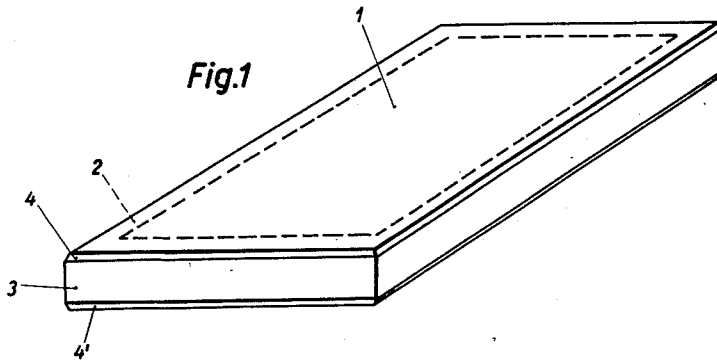
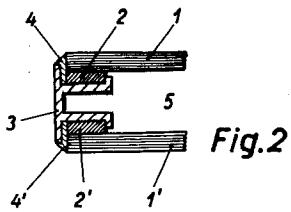
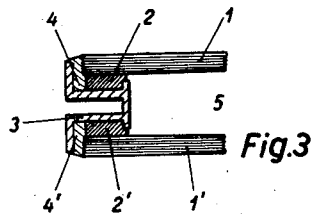


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DOUBLE PANE ELEMENT
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DOUBLE PANE ELEMENT

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The invention relates to a double pane element comprising at least two panes of glass or other transparent or translucent material fitted into a frame in spaced relationship to form a cavity between the panes, each pane being secured by adhesive cementing means for sealing the cavity from the outside.

Prefabricated elements consisting of two sheets or panes of glass or transparent material with a cavity between them to provide heat insulation are employed as vertical or horizontal assemblies in windows and doors and they are also sometimes fitted into a framework to form a facade. Owing to differences in the temperatures at the two panes of glass stresses arise at the joints between the panes and their frame and these often lead to the seal being broken. Moist air can then enter the cavity and form a mist on the inside of the panes. This is undesirable, e.g., clear glass or the like will be obscured thereby.

The element is therefore required to be entirely fluid-tight to permit the cavity, if desired, to be evacuated, or to permit a dry gas or a dry and thermally insulating gas or a dehydrating medium to be incorporated into the cavity, and at the same time sufficient rigidity must be preserved.

A method that has already been tried consists in producing double pane elements in which the panes are secured to the frame by two different materials to endeavour to satisfy the aforesaid requirements, but these elements have not been successful because the materials selected, viz., asphalt and vinyl acetate, were unsatisfactory and the desired effects did not materialize. More particularly, the asphalt tended to diffuse along the window panes and to interfere with clear sight. The double pane element according to the invention is characterised in that one material is poly-isobutylene, possibly with additives, and, the other material an epoxide resin, likewise possibly with additives.

The accompanying drawing illustrates two embodiments of the subject matter of the invention.

FIG. 1 is a perspective view of an element comprising two panes of glass,

FIG. 2 and 3 are sections of the seal at the edge of two frames of different forms of construction.

The element consists of two panes of glass or other transparent material 1 and 1' fitted into a supporting frame 3 by means of an elastic sealing compound 2 and 2'. Since the elastic compound imparts too little rigidity to the completed element the panes are at the same time secured to the frame by a substantially rigid material 4 and 4'. Especially suitable as an elastic cement is poly-isobutylene, with possible additives, whereas the connection 4, 4' is effected by an epoxide resin, likewise possibly with additives. The cavity 5 between the panes 1 and 1' is sealed from the outside in a gas-tight manner. When the sun shines on one side of the window element one pane of glass becomes warm and expands. When it cools, it contracts. The elastic cement absorbs the temperature stresses without affecting the seal. If the rigid compound should crack, in practice these will be only hair cracks, the rigidity of the element will nevertheless be maintained. The elastic compound may even expand into the cracks and seal them again.

The supporting frame 3 is a channel section with an

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extended web. If a profile as illustrated in FIG. 2 is employed then the frame may be bent at the corners after suitable incisions have been made, so that only welding will be required. The frame lies between the outer surfaces of the panes, but projects over the edges of the panes 1 and 1' so that the compound 4 and 4' will completely cover the edges of the pane. The projecting part of the frame also serves to protect the glass edges from damage. If the channel section of the frame is arranged with the channel directed towards the outside (FIG. 3) then the recess formed by the channel can be used for fitting the element in position.

The permanent seal permits the cavity 5 between the panes to be evacuated, or a gas can be introduced into the same having a lower heat transfer coefficient than air. Such a gas is for instance CCl_2F_2 or CO_2 . To restrict the transmission of heat even further at least one of the panes externally or internally can be provided with a reflecting deposit of gold or copper. Filtering panes may likewise be used. If a fancy glass is used, such as cast or patterned glass with a rough surface, then it is better to place the rough patterned surface to the inside and the smooth surface to the outside. The elastic cement on the inside edge of the glass tightly applies itself to the rough surface and maintains sealing contact therewith. The glass panes may also be of multi-ply glass, for instance a glass with a temperature sensitive intermediate layer which is transparent at low temperature, for instance at room temperatures of 20° , and which becomes milky when the temperature rises to say 30° , so that the multi-ply glass may then serve as a heat and possibly light intercepting glass.

As tests have already shown, the employment of the slightly more elastic poly-isobutylene and the more rigid epoxide resin for attaching the pane to the frame gives excellent results. The vinyl acetate formerly used was as such readily penetrated by moisture so that the asphalt which was combined therewith had to undertake the entire function of sealing. The epoxide resin the present invention proposes to use already provides a good protection from moisture and thus constitutes an additional safety factor.

The asphalt formerly used for sealing exhibits the necessary plasticity only within a narrow temperature range and readily hardens or tends to flow. Also its application between frame and pane is difficult, whereas the poly-isobutylene the invention proposes to use gives no such trouble and its physical properties remain fairly constant within a major temperature range, especially at the temperatures that are likely to arise in window frames.

What I claim is:

1. A plural-pane element comprising a frame, at least two light-transmitting panes secured to said frame in mutually spaced relationship to define at least one intervening cavity, said frame being in spaced relationship to each of said panes and the transverse maximum width of said frame being not greater than the distance between the outermost pane surfaces of said element, sealing means for sealing the cavity and for joining said panes to said frame, said sealing means comprising an elastic mass and a rigid resinous mass, said elastic mass being inwardly disposed toward said cavity relative to said rigid mass in a direction parallel to said panes, and said rigid mass being disposed toward the outside of said element in said direction, said elastic mass consisting essentially of poly-isobutylene, and said rigid mass consisting essentially of an epoxy resin.

2. A plural-pane element comprising a frame, at least two light-transmitting panes secured to said frame in mutually spaced relationship to define at least one intervening cavity, at least one of said panes being of plastic material, each of said panes being spaced from direct

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contact with said frame and the transverse maximum width of said frame being not greater than the distance between the outermost pane surfaces of said element, means consisting of two different cementing compositions for sealing the cavity and for joining a predetermined surface and edge of each pane to said frame, one of said compositions consisting essentially of a poly-isobutylene cement and forming an elastic mass joining said predetermined surface with said frame, the other of said compositions consisting essentially of an epoxide resin cement and forming a rigid resinous mass joining said edge of the pane to said frame.

3. A plural-pane element as set forth in claim 1, said cavity being filled with CCl_2F_2 .

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