

May 3, 1932.

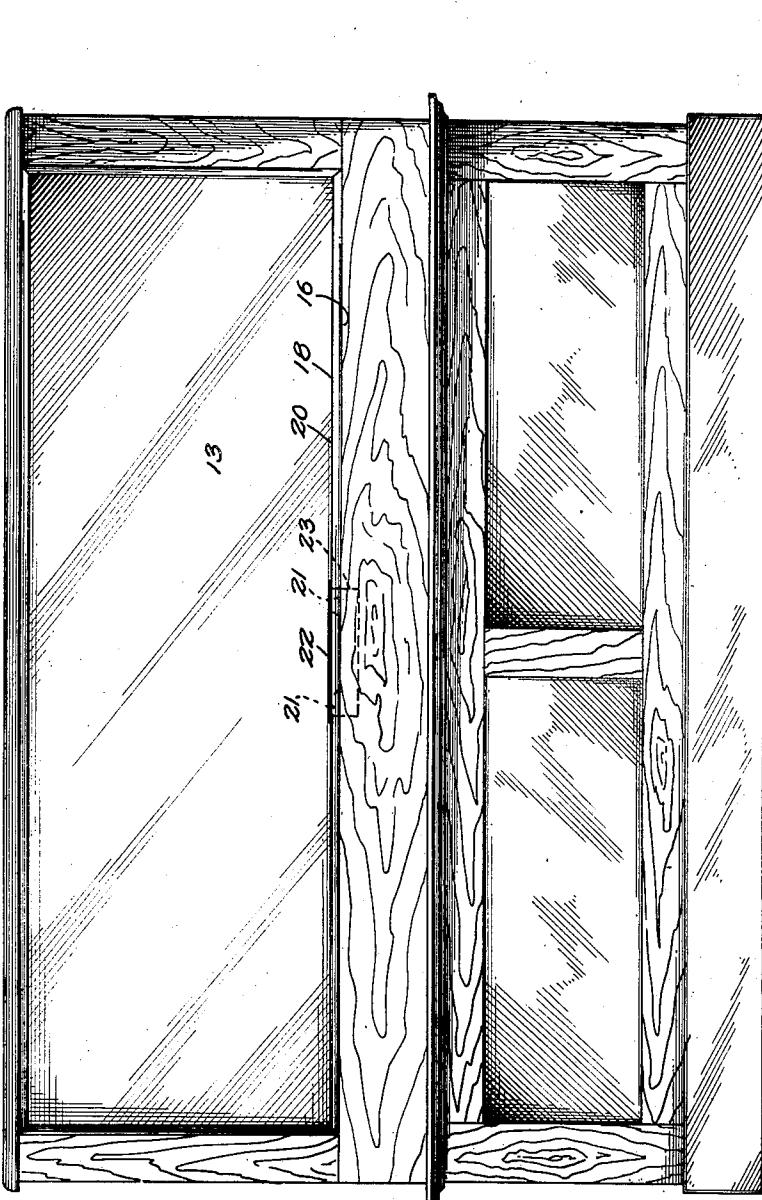
R. E. FREDERICK ET AL

1,856,867

WINDOW

Filed Aug. 3, 1929

2 Sheets-Sheet 1



1-161.

Inventors

ROLAND E. FREDERICK and
WILLIAM E. HILL

284

Frank H. Borden

Attorney

May 3, 1932.

R. E. FREDERICK ET AL

1,856,867

WINDOW

Filed Aug. 3, 1929

2 Sheets-Sheet 2

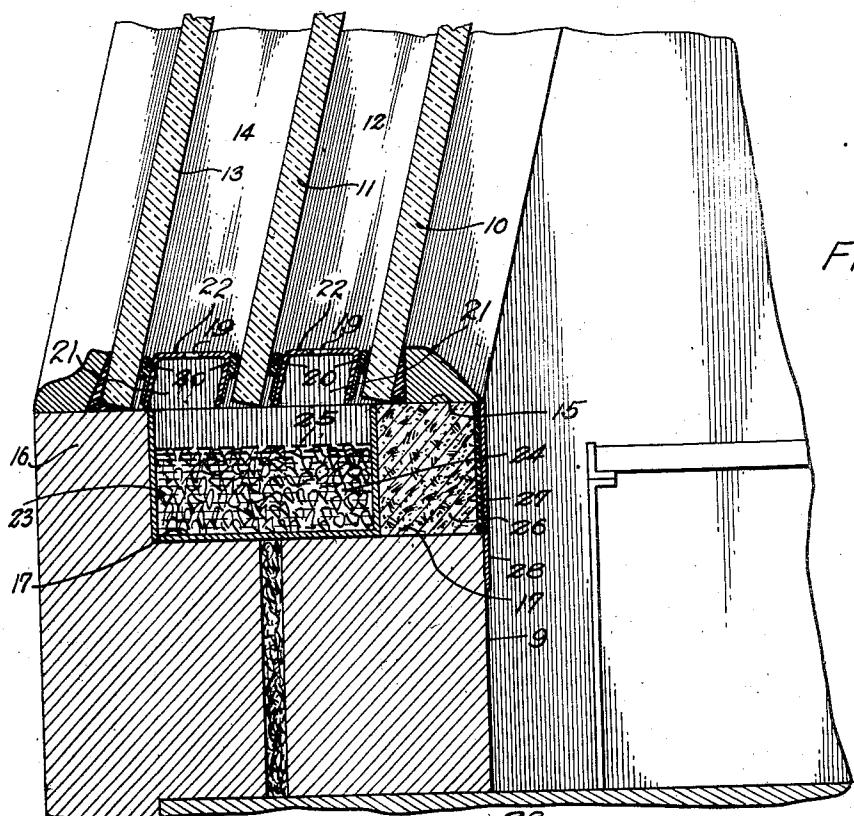


FIG. 2.

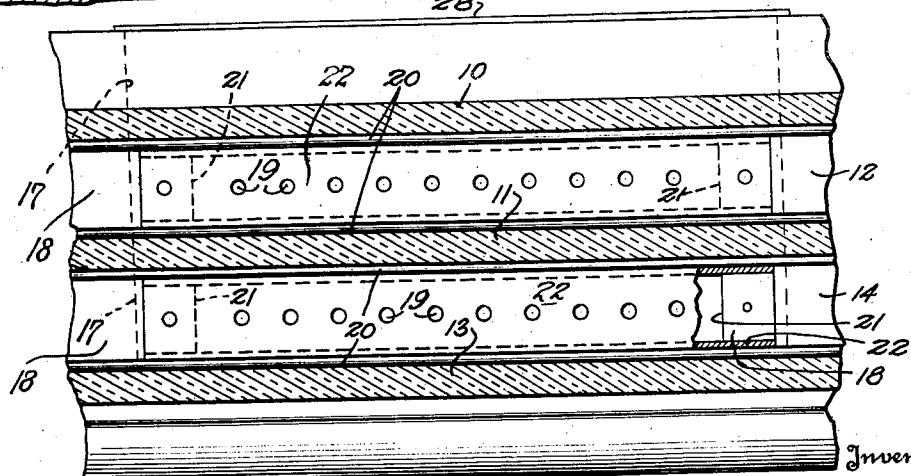


FIG. 3

ROLAND E. FREDERICK and
WILLIAM E. HILL

By

Frank H. Borden

Attorney

UNITED STATES PATENT OFFICE

ROLAND E. FREDERICK AND WILLIAM E. HILL, OF PHILADELPHIA, PENNSYLVANIA,
ASSIGNORS, BY MESNE ASSIGNMENTS, TO REUBEN E. OTTENHEIMER, OF BALTIMORE, MARYLAND

WINDOW

Application filed August 3, 1929. Serial No. 383,359.

This invention relates to windows, with particular reference to multiple pane, or sash, windows.

With multiple pane windows used for visibility combined with heat insulating properties, a disadvantageous factor is the deposition of condensed moisture on an inner pane or panes of the window. Such condensation occurs when there is appreciable variation in the temperatures on the inside and outside of the window, and cannot be removed in the normal case, especially in those installations where the panes are set tightly in the surrounding frame work.

15 Although the invention is of broad application, it will be discussed with relation to the multiple pane windows of a refrigerating, or other, show case.

The structure to which the invention pertains, is one in which insulation of the displayed goods from the heat of the atmosphere outside of the case is of great importance, but even more important is the ease and facility with which the customer may 25 observe the displayed contents of the case. As noted previously, the presence of moisture in the entrapped air between the spaced panes of the window in the chamber formed by the panes and the frame causes condensation on an inner surface of one or more panes, thus obscuring the customer's vision. The presence of moisture in the entrapped air has a further detrimental influence in that the thermal conductivity of the entrapped 35 air rises with the moisture content. For many reasons, therefore, the effective dehydration of the entrapped air is desirable and has been attempted by others from time to time, with but small benefit owing to conditions which have not been fully appreciated in the past.

It must be appreciated that up to the present it has been impossible to set the spaced 45 panes of glass in their openings with an absolutely air tight seal, on a commercially feasible basis or scale. Moreover, it will be appreciated that as an incident to variations in relative temperatures (i. e. the temperatures inside of the refrigerating case, and the tem-

peratures of the atmosphere surrounding the case externally), the entrapped air in the air chambers between the several panes will be caused to expand or contract. In view of this fact, and even assuming that the air initially filling the space between the panes is completely dried beforehand, it will be evident that the expansion and contraction noted will effect a pumping action, gradually forcing dried air out of the air chambers between the panes, and then sucking moisture laden air in to take its place. The pumping action may be and usually is, very slow but the seepage incident thereto is fairly constant, and it is not long before the air chambers are laden with moisture which condenses upon the cold surfaces of the panes when the dew point of the entrapped air is reached.

Among the objects of this invention are; to improve the construction of windows; to provide means for dehydrating air passing into the space between panes; to provide a window having multiple spaces between window panes with means equalizing the pressures in said spaces; to provide means for drying air confined between panes of glass actuated by natural forces acting upon said air to prevent the moisture content of the air filled space from approaching saturation, regardless of the temperature of the walls delineating such space; to improve the thermal insulating value of multi-pane windows; to improve the construction of refrigerating show cases; and to obviate the disadvantageous features attaching to previous constructions.

In carrying out the invention in a preferred form, a window construction is provided, including multiple spaced panes having two substantially parallel air spaces, a channel or passage is provided communicating with the two air spaces, so that the pressures in the said spaces are kept equalized regardless of relative temperature variations; and providing in the channel dehydrating means past, or through, which, air from the spaces is caused to pass, and give up its moisture, and preferably also provided with means for removing and renewing the charge of dehydrating material when it loses its efficiency.

In the accompanying drawings:

Fig. 1 represents a front elevation of a refrigerating show case according to this invention, with the dehydrating trough and the communicating channel in which it is disposed, indicated in dotted lines at the lower end of the window,

Fig. 2 represents a fragmentary vertical section on a larger scale, through the window frame, the spaced panes and the dehydrating trough, showing the assembly, and

Fig. 3 represents a fragmentary horizontal section looking down upon the perforated spacing strips between the panes to show the communicating passages between the air chambers delineated by the panes of glass.

In the preferred form the window construction includes an internal pane of glass (10) the intermediate pane (11) in substantial parallelism therewith, but spaced therefrom to form an air chamber (12), an external pane (13) spaced from and substantially parallel with the intermediate pane (11) and delineating with said pane (11) an air space or chamber (14). It is preferred that the air spaces or chambers (12) and (14) be of substantially similar volume, although it is contemplated that they may be so differently proportioned, by the locations of the panes of glass as to facilitate the equalization of pressures in the spaces.

The several spaced panes are disposed upon a substantially flat upper surface (15) of the horizontal supporting strip (16) of the show case frame, which may have a slot or recess (17) extending laterally from within the show case to a point within the vertical lower limits of the external pane (13). The several panes are spaced and made as nearly air tight as possible in any conventional manner, as by means of spacing or parting strips (18) carrying the longitudinal extending compression members (20). For descriptive purposes the framework containing the panes comprises the structure of the show case surrounding the panes, including the spacing strips and compression members, or their equivalents. At desired points in the spacing strips (18) vertical openings or slots (21) are provided, which communicate with the recess (17) in the supporting strip (16) at the bottom, and with the respective spaces or chambers (12) and (14), between the panes, at the upper ends. The vertical openings may be closed at the upper ends for neatness by a non-corrosive polished metal strip (22) of any desired form, size, or shape, but preferably of inverted substantially U-shape, as disclosed, having perforations or openings (19) and tacked to the strips (18). An open mouthed receptacle (23) of noncorrosive material and filled with a dehydrating substance (24) such as calcium chloride, is inserted laterally into the recess (17) to positions beneath the vertical

openings in the respective strips (18). In order to hold the loose calcium chloride in position during shipment, a reticulated or mesh material sheet (25) may be imposed upon the upper surface of the dehydrating material (24). The receptacle being properly disposed as shown, the recess (17) is then closed by a block or plug of insulating material, such as cork (26) pushed in through or from the inside of the case, which may be caused to have an air tight seal with the inner surface (9) of the case by a plastic cement (27) and which in time may be covered for decorative purposes, by a sheet of non-corrosive metal or paint or the like (28).

With the structure substantially as described above, it will be observed that the recess (17) and slots (21) and openings (19) form a channel continuous from space (12) to space (14), and which is disposed in the framework surrounding the panes and is substantially sealed off from contact with the atmosphere in any direction.

It will be understood that with a low temperature in contact with pane (10) and a higher temperature on pane (13) there will be a differential expansion of the air in the chambers or spaces (14) and (12) respectively, such as to cause expanded air from spaces (14) to pass through the lower opening across the surface of the dehydrating substance and into space or chamber (12) in which case the space or chamber (12) is a reservoir from which air passes into the space (14) through the recess (17) and ports (19) thus equalizing the pressures in the said spaces and simultaneously drying the air passing between the chambers. Upon further variations in relative temperature, there will be further differential variations in pressures resulting in a further passage of air across the dehydrating material in its passage to the other chamber. While it is recognized that equalization of the pressures might still present pressures in each chamber, either higher or lower than the only approximately air tight joints will withstand without seepage, yet for all practical purposes it may be considered that the mere equalization alone substantially maintains the initial charges of entrapped air between the panes. This factor alone, without the use of the dehydrating material, is effective for long periods against raising the moisture content to a point such as to obscure vision through condensation, if the initially entrapped air was reasonably dry.

Even though the resultant equalized pressures might be such as to cause seepage of moisture laden air into the confined spaces, still the natural circulation incident to expansion and contraction as noted, will very quickly remove enough moisture as to render the contained air sufficiently dry as to maintain the thermal efficiency of the insulating

spaces, and, of course, with a maintenance of clear vision.

It will be understood that the initial charge of dehydrating material will last for an indefinitely long period, and that upon its reaching a state of saturation, it is a relatively simple matter to remove plate (28) and the plastic cement (27), pull out the plug (26) giving access to the contained receptacle which may be removed, to insert a new charge in its place, which is subsequently re-sealed in position.

It is to be noted that with the dehydrating material substantially sealed in a space communicating with the entrapped air, highly beneficial results may be secured even without the equalization of pressures in a plurality of chambers. Owing to the existence of convection currents in the entrapped air, incident to variations in external temperatures, the entrapped air will be caused to circulate in the confines of its space, thus passing over the dehydrating material and constantly tending to maintain its dryness, even though but a single air chamber is provided, and even though there may still be a pumping action incident to variations in temperatures. It will simply mean a more frequent renewal of the dehydrating material. Such a construction and function is contemplated in this invention.

It is to be noted that the improvement recited, is of very low cost, is unobtrusive, and is highly effective for the purposes intended.

It will be clear that although the construction disclosed is preferred, yet many modifications will occur to those skilled in the art without departing from the spirit and scope of the invention, and all of which are to be construed as within the spirit of the invention as recited in the appended claim.

We claim as our invention:

In a refrigerating case having a plurality of spaces between the panes, means including a channel for equalizing the pressures between the spaces, one surface delineating the channel comprising dehydrating material to dehydrate the air passing therethrough.

Signed at Philadelphia, county of Philadelphia, and State of Pennsylvania, this 2nd day of July, 1929.

ROLAND E. FREDERICK.
WM. E. HILL.