May 8, 1951 R. H. STILES 2,552,298

METAL WINDOW SASH FRAME

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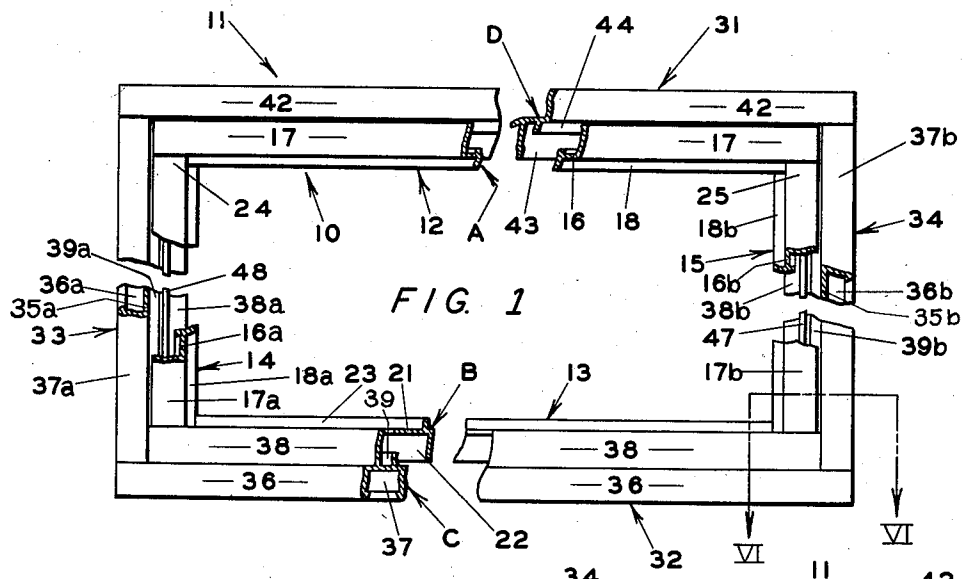


FIG. 1

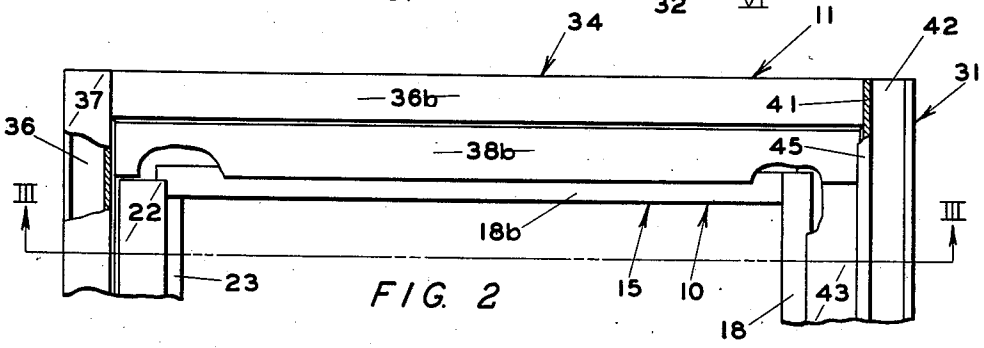


FIG. 2

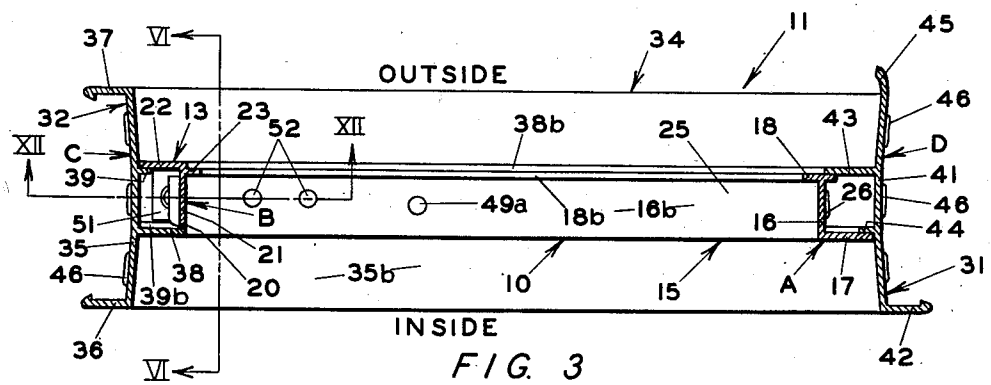


FIG. 3

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METAL WINDOW SASH FRAME

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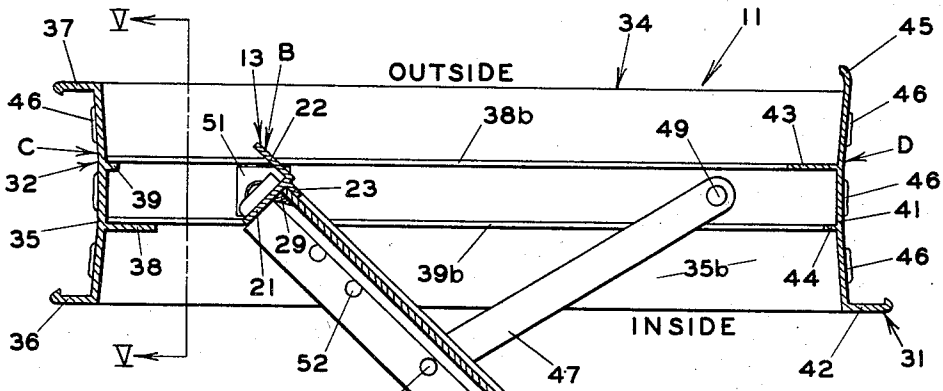


FIG. 4

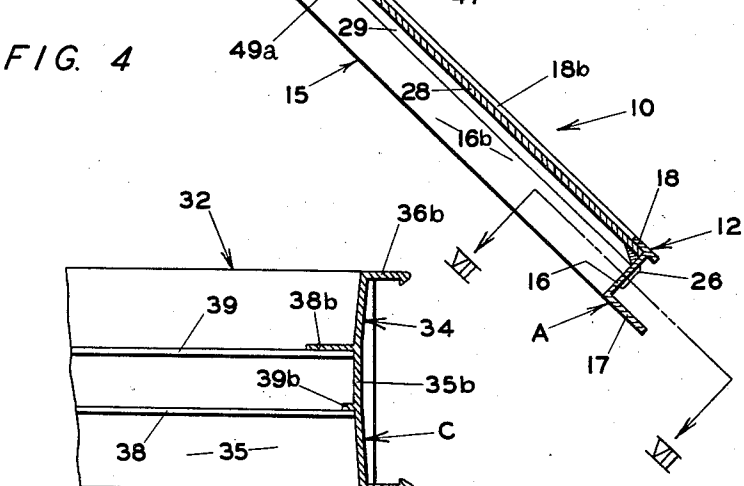


FIG. 5

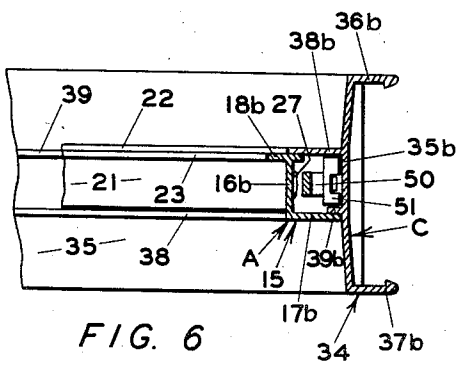


FIG. 6

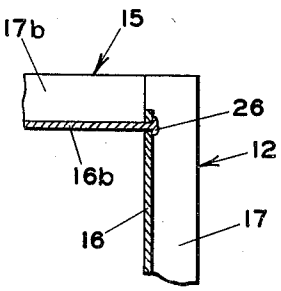


FIG. 7

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METAL WINDOW SASH FRAME

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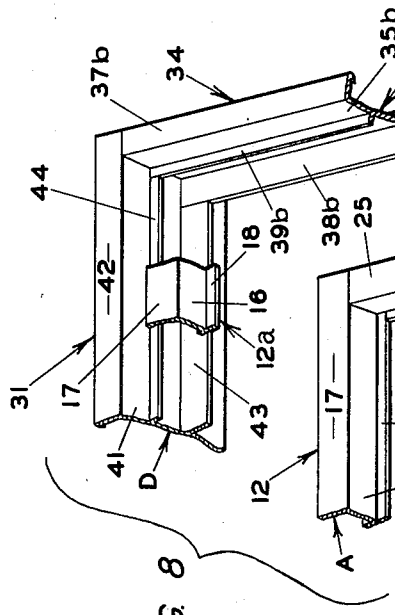


FIG. 8

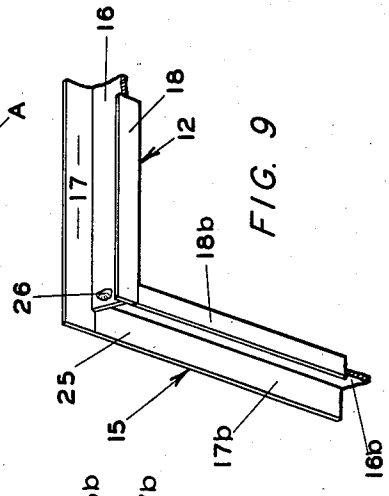


FIG. 9

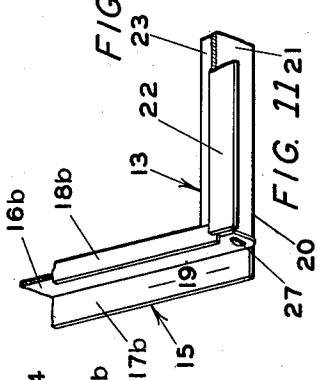


FIG. 11

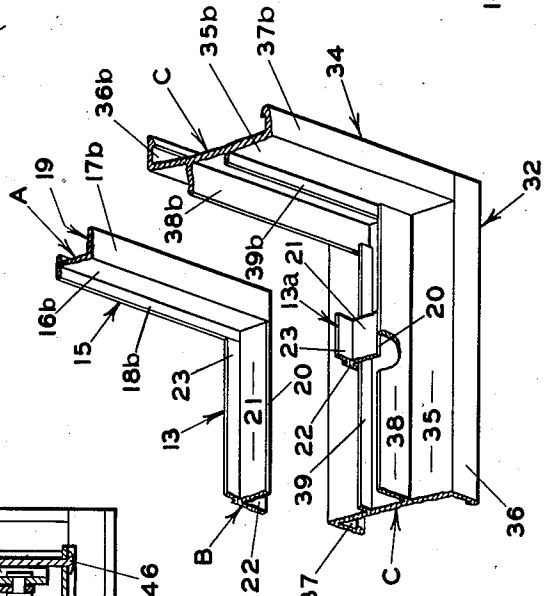


FIG. 10

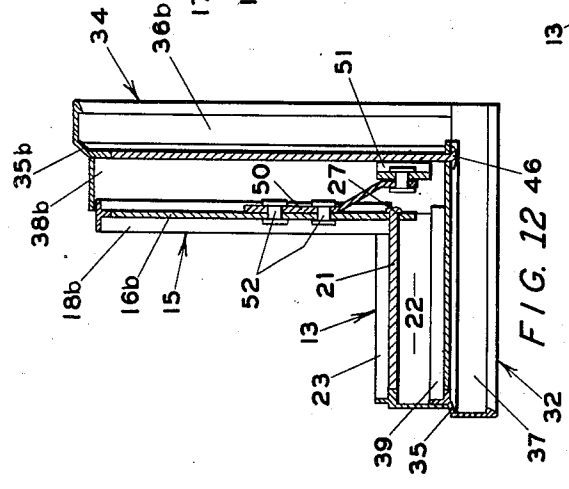


FIG. 12

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Patented May 8, 1951

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UNITED STATES PATENT OFFICE

2,552,298

METAL WINDOW SASH FRAME

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Application January 8, 1948, Serial No. 1,220

5 Claims. (Cl. 189—75)

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This invention relates in general to a metal, ventilating window frame and sash, and more particularly to a type thereof fabricated from extruded metal elements and provided with a double seal against air leakage between the said sash and the frame.

Persons familiar with ventilating type window construction will immediately recognize the advantages of such a window in which the sash and frame are fabricated from extruded metal elements, wherein such elements are so constructed that a double metallic seal is provided between the sash and the frame in its finished form.

Previous known attempts to develop a sturdy, self-contained, light-weight ventilating window adaptable to use in building construction have not always been completely satisfactory. Often the window has been flimsy in structure or too complicated to be economical. Especially where glass blocks are used, it is advantageous for the window to have a frame adapted to engage directly said glass blocks or other wall construction.

Accordingly, a primary object of this invention is to provide a ventilating window whose sash and frame are fabricated from extruded metal elements, wherein such elements are so constructed that a double seal is provided between the sash and the frame.

A further object of this invention is to provide a ventilating window, as aforesaid, in which the said extruded sash and frame elements are reduced to their simplest form, and in which a minimum of different extruded forms are required to fabricate a complete window.

A further object of this invention is to provide a ventilating window, as aforesaid, whose sash and frame are sturdy, self-contained and light in weight.

Other objects and purposes of this invention will become apparent to persons familiar with this type of equipment upon referring to the accompanying drawings and upon reading the following specification.

As will be apparent from the hereinafter following description, the principles of my invention have been embodied in a horizontally tilting, metal frame, double-sealed basement window which is herein utilized for illustrative purposes. It will be understood, however, that some or all of the features of my invention may be applied to other types of windows, such as casement windows, or window-type constructions, without departing from the scope of my invention.

In meeting those objects and purposes hereto-

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fore mentioned, as well as others incidental thereto and associated therewith, I have provided, in the specific embodiment herein illustrated, a rectangular frame comprised of four extruded metal elements suitably secured together at their adjacent ends. A rectangular sash, which is also comprised of four extruded metal elements, suitably secured together at their adjacent ends, is horizontally, pivotally and slidably supported by said frame.

The frame elements and the sash elements are so constructed and arranged together that a double, metallic seal is provided between the sash and the frame.

For one preferred embodiment of the invention, attention is directed to the drawings in which:

Figure 1 is a broken, side elevation of the metal window sash and frame to which this invention relates as viewed from the inside of the building in which it may be installed.

Figure 2 is a broken, side elevation of one end of said window sash and frame as viewed from the outside of the building in which it may be installed.

Figure 3 is a cross-sectional view of Figure 2 taken along the line III—III showing the sash in closed position and the panel omitted.

Figure 4 is a cross-sectional view taken along the same line as Figure 3, but showing the sash swung open with respect to the frame and a panel, here glass, in place.

Figure 5 is a cross-sectional view of Figure 4 taken along the line V—V.

Figure 6 is a cross-sectional view of Figures 1 and 3 taken along the line VI—VI.

Figure 7 is a cross-sectional view of Figure 4 taken along the line VII—VII.

Figure 8 is an exploded, inside, oblique, fragmentary view of the upper right hand corner of the sash and frame appearing in Figure 1, showing a first fragment of the sash spaced away from the frame and a second fragment of the sash, which is a duplicate of a portion of said first fragment, in position on the frame.

Figure 9 is another oblique, fragmentary view of the sash corner shown in Figure 8, viewed from the outside of the window.

Figure 10 is an exploded, inside, oblique, fragmentary view of the lower right hand corner of the sash and frame appearing in Figure 1, showing a first fragment of the sash spaced away from the frame and a second fragment of the sash, which is a duplicate of a portion of said first fragment, in position on the frame.

Figure 11 is an other oblique, fragmentary view of the sash corner shown in Figure 10 viewed from the outside of the window.

Figure 12 is a cross-sectional view of Figure 3 taken along the line XII—XII.

As illustrated in Figures 1, 2, 3 and 4, the ventilating window to which this invention relates is comprised of a sash 10 and a frame 11 which are pivotally and slidably engaged as hereinafter described in detail.

Sash construction

The sash 10 is comprised of a top horizontal sash element 12 and a bottom horizontal sash element 13, which horizontal elements are secured at their corresponding extremities to the adjacent ends of a pair of vertical or side sash elements 14 and 15. Such securement between ends of said sash elements is hereinafter disclosed in detail.

The said sash elements may be extruded from any suitable material such as aluminum. In this particular embodiment of the invention, the top sash element 12, and the two vertical sash elemens 14 and 15 are cut from the same extrusion A (Figures 1, 3, 4 and 6). Said sash elements have webs 16, 16*a* and 16*b*, large flanges 17, 17*a* and 17*b*, integral with a respective longitudinal edge of said webs, and small flanges 18, 18*a* and 18*b*, integral, respectively with the other edge of the said webs 16, 16*a* and 16*b*, said small flanges extending on either side of their respective webs. The said large flanges and small flanges are substantially parallel to each other and perpendicular to the said webs.

The bottom sash element 13 is made from extrusion B (Figures 3 and 4), which has a web 21, a large flange 22 extending perpendicularly outwardly from one edge of said web 21, and a small flange 23 extending perpendicularly inwardly from the opposite side of said web 21. Said flanges are parallel, with the small flange displaced slightly inboard about the thickness thereof from the longitudinal edge of the web 21 from which the large flange 22 extends. The flanges 22 and 23 are preferably an integral part of the web 21. The web 21 of extrusion B is is preferably the same width as the web 16 of extrusion A.

The said window herein disclosed is so designed and contructed that the left end, as appearing in Figure 1, is a mirror image of the right end. Therefore, although both ends of said window are fully described, all of the accompanying drawings, except Figure 1, are directed to the right end of Figure 1. It will be understood, however, that such drawings apply in reverse to the left end of Figure 1.

The small flanges 18*a* and 18*b* at the upper ends 24 and 25 of the vertical elements 14 and 15, respectively, are cut away as shown in Figures 1, 2 and 9, to provide space for the overlap by the small flange 18 of the top sash element 12. The tenons 26 (Figures 7 and 9) which are integral with the upper ends 24 and 25 of said vertical elements 14 and 15, extend through suitable openings in the web 16 of the top horizontal element, one adjacent to each end thereof. Said tenons are upset against the outside of the web 16 of the sash element 12. It will be clearly understood that such means of securement between sash elements is described for illustrative purposes only and that other conventional means may alternatively be used.

The small flange 23 is removed (Figures 10 and 11), as required, at both ends of the bottom horizontal element 13 to provide space for the overlap by the small flanges 18*a* and 18*b* at the lower ends of the vertical elements 14 and 15. Both extremities of the web 21 of the bottom horizontal sash element 13 are provided with tenons 27 (Figures 6 and 11), which extend through suitable openings in the lower ends of the webs 16*a* and 16*b* of the vertical sash elements 14 and 15. The portion of said tenons 27 extending through the said webs 16*a* and 16*b*, respectively, may be upset against the outside surface of said webs, in the same manner described with respect to the tenons 26 and shown in Figure 7.

The web 21 is preferably of such width that its free edge 20 (Figure 10) lies substantially within the plane of the inner surface 19 of the flange 17*b*, and the inner surface (not shown) of the flange 17*a*, for reasons which will hereinafter become apparent.

An appropriate panel 28, such as glass, may be held against the small flanges 18, 16*a*, 18*b* and 23 of said four sash elements between the webs 16, 16*a*, 16*b* and 21 thereof, as shown in Figure 4, by any suitable means such as conventional putty 29.

Frame construction

The frame 11 is comprised of a top horizontal frame element 31, a bottom horizontal frame element 32 and a pair of vertical or side frame elements 33 and 34, which vertical elements connect the adjacent ends of said horizontal elements. The connecting ends of said frame elements may be secured to each other in any convenient conventional manner, such as by means of tenons, integral with the end of one frame element, extending through suitable openings near the end of another frame element, in the general manner heretofore described with reference to the sash elements.

The said frame elements may be extruded from any suitable material, such as aluminum. In this particular embodiment of the invention, the bottom horizontal frame element 32 and the two vertical frame elements 33 and 34 are cut from the same extrusion C, a cross-section of which is shown in Figures 4, 5 and 6. Said frame elements have central webs 35, 35*a* and 35*b*, respectively, with integral block engaging flanges 36, 35*a*, 36*b*, 37, 37*a*, and 37*b*, respectively, extending away from the longitudinal edges of the said central webs 35, 35*a* and 35*b* on the corresponding same sides thereof. Said flanges, which may be as wide as desired, are approximately perpendicular to said webs and preferably parallel to each other.

Large guide stops 38, 38*a* and 38*b*, and small guide stops 39, 39*a* and 39*b*, which are each an integral part of said webs 35, 35*a* and 35*b*, respectively, extend therefrom on the opposite side from said flanges 36, 36*a*, 36*b*, 37, 37*a*, and 37*b*, respectively. Said large and small guide stops of extrusion C are approximately perpendicular to the said web and are spaced, in parallel disposition, the same distance apart as the large and small flanges on the extrusion A of the sash. The said guide stops are so positioned along the web of extrusion C with respect to the said block engaging flanges that when one piece of the extrusion C is reversed with respect to another piece of the extrusion C, the large guide stops will bear snugly against the outside surfaces of the small guide stops while the adjacent block engaging flanges of the two said reversed pieces of extrusion C lie substantially within the same

plane. Reasons for such relationship between said block engaging flanges and the said large and small guide stops on extrusion C will be dealt with in detail, hereinafter.

Extrusion D, which comprises the top horizontal frame element 31, has a central web 41, with a flange 42 integral with the inner longitudinal edge of said web, which flange extends approximately perpendicularly from said web 41. A large guide stop 43 and a small guide stop 44, which are integral with the web 41, extend approximately perpendicularly from said web on the opposite side from which said flange 42 extends. The guide stops 43 and 44 are the same distance apart as the guide stops 38 and 39. The small guide stop 44 is the same distance from the edge of the central web 41, from which the flange 42 extends, as the small guide stops 39, 39*a* and 39*b* are from the edge of the webs 35, 35*a* and 35*b*, respectively, from which the block engaging flanges 37, 37*a* and 37*b* extend.

The extrusion D is identical with extrusion C in all respects except that it lacks a flange at the outside edge of the web 41 (Figures 3 and 4). This unflanged edge 45 extends a little further out than the comparable edge of the extrusion C, and, since it is a part of the top horizontal frame element, it offers added protection to the window from the elements. The web portions of each of these extrusions are preferably curved in cross-section as shown in the drawings for the double purpose of providing added strength in all sections and providing better water shedding capacity in the bottom section.

In assembling the frame 11, the vertical frame elements 33 and 34, which are comprised of sections of extrusion C, are each provided in this embodiment with three tenons 46 at each end thereof. Said tenons 46 are preferably an integral part of the webs 35*a* and 35*b* of said vertical elements 33 and 34 and extend through suitable openings in the webs 35 and 41 of the bottom and top horizontal frame elements 31 and 32, respectively. The said tenons 46 are preferably upset against the webs 35 and 41 in the same general manner as the tenon 26 shown for the sash corners in Figure 7.

The top frame element, which is comprised of a section of the extrusion D, is secured to said two vertical frame elements 33 and 34 so that the small guide stops of all three said elements are co-planar, and so that the large guide stops of all three elements are also co-planar (Figure 8). The large and small guide stops 43 and 44 on said top frame element are relieved as required at both ends of the element to allow for the guide stops 38*a* and 38*b* on the vertical frame elements 33 and 34, the ends of which stops are flush with the ends of the webs 35*a* and 35*b*.

The bottom horizontal frame element 32, which is a section of extrusion C in a reversed position, is engaged at its ends by the tenons 46 of said vertical elements 33 and 34 so that its large guide stop 38 lies snugly against the inside of the small guide stops 39*a* and 39*b* on said vertical frame elements (Figure 10). The small guide stop 39 of said bottom element 32 rests snugly against the inside surfaces of the large guide stops 38*a* and 38*b* on said vertical frame elements 33 and 34. The small guide stop 39 on said bottom frame element 32 is relieved at both ends of the element for reasons which hereinafter become apparent.

The manner in which the extrusion A, which comprises the top and vertical sash elements, engages the extrusions C and D, which comprise the vertical and top frame elements, respectively, is illustrated in Figure 8 by the engagement of a fragment 12*a* of the top sash element 12 with the top frame element 31.

The manner in which the extrusion B, or bottom sash element, engages the extrusion C, or bottom frame element, is illustrated in Figure 10 by the engagement of a fragment 13*a* of the bottom sash element 13 with the bottom frame element 32.

A hinge bar 47 (Figure 4) is pivotally secured at its one extremity, by means such as a rivet 49, to the web 35*b* of the vertical frame element 34, near its upper end and between the guide stops 38*b* and 39*b*. A suitable bushing holds the hinge bar away from said web 35*b* so that said bar will clear the small guide stop 39*b*. The other extremity of said hinge bar 47 is pivotally secured, as by means of a rivet 49*a*, to the web 16*b* of the corresponding vertical sash element 15 intermediate its extremities. Another hinge bar 48 (Figure 1) is pivotally connected at its one end to the vertical frame element 33 and at its other end to the corresponding vertical sash element in the same manner as above described with respect to the hinge bar 47.

A pivot bar 50 (Figures 6 and 12) is rigidly attached at its one end by rivets 52, or other suitable means, to the lower end of the web 16*b* of the vertical sash element 15. The other end of said pivot bar 50 is pivotally secured to a slide block 51 which rides between the guide stops 38*b* and 39*b* of the vertical frame element 34. The pivot bar 50 is arched so that the slide block 51 is held under compression against the web 35*b* of said vertical frame element 34. Another pivot bar (not shown) is rigidly attached at its one extremity to the lower end of the web 16*a* of the vertical sash element 14, while its other extremity is pivotally secured to a slide block (not shown) in the same manner and for the same purposes as the pivot bar 50 and slide block 51.

Any appropriate latching means, not shown, may be provided between the top horizontal sash element 12 and the top horizontal frame element 31.

Operation

It will be understood that the metal window, to which this invention relates, is herein described and disclosed as a tilting window and that it is especially adapted to mounting within a glass brick opening for illustrative reasons only. In the light of the foregoing, it will be obvious to persons familiar with this type of equipment that the hereinbefore described construction and hereinafter disclosed operation of said metal window may be readily adapted to applications where the problems involved are less complicated.

If, for example this window is used in a conventional basement wall of concrete building blocks, any conventional, convenient means such as wood or cement may be used to fill in between the outwardly extending flanges of the frame elements and the walls defining the window opening.

In the preferred embodiment of the invention as illustrated, the block engaging flanges 36, 37*a*, 37*b* and 42 on the inside of the window frame 11, and the block engaging flanges 37, 36*a* and 36*b* on the outside of the said window frame 11 engage the bottom, vertical sides and top respectively, of the walls defining the opening into

which the said frame 11 is inserted. The insertion is preferably made so that the top horizontal frame element 31 engages the top of the opening and so that its unflanged edge 45 extends towards the outside of the structure, thereby causing the sash 10 to open inwardly.

When said sash 10 is in the closed position, the large flanges 17a and 17b of the vertical sash elements 14 and 15 (Figures 1, 3, 6 and 10) bear snugly against the inside surfaces of the small guide stops 39a and 39b of the vertical frame elements 33 and 34. The small flanges 18a and 18b of the vertical sash elements bear snugly against the inside surfaces of the large guide stops 38a and 38b of the vertical frame elements and the flanges 17 and 18 of the top horizontal sash element 12 bear snugly against the inside surfaces of the small guide stop 44 and large guide stop 43, respectively, of the top frame element. The flange 22 and the edge 20 of the web 21 of the bottom sash element 13 (Figures 1 and 3) bear snugly against the outside surfaces of the small guide stop 39 and the large guide stop 38, respectively, of the bottom frame element 32. Hence, the bearing of the two flanges of the sash elements against the two guide stops of the respective frame elements produces a double weather seal between the sash and frame of the said window.

Because the web edge 20 (Figure 10) and the inner side 19 of the vertical sash element flange 17b are co-planar, as aforesaid, and because the outside surface of the large guide stop 38 engages the inside surface of the small guide stop 39b, the said flanges 17b will engage the inside surface of said small guide stops 39b, and the edge 20 will engage the outside surface of said large guide stop 38 when said window sash 10 is in the closed position.

As shown in Figures 6, 10 and 11, the small flange 23 of the sash element is co-planar with the small flange 18b of the vertical sash element 15. Because the small guide stop 39 on the bottom frame element 32 engages the inside surface of the large guide stop 38b of the vertical frame element 34, and because the large flange 22 of said sash element 13 is displaced, as aforesaid, from the said plane of the said small flanges 23 and 18b, said large flange 22 bears snugly against the outside of the small guide stop 39 on the bottom frame element 32, and the small flange 18b engages the large guide stop 38b on said vertical frame element 34 when said window sash 10 is closed. The large flange 22 of said sash element 13 then becomes coplanar with the large guide stop 38b of said vertical frame element 34. Said large flange 22 is slightly shorter than the distance between said large guide stops 38a and 38b (Figure 1) so as to prevent contact therewith when said window sash 10 is opened and closed.

It will be understood that the relationship between the sash elements 12, 13 and 15 and the frame elements 31, 32 and 34, as described above, applies in reverse to the relationship between the sash elements 12, 13 and 14 and the frame elements 31, 32 and 33, because the left end of the window (Figure 1) is a mirror imagine of the right end of the window, as aforesaid.

The sash 10 is opened with respect to the said frame 11 by moving the top sash element 12 away, inwardly in the embodiment here illustrated, from the top frame element 31. Such movement causes the two slide blocks, one of which is shown at 51 in Figures 4, 6 and 12, to move upwardly between the guide stops 38a and 39a of the vertical frame element 33, and between the guide stops 38b and 39b of the vertical frame element 34. At the same time, the hinge bars 47 and 48 pivot upon their connections with the vertical frame elements 33 and 34 and the vertical sash elements 14 and 15. The bottom sash element 13 correspondingly moves upward and away from the bottom frame element 32.

The small guide stop 39 on the bottom frame element 32 is relieved adjacent to the vertical frame elements 33 and 34, as aforesaid, to prevent its interference with the free movement of the slide block, such as the slide block 51 shown in Figure 12.

Closure of the sash 10 may be accomplished by moving the top sash element 12 back towards the top frame element 31.

Although, as aforesaid, the above mentioned drawings and description apply to one particular, preferred embodiment of the invention, it is not my intention, implied or otherwise, to eliminate other variations or modifications which do not depart from the scope of the invention unless specifically stated to the contrary in the hereinafter appended claims.

I claim:

1. A structural shape for a window frame member, said structural shape in cross section comprising: a first channel element having a pair of spaced, parallel flanges and a connecting web; a second channel element having a pair of spaced, parallel flanges and a connecting web constituting a portion of the connecting web of the first channel element; the flanges of said second channel element being directed oppositely from the flanges of said first channel element and spaced apart in the direction of said connecting web a distance substantially less than the flanges of said first channel element; one of said flanges of said second channel element being longer than the other of the flanges of said second channel element; the midpoint of the distance defined between the inwardly facing surfaces of the flanges of said second channel element being off-set from the center of said first channel element a distance equal to one half the thickness of the one of said flanges of said second channel element closest to the center of said first channel element.

2. A structural shape for a window frame member as described in claim 1 wherein that portion of said connecting web of said first channel element on each side of said second channel element describes an angle between said connecting web and the flanges of said second channel element of slightly more than 90°.

3. A structural shape for a window frame member, said structural shape in cross section comprising: a first channel element having a pair of flanges and a connecting web; a second channel element having a pair of flanges and a connecting web constituting a portion of the connecting web of the first channel element; said second channel element being asymmetrical with respect to said first channel element; the flanges of said second channel element being directed oppositely from the flanges of said first channel element and spaced apart in the direction of said connecting web a distance substantially less than the flanges of said first channel element; one of said flanges of said second channel element being longer than the other of the flanges of said second channel element; the flanges of

said second channel element being so located with respect to the center line of said first channel element, that one pair of similarly facing sides of said last-named flanges are equally spaced from the center line of said first channel element.

4. In a window frame, said frame comprising: a bottom member; a pair of side members; a top member; said bottom member and said side members each constituting lengths of a single structural shape; said side members each being turned end for end with respect to said bottom member; said structural shape comprising a first channel element having a pair of flanges and a connecting web; a second channel element having a pair of flanges and a connecting web constituting a portion of the connecting web of said first channel element; the flanges of said second channel element being directed oppositely from the flanges of said first channel element and spaced apart in the direction of said connecting web a distance substantially less than the flanges of said first channel element; one of said flanges of said second channel element being longer than the other of the flanges of said second channel element; the midpoint of the distance defined between the inwardly facing surfaces of the flanges of said second channel element being offset from the center of said first channel element a distance equal to one half the thickness of the one of said flanges of said second channel element closest to the center of said first channel element whereby the long flange of said second channel element of each of said side members seats against the short flange of the second channel element of said bottom member and the flanges of the first channel element of each of said side members are flush with the flanges

of the first channel element of said bottom member.

5. A structural member for window frame construction, said structural member having a cross sectional shape comprising: a pair of oppositely directed channel elements each having a connecting web between their legs; a portion of the connecting web of said first channel element constituting the connecting web of the second channel element; the legs of said first channel element spaced apart a distance greater than the legs of said second channel element; one leg of said second channel element being longer than the other leg of second channel element; the midpoint of the distance defined between the inwardly facing surfaces of the flanges of said second channel element offset from the center of said first channel element a distance substantially equal to one half the thickness of the one of the legs of said second channel element closest to the center of said first channel element.

RICHARD H. STILES.

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