June 27, 1933. V. P. WARREN 1,915,704

SHOWCASE REFRIGERATOR

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Fig. 1.

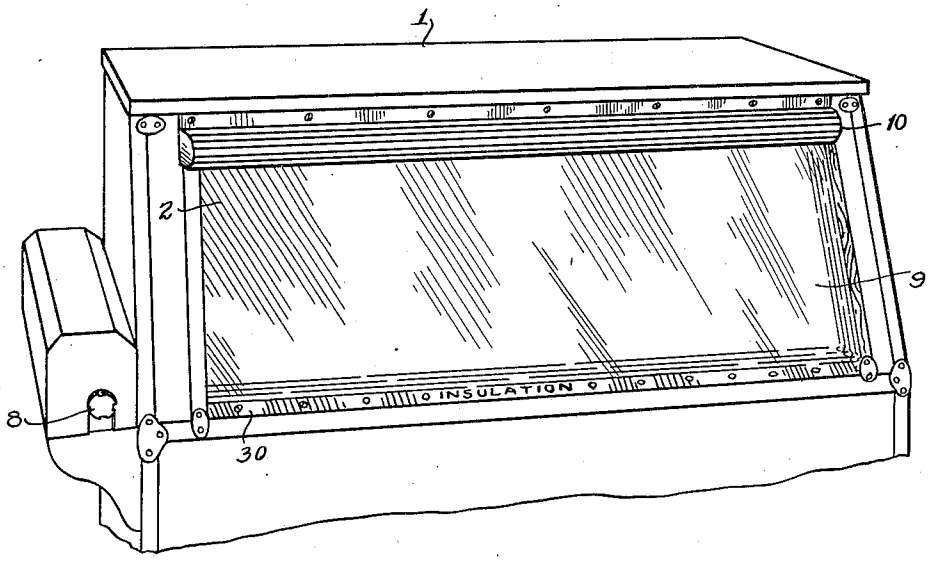


Fig. 7.

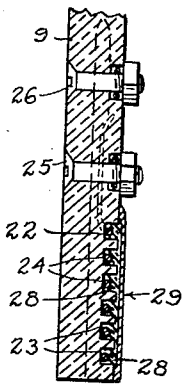


Fig. 5.

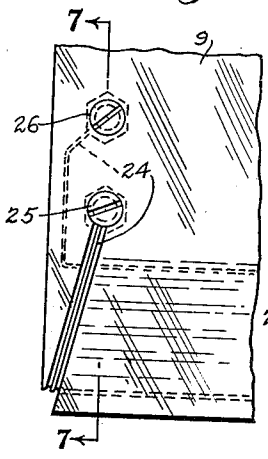


Fig. 6.

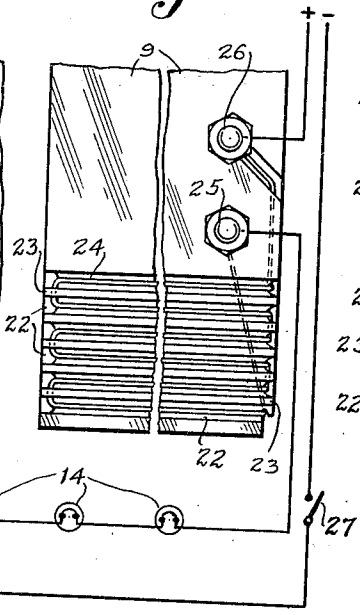
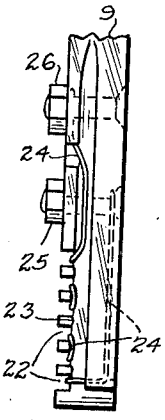


Fig. 8.



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Fig. 2.

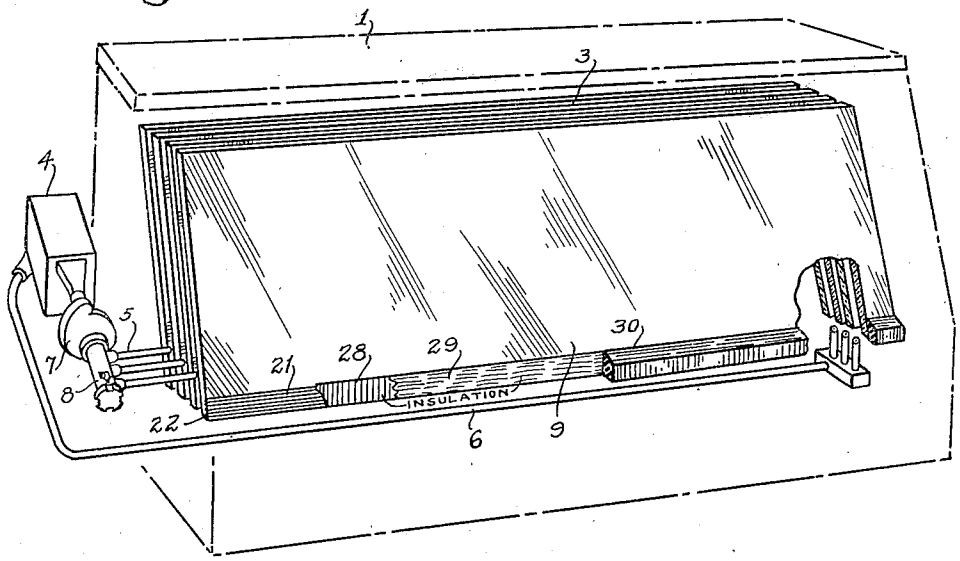
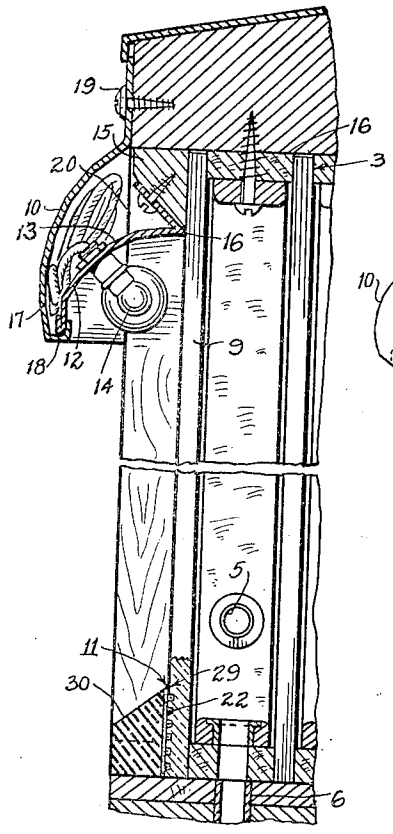


Fig. 3.



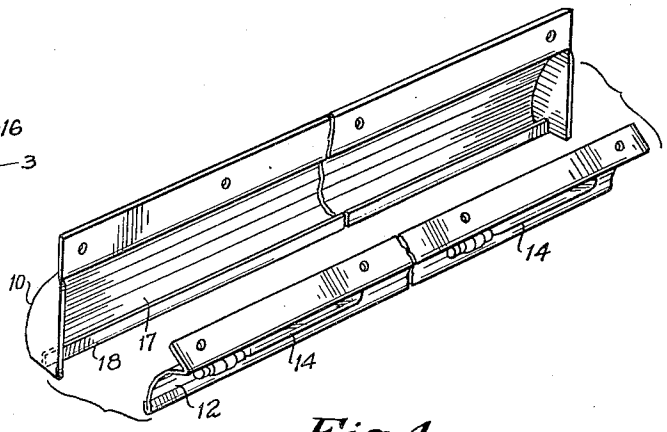


Fig. 4

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UNITED STATES PATENT OFFICE

VIRGIL P. WARREN, OF ATLANTA, GEORGIA

SHOWCASE REFRIGERATOR

Application filed January 26, 1931. Serial No. 511,879.

This invention relates to showcase refrigerators and particularly to showcases of that type in which the window, for heat insulating purposes, is constructed with alternate laminations of glass and air.

In my Patent No. 1,856,008, granted April 26, 1932, is described a system for maintaining visibility through the showcase window by inhibiting moisture condensation on the panes, or removing such moisture as may have condensed thereupon, by establishing a dehydrating circulation for the air within the air cells formed between the glass panels.

While this system solves the condensation problem with respect to the surfaces of the inner glasses, it still leaves the outer surfaces of the outer glass subject to being the recipient of condensed moisture from the store atmosphere.

The object of the present invention is to provide in combination, means for reducing the humidity of the air in the air cells by the glasses, below that degree at which it can condense on the respective inner panes at the temperatures of said panes, and means for elevating the temperature of the outer pane above the condensation point of the uncontrolled humidity of the atmosphere.

Another object of the invention is the construction of the heating means and the relation of its elements to specific regions of the area of the outer surface of the outer glass.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

In the drawings in which the same characters of reference have been used throughout the several figures to designate identical parts:

Figure 1 is a perspective view of a refrigerated showcase embodying the principles of the invention;

Figure 2 is a similar view, parts being removed and parts being shown in section to illustrate the details of construction;

Figure 3 is a cross section through the window portion of the showcase, parts being omitted;

Figure 4 is an exploded perspective view of the reflector;

Figures 5 and 6 are respectively, rear and front views of a corner of the outer glass panel showing details of the rheostat construction, Figure 6 showing also diagrammatically the preferred relation of the rheostat circuit to the lighting circuit;

Figure 7 is a cross section taken along the line 7—7 of Figure 6; and

Figure 8 is an end view of the corners of the panel shown in Figure 6.

Referring to the several figures, the numeral 1 represents a refrigerated showcase having the front display window 2. A refrigerating coil, not shown, may be suitably positioned within the chamber of the showcase, and with a view to conserving the low temperature of the showcase the window is constructed of a plurality of layers or panels 3 of glass separated by insulating air spaces 4. Figure 3 shows that the spaces between the glass panels are suitably sealed so as to constitute said spaces as air cells, the nature of the sealing means not being such however, as to preclude enough leakage to provide for breathing in and out by the air in said cells to compensate for expansion and contraction of said air due to temperature changes both inside and outside of the refrigerator showcase. If the pressure within and without the air cells could not be equalized by such respiration, the glass panels would be crushed in by atmospheric pressure at periods of depression within said air cells.

Through the respiratory interchange of air above referred to, a certain degree of humidity occurs in said air cells which may condense into a mist upon the glass panels impairing visibility of the displayed contents of the showcase.

For the purpose of reducing the humidity of the enclosed air below the point at which the moisture will condense upon the glass panels, a circulation system is provided including a drier 4 containing chloride of calcium or other drying agent and being connected to the air cells between the glass panels by pipes 5 and 6 communicating with the said air cells preferably at their opposite ends. A fan 7 creates the circulation and

a valve 8 provides means for selectively determining the circulation through any of the individual air cells to the exclusion of the others. All this is described in detail in my hereinbefore mentioned companion application and it is also fully explained in said application how the moisture may collect first on the innermost glass due to its temperature being the lowest and the advantages of providing for the individual dehydration of the several air cells.

Since the front or outermost glass panel 9 is subject to the condensation thereupon of the humid air of the store atmosphere, which humidity cannot be controlled, means is provided for heating the front glass panel. These means provide a lamp and reflector 10 at the top of the panel and a rheostat 11 adjacent its lower edge. The lamp and reflector may be relied upon to heat the upper half of the glass to a temperature at which atmospheric moisture will not condense upon the surface of the glass while the rheostat is employed for heating the lower portion of the glass. In practice, moisture will be found to collect on the lower portion of the window first, since the lower part of the refrigerated chamber is somewhat colder than the upper part.

The reflector comprises a silvered or polished trough-shaped member 12, the surface of which is prismatic rather than cylindrical in a longitudinal direction, providing rectangular reflector facets 13 for reflecting the heat from the electric lamp 14 against the upper portion of the front glass. By having the reflecting surface faceted instead of curved the reflected heat is thrown in successive bands upon the glass rather than being reflected in a mere line formation, thus distributing the heat with more or less uniformity over quite an area in the upper region of the glass. The reflector may be screwed or otherwise suitably secured to a molding 15 which holds the glass panel in place at the top but this means of securing the reflector is merely suggestive and not at all limitative in its bearing upon the invention. It is highly desirable however that the reflector 13 make metallic contact with the front glass panel as is indicated at 16 in Figure 3. By so doing, the reflector acts as a heat conducting element for imparting heat directly to the glass panel by conduction.

The reflector is preferably provided with a removable hood 17 having a channel 18 at the bottom which overlaps the lower free end of the reflector and having a flange 19 at the top adapted to be secured to the front wall of the showcase. A conduit 20 is formed between the reflector 13 and the hood 17 which may receive the wires which fit the electric lamps 14.

The lamps may be spaced at any desired interval between the reflector and the glass panel.

Referring to the rheostat 21, it will be observed that the lower part of the glass panel is provided with longitudinal grooves 22 extending the length thereof and across the ends of said panel so as to provide projections 23 at said ends. An appropriate length of high resistance wire 24 is laid in said grooves passing around the projections 23 and being retained in place by said projections. The ends of said high resistance wire are suitably secured to the glass panel by means such as the binding screws 25 and 26, said screws being preferably concealed beneath the bead which covers the adjacent edge of the panel 9.

Figure 6 shows that the rheostat is preferably connected in series with the lighting circuit of the showcase so that when the lighting switch 27 is closed, both the lamps and rheostat operate together.

The grooves 22 are quite deep and the wire 24 is disposed at the bottom of said grooves so that the glass absorbs most of the heat radiated by said wire. The grooves are filled on the outer side of said wire with a cementitious substance 28, water-proof and of electrical insulating nature, and permanently flexible so that it will not crack from the expansion of the wire 23 when the latter is heated. By virtue of the fact that the wire is backed by the flexible cementitious substance its expansion will not stress the glass. Since as has been previously stated, the tendency of the condensed moisture is to collect first at the lower part of the glass, especial provision is made for moisture-proofing the rheostat. With this object in view a strip of mica 29, shown in Figures 2 and 3 is placed upon the layer of cementitious substance and in adhesive relation thereto. This forms a hermetic seal for the electrical element of the rheostat for further ensuring the heat and moisture proof integrity of the rheostat. A molding 30 of hard rubber or other suitable moisture proof and dielectric substance is placed against the mica, covering and concealing the entire rheostat, and a layer of water-proof cement preferably intervenes the adjacent faces of the molding 30 and the mica strip.

In the practical application of this invention to the window of a refrigerated showcase, the side and top members of the molding or frame which retains the front panel may for purposes of economy be made of wood and are preferably of the same color and shape as the molding 30 so as to give the appearance of similarity to all four sides of the molding or frame.

In the operation of my invention, the presence of moisture upon any one or more of the interior panels of glass indicates the need for dehydrating the air in the cell or cells

associated with the moist panel. A switch is then operated starting the motor 7 and the valve 8 is manipulated so as to direct the dehydrating circulation through the desired air cell. If the moisture appears on the outside surface of the front panel the lighting switch is closed, simultaneously actuating the lamps and reflector, and the rheostat.

It is obvious that changes in the arrangement of the several parts or alterations in the details of construction thereof may be made if desired without transcending the spirit and scope of the invention as claimed.

What I claim is:

1. In a refrigerated showcase, a window comprising a plurality of spaced glass panels defining a plurality of air cells therebetween, means for selectively reducing the humidity of the air in said air cells below the point at which moisture will condense from said air on to the glass surfaces bounding said air cells, in combination with means for raising the temperature of the outside glass panel to such a point that moisture will not condense upon the outside surface of said panel from the atmosphere outside of the showcase.

2. In a refrigerated showcase as claimed in claim 1, the means for raising the temperature of the outside panel comprising an illuminative heat source adjacent the top of said outside panel, and a rheostat adjacent the bottom of said panel in series circuit with said illuminative heat source.

3. In a refrigerated showcase, a window comprising a plurality of spaced glass panels defining a plurality of insulating air cells therebetween, and means for raising the temperature of the outside panel including an illuminative heat source adjacent the top of said panel, and a concave reflector having a longitudinally faceted surface associated with said illuminative heat source for reflecting heat upon the upper portion of said panel in a zone of considerable width.

4. In a refrigerated showcase, a window comprising a plurality of spaced glass panels defining a plurality of air cells between said panels, means for raising the temperature of the outside glass panel to such a point that moisture will not condense upon the outside of said panel from the atmosphere outside the showcase, said means comprising a high resistance electric heating element disposed adjacent the bottom of grooves formed adjacent the lower edge of said panel.

5. In a refrigerated showcase as claimed in claim 4, said grooves being filled with a flexible dielectric and moisture-proof cementitious substance permitting expansion of said high resistance wire without stressing the glass of said panel.

6. In a refrigerated showcase, a glass panel forming the outside member of a laminated insulating window, means for heating said glass panel to prevent condensation thereupon of atmospheric moisture, said means comprising a high resistance wire wound in grooves formed adjacent the lower edge of said panel and in substantial contact with the glass at the bottoms of said grooves, a flexible, dielectric, moisture-proof cementitious substance filling said grooves, a thin sheet of insulating material covering said grooves and being adhered by said cementitious substance, and a molding of electrical insulation material secured in contact with said sheet and concealing said heating means.

7. Window panel for refrigerated showcase comprising a glass sheet having grooves formed longitudinally of an edge thereof, a high resistance wire arranged in said grooves in contactive relation to the glass at the bottoms of said grooves, parallel portions of said wire being separated by the ribs defined between adjacent grooves, the groove portion of said glass being filled in above said high resistance wire, and a thin sheet of insulating material over-lying said grooves and cemented thereto by said cementitious substance, the terminals of said high resistance wire being fixed to suitable connectors carried by said glass sheet.

In testimony whereof I affix my signature.

VIRGIL P. WARREN.