March 3, 1964 S. LUNDE 3,122,799

WINDOW

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FIG.2.

FIG. 1a.

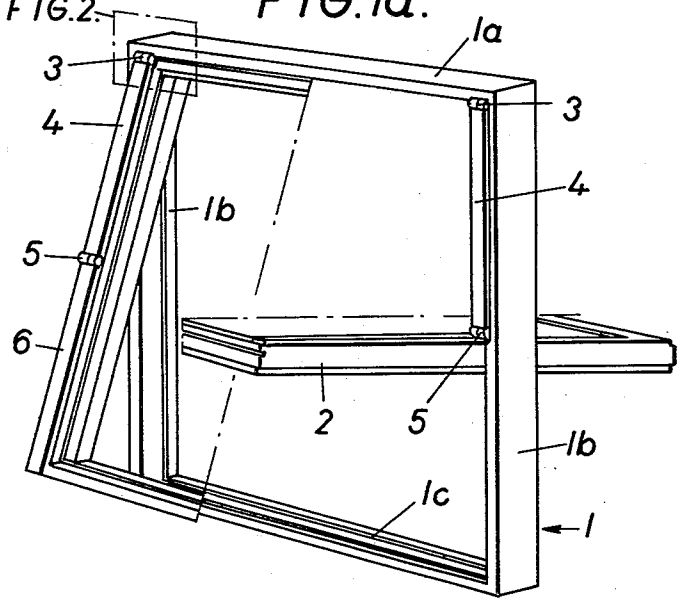


FIG. 1b.

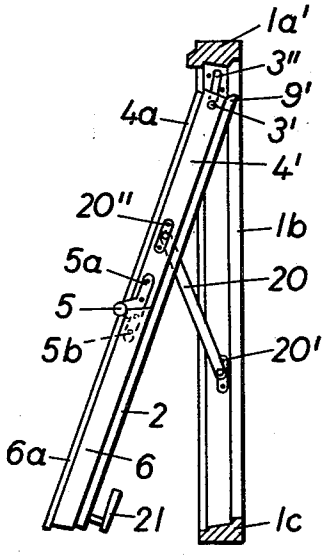


FIG. 2.

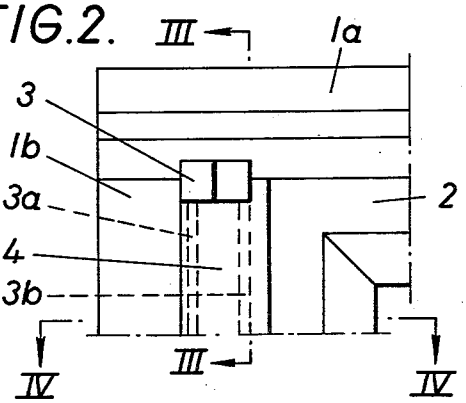


FIG. 6.

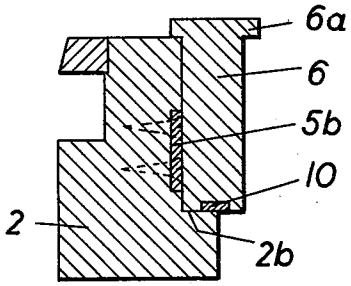


FIG. 4.

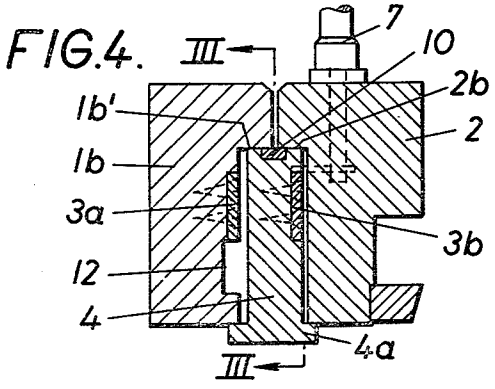
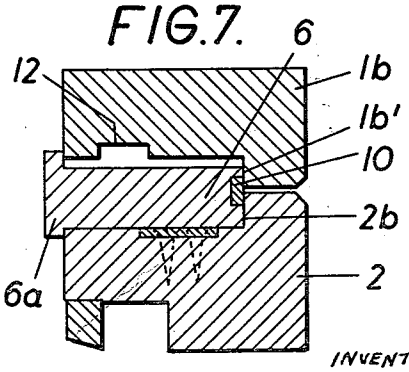


FIG. 7.



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FIG.3.

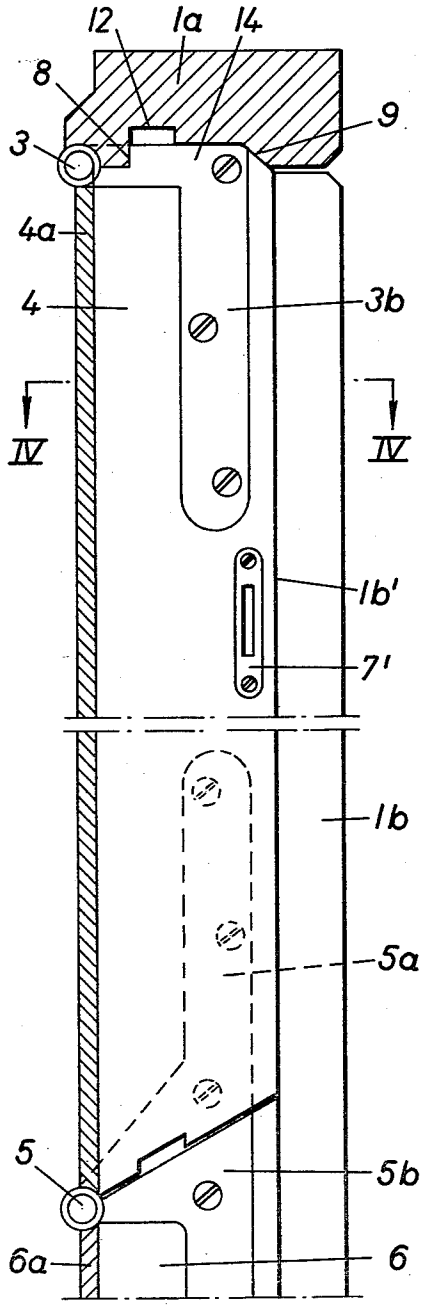
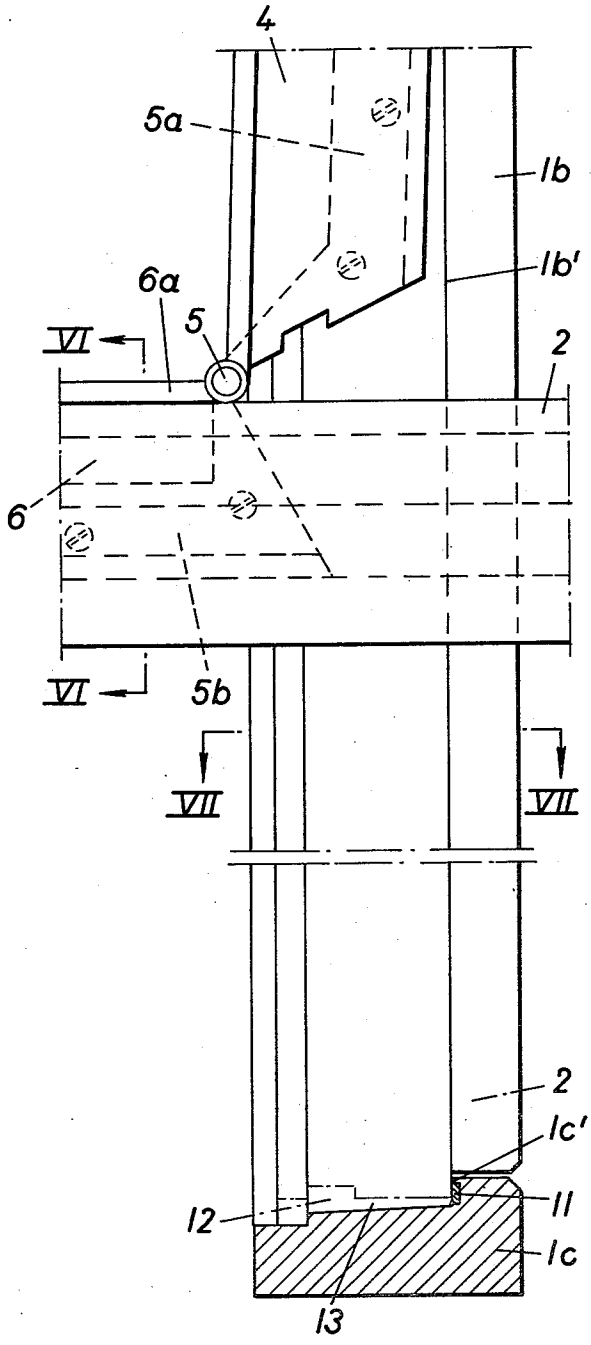


FIG.5.



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WINDOW

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4 Claims. (Cl. 20—53)

This invention relates to windows, and more particularly to windows having a sash arranged for swinging movement about two horizontal axes, one axis being at or near the top of the window frame, and the other axis being approximately equidistant from the top and bottom of the sash.

In windows of this type, the window sash is swung outward about the higher one of the axes to admit air to the interior of a building while preventing entry of rain. The sash is swung about the central axis for convenient cleaning of the outside of the window.

It is the object of the invention to improve on windows of the type described.

It is a more specific object of the invention to provide a window with a sash swingable about two vertically spaced horizontal axes, in which the outside of the sash is available for cleaning with a minimum of effort.

Another object is the provision of such a window the sash of which may be swung about its lower axis without necessitating wide outward swinging of the sash about the higher axis.

With these and other objects in view, the invention in its more specific aspects provides the side members of a window frame and of the corresponding sash with elongated grooves which jointly constitute two recesses, each extending in a side member of the frame and a corresponding side member of the sash from the top to the bottom members of the sash and frame in the closed position of the sash. An elongated arm having two end portions is arranged in each recess. One end portion is pivotally fastened to the frame near its top member and the other end portion to a side member of the sash, so that the sash together with the arm may be pivoted about one axis adjacent the window frame top and the sash may be independently pivoted on the arms about a central axis.

Other features and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing in which like reference numerals designate like parts throughout the figures thereof, and in which

FIG. 1*a* is a perspective view of a first embodiment of the window of the invention, one half of the window sash being shown pivoted out of the closed window position about the higher one of the axes, and the other half of the window sash being shown pivoted about the central horizontal axis;

FIG. 1*b* shows a modified window of the invention in side elevation with parts of the window frame being broken away to better reveal the sash and the means for fastening it to the frame;

FIG. 2 shows a detail of the window of FIG. 1*a* in enlarged front elevation;

FIG. 3 shows the window of FIG. 1*a* in fragmentary side elevational section on the lines III—III in FIG. 2 and FIG. 4;

FIG. 4 is a sectional plan view of the detail illustrated in FIG. 2 and is taken on the line IV—IV, the plane of section also being indicated in FIG. 3;

FIG. 5 shows another detail of the window of FIG. 1*a*, with a side member of the frame broken away and the bottom member of the frame or sill shown in section;

FIG. 6 shows the sash of the window 1*a* in section on the line VI—VI in FIG. 5; and

FIG. 7 is a section through the side members of the frame and sash on the line VII—VII in FIG. 5.

Referring now to the drawing in detail and initially to FIG. 1*a*, there is seen a window frame 1 consisting of a top member 1*a*, two side members 1*b*, and a bottom member or sill 1*c*. The frame 1 defines an opening into which a sash 2 may be inserted. The opening and the sash are of rectangular shape, and the horizontal width of the opening over its entire height is slightly greater than the corresponding width of the sash.

The sash 2 is hung in the frame 1 by means of two elongated arms 4, the ends of which are respectively pivoted on pins 3 at the corners of the frame where the top member 1*a* and the side members 1*b* meet, and on pins 5 at the center of the side members 1*b*. As seen in the left portion of FIG. 1*a*, the sash 2 may be swung outward together with the arms 4 about the common axis of the pivot pins 3 near the top of the frame 1. As seen in the right portion of FIG. 1*a*, the sash 2 may be pivoted about the common axis of the pins 5 while the arms 4 remain in the position which they asume when the window is closed. A filler strip 6 having a similar appearance to the arms 4 is fastened on the portion of each sash side member which extends downward from the pin 5 so that the sash, when not pivoted about the pins 5, presents uniformly appearing sides interrupted only by the centrally located pins 5.

It will be understood that the sash 2 is glazed, or provided with screening or other insert material which extends between the elements of the sash structure illustrated. Such a glass pane, screen panel or the like has not been illustrated since it is conventional and would interfere with pictorial representation of the inventive features of the window.

FIG. 2 shows the upper left hand corner of the window of FIG. 1*a*, as viewed in front elevation from the outside in the closed condition. There are seen two hinge leaves 3*a*, 3*b* which are respectively attached to the side member 1*b* of the frame and to one end of the arm 4, and are connected by the pin 3 which is integral with one of the leaves and engages a corresponding eye in the other leaf.

FIG. 3 shows portions of the window of FIG. 1*a* in side elevational section on the line III—III in FIG. 4, whereas the latter figure illustrates the side members of the frame and sash in plane section on the line IV—IV in FIG. 3.

The opposite faces of the window frame side member 1*b* and of the juxtaposed member of the sash 2 are seen to be rabbeted so as to be each formed with an elongated groove. The grooves jointly form an elongated recess in which the arm 4 is received when the window is closed, or when arm 4 and sash 2 are jointly pivoted on the pins 3. The recess is open toward that side of the window which is outside the building in the normal installed condition of the window, and the narrow longitudinal wall of the recess opposite the open side is formed by stop faces 1*b'* and 2*b* on the window frame and the sash, respectively.

The arm 4 has a resilient strip 10 of sealing material (weather stripping) inserted therein in such a manner that it bridges the opening between the stop faces 1*b'* and 2*b* when the arm 4 is fully received in the recess between the side member 1*b* and the sash 2. The open side of the recess is simultaneously covered by a cap flange 4*a* integral with the arm 4 which overlaps the side member 1*b* and the corresponding member of the sash 2.

A rotary latch 7 (FIG. 4) is mounted on the side member of the sash 2 and permits the sash to be locked to the arm 4 by engagement with an apertured strike plate 7'

seen in FIG. 3. It will be appreciated that the latch 7 has a handle (not shown) which is on the inside of the window in the normal installed position. When the latch is engaged, the arm 4 and sash 2 pivot as a unit about the pivot pins 3.

The several members of the window frame are formed with a groove 12 which circles the window opening and opens into the aforedescribed recess for better sealing of the window, as is conventional. Except for this groove, the upper longitudinal portion of the recess is almost filled with the arm 4. The arm abuts in tightly sealing engagement against the stop faces 1*b*′ and 2*b* but is sufficiently spaced from the side members of the frame 1 and sash 2 to ensure free movement of the arm 4 under all conditions.

The hinge leaves 3*a*, 3*b* which are connected by the pivot pin 3, and the hinge leaves 5*a*, 5*b* which are connected by the pivot pin 5 are mounted in conforming recesses of the side member 1*b* and of the corresponding side member of the sash 2 so as to be flush with the respective faces of the side members.

As best seen from joint consideration of FIGS. 3, 6 and 7, the filler strip 6 is of a shape substantially identical with that of the arm 4. The filler strip has a resilient strip 10 of sealing material inserted in an outside surface which abuts against the stop face 1*b*′ of the side member 1*b* of the window frame, when the window is closed, and permanently abuts against the stop face 2*b* of the sash 2 to which the filler member 6 is fixedly attached, as is evident from FIG. 6 which only shows the sash without the frame. A cap flange 6*a* integral with the member 6 projects from the recess in which the filler member 6 and the arm 4 are received in the closed window position. The cap flange 6*a* overlaps laterally adjoining portions of the side member of the sash 2, and abuttingly overlaps the side member 1*b* of the frame 1 in the closed window position.

The juxtaposed grooves in the side members of the frame 1 and of the sash 2 thus constitute a recess which extends with uniform cross section from the top to the bottom of the window opening. About one half of the groove length is largely filled with the arm 4 in the closed window position and the other half is almost filled by the filler member 6. The arm 4 and the filler member 6 seal the gap necessary between the window and frame side members for easy operation of the window by means of a double seal in which the cap flanges 4*a*, 6*a* and the resilient strip 10 enclose an air chamber communicating with the groove 12.

Referring again to FIG. 3, it is seen that the top member 1*a* of the window frame 1 is recessed and the recess 14 in the member 1*a* is matingly engaged by the top of the sash 2, except for the groove 12. The recess 14 in the frame member 1*a* is open downwardly toward the window sill. Adjacent the open side, the recess has a wall or stop face 8 in a plane tangential relative to a cylinder drawn about the axis of the pivot pins 3 and perpendicular to the axis of the window opening, and another wall or stop face 9 which is obliquely inclined to the axis of the window opening and also tangential to the aforementioned cylinder. The two stop faces 8, 9 jointly define a space which tapers in an upward direction.

The arm 4 and the filler member 6 are seen in FIG. 3 to have respective end faces which are obliquely transverse of the common direction of elongation of the arm 4 and the filler member 6. These end faces are in abutting engagement and form a seal when the window is closed or when the arms 4 together with the sash 2 are swung outward of the frame 1 about the pins 3 while the latch 7 engages the aperture of the plate 7′.

FIG. 5 illustrates the relative position of the arm 4, the sash 2 and the frame 1, when the sash is pivoted from the closed position about the pins 5 for cleaning or for any other desired purpose. When the sash 2 is swung counterclockwise from the position seen in FIG. 5, its lower edge eventually abuts against a stop face 1*c*′ of the window sill 1*c* in which a sealing strip 11 is embedded. I prefer to avoid direct contact of the bottom of the sash 2 with the window sill 1*c* in the interest of easy opening and closing of the window. A gap 13 communicating with the groove 12 is left and is sealed from the inside of the building by the strip 11.

I normally equip the bottom member of the sash 2 with a rotary latch similar to the latch 7 and cooperating with a corresponding strike plate in the window sill 1*c*. Such a latch is shown at 21 in FIG. 1*b* but has been omitted from FIGS. 1*a* and 2 to 7 for the sake of clarity.

The afore-described window is operated as follows:

When it is desired to open the window for admitting air while excluding precipitation, the latch 7 is kept locked but the latch corresponding to the latch 21 is turned open and is pushed outward, whereupon the window swings on the pins 3 into the position illustrated in the left portion of FIG. 1*a*. It may be secured in that position in any desired manner, for example by non-illustrated braces attached to the window sill 1*c*.

When it is desired to admit a maximum of fresh air or to clean the outside of the non-illustrated window pane in the sash 2, the latch corresponding to the latch 21 is left locked but the latch 7 is rotated until it clears the strike plate 7′. The sash 2 may then be tilted on the pivot pins 5 into any desired position. The axis of the pins 5 is in the central plane of symmetry of the sash 2 but laterally offset from the center of gravity of the sash. In the absence of external forces, the sash will tend to assume the horizontal position seen in the right half of FIG. 1*a* and also illustrated in FIG. 5. Because of the nearness of the pivoting axis to the center of gravity, it is quite easy to pivot the window sash into any other desired position in which it may then be fixed by conventional means not further illustrated. If so desired, the window may readily be turned through approximately 180° for greatest convenience in cleaning.

While the need for such operation may not frequently arise, it is possible to tilt the sash 2 simultaneously about the axes of the pins 3 and 5. Where the sash is also employed as a reflector for celestial light, the simultaneous outward movement about the pins 3 and titlting movement about the pins 5 permits the sash 2 to be positioned for reflecting a maximum of light into the window opening.

When the window is being closed, the top member of the sash 2 is wedged into the recess 14 in the top member 1*a* of the window frame and provides a tight seal which, nevertheless, is readily broken when the window is to be opened. The necessary gaps between the side members of the frame and sash are tightly sealed by the interposed arms 4 and filler members 6. A tight seal at the bottom of a window is not overly important where it is mainly intended to keep heat in the building but the seal provided by the strip 11 is amply adequate to seal out heat from a refrigerated building.

The modified embodiment of the invention illustrated in FIG. 1*b* is very similar to the window the structural and operational features of which have been described so far. It differs from the first embodiment disclosed mainly in the manner in which the swinging arms are connected to the window frame.

The hinge leaves 3*a*, 3*b* and the pin 3 which connect the arms 4 to the frame 1 for rotation about a fixed axis have been replaced in the apparatus shown in FIG. 1*b* by a slotted plate 3″ in each top corner of the window frame. The plate 3″ is engaged by a pin 3′ which is rotatable and longitudinally movable in the slot of the plate. The slot extends from a point adjacent the top frame member 1*a*′ downward and outward of the window.

Braces 20 connect a central portion of each arm 4′ intermediate the pins 3′ and 5 to a point of the window frame side member 1*b* somewhat below the level of the pin 5 in the closed position of the window. The braces 20 are fastened to the side members 1*b* and the arms 4

respectively by hinges 20' and 20''. Only one brace 20 and one set of hinges is seen in FIG. 1*b*. The arms 4' are substantially similar to the afore-described arms 4 but have openings suitably dimensioned to permit movement of the braces 20. The braces 20 are of relatively thin sheet stock and fit into the clearance between the arm 4' and one of the side members of the frame 1 or sash 2 in the closed position of the window.

The tilting movement of the sash 2 about its central axis is unaffected by the structural modifications which distinguish the window of FIG. 1*b* from that of FIG. 1*a*. When it is desired to tilt the window sash 2 about its upper horizontal axis, the latch 21 is opened without unlocking the latch or latches 7 not visible in FIG. 1*b*.

When the bottom member of the sash is pushed outward by pressure applied to the handle of the latch 21 or otherwise, the pins 3' slide downward in the slots of the plates 3'' while the hinges 20'' and the portions of the arms 4' attached thereto move in circular arcs about the fixed axis of the hinges 20'. When the sash reaches the position shown in FIG. 1*b* in which the pins 3' abut against the lower terminal walls of the slots in the plates 3'', the window has reached the limit of its outward swinging movement about its higher horizontal axis. It will then maintain its position without the need for special fastening means. In the illustrated position, the sash permits passage of air through a gap between its top member and the top member 1*a*' of the window frame.

The top member of the sash 2 carries a projection 9' which has a slanting face for engagement with a mating recess in the top member 1*a* of the window frame. The slanting face of the projection 9' guides the sash 2 into sealing engagement with the window frame 1 when the window is closed by pulling the latch 21 inward, whereby the sash is raised together with the arms 4.

The window of the invention in common with known top-hinged windows has the advantages of permitting very effective ventilation of the building and of providing an unimpeded escape in the event of fire. It additionally facilitates cleaning of the outside surfaces of the window panes by a person standing inside the building.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may also be practiced otherwise than as specifically disclosed.

What I claim is:

1. A window comprising, in combination,

(*a*) a frame having a top member, a bottom member, and two side members interposed between said top and bottom members, said members defining a window opening therebetween;

(*b*) a sash adapted to be engaged in said opening to substantially close the same, said sash having a top member, a bottom member, and two side members interposed between said top and bottom members, the members of said frame and said sash constituting respective pairs of juxtaposed members when said sash is engaged in said frame, opposite adjacent faces of the members of each pair of side members being formed with respective elongated grooves, juxtaposed ones of said grooves jointly constituting two elongated recesses each extending substantially from said top members to said bottom members when said sash is engaged in said opening;

(*c*) two first pivot means on said frame adjacent the top member thereof and adjacent respective side members thereof;

(*d*) two second pivot means on respective side members of said sash and spaced from the top and bottom members of said sash;

(*e*) an elongated arm in each of said recesses, said arm having two end portions respectively secured to a corresponding one of said first and second pivot means, and extending in a longitudinal portion of said recess;

(*f*) a filler member in each of said recesses and substantially extending over the remaining longitudinal portion thereof, said filler member being secured to one of the side members adjacent the respective recess; and

(*g*) cap flange means on each arm and on each filler member projecting outwardly of respective ones of said recesses and overlapping said side members.

2. A window as set forth in claim 1, wherein said recesses have one longitudinal side open, and said side members have respective juxtaposed stop faces in said recesses facing each open side, each said arm including an elongated sealing member in simultaneous abutting contact with said stop faces when said arm is received in said recess.

3. A window as set forth in claim 1, wherein said top member of said frame means is formed with recess means elongated transversely of said elongated recesses and substantially parallel to said axis of said first pivot means, said recess means having an open side opposite the bottom member of said frame means, a first longitudinal wall adjacent said open side and substantially perpendicular to said elongated recesses, and a second longitudinal wall adjacent said open side and obliquely inclined relative to said elongated recesses; said top member of said sash means having a projection substantially conforming to said recess means for mating engagement therewith when said sash means engages said opening.

4. A window comprising, in combination:

(*a*) a frame having a top member, a bottom member, and two side members interposed between said top and bottom members, said members defining a window opening therebetween;

(*b*) a sash adapted to be engaged in said opening to substantially close the same, said sash having a top member, a bottom member, and two side members interposed between said top and bottom members, the members of said frame and said sash constituting respective pairs of juxtaposed members when said sash is engaged in said frame, opposite adjacent faces of the members of each pair of side members being formed with respective elongated grooves, juxtaposed ones of said grooves jointly constituting two elongated recesses each extending substantially from said top members to said bottom members when said sash is engaged in said opening;

(*c*) two first pivot means on said frame adjacent the top member thereof and adjacent respective side members thereof;

(*d*) two second pivot means on respective side members of said sash and spaced from the top and bottom members of said sash;

(*e*) an elongated arm in each of said recesses, each arm having two end portions respectively secured to a corresponding one of said first and second pivot means and extending longitudinally in said recess, each of said first pivot means including a two-part hinge, one part being a slotted hinge plate, the slot of the plate extending from a point adjacent a respective one of said top members downwardly and outwardly of the window, and the other part being a pin engaging said slot, one part of each of said hinges being attached to a respective one of the side members of the frame and the other part being attached to a respective one of the side members of the sash;

(*f*) a filler member in each of said recesses and substantially extending over the remaining longitudinal portion thereof, said filler member being secured to one of the side members adjacent the respective recess;

(*g*) cap flange means on said arm and on said filler member projecting outward of said recess and overlapping said side members;

(*h*) a brace in each of said recesses in a clearance between said elongated arm and an adjacent one of the frame side members, each brace having two end portions respectively secured to the arm and to the adjacent frame side member, one brace end portion being secured intermediate the first and second pivot means, and the other brace end portion being secured below the second pivot means; and

(*i*) hinges respectively securing the brace end portions to the arm and the adjacent side member, one of said hinges having a fixed pivoting axis parallel to the axis of said pivot means and permitting pivoting

movement of the brace and portion secured thereto, and the other one of said hinges having a pivoting axis parallel to the axis of said pivot means and movable in a slot extending transversely to said axis.

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