Feb. 15, 1955 W. A. WATSON 2,701,898

METAL STORM SASH STRUCTURE

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Fig. 1.

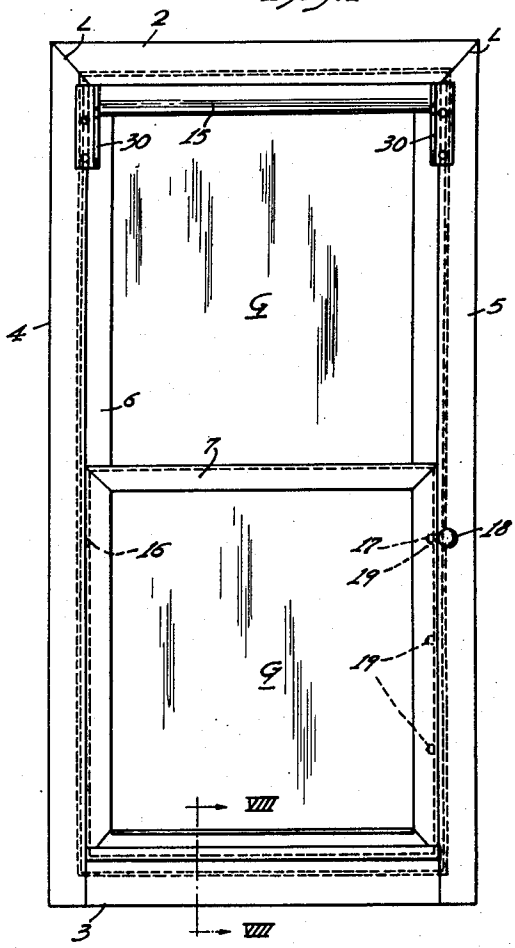


Fig. 2.

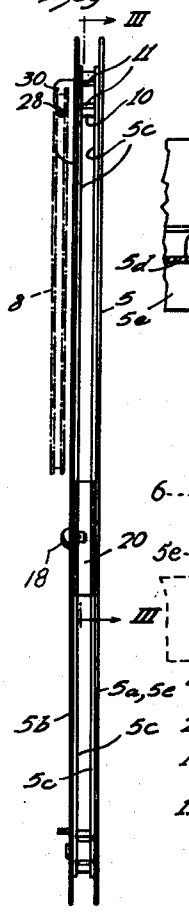


Fig. 3.

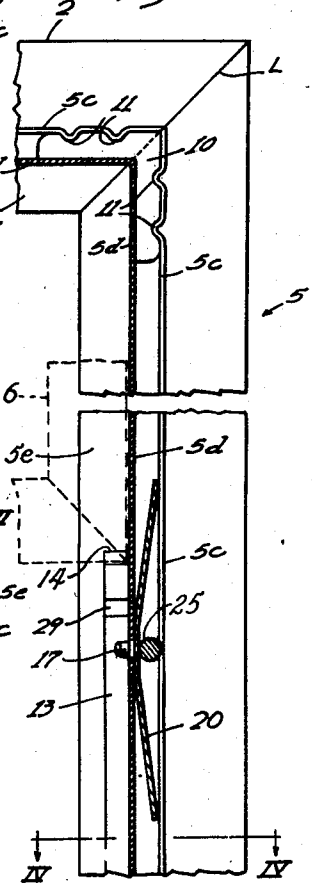
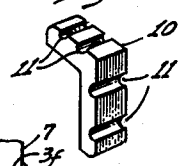


Fig. 10.



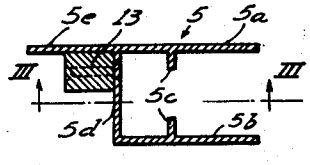


Fig. 4.

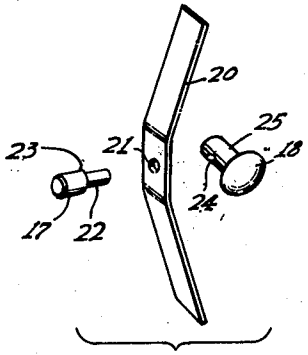


Fig. 11.

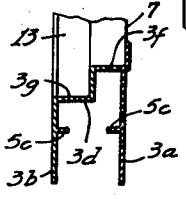


Fig. 8.

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METAL STORM SASH STRUCTURE

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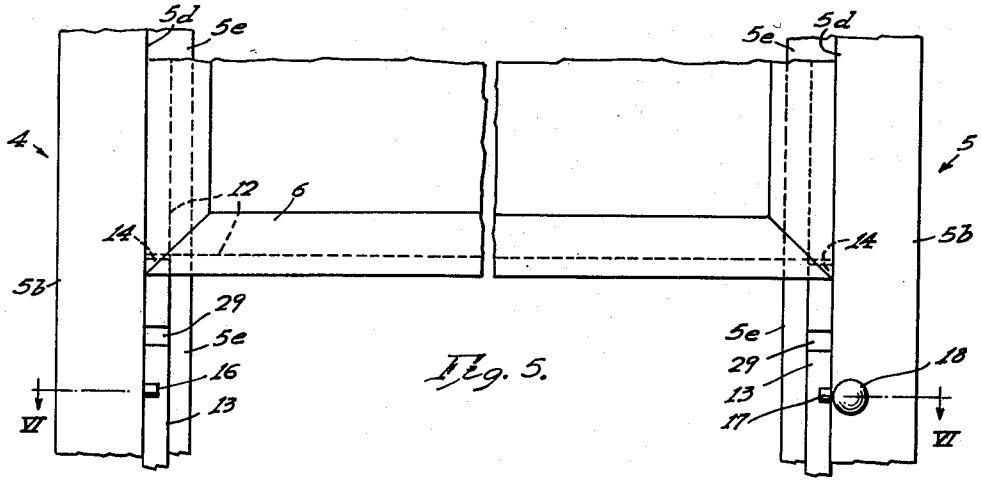


Fig. 5.

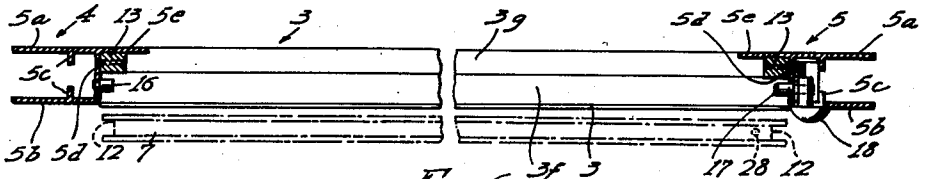


Fig. 6.

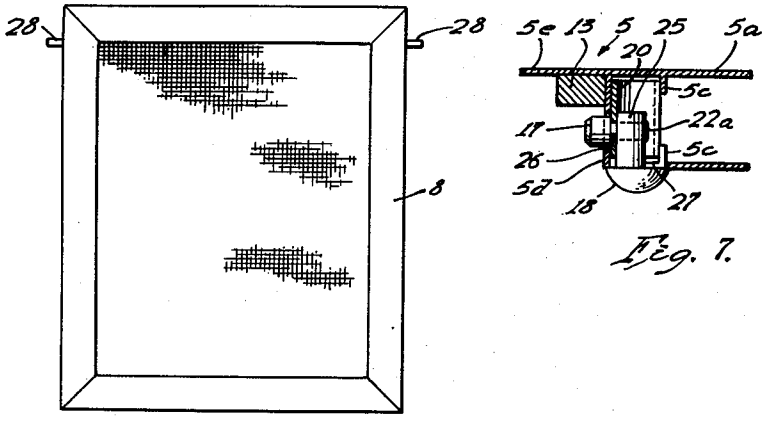


Fig. 9.

Fig. 7.

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METAL STORM SASH STRUCTURE

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Application July 22, 1949, Serial No. 106,205

6 Claims. (Cl. 20—55)

My invention relates to window structures, more particularly to storm windows, and consists in certain new and useful improvements in storm windows whose frames are constructed of aluminum sections.

The object of the invention is to provide a combination storm window and window screen of simplified and economical construction, a structure wherein a screen sash may be removably employed with one or more window sashes as required during the various seasons of the year.

The invention will be understood upon reference to the accompanying drawings, in which:

Fig. 1 is a view in front elevation of a window structure in which my invention is embodied;

Fig. 2 is a view of the window structure in side elevation, as seen from the right of Fig. 1, and indicating in dotted lines a screen sash suspended out of service position at the top of the frame;

Fig. 3 is a fragmentary view to larger scale, showing the frame of the window structure in section, as seen on the plane III—III, indicated both in Fig. 2 and in Fig. 4, with a lower corner of the upper sash of the structure indicated fragmentarily in dotted lines;

Fig. 4 is a view in cross-section on the plane IV—IV of Fig. 3, showing on still larger scale and in sectional detail the form of the frame;

Fig. 5 is a fragmentary view, showing portions of the two sides of the window frame in front elevation, and a portion of the upper sash positioned in the frame, but with the lower sash removed;

Fig. 6 is a sectional view of the structure, as seen on the plane VI—VI of Fig. 5, and indicating in broken lines the lower window sash removed from, but adjacent to, the seat in the window frame that receives it;

Fig. 7 is a cross-sectional view of the window frame comparable with Fig. 4, except that Fig. 7 is taken on the plane indicated at VI—VI in Fig. 5. This view shows in detail the locking device for the lower sash;

Fig. 8 is a view in cross-section of the bottom member of the frame, the view being taken on the plane VIII—VIII of Fig. 1;

Fig. 9 is a view in front elevation of a screen sash that is removably mounted in the lower portion of the frame;

Fig. 10 is a perspective view of a special corner piece that is advantageously used in effecting the union of the top and bottom members with the two side members of the window frame; and

Fig. 11 is an "exploded" view in perspective of the elements that form the locking device.

The window structure, herein illustrated as exemplary of the structure of my invention, comprises a rectangular frame formed of top and bottom frame members **2** and **3**, and opposite side members **4** and **5**. The frame is adapted to receive and snugly support upper and lower window sashes **6** and **7**, and within the area of the lower window sash a screen sash **8** may be removably mounted in the frame.

The top and two side members of the window frame are formed of extruded aluminum stock having a cross-section of the form shown in Fig. 4. The cross-sectional form of the extruded stock is in general shaped as the letter **h** laid on its side. Two continuous flanges **5***c* extend inward from the two webs that form the legs **5***a* and **5***b* of the **h**; the flanges **5***c* are spaced from the web **5***d* that forms the cross-arm of the **h**, and

the web **5***d* forms with the flange portion **5***e* a right-angled recess that provides the seat for the window sashes, as will presently appear. The extruded aluminum stock of which the bottom member **3** of the window frame is formed is also of general **h** shape in cross-section, including between the legs **3***a* and **3***b* two continuous flanges **5***c*, as shown in Fig. 8. However, the web that forms the cross-arm of the **h** is stepped, providing in the extent of the cross-arm between the portion **3***a* and leg **3***b* two right-angled recesses **3***f* and **3***g*, as shown.

A piece of the extruded stock shown in Fig. 8 is cut to proper length to form the bottom element **3** of the window frame, and three pieces of the stock shown in Fig. 4 are cut to the lengths required for the two sides **4** and **5** and the top **2** of the frame, the ends of the several pieces being accurately cut on a 45 degree angle, so that four frame members meet on neat lines **L** (Fig. 1) at the four corners of the frame. The flanges **5***c* of all four of the frame members meet end to end, and provide in the assembled window frame two spaced, peripherally continuous flanges, as will be understood upon considering Figs. 2 and 3. The flange portions **5***e* of the several members **2**, **4** and **5** extend in common plane, and form in conjunction with the cross-arm or web portions **5***d* a peripheral angular seat for the window sashes, and at the bottom of the frame two seat portions **3***f* and **3***g* are formed in the member **3**, as above-mentioned and shown in Fig. 8.

A very simple and effective device is employed to unite, and to reinforce the joints of, the frame members at the four corners of the frame. The device consists in small angular corner pieces **10**, which are preferably castings of aluminum, including in the outer faces of their legs grooves **11**, as shown in Fig. 10. The structure at each of the four corners of the window frame will be understood upon considering the upper portions of Figs. 2 and 3. The legs of each corner piece **10** are of such thickness that they snugly fit in the channel between the webs **5***a* and **5***b* and the spaced pair of parallel flanges **5***c* and the cross-arm or web portion **5***d* of the frame members. The bodies of the flanges **5***c* are locally crimped and pressed into locked engagement with the grooves **11** of the corner piece **10**. A very rigid and durable joint is thus formed at each corner of the frame, and a window frame of extraordinarily sturdy construction is obtained.

Each of the window sashes **6** and **7**, that are supported in the window frame, comprises a rectangular frame formed of extruded aluminum stock which is channeled to receive the edges of a rectangular pane of glass G. This specification need not dwell on the details of structure of the window sashes, other than to note that the outer peripheral edges of the window sashes are channeled, as shown at **12** in Fig. 6 and indicated by the dotted lines **12** in Fig. 5.

In the upper half of the seat formed by the flanges **5***e* and webs **5***d* of the top member **2** and the two side members **4** and **5** of the frame the upper window sash **6** is snugly secured. The sash **6** is vertically supported in seated position by means of two aluminum rods or guide bars **13** of rectangular cross-section, which extend from the stepped web portion **3***g* of the bottom frame member **3** upwardly to the bottom of the upper sash **6**. One rod **13** is riveted in the corner of each of the vertically extending portions of the seat (**5***d*, **5***e*) of the frame; the rods are of equal thickness with the body of the upper sash **6** (Fig. 3), and in breadth are only about one-half the breadth of the peripheral flange **5***e* of the window frame (Fig. 5); and the upper end of each rod is chamfered to provide a tip **14** that extends into the peripheral channel **12** in the sash **6** (Figs. **3** and 5). At the top of the window frame a resilient strip **15** (Fig. 1) of aluminum is riveted to the frame, and extends downward over the upper edge of sash **6**, and this strip **15**, in conjunction with the rods **13** engaging the bottom edge of the sash, serves to secure the sash to its seat. The upper edge of the sash **6** in seated position does not extend entirely to the top of the seat; that is, the upper edge of the sash does not abut against the web portion **5***d* of the top frame mem-

ber 2 (Fig. 3), but clears such web portion by an interval sufficient to permit the sash 6 to be intentionally raised a sufficient distance to free its lower edge from engagement with the tips 14 of the rods 13, whereby the lower edge of the sash may be drawn outwardly from the tips of the rods, which then permits the sash to be pulled downwardly and out of the window frame. The upper sash 6 may thus be readily removed from the window frame and replaced at will.

The bottom edge of the lower sash 7 rests upon the web portion 3*f* (Figs. 6 and 8) of the bottom member 3 of the window frame, and the two side edges of the sash 7 seat laterally against the faces of rods 13, while the top edge of the sash 7 seats laterally against the inner face of the bottom frame member of upper sash 6. Essentially, the lower window sash 7 must be raised and lowered to various desired vertical positions in the window frame, and in the simplified structure to this end my invention is centered, taken in conjunction with certain of the other features herein illustrated and described.

As already mentioned the sash 7 (as well as sash 6) has a peripherally extending channel 12 in its outer edge. The reaches of this channel in the two vertical sides of the sash are of particular utility. Pins 16 and 17 are mounted in the two side members 4 and 5 of the window frame, to extend into the channels 12 (Fig. 6) in the two sides of the sash 7. With the channeled edges of the lower sash thus engaged by the two pins 16 and 17, it will be understood that the sash is secured in snug position against the faces of the fixed rods 13 in the window frame, and as thus secured the sash may be readily raised and lowered. The vertical edges or faces of the upper sash frame, being equal in thickness to the rods 13, form in effect a continuation of such rods to the extent required to provide a slideway for the lower sash throughout substantially the entire vertical extent of the window frame. A vertically adjustable window sash assembly of greatest simplicity is thus obtained.

A further important feature remains to be noted. One of the pins—the pin 17 in this case—is mounted for manipulation in the window frame, and to such end a knob 18 is accessible on the face of the frame, whereby the pin 17 may be pressed in outward direction with respect to the sash channel 12 into which it extends. The basal face of said channel includes a series of holes or orifices 19 into which the pin 17 may be engaged, to lock and support the sash in a correspondingly adjusted vertical position in the window frame.

The construction of the resiliently adjustable pin 17, forming, as it does, an excellent locking device, provides a distinct feature of the invention.

Referring to Fig. 11, the locking device will be seen to comprise a leaf spring 20 provided with a medial orifice 21. The pin 17 is formed with a reduced extension 22, forming a shoulder 23. The extension 22 is adapted to extend through orifice 21 in the leaf spring, and through a hole 24 opening through a shank 25 integral with the adjusting knob 18. The facility of assembling the locking device in the window frame is noteworthy. Before the side member 5 of the window frame is assembled with the top and bottom members 2 and 3, the leaf spring 20 is introduced endwise into the channel formed by and between the portions 5*a*, 5*b*, 5*c* and 5*d* of the said side member 5. The body of the spring is flexed in order to insert it in the channel, and once confined in the channel the stress of the spring urges its medial orificed portion against the body of web 5*d*. The flange portions 5*b* and 5*c* of the frame member 5 are slotted, as at 27, to receive the shank 25 of the knob 18, and the web portion 5*d* is provided with an orifice 26 to receive the pin 17, as shown in Fig. 7. In assembling the locking device (which may be now done either before or after the member 5 is united with the frame members 2 and 3), the leaf spring is slid along the channel in frame member 5, into the position in which the orifice 21 in the spring registers with the opening 26 in web 5*d*. Next, the shank 25 is inserted in the slot 27 and the hole 24 in the shank placed in alignment with the orifices 21 and 26. Then the pin 17 is positioned in the opening 26, with its extension 22 projected through the orifice 21 in the leaf spring and the hole 24 in shank 25, thereby bringing the shoulder 23 on the pin to abutment upon the body of the leaf spring. The outer end of extension 22 of the pin is peened or upset, as at 22*a*, against the side of the shank 25, and the locking device assembly is completed.

Manifestly, the leaf spring 20 tends to hold the pin 17 in extended position, that is, in position extended fully into the channel 12 in the adjacent edge of the window sash 7, or into one or another of the orifices 19 formed in the wall of such channel, thereby forming an effective window lock. By pressing the knob to right, the pin 17 is moved to the right (against the tension of the leaf spring), and is so far disengaged from the orifices 19 as to permit the window sash 7 to be vertically raised and lowered. An integral lip 7*a* (Figs. 1 and 2) is formed on the bottom frame member of the sash, to provide a finger-hold for the person adjusting the sash. The window sash 7 may be raised to a position where its lower edge is moved to a point above the pins 16 and 17, whereby the sash is disengaged from the pins and may be readily removed from its slideway or seat in the window frame. The operation of replacing the sash in assembled position in the window frame will be obvious.

When the sash 7 is removed, the screen sash 8 (Fig. 9) may be inserted in the frame in common plane with the upper sash 6. The screen sash is provided with two pins 28 that are received in kerfs 29 formed in the rods 13. The lower edge of the screen sash 8 seats on the portion 3*g* at the bottom of the window frame, and the sides of such sash fit flush between the rods 13, with the top of the sash lying flush against the bottom edge of the upper window sash 6. The upper window sash 6 and the screen sash 8 thus form a complete coverage of the opening in the window frame. When the screen sash has been assembled in the window frame, the lower window sash 7 may be installed and operated in the manner already described. The lower window sash 7 in assembled position secures the screen sash 8 in place.

During the winter months, or at other times when the screen sash may not be required, the screen sash may, of course, be removed from the window frame and stored. Alternately, the screen sash may be suspended from the top of the window frame, as by means of slotted brackets 30 in which the pins 28 on the screen are engaged. Fig. 2 illustrates in broken lines such suspension of the screen sash.

Within the terms of the appended claims various modifications are permissible, without departing from the spirit of the invention. The window frame structure of the invention is primarily intended as a storm window, and, as such, will normally be installed in a window casement of a home or other building on the outer side of the conventional permanent window sashes, and the particular manner in which my window frame is mounted in such casement is not a matter concerning my present invention. Those skilled in the art will understand, and it is needless unduly to involve this specification with such detail. It is to be understood, however, that certain of the structural feaures of my window may prove of utility in permanent window structures—window structures that are permanently constructed in buildings, as distinguished from auxiliary window structures that are applied after building construction.

I claim:

1. In a window structure comprising a metal frame formed of top, bottom and opposite side members, and a sash secured to and vertically adjustable in said frame; the invention herein described wherein said sash is provided with two vertical side portions each having a vertically extending channel, and a pin extending inwardly from each of the opposite side members of said frame into the channel of the adjacent side portion of the sash and forming a slide-joint between the sash and the frame, whereby the sash engaged to said frame may be vertically adjusted, one of said pins being retractable from engagement with the associate channel in said sash to permit the removal and introduction of the sash, as described.

2. In a window structure comprising a metal frame formed of top, bottom and opposite side members, and a sash secured to and vertically adjustable in said frame; the invention herein described wherein said sash is provided with two vertical side portions each having a vertically extending channel, the wall of the channel in one said side portions including a plurality of vertically spaced orifices, and a pin extending inwardly from each of the opposite side members of said frame into the channel of the adjacent side portion of the sash and forming a slide-joint between the sash and the frame, whereby the sash engaged to said frame may be vertically adjusted,

one of said pins being mounted in the associate side member of said frame for selective sash-locking engagement with orifices in the wall of the channel into which it extends and movable outwardly from orifice-engaging position on a line substantially parallel to the plane of said sash.

3. In a window structure comprising a frame and a window sash slidably mounted therein, said frame having a side frame member of hollow construction, and a locking device for said sash; the invention herein described wherein said hollow frame member is formed of a length of extruded aluminum of general **h** shape in cross section, with flanges extended inwardly from and between the two legs of the **h**, said locking device comprising a leaf-spring inserted, stressed and secured in the channel formed in the hollow body of the frame member by and between said flanges, the bodies of said legs and the cross-arm of the **h**, a pin connected to the body of said leaf-spring and extending through the wall of said hollow frame member for engagement with said sash, a pin-adjusting element accessible on the face of the frame member, and a shank extending from said adjusting element through said slot and connected to said pin.

4. In a window structure comprising a metal frame formed of top, bottom and opposite side members, a sash secured to and vertically adjustable in said frame, said sash having two vertical side portions each having a vertically extending groove, a pin extending inwardly from each of the opposite side members of said frame into the groove of the adjacent side portion of the sash and forming a slide-joint between the sash and the frame, whereby the sash engaged to said frame may be vertically adjusted; the invention herein described wherein at least one side member of the frame is formed of extruded aluminum of general **h** shape in cross section, with flanges extending inwardly from and between the two legs of the **h**, a leaf-spring stressed and secured in the channel formed by and between said flanges and the legs and cross-arm of the **h**, the pin extending inwardly from the side frame member last mentioned being connected to the body of said leaf-spring and extending through the body of said **h**-shaped frame member into engagement with a groove in said sash, a pin-adjusting element accessible on the face of the hollow side frame member, the latter member including a slot, and a shank extending from the adjusting element through said slot and connected to said pin.

5. In a window structure comprising a metal frame formed of top, bottom and opposite side members, a sash secured to and vertically adjustable in said frame,

said sash having two vertical side portions each having a vertically extending groove, a pin extending inwardly from each of the opposite side members of said frame into the groove of the adjacent side portion of the sash and forming a slide-joint between the sash and the frame, whereby the sash engaged to said frame may be vertically adjusted; the invention herein described wherein at least one side member of the frame is formed of extruded aluminum including an internal channel, one of said pins comprising a locking device for said sash, a leaf-spring inserted and stressed in the channel of the last mentioned frame member, the last-named pin being connected to said leaf-spring and extending inwardly through the wall of said side frame member for engagement with a groove in said sash, a pin-adjusting element accessible on the face of the latter side frame member, the latter member including a slot, and a shank extending from the adjusting element through said slot and connected to said pin.

6. In a window structure comprising a metal frame formed of horizontal top and bottom members and opposite vertical side members, two vertical guide-bars secured one in each of said side members and comprising therewith a slideway, a window sash having opposite vertical side edges each including a vertical channel, and means for securing said sash in sliding engagement with said guide-bars; the invention herein described wherein said means comprise two pins secured in and extending severally from the opposite side members of said frame into said channel, one of said pins being retractable from engagement with the associate channel of said sash to permit the removal and introduction of the sash, as described.

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