

Feb. 13, 1951

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2,541,675

COMBINATION WINDOW FRAME CONSTRUCTION

Filed Jan. 29, 1949

3 Sheets-Sheet 1

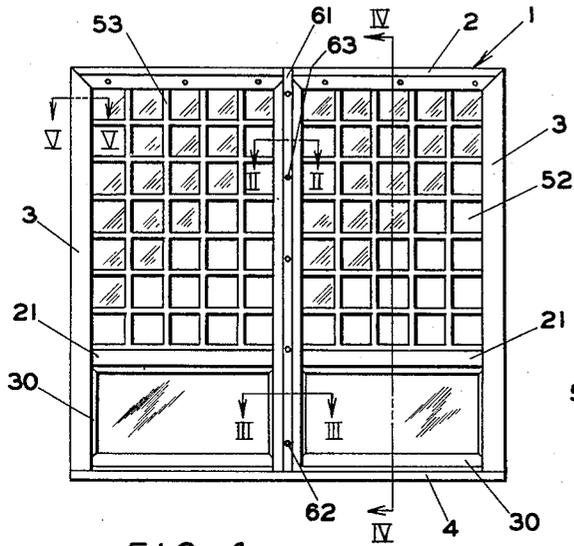


FIG. 1

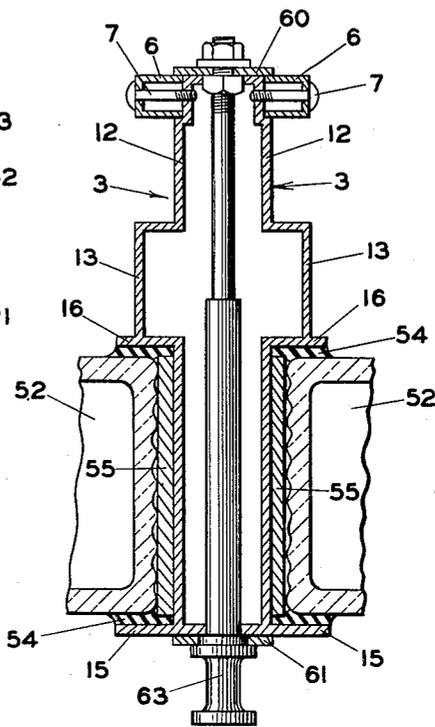


FIG. 2

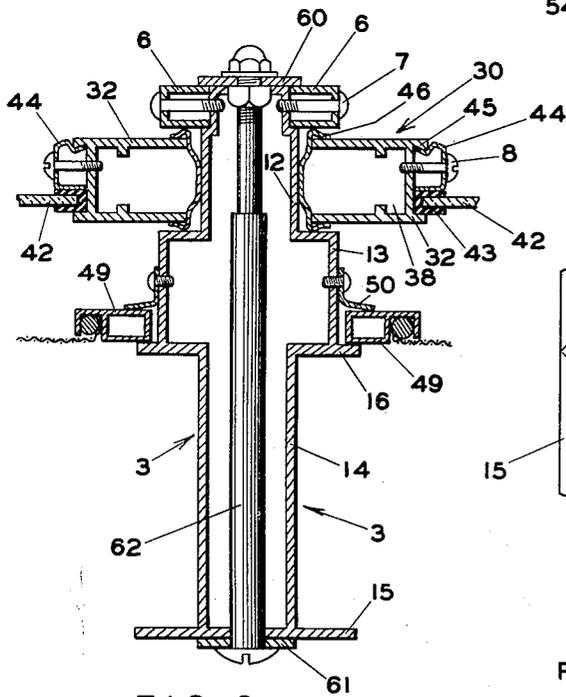


FIG. 3

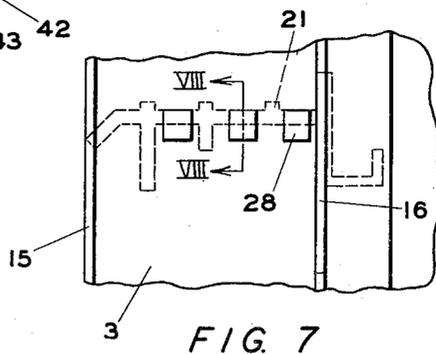


FIG. 7

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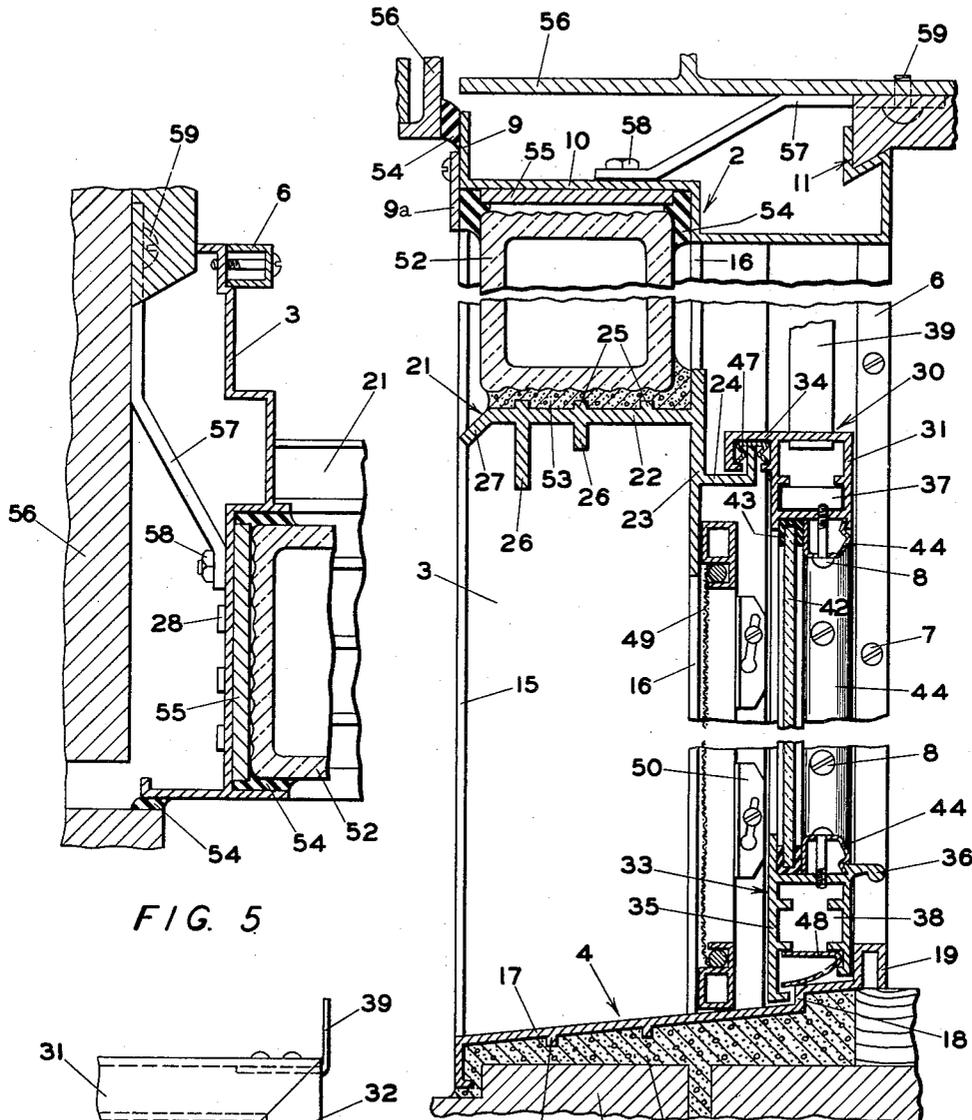


FIG. 5

FIG. 4

FIG. 6

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3 Sheets-Sheet 3

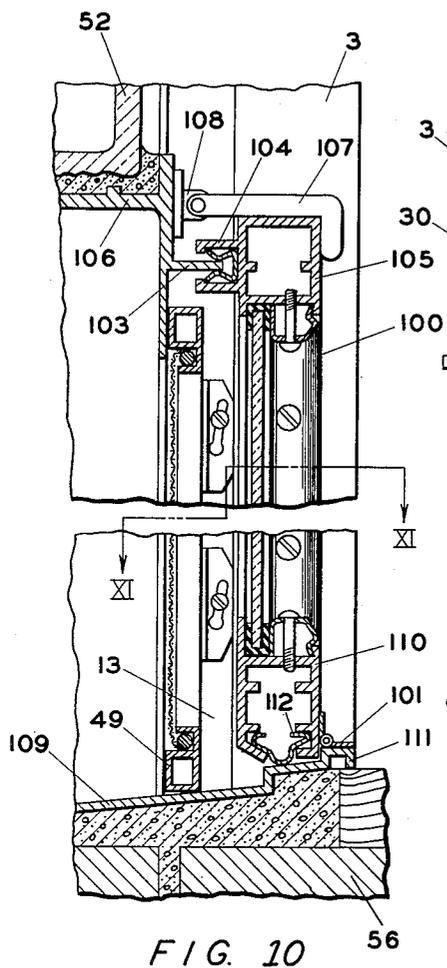


FIG. 10

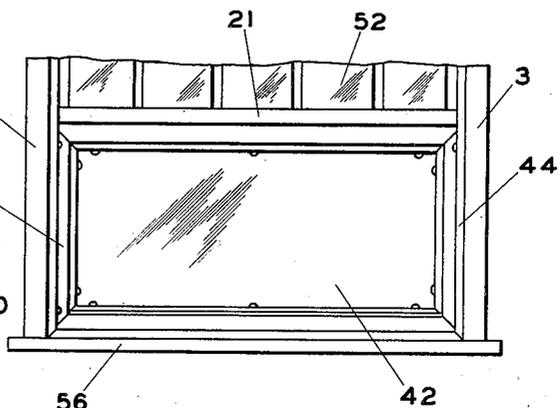


FIG. 12

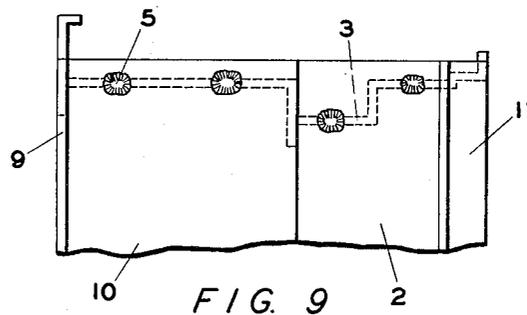


FIG. 9

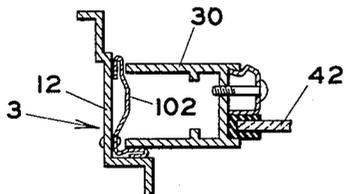


FIG. 11

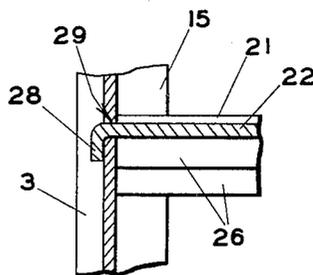


FIG. 8

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# UNITED STATES PATENT OFFICE

2,541,675

## COMBINATION WINDOW FRAME CONSTRUCTION

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3 Claims. (Cl. 189-76)

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This invention relates to window construction and more particularly to an integrated window frame having a movable window sash in its lower portion and glass blocks in its upper portion.

In recent designs for buildings, glass blocks have frequently been substituted for the more conventional window constructions. However, the usual practice of filling the entire window opening with glass blocks has been found unsatisfactory in many applications and the need for a practical modification has been recognized for some time. One major objection to solid panels of glass blocks in public buildings has been that they seal window openings which previously served as exits in the event of fire or panic. This objection has been a major consideration limiting the use of glass blocks in school and auditorium construction.

A further objection to said solid panels of glass blocks has been the inability to open said panels for needed ventilation. This situation becomes a serious obstacle both in single dwellings, where adequate air conditioning systems are not installed, and in multiple unit dwellings or large buildings where failure of the air conditioning system might necessitate evacuation of the building unless other means of ventilation were available.

Attempts have been made to solve the ventilation problem, only, by providing a glass sash, hinged along its lower edge, in conjunction with said glass blocks. However, this arrangement has proved unsatisfactory, especially when used at any great distance from the ground or roof, because there is no convenient way to clean the outside of either the window or the glass blocks.

Hence, it is desirable that a frame be designed to support a vertically sliding sash as well as glass blocks, thereby providing an opening of sufficient size to permit the passage therethrough of a man's body. It is further desirable that such frame be capable of supporting anchors for a window cleaner's safety belt in such positions that said window cleaner can reach all of the glass blocks.

Although these problems have existed and have been recognized almost since the introduction of glass blocks as a standard construction material, not until my invention had a satisfactory solution thereto been developed. The advantages available from the use of glass blocks are such that a suitable modification of the glass block window, overcoming these disadvantages, has long been desired.

My invention provides substantially all of the

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advantages of glass blocks plus those of a conventional window equipped with a vertically sliding sash. However, the construction of a window having both glass blocks and sliding sash construction involves several difficult problems. In order to provide an easily accessible exit for emergencies or for panel and window cleaning, it is advantageous that the opening to be covered by the sliding sash be located in the lower portion of the window. This requires a structure of sufficient strength to support the glass blocks mounted above the opening. Therefore, one of the major problems overcome in designing my window frame has been to provide an economical frame sufficiently strong to support the weight of the blocks. In addition, the frame must be pleasing in appearance and relatively simple to fabricate and install.

The factor of strength is of utmost importance because glass blocks are heavy, especially if the window is large. It is essential that the blocks be firmly supported to prevent their separation at the mortared joints and from the frame itself. Particularly is this a crucial requirement with glass blocks occupying the upper portion where their weight will tend to deflect the central portion of the frame. Although this applies particularly to that portion of the window acting both as a support for the glass blocks and as a divider between the upper and lower portions of the window, it is also necessary for the entire frame to be so constructed that it will retain its true shape despite the forces to which it is subjected.

Another type of problem retarding the use of glass blocks is the difficulty of laying them. The proper laying of glass blocks requires skill and knowledge different from that of the average mason because of their greater co-efficient of expansion and tendency to loosen from the binding mortar unless correctly installed. My frame design permits installation of the glass blocks either at the factory or at a sales agency having men specialized in this particular work and thus assuring a high and uniform standard of workmanship.

It is, therefore, a primary object of my invention to provide a window frame design combining an upper portion for support of glass blocks with a lower portion having a conventional sliding sash.

A further object of my invention is to provide a simple and economical window frame of sufficiently sturdy construction that it will support the weight of glass blocks without deflection either vertically or horizontally.

An additional object of my invention is to provide such a window frame which is easy to install.

Additional advantages of my invention will be recognized by those skilled in the building design and construction art upon reading the following specification and studying the accompanying drawings, in which:

Figure 1 is a front elevation view of my improved window construction, including a pair of window units and each having a sliding sash.

Figure 2 is a sectional view of my improved window construction taken along the plane II—II of Figure 1.

Figure 3 is a sectional view of my improved window construction taken along the plane III—III of Figure 1.

Figure 4 is a broken, sectional view of my improved window construction taken along the plane IV—IV of Figure 1.

Figure 5 is a fragmentary, sectional view substantially as taken along the plane V—V of Figure 1.

Figure 6 is an enlarged, fragmentary view of the corner construction of the sash for my improved window construction.

Figure 7 is a fragmentary side elevational view of my improved window construction showing the method of joining the peripheral frame members and the brick supporting structure.

Figure 8 is a fragmentary sectional view of my improved window construction taken along the plane VIII—VIII of Figure 7.

Figure 9 is a fragmentary, top view of my frame construction showing the means for joining the peripheral frame members.

Figure 10 is a fragmentary, sectional view of a modified form of my improved window construction, substantially as taken along the plane IV—IV of Figure 1.

Figure 11 is a fragmentary, sectional view taken along the plane XI—XI of Figure 10.

Figure 12 is a fragmentary interior view of the lower portion of my improved window construction.

In executing the objects and purposes of my invention I have provided a window construction having a peripheral frame equipped with a horizontal structural member extending across the opening therein. The upper portion of the opening is closed by glass blocks supported by the horizontal member and the lower portion of the opening is closable by a sash vertically slidable to uncover said lower opening and designed to be functionally integral with the entire frame.

In the following description the terms "inwardly" and "outwardly" are freely used and are to be taken as inwardly toward the interior of the building when the window is in place, and outwardly away therefrom. The terms "inside" and "outside" are to be taken as interchangeable with inwardly and outwardly, respectively. The terms "upwardly" and "downwardly" are also freely used and are to be taken as upwardly in the direction of the top of the window as normally installed and shown in Figure 1 and downwardly in the opposite direction. The terms "upper" and "lower" are to be taken as interchangeable with upwardly and downwardly, respectively.

The frame construction presented in the following description is that of a window utilizing a single frame. However, as is shown in the drawings, the window may be of any size which is a multiple of the basic frame size, since any number of frames can be set side by side in an

opening by the simple expedient of substituting joining plates and bolts, where the frames are contiguous, for the offset plates normally anchoring the frame to the building structure.

Referring to the drawings in detail, the numeral 1 refers to a peripheral frame having a top member 2, side members 3 and a sill member 4. These top, side and sill members are constructed so that a panel of glass blocks 52 may be supported within the upper portion of the opening formed thereby near the outside thereof, somewhat in the normal position of the upper sash of an ordinary double hung window, and a vertically sliding sash frame 30 may be supported in its lower portion, inwardly thereof, in the normal position of the lower sash of said ordinary double hung window.

The members 2 and 3 and the sill 4 may be secured to each other in any convenient, conventional manner, such as by means of the tenons 5 (Figure 9) extending from the upper and lower ends of the members 3 through appropriate mortises in the member 2 and sill 4, and upset thereagainst. A more detailed and more fully disclosed example of this type of corner securement may be found in my copending application, Serial No. 1,220, filed January 8, 1948.

The top member 2 (Figure 4) is provided with a sealing flange 9, an offset portion 10 and a plaster key 11. The width of the offset portion 10 is such that a glass, or other similar, block may be freely seated within it. The side members 3 (Figures 2 and 3) are each equipped with a channel 12 defined on one outward side by a fixed guide 13 integral with the side member 3 and on the other side by a detachable guide 6 (Figure 3). Each of the detachable guides 6 is secured to the side member with which it is associated by means of screws 7. The seat portion 14 of the side members is defined by the flanges 15 and 16. The flange 16 is an extension of one wall of the fixed guide 13 which extends the entire length of the side member 3. The detachable guide 6 is shown as extending the entire vertical length of the frame. Such construction is not essential to the operation of my window since the length of this member need not be more than twice the height of the hereinafter described sash 30. However, the additional length shown (Figure 4) is desirable from an esthetic standpoint.

The sill member 4 consists of an inclined portion 17, step 18 and ridge 19. Ribs 20 extend downwardly from the lower side of the inclined portion 17 to reinforce the member against upward or downward, lateral deflection.

At a point spaced substantially above the sill member 4 a beam 21 (Figures 1 and 4) extends between the side members 3 parallel to the sill member 4. The beam 21, in cross section, consists of a horizontal plate 22, a downwardly directed vertical flange 23 secured along the inside edge of said plate and having an upwardly and inwardly extending hook 24 projecting from the lower portion of said flange 23, but spaced from the end thereof. Relatively short ribs 25 project upwardly from the horizontal plate 22 and relatively longer ribs 26 extend downwardly from said plate 22. A downwardly inclined flange 27 is provided along the outside edge of the horizontal plate 22. The ribs 25 and 26, the inclined flange 27 and the vertical flange 23 serve primarily to increase the moment of inertia of the beam 21 to reinforce it against bending loads. The ribs 25 also function, respectively, as a mortar lock.

The beam 21 is installed in the peripheral frame 1 by means of the tenons 28 (Figures 7 and 8), which are inserted through the mortises 29 in the side members 3 and then riveted over to grip firmly the side members 3.

The sash frame 30 (Figures 1, 3 and 4) consists of a top rail 31, side rails 32 and bottom rail 33. The top rail 31 has a main, box-shaped portion and an outwardly and downwardly extending hook 34. The side rails 32 each consist of a substantially U-shaped channel having its open side facing directed toward the adjacent side members 3 of the peripheral frame 1. The bottom rail 33 consists of a substantially U-shaped channel having its open side facing directed toward the sill member 4. The outside leg 35 of the bottom rail channel 33 is longer than the inside leg. Integral with the bottom rail 33 is an upwardly and inwardly extending handle 36. The rails of the sash frame, where they join at the corners (Figure 6), are mitered and the resulting joint is welded, or otherwise suitably fastened, to provide a rigid structure. A corner member 37, extending around the corner is attached to each rail defining a corner by driving it into the central opening 38 in each of the rails. The size of the corner member 37 is such that when driven into the opening 38 it firmly engages the walls of the opening.

The sash frame 30 is preferably suspended upon a pair of conventional, metal sash tapes 39 (Figure 4) resiliently supported in any convenient manner upon said peripheral frame 1, above said sash frame.

This brief mention of said tapes 39 is presented only for the purpose of completeness and is not intended to limit the invention.

A transparent or translucent panel 42 made from any suitable material, such as glass, may be held in place within the frame 30 by a suitable caulking means 43, such as putty or a rubber gasket, and a glazing bead 44 (Figure 3) bearing on the putty or gasket and anchored to the sash by a clip 45 on each of the rails of the sash. The glazing bead 44 is further held against accidental disengagement by means of the screws 8. A weather strip 46 (Figure 3) is mounted on the channels of each of the side members 12 and bears against the side rails 32 when the sash frame 30 is in place. A U-shaped weather strip 47 (Figure 4) is mounted within the hook 34 of the top rail 31. A V-shaped weather strip 48 is seated within the open end of the bottom rail 33, for engagement with the step 18 of the sill member 4 when the sash frame 30 is closed.

Although the various individual parts constituting the structural portions of the frame 1, including the beam 21 and the sash frame 30, may be made from any suitable metal, said parts are preferably fabricated from aluminum because of its resistance to corrosion, suitability for complex extrusions and pleasing appearance.

The glazing bead 44, side rail weather strip 46, meeting rail weather strip 47 and sill weather strip 48 are each formed from any suitable resilient material, such as spring-bronze or stainless steel. Other materials may be used so long as they have sufficient resiliency. The resiliency of the material both aids in anchoring the parts into place and causes them to bear against the adjacent part of the window structure to effect a sealing action.

A screen 49 (Figure 4) of any suitable design is positioned within the opening below the beam 21 and exterior of the sash frame 30, and is held

in place by the slides 50. The screen nests against the inside face of the flange 23 of the beam 21, and against the flange 16 on each of the side members 3.

The opening above the beam 21 is closed by a panel of glass blocks 52 supported upon the beam 21. The blocks may be bound to each other in any suitable manner and are seated at the lower edge of the block panel on the mortar or grout 53. Along its sides and top, the block panel is received into appropriate channel shaped seat portions 14, above described, of the side frame elements 3 and the offset 10 of the top frame element 2. To permit the glass blocks to expand freely with respect to the frame, substantial space is provided between the edge of the block panel and the adjacent surfaces of the frame elements, which space, to prevent drafts, may be filled with a resilient material 55. Said resilient material may be anything suitable, such as a fibrous glass insulation. The sealing flange 9a of the top member 2 and the flanges 15 of the side members 3 project into the opening containing the glass block panel sufficiently to enclose and hide the expansion strip 55 and prevent outward movement of the blocks 52. The inward wall of the offset 10 and the upper portion of the vertical flange 23 of the beam 21 limit inward movement of the glass blocks 52.

Any suitable and convenient structure may be used to anchor the frame 1 to the building structure 56. One such construction is illustrated in Figures 4 and 5 and consists of an offset plate 57 extending between the frame 1 and the building structure 56. The offset plate 57 is anchored to the frame 1 by a bolt 58 and to the building structure 56 by a screw 59.

Where the opening requires more than one frame unit, as illustrated in Figure 1, two or more frames are mounted side by side, each being anchored at its top and bottom to the building structure in the same manner as if it were a single frame window. One side of each of the outside frames is anchored to the building structure. Where the frames abut each other, the joint between the frames is covered by a plate 60 (Figures 2 and 3) on the interior, and finish strip 61 on the exterior. The plate 60 and finish strip 61 are held in place by bolts 62. A bolt 63 (Figures 1 and 2), which is preferably positioned near the upper edge of the window, may be provided for engagement by the safety belt of a person cleaning the window, and in this embodiment it performs no other function. The plate 60, finish strip 61 and bolts 62 serve to keep each of the frames in alignment.

The window frame assembly, with or without the glass blocks, is mounted in a suitable opening in a building structure 56 and the offset plates 57 are attached to mount it firmly into position. At the time of installation the sill is placed on fresh concrete or grout 40 in order that the ribs 20 may penetrate the mixture and firmly anchor the window frame in said concrete when it has set. The gap existing around the window frame is then closed by means of bricks, mortar or plaster, whichever material is used to complete the particular wall structure and give a finished appearance thereto.

The sash 30 is mounted in the frame 1 by removing the detachable guide 6 and placing the sash against the fixed guide 13 and replacing the detachable guide 6. As so mounted, the sash may slide vertically between the guides. As the sash 30 is opened it slides upwardly past the beam

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21 and the glass blocks 52 and in open position, resides inwardly of and parallel with said panel of glass blocks. The sash, in raised position is supported by the sash tapes 39. A latching device may be added to the window; however, such additions are optional and since they form no part of my invention they are not illustrated.

If constructed as above described, the upper part of the window is sealed against drafts and, being of glass blocks, requires little or no maintenance, although the full benefit of daylight is obtained. At the same time the lower part of the window may be opened in case of an emergency or for purposes of ventilation. By constructing the dual type window as an integrated unit, the proper coordinated functioning of each portion is assured and the installation rendered simple and rapid.

A modification of my window structure (Figures 10 and 11) can be obtained, with certain advantages being thereby sacrificed and others attained, by replacing the vertically sliding sash frame 30 with a hinged sash 100 which is hinged along its lower edge within the frame 1 upon the window sill member 109 by means of hinges 101. The detachable guides 6 as well as the metal sash tapes 39 may then be eliminated. The side weather strips 102 (Figure 11) are redesigned to fit, and are secured to, the side members 3 within the channels 12 (Figure 11) for cooperation with the side rails 30. The upwardly extending portion of the hook 24 (Figure 4) on the beam 21 is eliminated to leave a horizontal, inwardly extending arm 103 on the beam 106 (Figure 10). An outwardly opening channel 104, having flanges hooked toward each other along their free edges, is provided along the top rail 105 of the hinged sash 100 for receiving the arm 103 directed toward the beam 21. Any effective latching device may be used to retain the sash in closed position. A latch of suitable construction (Figure 10) may consist of a base 108 secured to the beam 106 and a lever 107 pivotally supported upon the base 108 for engaging the top rail 105 of the sash 100.

The lower rail 110 of the hinged sash 100 is so designed that when the sash 100 is moved about the hinge 101 the rail 110 will not interfere with the guide 13. The sill 109 of the peripheral frame is modified by reducing the height of the ridge 111 and thereby lowering the pivot point of the hinge 101. A weather strip 112, held in the lower part of the hinged sash, presses against the sill 109 when the sash 100 is in closed position.

When the window is modified to utilize a hinged sash construction the hinged sash may either be positioned inwardly of the glass blocks 52, as shown, or be placed beneath the glass blocks. If the latter construction is employed, then the width of the frame can be reduced to eliminate the portion previously used to provide space for the sash to slide upwardly past the glass blocks. Whether or not the width is reduced, it is optional whether the pivoted sash is hung from the

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bottom or top, i. e., hinged upon the sill member 4 or the beam 21 or even hinged upon one of the side members 3. In each case some modification of the latching structure may be necessary to accommodate the existing circumstances.

Other variations and modifications will be apparent to persons acquainted with equipment of this general type and the problems and design thereof; however, each of these variations and modifications are embraced within the general scope of my invention and will accordingly be included within the purview of the hereinafter appended claims excepting as said claims expressly provide otherwise.

I claim:

1. In window construction a rigid, peripheral frame defining a central opening divided into an upper portion closed by masonry glass blocks and a lower portion closed by a movable sash, the means for dividing said central opening and supporting said blocks in cross section comprising: a vertical plate; a horizontal arm integral with said plate intermediate the upper and lower edges of said plate and having a length greater than the thickness of said masonry glass blocks; a flange on the end of said arm remote from said plate and directed away from said masonry glass blocks; spaced depending vertical legs on said arm spaced from both said vertical plate and said flange.

2. Means for dividing the central opening of a peripheral frame in a window construction as described in claim 1 wherein said vertical legs extend from both the upper and lower faces of said arm.

3. Means for dividing the central opening of a peripheral frame in a window construction as described in claim 1 wherein said vertical legs are of unequal length, the longer of said legs being adjacent said flange; a hook shaped sash engaging arm integral with said vertical plate and projecting from said vertical plate in a direction away from said horizontal arm.

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Pittsburgh Corning Corporation pamphlet, "Glass Blocks," copyright 1948 by the Pittsburgh Corning Corporation.