 5 is a cross section of the meeting rails of the two sash.

Figure 6 is an edge view of the two sash in closed mutual relation.

Figure 7 is a detail section of the top rail of the sash and engaged part of the window frame.

Figure 8 is a detail cross section of a rail of the screen sash.

Figure 9 is a detail section of the screen and engaged part of the window frame, showing the retaining means.

Figure 10 is a fragmentary elevation of the outer side of the screen with a part broken away.

There is illustrated a window comprising a frame 10 for the opening, the outer portion of which frame may conform to conventional practice as to sill form, boxing, etc. While counter balances may be employed with my sash if desired, the manner of doing so will be uderstood by those versed in the art, and for that reason no showing of means of the kind is made here. The frame includes a sill 11 and side members or jambs 12 between which the sill is fixed, and extending a distance below the sill, while the top member 13 of the frame may be a plain lintel piece. On the inner sides of the side members 12, the lintel and the top of the sill, a continuous stop 14 is mortised, having an inner face formed with a dove-tailed slot or groove 15 (see Figure 7) close to the faces of the frame members. That is, the sides of the groove are undercut, so that its inner part is wider than the opening. Set in this slot there is a continuous strip 16 of rubber or other suitable resilient material having the form in cross section of a segment of a circle and including preferably an arc of approximately 200 degrees, although this may be varied without departing from the essentials of the invention. This strip is set in the slot within the open side toward the bottom of the slot, its edges being against the bottom of the slot, and

the sides of the strip so confined and compressed by the sides of the slot that the middle closed part of the strip is caused to bulge and project from the slot substantially. The slot and strip 16 should have a width duly proportionate to the degree of compression of the strip that experience shows necessary to permit a good weather seal. For a normal window, a quarter or three-eighths of an inch is a sufficient width for the groove at the face of the stop and the strip 16 may be a stock similar to rubber tubing, produced in the necessary shape.

An upper and a lower sash 17 and 18 respectively are shown, set in the window opening and against the stop 14 in compressive engagement with the strip 16. The sash each comprises an outer simple frame 19 having a rabbet 20 at the inner face around the opening therein, and a retaining frame 21 is secured thereto by screws 22 or other fastenings, forming with the rabbet a groove in which the edges of a window light 23 may be loosely set. This light is shown as having engaged upon its edges and compressed between the frame 21 and side of the rabbet a mounting and sealing strip 24 somewhat similar to the strip 16, although it may comprise a complete rubber tube slit at one side, if desired. Using such rubber stock, the edges close snugly against the glass and the adjacent edge portions bow outwardly from the glass a substantial distance, while the extreme edges of the glass abut the wall of the strip opposite the slit. When confined between the frames 19 and 21, therefore, the rubber is also pressed tightly against the surfaces of the frames and so effects a complete double seal at each side of the light.

The lower edge of the upper sash is formed with a dove-tail slot 25 of the same form as the slot 15, and a strip 26 similar to the one 16 is set therein to abut the top edge of the lower sash, so that a complete seal is effected between the sash. These meeting edges the two sash also are sloped downward from the inner faces of the sash to the outer faces thereof, so that any water and snow gaining access to the space between them will drain to the outside. This slope is made substantially more than the minimum necessary for drainage merely, and is sufficient to afford an overlap or interlock of the two edges so that the bottom of the upper sash can not swing inwardly when the lower sash is held in normal closed position. The sash are of sufficient vertical dimensions to equal the distance between the sill and lintel of the frame, causing a snug fit of the two and with the frame when the sash is in closed position.

In the inner faces of the side members of the frame there are formed duplicate groove or slot systems for guiding and retentive engagement of pins fixed in the sash. Two such pins 27 are fixed in the lateral edges of the upper sash 17, very close to the top thereof, and nearer the outer face of the sash than the inner face thereof. They are fixed in the portion 19 of the sash and project laterally therefrom a quarter to three-eighths of an inch as heretofore practiced, each pin being preferably a metal pin of ample diameter to withstand wear and stresses incident to the uses to be described. Two similar pins 28 are fixed in the same edges of this sash 17 at the lower part, but further from the bottom of the sash than the pins 27 are from the top of the sash; and there are two such pins 29 in the corresponding edges of the lower sash 18 at its upper part spaced further from the top of this sash than the pins 27 are spaced from the top of the sash 17. The groove system is of uniform depth and width throughout, to permit ready sliding of the opposite pins simultaneously in the alined grooves of opposite sides of the frame. The system includes a main vertical groove 30 which extends from near the top of the frame 10, to near the bottom of the frame a distance below the sill. This groove passes downwardly spaced from the inner edge of the sill 11, and the frame or the wall structure of the building in which it is installed has built therein a pocket or closet space 31 to accommodate the sash at times and the groove 30 extends into this pocket, as will be described.

The groove 30 is intersected by a number of grooves extending transversely on the side face of the frame 10, the uppermost one 32 having an entrance opening on the inner edge of the frame and being inclined downwardly from this entrance to a point outwardly of the groove 30 on the frame spaced from the inner face of the stop 14 slightly more than the space between the pins 27 and the outer face of the sash 17. The groove 30 stops at the last named intersection. From the outer inclined part of the groove an upward extension thereof 33 is formed close to the stop 14, stopping just above the position of the pins 27 when the window is closed, and inclined outwardly slightly so that the pin is pressed outwardly and the sash is thereby caused to compress the strip 16 when the sash is in full closed position. The relation of the parts is such, however, that the sash does not tightly engage the face of the stop 14, so that pivotal movement of the sash on the axis of the pins 27 is permissible sufficiently for the lower end to swing with the pins 28 clear of the frame as will be explained. A second transverse groove 34 is formed having an entrance at the inner edge of the frame, with an outer part to receive the lower pin 28 of the sash 17 when in closed position. It has a horizontal lower side 35, and a curved upper side 36 concentric with the position of the pin 27 when the sash is in closed position and on a radius coincident with the pin 28 at the said position of the sash 17. The groove 34 is thus widened at its entrance. Its inner extremity is also formed with a slight notch 37 in its lower side adapted to receive the lower side part of the pin 27 when the sash 17 has dropped a very slight extent from full closed position, so that when the lower sash is removed, the lower part of the upper sash can not be pressed inward casually, as might happen by wind pressure.

A third transverse groove 38 is formed across the groove 30 below the groove 36 and also opening from the inner edge of the frame 10, being inclined downwardly from that entrance and extended to a point below the position of the pin 29 when the lower sash is in closed position, and then extended upward as at 39 to a point to accommodate that pin when the lower sash is closed, and to press the pin outward so that the sash is held against the stop 14.

Spaced inwardly from the inner edge of the sill piece 11, there is a bar or other member 40, forming the inner side of the opening or entrance to the pocket 31. This entrance is of a size to permit ready passage of the sash therethrough while the pins of the sash are in the groove 30. There is hinged on the bar 40 a door closure or lid 41, of a size to extend partly over the sill and to rest against the inner face

of the sash 18 when the latter is in full closed position, compressing the latter slightly so as to hold the sash snugly against the weather seal strip 16, thereby serving as a seal device, anti-rattler and lock by means of which opening of the window from the outside is prevented. The stop 14 is provided at the sides and top of the window with an outer flange, shoulder, or stop strip 42, and set immediately within this stop 42 and retained thereby there is a screen 43 having two long pins 44 at its upper edge and two short pins 45 at its lower edge engaged in holes in the lower edge of the stop 14 at the top of the window, and in the top edge of the stop 14 at the bottom of the window, respectively. The screen comprises a rectangular frame adapted to fit loosely between the side portions of the stop 14, and materially shorter than the space between the top and bottom portions of the stop 14, the supplementary stop 42 being extended sufficiently to permit a slight vertical movement of the screen in the space within the stop 14 and still maintain a closure between the two. The screen is put in place by inserting the long pins in the holes at the top of the window, and lifting it until the short pins clear the top of the stop 14 on the sill, when pressing the bottom of the screen outwardly and allowing the screen to drop downward with the pins 45 engaging in the holes in the stop 14. The screen may be made foldable at the middle so that it may be introduced into the pocket 31 along with the sash, if desired.

The screen consists of a body frame 43 of suitable material in the side of which spaced from and parallel to the edge of the opening through the frame, there is formed a continuous groove 46 near the inner edge of the frame. The frame piece has a substantial side face portion outwardly of the groove in which there are set a multiplicity of spurs or pins 47 suitably spaced longitudinally throughout the side members and end members of the frame, these pins being quite small in diameter, so that they may readily penetrate the screen material 48 when the latter is laid on the frame preparatory to securing it in place. A cover strip or facing piece 49 is secured on the body frame over the edges of the screen material, the spurs or pins penetrating this, and so causing the screen to be retained in place. On the cover piece there is a rib 50 adapted to enter the groove 46 and lie therein with the screen material passing under it and beyond, or this rib may be a separate element of corresponding size adapted to be laid over the groove upon the screen and confined by the cover strip when the latter is fastened in place. The cover strip may be secured by laying it over the spurs 47 and driving it down thereon with a hammer or otherwise. Or it may be secured by suitable fastenings applied where required. Where the groove 30 passes into the pocket 31, it is formed with a transverse portion 51 just below the sill into which extension the upper pins 27 and 28 of the sash may pass, the groove 30 continuing to near the bottom of the pocket, where it has a horizontal portion 52 into which the lower pins 28 of the upper sash may be moved when the pins 27 are in the extension 51.

On the extreme inner edge of the side members of the frame 10 one or more notches 53 are formed adapted to receive the pins 27, 28 or 29, as may be required. The slot 30 has a series of rest notches 54 in its outer side between the slots 32 and 36 to receive the pins 27 or 29 as occasion may require, and support the sash at various adjustments in the upper part of the window opening.

In use, the window frame and sash being constructed as described, it will be seen that neither sash can be moved from outside the window, and a good simple weather-tight closure is presented. To remove the lower sash, the lid 41 is raised and swung upward and inwardly of the window to full open position at which it extends inwardly away from the pocket as dotted in Figure 2. This releases the lower part of the sash 18, which may now be swung inward, the pins 29 dropping in the extension 39 of the slot 38 until the pins may be drawn outwardly in the latter slot, the lower part of the sash may be entered in the pocket while the pins are moved to the slot 30, into which they may be dropped, the sash thus entering the pocket completely. At the first movement of the lower part of sash 18 the pins 28 of the upper sash drop into the notches 37 retaining the upper sash in closed position. These notches may be only about one sixteenth of an inch deep, so that the movement so involved is immaterial on the closure effect of the upper sash. If the lower sash is not to be entered in the pocket, it may be swung inwardly of the frame, while the upper part is drawn outward to move the pins 29 out through the entrance of the slot 38, the sash being thus freed from the frame 10 entirely. Or the pins 29 may be moved upwardly in the slot 30, and rested in the outer part of the slot 36 next the upper sash, thus leaving a small ventilating opening below the lower sash; or the pins may be engaged in some of the rest notches 54 in the upper part of the slot 30, or in the outer part of the slot 32 next the upper sash, attaining various adjustments of the lower opening for ventilation, the last mentioned position being full open position of the lower sash. Also, if desired, after the pins have been moved inwardly from the slot 38 and clear of the frame, while the lower portion of the sash is entered in the pocket 31, the pins 29 may be engaged in some of the notches 53 in the inner edge of the frame, thus supporting the lower sash in a lowered position, and causing air entering the lower part of the window to be deflected upward, thus avoiding undesirable drafts.

After lowering of the sash 18 with its pins to the slots 38, whether it be removed from the frame or adjusted in some of the lowermost positions, the upper sash can be removed or adjusted. This is accomplished by applying a slight lifting force to the sash to enable the pins 28 to move from the notches 37 readily, and the sash then swung to move the pins 28 outwardly in the slots 36. The pins may be allowed to drop into the slots 30 as the pins 27 move downwardly in the extensions 33 of the slots 32, or the pins 28 may be swung clear inwardly of the frame, and when the pins 27 have dropped to the slots 32 they may be moved into the slots 30 or clear of the frame as desired. Pins 28 may be retained in slots 30 and pins 27 allowed to rest in some of the notches 54, thus supporting the upper sash at different heights to afford ventilation thereover. If the lower sash has not been entirely removed, it may be returned to its normal closed position after the last named adjustment of the upper sash, thus opening the window only at the top, and affording adjustment of the top opening to suit requirements.

Both sash may be disposed in the pocket 31 if desired, the first one introduced therein being moved outwardly to the front or outer side of the pocket next the outer side of the building wall. The transverse groove 52 at the lower end of the slot 30 accommodates the pin 28 at the respective side of the sash for such movements. The pocket may also accommodate the screen when the latter is folded in half.

Any desired handles or grip devices 55 may be attached to the sash and to the screen to facilitate manipulation thereof, as discretion may dictate.

In replacing the upper sash 17, when the pins 27 have been entered fully in the slots 32, the simple pressure of the lower pins 28 inwardly on the horizontal lower sides 35 of the slots 34 will cause the pins 27 to be forced upwardly into engagement with the inner side of the extensions 33, and effecting compression of the weather seal 16 and when the pins 28 engage the notches 37 the sash will be retained in closed position individually and independently of the lower sash.

The construction of the screen is specially designed to improve manufacture of screens with the screen tightly stretched and with a minimum expenditure of time and effort by the workmen. In the construction of my screen, the body frame 43 being assembled as illustrated, the cover piece 49 being at hand, the frame is laid on a suitable support with the groove 46 and pins 47 upwardly, and a sheet of screen material 48 laid thereon with its edge portions extending over the pins. With the screen arranged approximately flat, without material stretching, its edge portions are pressed downward on the pins 47 and the cover piece with the rib 50 thereon put in place with the rib alined with the groove. Suitable nails being now driven into the cover piece and into the frame 43, the rib 50 is thereby forced downwardly into the material of the screen, depressing it into the groove 46. The portions of the screen at both sides of the groove 46 tend to be drawn inwardly, but as movement of the body of the screen to accommodate this tendency is opposed by the pins 47 after a very slight movement, the screen must then move principally outward to the slot, with the result of very tightly stretching the screen within the frame without any other effort on the part of the workman than the driving of the nails or other fastenings by which the cover piece 49 is secured.

In case the rib 50 is not formed integrally with or attached to the cover piece 49, a piece of wire, cord, or other material, may be laid over the groove and upon the screen to serve as a rib, as the cover plate is put in place.

I am aware of the use of the groove and rib stock in screen sash heretofore, but it is open to the objection that the screen slips inward under the rib preventing adequate stretching of the screen on the frame. The pins 47 counteract this tendency fully, and in addition by holding the screen edges throughout while the cover is being put in place, there is assured a uniform stretching of the screen throughout its area.

I claim:

1. A window comprising a frame having duplicate sash pin guiding and support grooves in its jambs, a sash fitted for vertical and horizontal translative movement in the window opening and having pins fixed in its lateral edges slidably engaged in the grooves for retention and support of the sash, a front stile on the frame defining a stop positioned to receive the sash thereagainst when in closed position, a resilient compressible yielding sealing member set in the inner face of the stile and extending longitudinally throughout the stile to continuously abut the face of the sash at times, said grooves including inclined portions to receive the pins of the sash and located to extend above and below the normal closed positions of the pins, arranged so that on movement of the sash vertically to closed position, the inner sides of the inclined parts of the slots will engage the inner sides of the pins and press them outwardly, whereby the sash will be caused to engaged and deform the said sealing member.

2. A window comprising a frame having jambs formed with duplicate alined sash pin guiding grooves in opposed relation and having a continuous stop spaced outwardly of the grooves, at least one sash fitted for vertical and horizontal translative movement between said jambs and having fixed lateral pins in its lateral edges slidably engaged in the grooves for retention of the sash, said grooves including major vertical portions and having inclined portions extending above and below the normal closed positions of the pins convergent upwardly toward the stop and arranged so that on movement of the sash vertically to closed position the inner sides of the inclined portions of the grooves will engage the inner sides of the pins and press them outwardly.

3. The structure of claim 2 including two sash in which the upper sash includes lateral pins at its upper and at its lower parts, the lower sash having lateral pins at its upper opposite parts, said grooves having terminal parts to receive the upper pins of each sash and to engage and press them toward the said stile, said grooves including a part in each jamb concentric with the upper operative positions of the upper pins of the upper sash on the radius of the lower pins of the upper sash, and notched on the lower side at the outer part to receive the said lower pins of the upper sash when the latter is in closed position and unsupported otherwise.

4. The structure of claim 2 in which said grooves include transverse parts arranged and adapted to aline with respective upper pins of at least one sash and having outer parts toward the stop below the normal levels of the respective upper pins of the sash and having upwardly extending outwardly inclined groove portions from said outer parts to receive said pins, constituting said inclined portions first named.

5. The structure of claim 2 including upper and lower sash each having upper and lower pins in each side and in which a parallel groove is included in each jamb spaced inwardly of and parallel to the said major vertical portions of the first named grooves, connecting transverse grooves from the first named groove at the closed positions of the lower pins of the upper sash to the parallel groove, connecting transverse grooves extending from the said first named grooves below the normal closed positions of the upper pins of each sash and opening into said parallel grooves, said parallel grooves having notches in the sides thereof, to receive the pins of either sash in sash-supporting engagement, the lower sash being movable to clear the upper one.

6. A window structure of the character described including a frame having a sill and jambs with pin guiding grooves therein, upper and lower

sash vertically slidable in the frame and each provided with lateral pins slidable in the grooves, said grooves including outer ones stopping above the sill and receiving said pins when the sash are in closed position, and an inner groove in each jamb inwardly of the closed positions of the sash and extending below the sill, a pocket structure included in the frame below the sill including an opening at the sill offset from the closed position of the sash and arranged to receive each sash therethrough by movement thereof with its pins in the last named groove, and connecting grooves between said outer and inner grooves for shifting of said pins from one groove to the other, horizontal pin receiving extensions being formed from said inner groove below the sill for support of sash offset from the said inner groove, and a closure for the opening.

7. A window structure of the character described including a frame having a sill and opposed pin guiding grooves in its sides, sliding sash having lateral pins slidable in the grooves, grooves being included spaced inwardly of the closed position of the sash and extending below the window a distance, a wall pocket structure including an opening at the sill of the window to receive said sash therethrough, said last named grooves extending through said opening, and a closure for said opening, comprising a cover hinged at the side of the opening spaced from the closed position of the sash and having a radius to lie when closed with its swinging edge in close abutment against the lower inner face of the lower sash when the latter is in closed position.

8. The structure of claim 7 in which a groove leads from each of said grooves spaced inwardly through the inner face of the frame to permit passage of said pins clear of the frame, and notches on the inner face of the frame a distance above the said pocket opening less than the vertical dimension of one sash, for the purposes described.

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