

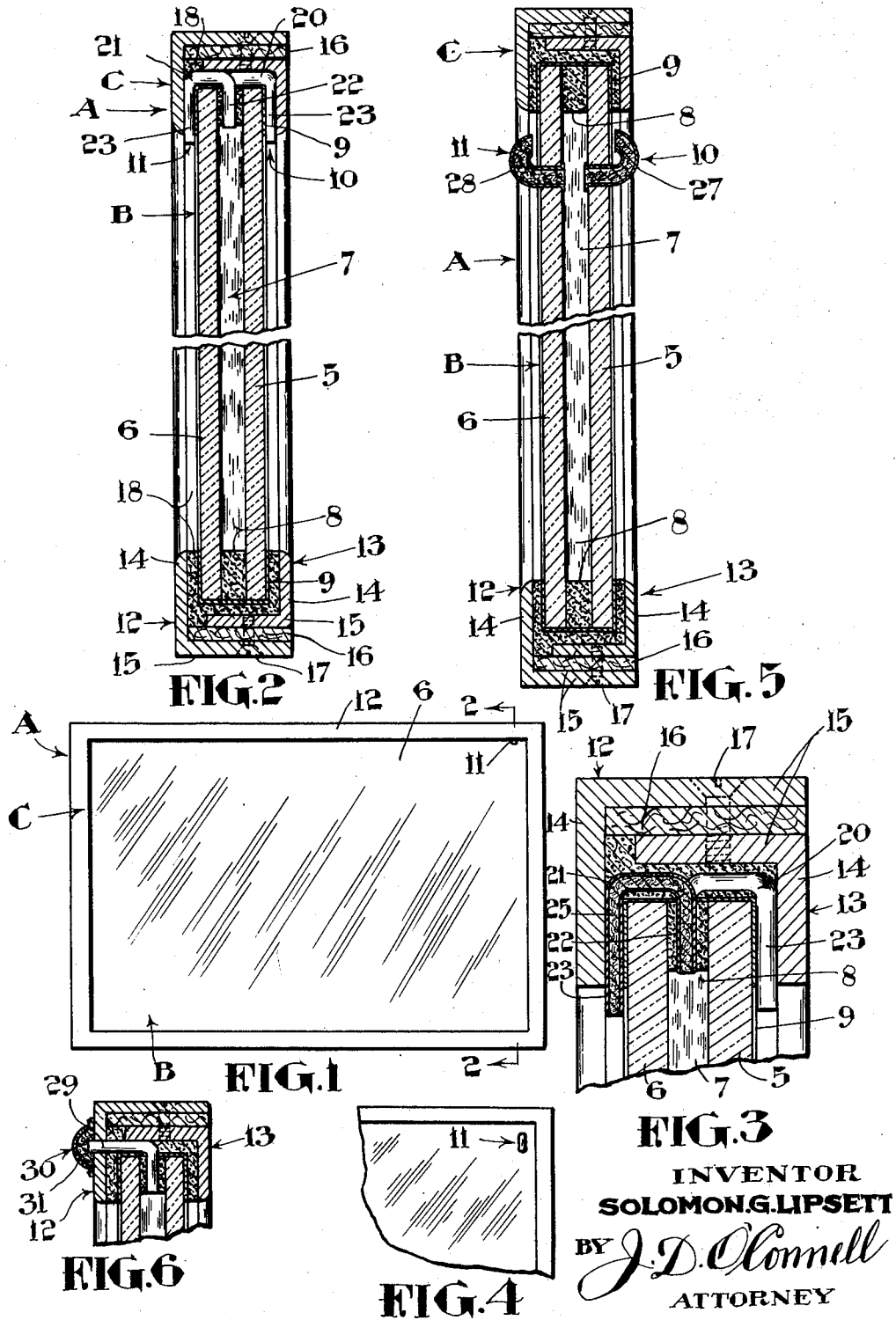
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WINDOW FRAME CONSTRUCTION

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WINDOW FRAME CONSTRUCTION

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This invention relates to multiple-glazed window units for use in air conditioned railway cars, buildings and other locations and it comprises a unit in which provision is made for suitably venting the space between the glasses to either the indoor or outdoor atmosphere through a single breather vent containing a suitable filtering medium which enables the window to "breathe" freely so that the air in said space will always tend to be at the prevailing atmospheric pressure and will generally be at a temperature above the dew point or saturation temperature of the water vapor contained in the air between the glasses. Under these conditions the air space is kept substantially free of moisture and no serious difficulties are experienced in connection with clouding, sweating or frosting between the glasses.

The present invention is a radical departure from the usual type of double glazed window unit in which complete, permanent, hermetic sealing of the space between the glasses is relied upon to exclude moisture from said space and prevent sweating or frosting between the glasses or in which drying agents are placed to absorb any moisture that may enter or any inherent moisture. According to the present invention the air space between the glasses is placed in communication with the indoor or outdoor atmosphere through a single vent opening, tube or passage through which air is freely drawn into or expelled from said space so that the air will always tend to be at the prevailing atmospheric pressure. In the winter time the space between the glasses is placed in communication with the outdoor atmosphere through a single vent so that the cold air which passes inwardly through the vent is warmed up as it enters said space. Cold air, remaining at the same temperature, or warmed up, does not deposit out dew or moisture. In the summer time, especially when the unit is installed in an air conditioned railway car, building, or the like, the space between the glasses may be similarly placed in communication with the indoor atmosphere so that the cooler air on the inside of the window is drawn into the space between the glasses and is sufficiently raised in temperature to prevent the deposit of dew or moisture.

A double glazed window unit in which a single breather vent connects the air space between the glasses to the outside atmosphere only may also be employed for both winter and summer use. With this construction no deposition of moisture or frosting will occur between the glasses in the

winter time when the air outdoors is cooler than the air indoors. In the summer time when the air outside is warmer than the air inside the car or building deposition of moisture between the glasses will occur only when the air indoors is cooled substantially below the dew point of the outside atmosphere. Experience and tests have proven that this latter effect will occur only on rare occasions and is rectified within a short space of time due to the breathing action. A single vent to the outside will thus work favorably in both winter and summer.

Double glazed window units of the hermetically sealed type are open to the objection that a small break in the sealing compound or leak in any other sealing method between the edges of the glasses will result in the progressive accumulation of moisture in the air space between the glasses. These breaks are caused, in some cases, by deflection of the glasses due to differences between the atmospheric pressure and the pressure of the air in the air space. This objection does not apply to windows designed in accordance with the present invention since the venting of the air space to either the indoor or outdoor atmospheres substantially eliminates flexing of the glasses and excessive stressing of the sealing means or compound.

Proceeding now to a more detailed description reference will be had to the accompanying drawing, in which—

Fig. 1 is an outside elevation of a preferred form of window unit designed in accordance with this invention.

Fig. 2 is a sectional view taken substantially along the line 2—2 of Fig. 1.

Fig. 3 is an enlarged detailed sectional view showing more clearly the arrangement of the breather vents appearing in Figs. 1 and 2.

Fig. 4 is a fragmentary inside elevational view of a modified window unit designed in accordance with this invention.

Fig. 5 is a view similar to Fig. 2 of the modified window unit appearing in Fig. 4.

Fig. 6 is a sectional view of a portion of a modified window unit in which the space between the glasses is connected to the outdoor atmosphere only.

In the drawing, my improved window unit is generally indicated at A. It comprises a preformed glazing assembly B mounted in a suitable sash frame C.

In the construction shown in Figs. 1 to 3 inclusive the glazing assembly B comprises a pair of glass plates 5 and 6 spaced apart to provide

an intermediate air space 7, the edges of the plates being cemented together by a suitable sealing compound 8 and being also enclosed by a thin closely fitting U-shaped metal binding frame 9 which serves to reinforce the plates against relative outward displacement. Vents 10 and 11 are provided so that the air space 7 may be selectively connected or vented to either the outdoor or indoor atmosphere as hereinafter described.

The frame C in which the glazing assembly is mounted may be of any suitable design. In the present instance I have elected to show a frame of the type set forth in the co-pending application of H. M. Woelfel, Serial No. 137,306, filed April 16, 1937, Patent No. 2,128,870, Aug. 30, 1938. This type of frame is formed by L-shaped sections 12 and 13 fitted together so that their flanges 14 form the side walls of a U-shaped glazing receiving channel, the bottom of which is formed by the remaining flanges 15 disposed in overlapping relation and held out of direct contact with each other by an interposed layer 16 of fibrous or other suitable insulating material of low thermal conductivity. The flanges 15 are secured together by screws 17 which also pass through the interposed insulating material. The marginal portions of the glazing assembly B are secured in the channel of the frame C by means of the cement indicated at 18. The cement used in this connection is preferably of low thermal conductivity and serves to form an insulating layer between the glazing assembly and the side and bottom channel walls of the sash frame.

In the construction shown in Figs. 1 to 3 inclusive the vents 9 and 10 consist of two inverted U-shaped tubes 20 and 21 arranged so that the inner leg 22 of each tube extends downwardly through the sealing compound 8 and the metal binding frame 9 and communicates with the upper portion of the air space 7. The outer leg 23 of tube 20 is directed downwardly along the outer surface of the glass plate 5 as shown in Fig. 2 while the outer leg 23 of tube 21 is similarly directed along the outer surface of the glass plate 6. Both of these tubes are preferably filled with cotton or mineral wool 25 or other suitable filtering medium.

In the winter time the tube 20 leading to the indoor side of the window is closed to exclude indoor air from the space 7 so that the breathing action takes place solely through the tube 21. When the pressure of air within the space 7 increases above the atmospheric pressure at the outer end of the tube 21 a portion of the air is discharged from this space through the tube 21 until the pressure in said space is equalized with the outside atmospheric pressure. When the pressure of air in the space 7 is reduced below the atmospheric pressure at the outer end of tube 21 cold air is drawn inwardly through said tube. As it enters the space 7 this cold air is raised in temperature since the prevailing temperature in space 7 is approximately the mean between the indoor and outdoor temperatures. Hence, even if the outside air is at the saturation point it will be sufficiently warmed up on entering the space 7 to prevent the deposit of dew or moisture.

In the summer time, with artificial cooling of the indoor air, the venting of space 7 to the outdoor atmosphere would give satisfactory results provided the temperature maintained indoors did not cool glass 5 to a temperature below the dew point of the air outdoors. In the latter case the

venting of space 7 to the outdoor atmosphere would allow the deposit of moisture on the inner glass since the temperature of the outside air drawn into the space 7 would then be lowered to the dew point temperature instead of being warmed up. For this reason the vent tube 20 is provided so that the space 7 may be vented to the indoor atmosphere in cases where the building or car in which the window unit is installed is equipped with air cooling equipment. When the vent tube 20 is used the tube 21 is plugged to exclude outdoor air from the space 7.

In Figs. 4 and 5 I have shown a slight modification in which the vents 10 and 11 are formed by appropriately curved metal tubes 27 and 28 having their inner ends secured in suitable vent openings formed directly in the glasses 5 and 6. These tubes are filled with cotton, mineral wool, or other suitable filtering medium 25 and are reversely curved so that their outer ends are disposed close to the outside surfaces of the glasses. This construction is effective for excluding dust, rain and other foreign matter from the space 7 and also prevents water entering this space through the vents when the glasses are being washed. The tubes 27 and 28 are used in the same manner as the tubes 20 and 21.

In Fig. 6 I have shown a further modification in which the space 7 is connected to the outside atmosphere only through one or more breather vents 29. In this case the inner end of each vent tube communicates with the space 7 while the outer end projects through an opening in the frame member 12 and is covered by a perforated cap 30 filled with cotton, mineral wool, or other suitable filtering medium 31.

From the foregoing it will be understood that the fundamental feature of this invention is the provision of breather vents which enable the window to breathe freely so that the air in the space or spaces between the glasses will always tend to be at the prevailing atmospheric pressure and will generally be above the dew point or saturation temperature. The invention is not limited to double glazed windows but is also useful in connection with windows in which two or more air spaces are provided by increasing the number of glasses.

It is pointed out that the use of any other suitable means for securing the edges of the glasses together to form the enclosed air space or spaces may be resorted to instead of using the sealing compound described herein.

The foregoing and various other modifications coming within the scope and spirit of this invention are intended to be covered by the terms of the appended claims.

In the specification and claims the term "breather" vent is intended to mean a passage connecting one of the air spaces between the glasses to the outside air so that air is freely drawn into or discharged from said space through said passage as the pressure of air within said space falls below or increases above the atmospheric pressure at the outer end of the passage; the alternate inward and outward flow of air which takes place through said passage being such that the pressure in said space is substantially equalized with the outside atmospheric pressure.

The term "breathing action" as used in the specification and claims, refers to the inward and outward flow of air which takes place through each breather vent due to the aforesaid rise and fall of the air pressure within the air space served

by said vent. Further disclosure pertinent to the instant invention may be found in applicant's continuation-in-part application Serial Number 227,405, filed August 29, 1938.

5 Having thus described my invention, what I claim is:

10 1. An insulating window construction to be positioned between an air conditioned enclosure and the outside air that comprises a plurality of panes, said panes being spaced apart and having their edges sealed together to form an hermetically sealed compartment, and means for venting said otherwise hermetically sealed compartment to the outside air at one point only to prevent excessive circulation of air through said 15 compartment.

20 2. An insulating window construction to be positioned between an air conditioned enclosure and the outside air that comprises a plurality of panes, said panes being spaced apart and having their edges sealed together to form an hermetical-

ly sealed compartment, means for venting said otherwise hermetically sealed compartment to the outside air at one point only to prevent excessive circulation of air through said compartment, and a filter associated with said venting means to inhibit the ingress of moisture and 5 foreign matter.

3. An insulating window construction to be positioned between an air conditioned enclosure and the outside air that comprises a plurality of 10 panes, said panes being spaced apart and having their edges sealed together to form an hermetically sealed compartment, and a single vent connecting said otherwise hermetically sealed compartment to the outside air, said vent having a filter material therein whereby to prevent 15 excessive circulation of air therethrough and the ingress of foreign matter and inhibit the ingress of moisture.

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