Nov. 12, 1963 C. A. WULF, JR., ETAL 3,110,370

CURTAIN WALL MATERIAL

Filed June 4, 1959

FIG. 1

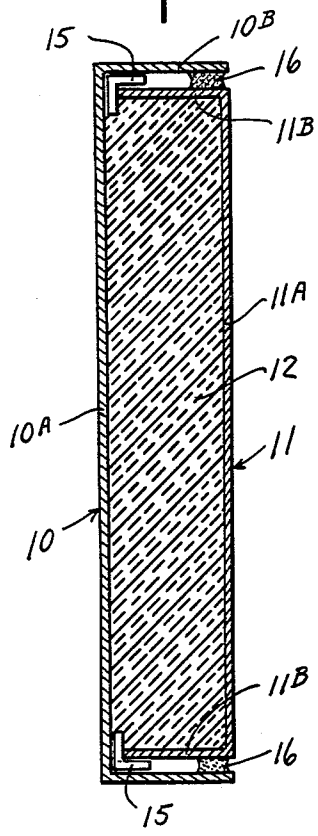


FIG. 2

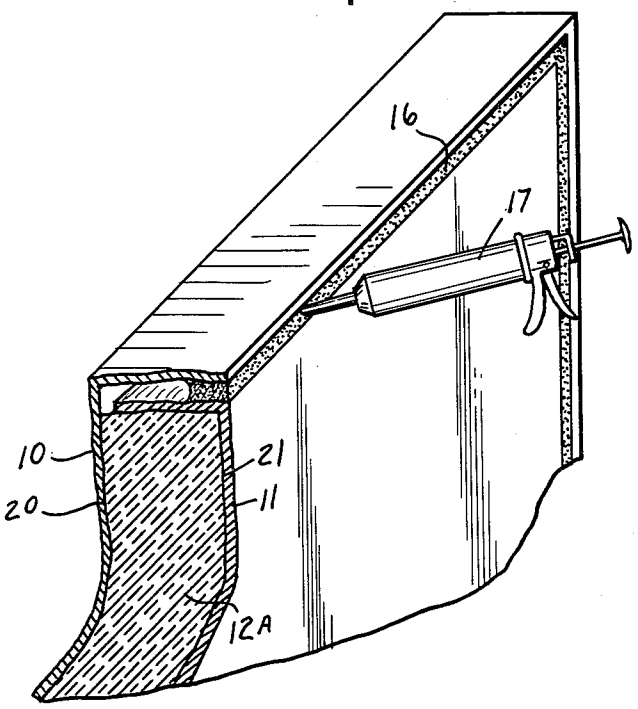
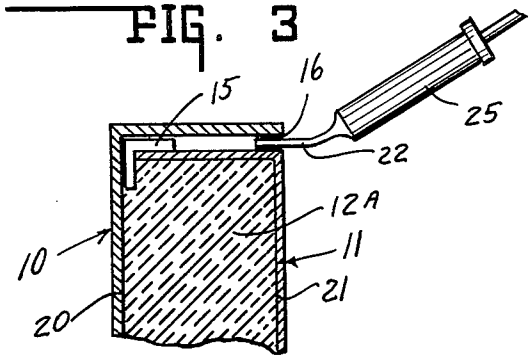


FIG. 3



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3,110,370
CURTAIN WALL MATERIAL

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The present invention relates to building materials and, more particularly, relates to improvements in curtain wall material and to a method for making curtain wall material.

It is an object of the present invention to provide an improved curtain wall structure.

A further object of the present invention is to provide an improved method for making curtain wall material.

Frequently the walls of modern buildings are constructed of curtain wall material, which usually includes an outer panel, which faces outwardly of the building, an inner panel, which faces the inside wall of the building, and insulating material, which is received between the two panels. The panels are frequently formed of steel and sometimes of a composite material called "porcelain enamel" (glass fused on steel). Such curtain wall sections are used to form the walls of modern buildings which are so constructed that the sections forming the walls do not carry substantial stresses, the steel or other structural members of the building being so designed as to support the weight of the building.

Thus, such curtain wall sections may be constructed, for example, of a one-inch thickness as compared to the twelve-inch thickness of walls in older types of buildings. In present-day curtain wall sections, the outer panel is connected to the inner panel by means of a plurality of bolts or other metal fastening means which pass through flanges at the edges of the panels or, in some cases, through the centers of the panels. Such fastening means allow a heat loss from the building because of the known property of metal to quickly transmit heat, the heat passing from the inner panel through the fastening means and the outer panel to the outside. Also on hot summer days heat will be conducted in the opposite direction.

It is, therefore, an object of the present invention to provide an improved curtain wall structure which will allow only a minimum heat transfer.

Frequently in the making of curtain wall material, moisture is allowed to condense between the panels of a particular section of curtain wall material reducing the insulating ability of the insulating material received within the panels.

It is, therefore, a further object of the invention to provide an improved method for making curtain wall material which cuts down the amount of moisture available for condensation within the curtain wall material.

Still another object of the present invention is to provide curtain wall material and a method for making curtain wall material which has more perfectly flat outer surfaces, it being understood that frequently the panels making up the curtain wall material are bowed outwardly or inwardly in their centers and have further imperfections in their shape as a result of the operations necessary to form the panels.

Still further objects will become apparent as the description proceeds.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

FIG. 1 is a transverse sectional view of a section of curtain wall material constructed in accordance with the present invention.

FIG. 2 is a fragmentary perspective view of curtain wall material identical to that illustrated at FIG. 1 except that the insulating material is of a different type, FIG. 2 also illustrating certain apparatus used in the practice of the method also forming a portion of the present invention.

FIG. 3 is a fragmentary transverse sectional view of the structure of FIG. 2 but also illustrating certain further apparatus used in the practice of the method which forms a portion of the present invention.

Referring now to the drawings, our invention comprises an outer panel 10 made up of a rectangular portion 10A and a perpendicular flange 10B which extends around the edge of the rectangular portion 10A. An inner panel 11 having a rectangular portion 11A somewhat smaller than the rectangular portion 10A is also provided with a perpendicular flange 11B which extends around the edge of the rectangular portion 11A. The flange of the inner panel 11 is nested within the flange of the outer panel 10 with the concave portion of the inner panel facing the outer panel.

A large section 12 of insulating material is received within the chamber formed between the two panels and serves to prevent the transfer of heat from one of the panels to the other panel. A plurality of angle-shaped spacers 15 formed of insulating material are received at and adjacent the corners of the panels 10 and 11 and function to space the flange 11B of the inner panel from the flange 10B of the outer panel and from the rectangular portion 10A of the outer panel. As can be noted from an examination of FIG. 2, the spacers 15 are located only at near the corners of the panels and do not extend a substantial distance from those corners.

After the panels 10 and 11, insulating material 12, and the spacers 15 have been assembled as illustrated in FIG. 1, a bead of caulking compound 16 is placed between the flanges 10B and 11B by means of the caulking gun 17 illustrated in FIG. 2, or by any other suitable means, in such a manner as to secure the flanges together. Since the caulking compound 16 is the only element holding the parts in the relationship illustrated in FIG. 1, it is necessary that the caulking compound securely adhere to the mutually facing surfaces of the flanges 10B and 11B. We have found that polysulfide polymer caulking compound or any adhesive compound having similar properties will accomplish the secure adhesion necessary to hold he panels 10 and 11 together. Such polysulfide polymer caulking compound is commercially available and can be applied in a liquid state and will cure to a flexible, firm rubber.

It should be understood that the insulating material 12 can be any type of suitable insulation and does not have to be of the particular rigid type of insulation 12A described below.

Referring now more particularly to FIGS. 2 and 3, our process for making curtain wall material will now be described. The panels 10 and 11, the insulating material, and the spacers 15 are assembled as above described. The insulating material 12A used in our method should be of a type, such as honeycomb or foam glass insulation, which has a large number of cavities therein yet has firm, flat outer surfaces 20 and 21 for a purpose which will become evident.

Caulking compound 16 is then placed between the mutually facing surfaces of the flanges 10B and 11B so as to secure the flanges together and so as to seal the chamber formed between the panels 10 and 11 within which the insulating material 12A is received. We have found that the above-mentioned polysulfide polymer caulking compound will accomplish the sealing of the chamber necessary to our method. In placing the caulk-

ing compound, a tube 22 is seated therein so as to provide communication between a vacuum pump 25 and the chamber containing the insulating material 12A.

A partial vacuum is then created within the chamber by means of the vacuum pump 25, which results in moisture being removed from the insulating material 12A so as to dispose of the reduced insulating ability resulting from such moisture condensing within the curtain wall section. A further result of the exhaustion of air from the chamber is that the rectangular portions 10A and 11A of the panels are drawn into firm contact with the flat surfaces 20 and 21 of the insulating material 12A, whereby the panels are provided with more perfectly flat outer surfaces. The vacuum pump 25 is then removed and the tube 22 closed off by a plug or other suitable means The abutting surfaces of the panels and insulating material may or may not be coated with a contact type cement thereby helping to maintain the panels flat in the event of a loss of vacuum.

The above described process could be practiced with a non-rigid slab of insulating material or even with no slab of insulating material if the spacers are so proportioned and arranged as to perform the supporting function of the slab of insulating material 12A. For example, a plurality of spacers, in addition to the spacers 15, might be located at spaced points between the two panels 10 and 11 to resist the effect of the vacuum to draw the panels together. In such an arrangement, if no slab of insulating material is used, the vacuum would provide the needed insulation.

The invention claimed is:

1. Curtain wall material comprising a first panel having a rectangular portion and a perpendicular flange extending around the edge of said rectangular portion, a second panel having a rectangular portion smaller than the rectangular portion of said first panel and having a perpendicular flange extending around the edge of the rectangular portion of said second panel, said flange of said second panel nested within the flange of said first panel with the concave portion of said second panel facing said first panel whereby a chamber is formed between said first and second panels, a rectangular section of insulating material substantially filling said chamber, said section of insulating material having a pair of flat faces each of which faces a respective one of said rectangular portions, a plurality of spacers formed of insulating material and received between said panels adjacent the corners thereof and spacing the flange of said second panel from the flange of said first panel and from the rectangular portion of said first panel, and a bead of caulking material extending between the flanges of said panels, securing said panels together in a spaced relationship and sealing said chamber, said chamber having a partial vacuum therein which flattens the rectangular portions of said panels against the flat faces of said section of insulating material, said bead of caulking material being the only means securing said panels together.

2. The curtain wall material of claim 1 in which said caulking compound is a polysulfide polymer.

3. Curtain wall material comprising a first panel having a central portion and a flange extending around the edge of said central portion, a second panel having a central portion smaller than the central portion of said first panel and having a flange extending around the edge of the central portion of said second panel, said flange of said second panel being nested within the flange of said first panel with the concave portion of said second panel facing said first panel whereby a chamber is formed between said first and second panels, a plurality of spacers formed of insulating material and received between said panels at spaced intervals along the intersection of the central portion and the flange of said first panel and spacing the flange of said second panel from the flange and central portion of said first panel, and a bead of caulking material extending between the flanges of said panels securing said panels together in a spaced relationship, said bead of caulking material being the only means holding said panels together.

4. The curtain wall material of claim 3 in which said bead of caulking material seals said chamber and additionally comprising a section of insulating material substantially filling said chamber and having a pair of rigid faces each of which faces one of said central portions, said chamber having a partial vacuum therein which forces the central portions of said panels against the rigid faces of said section of insulating material causing said panels to conform to the shape of said rigid faces.

5. The curtain wall material of claim 3 in which said caulking compound is a polysulfide polymer.

6. The curtain wall material of claim 4 in which said caulking compound is a polysulfide polymer.

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