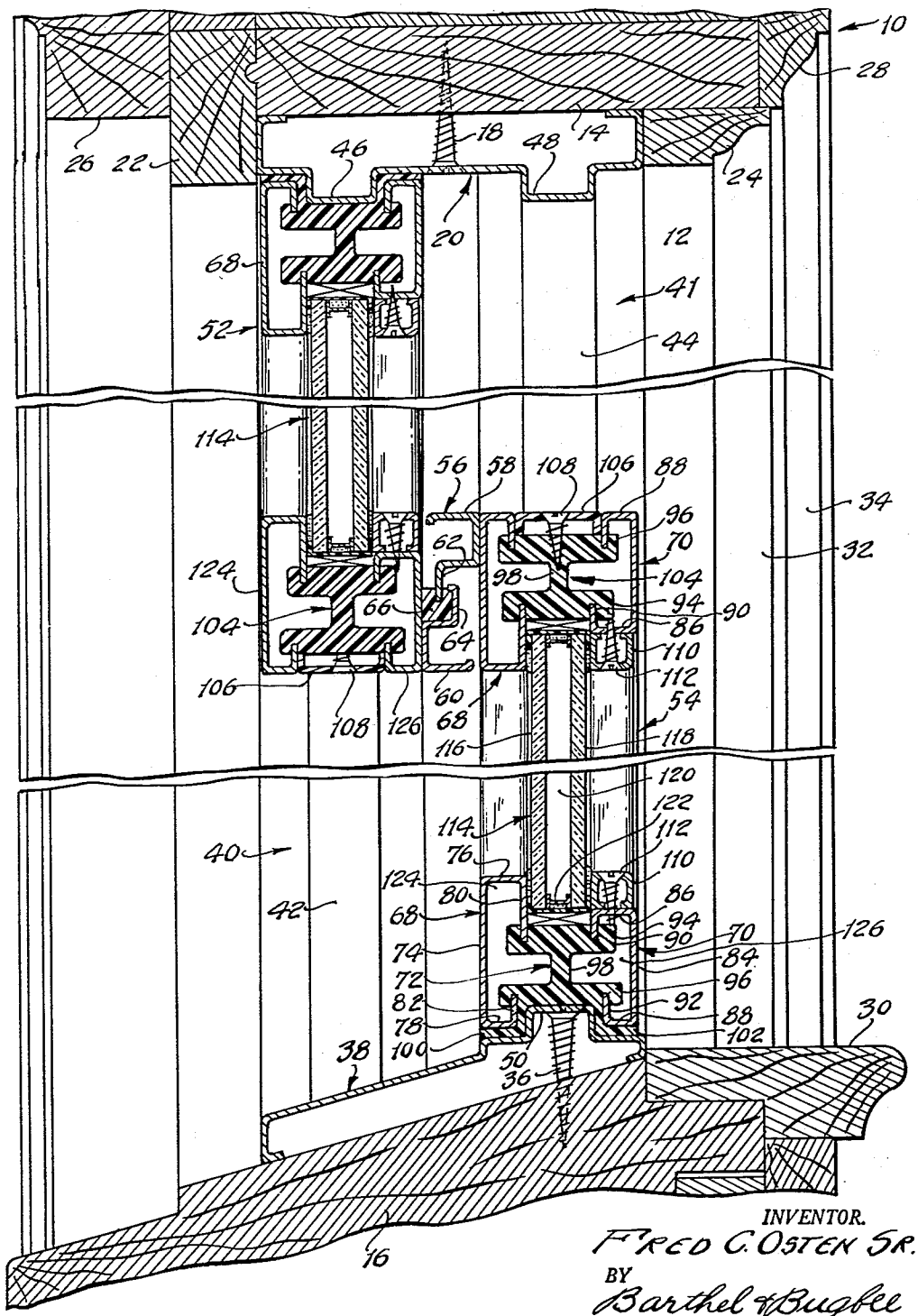
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INSULATED METAL-FRAMED WINDOW SASH

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INSULATED METAL-FRAMED WINDOW SASH

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This invention relates to metal-framed window sash structures and, in particular, to insulated metal-framed window sash structures.

One object of this invention is to provide a metal-framed double-pane window sash construction in which the sash frame structure has outer and inner hollow sheet metal components which are isolated and heat-insulated from one another by heat-insulating members which also support the double-pane unit and enable it to be quickly and easily assembled in the sash frame.

Another object is to provide a metal-framed double-pane window sash construction, as set forth in the preceding object, wherein the heat-insulating members also receive the edges of the outer and inner hollow sheet metal sash frame components so as to hold these components in alignment with one another without danger of their becoming displaced.

Another object is to provide a metal-framed double-pane window sash construction as set forth in the preceding objects, wherein the heat-insulating members are of approximately H-shaped cross-section with substantially flat surfaces adjacent the edges of the window pane unit which they support, so as to facilitate assembly by sliding in the windowpane unit from one side thereof.

Another object is to provide an insulated metal-framed window sash construction as set forth in the preceding objects, which is interchangeable with an uninsulated regular window sash in the same window frame, so as to reduce inventory of parts and simplify manufacture of such window frames, and also to enable such uninsulated regular window sash to be subsequently replaced by insulated sash by the user or owner of the building structure containing the window.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawing which shows a central vertical section through a double-hung insulated metal-framed double-pane window sash construction according to one form of the invention, with central portions of the upper and lower sash and window frame omitted to enable showing the details of the invention upon an enlarged scale.

Referring to the drawing in detail, there is shown therein a window frame or casing, generally designated 10, which includes jambs or side rails 12 interconnected by a top 14 and sill 16. Secured by fasteners 18 to the top 14 is a hollow sheet metal top 20 held in place between outer or blind stops 22 and inner rails or stops 24, these in turn being engaged on or adjacent their exposed faces by rails or strips 26 and 28 respectively. Similarly, the sill 16 has an inner rail 30 framed by side rails or strips 32 and 34 respectively. The foregoing construction, aside from the hollow sheet metal top rail 20, is ordinarily of wood and is conventional.

Secured to the wooden sill 16 as by the fasteners 36 is a hollow sheet metal sill 38. Extending between the metal head or top 20 and metal sill 38 and secured to

the opposite side rails 12 are conventional vertical sheet metal outer and inner sash guides 40 and 41 mounted on opposite vertical sides of the window casing 10. The sash guides 40 and 41 have outer and inner guide ribs 42 and 44 formed therein similar to the outer and inner ribs 46 and 48 in the metal top 20 and the upstanding rib 50 on the metal sill 38. On one side of the window casing 10 the sash guides 40 and 41 are resiliently mounted in a conventional manner (not shown). Slidably mounted in the sash guides 40 and 41 for vertical sliding motion relatively to the outer and inner guide ribs 42 and 44 are outer or upper and inner or lower insulated hollow metal double-pane sash units 52 and 54 respectively equipped with conventional sash balances (not shown) forming no part of the present invention. These are separated from one another by a horizontal hollow insulated metal rail 56. The upper and lower sash units 52 and 54 are of generally similar construction but are inverted relatively to one another, hence similar parts thereof are designated with the same reference numerals. The separator or parting rail 56, on the other hand, consists of upper and lower approximately question-mark-shaped members 58 and 60 respectively with adjacent ribs 62 and 64 respectively, separated from one another by an insulating strip 66 of heat-insulating material, such as vinyl plastic, preferably a so-called soft vinyl plastic. The rib 62 of the upper member 58 is embedded in the insulating strip 66, whereas the rib 64 embraces one side thereof. The members 58 and 60 are of nearly similar cross-sectional shape but are inverted and hence oppositely-facing relatively to one another. In this manner, the space between the upper and lower sashes 52 and 54 is filled and leakage of air as well as heat conduction inward or outward substantially minimized.

Each of the sash units or sashes 52 and 54 which, as stated above, are inverted relatively to one another, contains similar components, hence a description of the lower sash 54 will suffice also for the upper sash 52 without duplicating the description. Each sash 52 or 54 is provided with open-centered outer and inner hollow metal sash frame components 68 and 70 respectively of approximately rectangular C-shaped cross-section of different widths facing toward and separated from one another by insulating members 72 of approximately H-shaped cross-section. In particular, the outer and wider components 68 have main or outer walls 74, parallel connecting walls 76 and 78 of different widths perpendicular to the outer wall 74, and laterally-offset but parallel interrupted inner walls 80 and 82 respectively directed toward one another but with their nearer edges spaced apart from one another with a gap therebetween. Similarly, the inner and narrower components 70 have main or outer walls 84, connecting walls 86 and 88 of different widths perpendicular to the inner wall 84 and laterally offset but parallel interrupted inner walls 90 and 92 respectively directed toward one another but with the inner edges spaced apart from one another with a gap therebetween.

The insulating members 72 of approximately H-shaped cross-section are preferably of so-called rigid vinyl plastic or other suitable heat-insulating material with parallel bar portions or inner and outer flanges 94 and 96 respectively interconnected by a central web 98. The edges of the walls 80 and 90 of the outer and inner components 68 and 70 are embedded in the insulating member inner flange 90, whereas the walls 82 and 92 of the outer and inner components 68 and 70 are embedded in the outer flange 96, thus being held firmly in spaced parallel relationship with one another. The insulating members 72 which are adjacent the top and sill 20 and 38 respectively have outer and inner extensions 100 and 102 of angle cross-section which interfit between their

respective components 68 and 70 and the rib 50 of the sill 38 or rib 46 of the top 20 respectively. The extensions 100 and 102 may be integral with the insulating member 72 or separate therefrom. The remaining horizontal insulating members, generally designated 104, are similar to the insulating members 72 except that they lack the extensions 100 and 102 respectively.

Instead of these extensions, a channel-shaped spacer and insulating retaining member 106 of heat-insulating material, such as hard vinyl plastic, is secured as by the fasteners 108 to the insulating members 104 in the space between the outer and inner components 68 and 70. Similarly, the narrower components 70 carry hollow pane unit-retaining strips 110 of approximately channel-shaped cross-section secured to the narrower components 70 by fasteners 112 and serving to retain in assembly within the space between the components 68 and 70 a double transparent pane unit 114. The latter is of conventional construction and may comprise any such double-pane unit, several of which are available commercially upon the open market.

Each double-pane unit 114 is shown diagrammatically as consisting of spaced parallel outer and inner panes 116 and 118 separated from one another by a space 120 closed by an edge sealing strip or layer 122 of suitable sealing material disposed adjacent the edges of the panes 116 and 118 and extending between them so as to effectively seal the space 120 against the entry of moisture and dust. The space 120 between each pair of panes 116 and 118 of each double-pane unit 114 may be filled with dry air or an inert gas, such as nitrogen, or it may be partially evacuated, as desired. From the drawing, it will be seen that the narrow sash frame components 70 provide a sufficiently large central opening between their facing wall portions 86 through which the double-pane unit 114 may be inserted and secured by the retaining strips 110, as described below.

In the assembly of either of the upper and lower sashes 52 or 54, a pre-assembly is preferably first made of the wider sash frame components 68 and the insulating members 72 with the inner edges 80 and 82 of the former embedded in the spaced parallel portions 94 and 96 of the latter, as shown in the drawing. The insulating members 72 and 104 are preferably made in the form of extrusions of rigid vinyl plastic or other suitable insulating material, and their flanges 94 and 96 may be suitably grooved longitudinally either during extrusion or subsequently to receive the various inner edges 80 and 82 of the outer component 68 or the inner edges 90 and 92 of the inner components 70.

After this pre-assembly has been made as described immediately above, the double-pane unit 114 is then slid into the space between the innerportions 94 of the insulating members 72 and 104 until the edge sealing portions 122 come to rest against the inner walls 80 of the outer sash frame components 68. The assembler then snaps the inner components 70 into place against the sealing portions 122, inserts the spacers 106 by means of the fasteners 108, and then inserts the retaining channel members 110 against the double-pane units 114 and secures them to the inner sash frame components 70 by means of the fasteners 112. The sashes or sash units 52 and 54 may then be handled and installed in the same manner as uninsulated double-hung sliding sash units, or installed in replacement of such units where the sash guides 40 and 41 are of corresponding construction or cross-section. The insulating members 72 and 104 of H-shaped cross-section cooperate with the hollow outer and inner sash frame components 68 and 70 of approximately rectangular cross-section to provide large outer and inner dead air insulating chambers 124 and 126 respectively containing voluminous dead air spaces which perform improved and enhanced heat-insulating functions in a more efficient manner than prior insulating arrangements for metal-framed sash windows.

What I claim is:

1. An insulated metal-framed window sash comprising a pair of open-centered outer and inner hollow metal sash frame components of approximately C-shaped cross-section, said sash frame components having interrupted internal walls facing one another in spaced parallel relationship with gaps in the internal walls having spaced edges, said sash frame components having external walls interconnecting their respective internal walls, an open-centered insulating structure of heat-insulating material disposed in the space between said outer and inner sash frame components, said insulating structure being of approximately H-shaped cross-section with spaced substantially parallel outer and inner flanges and a web interconnecting said flanges, said insulating structure being disposed in the gaps in said internal walls in engagement with said internal wall edges, said insulating structure being spaced apart from said external walls and cooperating therewith to provide voluminous dead air insulating chambers, and a window pane structure disposed in the space between said components.

2. An insulated metal-framed window sash, according to claim 1, wherein one of said sash frame components is sufficiently narrower than the other sash frame component to provide a central opening which is sufficiently larger than said window pane structure to freely pass said window pane structure and enable insertion thereof during assembly.

3. An insulated metal-framed window sash, according to claim 1, wherein the surfaces of said flanges of said insulating structure adjacent the open center thereof are substantially flat and wherein the edges of said pane structure engage said flat surfaces.

4. An insulated metal-framed window sash, according to claim 1, wherein a spacing element of heat-insulating material is disposed between said outer and inner sash frame components outwardly of said pane structure.

5. An insulated metal-framed window sash, according to claim 4, wherein said spacing element is of hollow cross-section.

6. An insulated metal-framed window sash, according to claim 5, wherein said spacing element is secured to said insulating structure.

7. An insulated metal-framed window sash, according to claim 2, wherein a pane structure retaining element is secured to said narrower sash frame component in the central opening thereof adjacent said pane structure and projecting therefrom inwardly past said pane structure in retaining relationship therewith.

8. An insulated metal-framed window sash, according to claim 1, wherein an insulating structure flange extension portion of heat-insulating material is disposed outwardly of said insulating structure adjacent the outer periphery thereof.

9. An insulated metal-framed window sash, according to claim 8, wherein the insulating structure flange extension portion has a channel therein adapted to interfit with a corresponding rib within a conventional window frame.

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