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2,182,852

GLASS-ROOF ROOF LIGHT AND THE LIKE

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Fig. I.

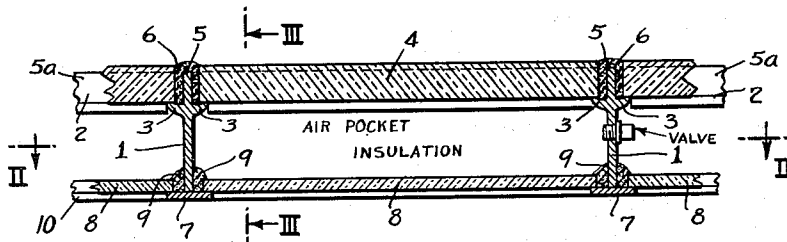


Fig. II.

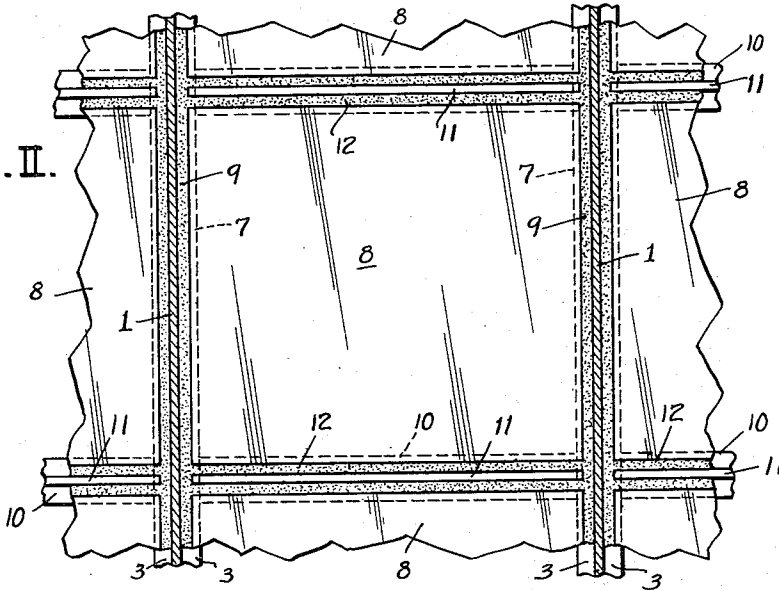


Fig. III.

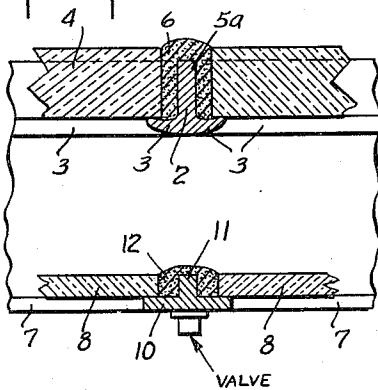
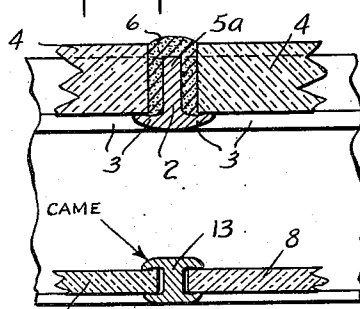


Fig. IV.



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GLASS-ROOF ROOF LIGHT AND THE LIKE

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8 Claims. (Cl. 108—16)

This invention relates to what I term in general, roof lights, but may be applicable in other ways or positions in structures, comprising sectional lights and supports therefor in combination such as are embodied in otherwise light free apertures in structures, and have for their purpose the transmission of a maximum amount of light through the aperture and to provide the necessary support for load that the structure may be called upon to carry. In particular, it relates to such form of roof lights of an improved construction adapted to provide an air space to effect an insulation between the outer or the glass exposed to the varying outside temperature, and the lower side of the glass light exposed to the temperature of the building or interior of the structure. Such air space may be provided substantially sealed so as to give a dead air space to more fully assure insulation, or may be varied in ways hereinafter set forth, but it is intended to provide for the proper support of the structure and permit ready assembly or installation, and replacement and repair.

To illustrate my invention one form of construction is shown in the accompanying drawing, in which:

Fig. I is a cross section of a portion of a roof glass embodying my invention.

Fig. II is a section of a fragmentary portion of a panel on the line II—II, Fig. I.

Fig. III is a section at one intersection of the supporting members, on an enlarged scale.

Fig. IV is a cross section of a portion of an intersection, on a larger scale, in modified form.

In some forms of my construction the supporting frame work or structure with interlocking members or rigidly interconnected construction material, may have bars similar to the floor lights or vault lights shown in my Patent No. 1,784,678 granted December 9, 1930, or Patent No. 1,987,490 granted January 8, 1935, but modified for the embodiment of my present invention.

In the drawing forming a part hereof the particular embodiment or form of my invention has deep load-carrying members 1 extending preferably parallel and spaced a predetermined distance apart, and at intervals interconnected by shelf-bars 2 interlocked with the upper portion of the deep or load-carrying members 1. In this form the interlocking of traversing members may be as shown in Fig. IV of my Patent No. 1,987,490, but in other forms, in the practice of my invention, the rigid interconnection of the load-carrying members or cross members, may be reinforced concrete, as shown in my Patents Nos. 1,587,487,

1,587,488 or 1,681,741. The load-carrying members and transverse bars or members 2 have lateral shelves 3 adapted to support the peripheral edge of glass light sections 4, preferably with webs 5—5^a upwardly extending as part of or connected to the load-carrying members 1 or cross interlock bars 2, so as to position the glass lights and provide for expansion material 6 being suitably placed to seal the joint between the edges of adjacent glass lights and the web, and to protect the web, whether connected to the load-carrying member or formed as part of it, and form a watertight seal substantially flush with the outer surface of the glass.

At or near the lower extremity of the load-carrying members 1—I attach, as by welding or otherwise, plates 7, which form on two sides of each aperture of the structure a shelf adapted to receive a second glass plate 8, and to provide along the edge of said plate a space for the introduction of a sealing material 9, such as a plastic suitable for sealing and accommodating expansion and contraction. At intervals I provide cross bars 10, preferably vertically below the interlocking shelf bars 2, which cross plates are attached to the plates on the lower edge of the load-carrying members 1, and provide a cross connection to support two edges of the lower glass plate 8. I may have these plates with a rib, as at 11, which aids in positioning the plates 8, and provides for uniform spacing to accommodate sealing material or expansion material 12. I may, however, as shown in Fig. IV, use a cam 13 to hold the abutting edges of glass plates 8 and suitably seal the joint.

In modified forms I may use in place of a plurality of sections of the inner glass 8, a continuous strip or plate of glass just wide enough to be inserted between the load-carrying members, but extending under a plurality of the outer load-carrying glass sections 4. I may also assemble the cross shelf bars 2 by having alternate ones interlocked with the upper portion of the load-carrying bars, and alternate ones loose adapted to be placed in position after the insertion of a long section of glass 8 for the inner face.

The deep load-carrying members 1—I form along the sides a closure for the air space between the outer glass 4 and the inner glass 8, and at the end of the roof glass panel I secure a plate transverse between the load-carrying members which closes the ends of the air space, and in view of the sealed joints of the glass lights, outer and inner, thereby provide a dead air space effective for insulation. The expansion and contrac-

tion of air in this space due to changes in temperature from either side conducted through the glass areas 4 and 8, I may accommodate, when necessary, by forming the end walls, between the load-carrying members, of thin flexible material, or may carry a tubular or other suitable member through one of the walls or structural members leading to an expansion chamber sealed in any suitable manner, such as by a water-trap, or I may use any suitable expansion balancing device to prevent increased positive or negative pressure, and to avoid ingress of air with foreign matter.

It will thus be noted that I provide a load-carrying structure which, in one form as shown may be assembled complete, or substantially so at plant, positioned as a complete panel on the structure in a roof or the like to cover the light opening, or may in other embodiments of my invention be constructed on the job, as by reinforced concrete. To assemble the form shown in the drawing, I insert the lower glass plates 8, position and seal them, and the upper or outside glass plates 4 and seal them with sealing and expansion material, providing a completed unit with the insulating air space. As shown, the inner glass width may be such as to permit it to pass readily between the protruding shelves 3—3 on the load-carrying structure, or by tilting the glass inserting one edge first, the glass may be slightly broader. Also the insertion of a long plate between two load-carrying members may be effected at one end and the ends of the air space thereafter closed, or other arrangements for insertion of the lower glass 8 may be resorted to permitting of a size to more completely fill the space between the webs of the load-carrying members.

It will be understood that these lights, whether for roof or other apertures in structures, are made in a panel having a plurality of load-carrying members, to resist weight, wind or other strains, and transverse members which may also be load-carrying, the members being adapted to support the light pervious heat insulating covering of the opening between such structural members, all in a plurality of sections depending upon the size of the light aperture of the building which the light is made to cover, or it may be so constructed as to overhang a curb partly or wholly surrounding the light aperture in the roof, or raised above a curb to give automatic ventilation.

Many variations may be made from the particular form of construction herein illustrated and specifically described, I may interconnect the inner and outer glass with glass or other airtight walls to seal the air space, thus forming unit light pervious insulating cells. Or each glass area may be assembled in separate frames which can be interconnected and sealed together, either at the plant or in the field.

While I prefer fabricated metal parts for the frame work, it may be of varied construction or material such as reinforced concrete. Also, while my invention is herein shown in one form particularly intended to cover the light aperture in a roof, it applies to any like structure to cover a light opening in a building where the advantages of my invention may be applicable. In the one form illustrated when the outer and inner glass plates are not sealed together in a manner to resist pressure due to temperature changes in confined air, I may perforate the bar or other members so that the air space throughout sections of the panel, or throughout the whole panel are interconnected for variations in volume of the

pocketed air due to temperature changes, and then attach one or more air pressure relief devices to maintain the pocketed air pressure substantially uniform, by allowing the expanded air to pass to a flexible chamber and return with reduction in temperature without permitting ingress of dust, moisture or any other foreign matter,—in order that the inner surfaces of the glass plates remain clear to avoid any necessity for disassembling for cleaning.

In some cases I may provide a valve as noted in Figs. I and III, preferably a one-way valve, which permits any increased volume of air due to a rise in temperature, to pass out of the insulating air pocket without increasing the pressure. Such a valve may be in one of the cross members 10 or 13, or it may be in one of the main load-supporting members at a side of the panel. In this connection I may also upon assembly of the structure substantially desiccate the air, that is fill the insulating pocket with substantially moisture-proof air, and at the same time otherwise condition the air to avoid any foreign matter that would cloud the pocket or cause condensation on the interior surfaces of the glass areas, upon changes of temperature. By having the one-way valve, the rise in temperature which may be caused by direct sunlight on a rooflight may well substantially exceed one hundred degrees, causes an expansion of the air, and with the relief valve operating only one way, the following reduction in temperature would cause a rarefaction of the air in the pocket, because of the portion of air driven out none will return through the one-way valve. Thus, I prevent the ingress of moisture or other foreign matter, but at the same time cause a slight rarefying or partial vacuum which is beneficial in reducing the chance of condensation. For such construction I securely fasten the edges of the bottom plate 8 so that the slightly increased pressure from the bottom will not raise it from its sealed bearings around the edges. In such modified constructions where the outer and inner glass areas are interconnected directly around their edges by glass walls or the like, such cells will be secured against collapse and will be secured as a unit against displacement. If other forms embody a vent or one-way valve they will be firmly secured against any displacement or collapse involved in the slight increase in pressure due to such automatic creation of partial vacuum. The latter construction may take the form of a completely enclosed glass block with only one opening protected by the one-way valve but in using the form of a single air-pocket cell, I prefer to use in my combination the hermetically sealed unit.

With certain of the variations in the construction of my insulating air pocket, the type of glasses or combined glass plates may be suitably supported by members corresponding to muntins in one direction or more, with the necessary attaching means to hold the air-pocketing glass areas or completely enclosed glass blocks in secure position.

It will be understood that while I have herein referred to light pervious, or transparent or translucent material, or glass, in the various forms of my invention it will be understood the essential characteristics are material through which a large amount of natural or artificial light will pass. The material spanning the light area may have plates for clear light, or for diffused light. The latter may be like diffusing glass such as I have used in the past as single plates in roof

lights, vault lights or the like. My invention permits of using special forms and qualities of glass, particularly in certain forms of my invention. It permits using amply strong glass to resist load, such as when structures, like roof lights, must carry people walking thereon, while in some forms permitting the use of the lightest glass areas for maximum light transmission or saving in cost, particularly in such of my embodiments now known as double glazing or double glazed roof lights.

These and various other modifications may be made without departing from the spirit of my invention, but what I claim and desire to secure by Letters Patent is:

1. A roof light or the like, comprising a panel formed with load-supporting members providing light apertures, a plurality of sections of light pervious material adapted to fit the light apertures, means on the load-carrying structure to support said sections, with their outer surface in a plane beyond any part of the load-carrying structure and means on said load-carrying structure adapted to support a second section of light pervious material substantially parallel and spaced a predetermined distance from the first section of light pervious material, so constructed and arranged whereby the apertures comprise an enclosed air space forming an insulation between the outer and inner sides of the panel with one outer surface of the panel flush for water-shedding.

2. A roof light or the like, comprising deep load-carrying members, transverse rigidly interconnected glass-supporting members, means associated with the deep load-carrying members to support glass sections adjacent one edge, means attached to the edge of the deep sections adapted to support a second glass section in spaced relation to the first glass section, and means for sealing the outer glass sections at their edges with each other, whereby an outer flush water-shedding surface is provided.

3. A roof light or the like, having deep load-carrying member construction extending in one direction throughout a panel, means adjacent and within the outer limit of one edge of said load-carrying members adapted to support the edges of a glass plate, means adjacent the other edge of load-carrying members to support a second glass plate, so constructed and arranged whereby the load-carrying structure is adapted to hold two substantially parallel glass plates or lights in sealed relation to the load-carrying structure forming an air pocket for insulation between the outer and inner sides of the panel with a sealed outer surface flush and water-shedding.

4. A roof-light or the like with a top water-shedding sealed surface, having deep load-carrying member construction, transverse structural members at intervals intermediate said deep load-carrying members, means associated with said load-carrying and transverse members to support substantially parallel glass plates constituting the light sections of the panel the outer surface of plates on one face in a plane beyond the supporting structure, sealing means between their adjacent edges, and so constructed and arranged whereby dead air space is provided between said substantially parallel glass or generally translucent plates.

5. A roof-light or the like, having a fabricated structure forming a panel including load-carrying members and with a series of structural members forming light apertures, means of support in each of said light apertures for light pervious units having two generally parallel plates for outside and inside coverage, means sealing the adjacent edges of the outside plates and means whereby dead air space is provided between said outside and inside plates for heat insulation of said roof-light.

6. A roof-light or the like having water-shedding outer surface, including a fabricated structure forming a panel including load-carrying members and forming light apertures, means of support in each of said light apertures for a plurality of generally transparent or translucent units, intermediate means whereby dead air space is provided between an outside and inside glass area, for heat and cold insulation and means intermediate the juxtaposed edges of the outside glass areas adapted to form a permanent seal therebetween substantially flush with the outer surface of said outside glass areas.

7. A roof light having outer and inner plates of translucent material, means for supporting the same in fixed spaced relation whereby an air-pocket is formed therebetween, means of support for the outer translucent areas so constructed and arranged whereby sealing material is permanently held between the adjacent edges thereof substantially flush with the outer surface providing a flush water-shedding outer surface.

8. A skylight having a series of top and bottom glass plates, a load-supporting structure adapted to hold said plates in spaced relation and cooperating therewith to form intermediate air-pockets, the means of support for the top plates cooperating to hold the outer surface thereof in a plane outside of any part of the supporting structure, and sealing means between the edges of adjacent plates and covering adjacent structural support parts.

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