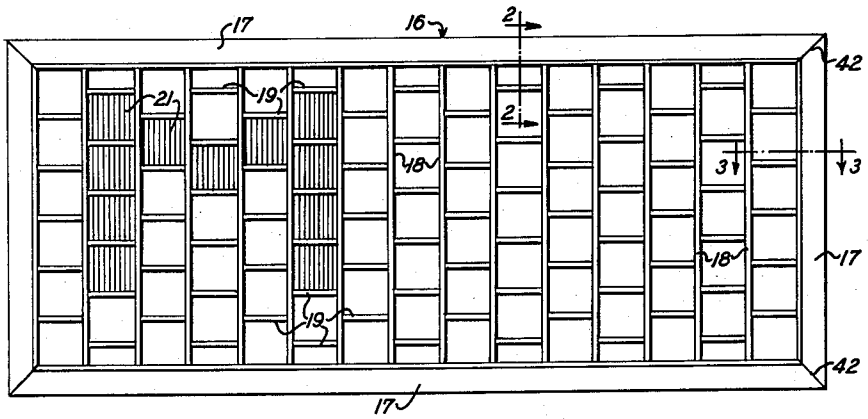
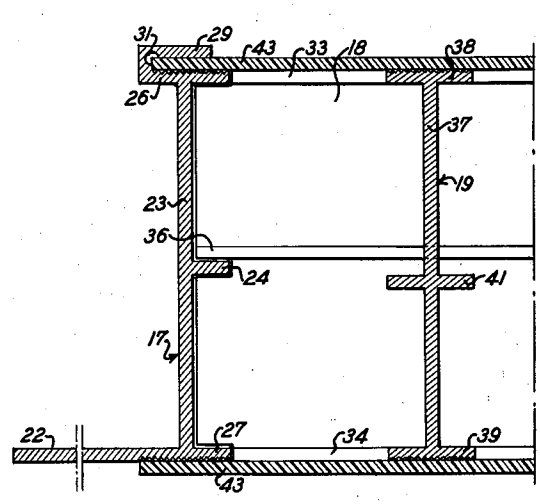
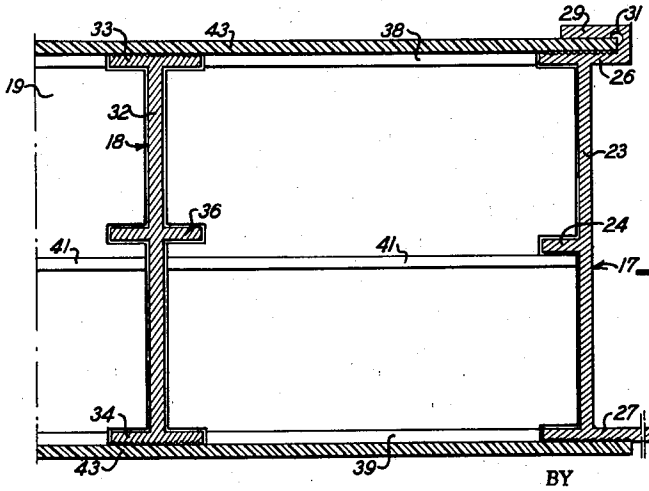
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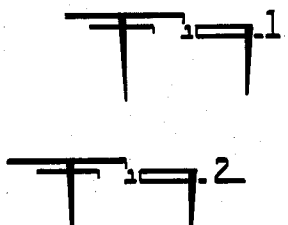
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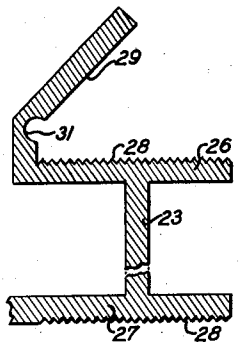
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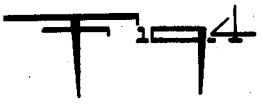


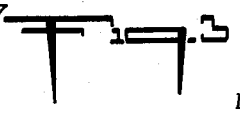












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SKYLIGHT

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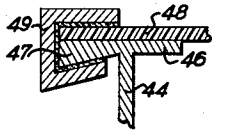


FIG. 5

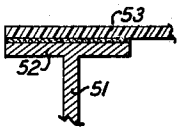


FIG. 6

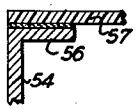


FIG. 7

FIG. 8

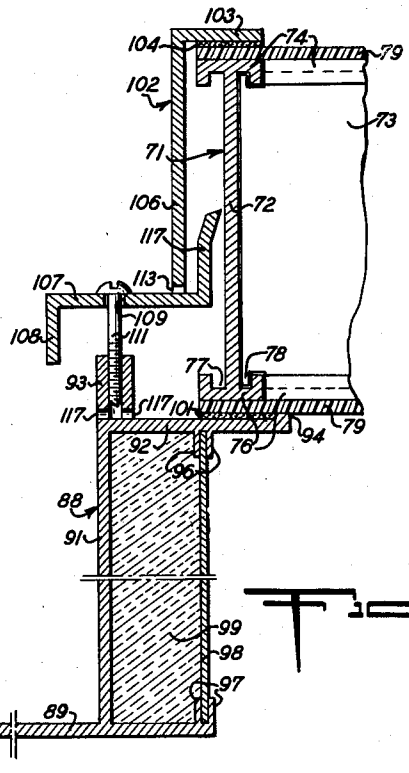


FIG. 10

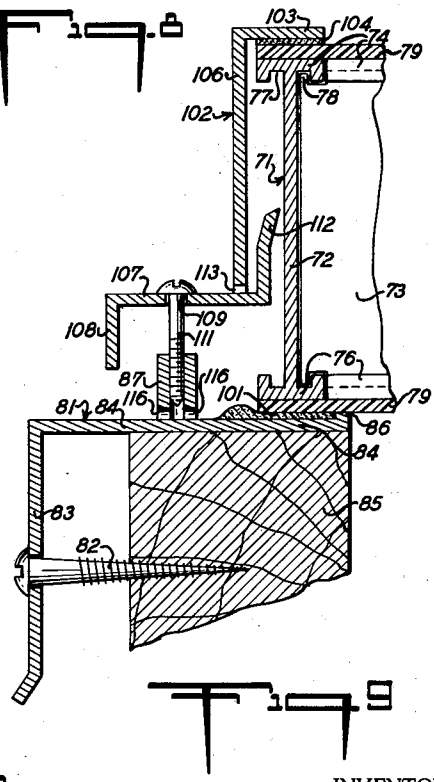


FIG. 9

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SKYLIGHT

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4 Claims. (Cl. 50—267)

This invention relates to new and useful improvements in skylights and more particularly relates to a skylight having double light transmission panels that are spaced apart and generally parallel to each other and a novel mounting arrangement therefor.

It is desirable that skylights have high light transmission but yet diffuse the light, be light in weight and easy to install but yet have structural strength, have high insulation value but yet be simple in construction and economical in cost.

It is an object of this invention to provide a skylight having double and spaced light transmitting panels.

It is another object of this invention to provide a double and spaced panel skylight having reinforced grid structure between the panels.

It is a further object of this invention to provide a double and spaced panel skylight having high light transmission and high insulation value but light in weight, simple to construct and install, and economical in cost.

It is also an object of this invention to provide a watertight, double and spaced panel skylight.

It is an additional object of this invention to provide a double and spaced panel skylight that can be readily adapted to pass only colored light through the entire unit or in selected portions to form an endless variety of colored patterns.

It is likewise an object of this invention to provide a double and spaced panel skylight that can be assembled away from the ultimate installation point and quite simply and easily installed at a subsequent time.

With these and other objects in view, the nature of which will be more apparent, the invention will be more fully understood by reference to the drawings, the accompanying detailed description and the appended claims.

We have found that spaced panels of light transmitting material laminated to opposite sides of a metal beam grid pattern when properly mounted give an excellent skylight that is simple to construct, easy to install, and economical in cost.

In the drawings:

Fig. 1 is a plan view of a skylight unit showing the grid structure constructed in accordance with this invention prior to lamination of the light transmitting panels thereon;

Fig. 2 is a vertical section taken along lines 2—2 of Fig. 1 after lamination of the horizontal panels showing a peripheral beam and a short beam in section and a portion of a transverse beam in plan;

Fig. 3 is a vertical section taken along lines 3—3 of Fig. 1 after lamination of the horizontal panels showing a peripheral beam and a transverse beam in section and all of a short beam in plan;

Fig. 4 is an enlarged detailed section of the top and bottom plates of the peripheral beam of Figs. 2 and 3;

Fig. 5 is an enlarged section of the top plate of a modified peripheral beam;

Fig. 6 is an enlarged section of the top plate of another modified peripheral beam;

Fig. 7 is an enlarged section of the top plate of another modified peripheral beam;

Fig. 8 is a vertical section through another modified peripheral beam;

Fig. 9 is a vertical section through the periphery of a skylight unit having a mounting arrangement apart from the grid supporting structure of the light transmission panels; and

Fig. 10 is a vertical section through a modified unit similar to Fig. 9.

Referring to the drawings in detail, this invention as illustrated is embodied in a pair of spaced panels laminated to a grid system of supporting I-beams but it will be appreciated that the grid system could be formed in several ways and not necessarily of I-beams.

In Fig. 1 is shown a plan view of a grid system, this one being staggered although the scope of the invention covers a continuous line arrangement or any other which may be chosen. Fig. 1 represents the frame **16** of a single skylight with the four peripheral beams **17** defining the frame. Spanning beams **18** completely span the short distance of the unit and short beams **19** extend transversely to and between adjacent spanning beams. The smaller compartments may be marked in various ways to form a desirable pattern. Red sheets of transparent plastic are here shown in compartments **21** to form the letter M, this giving a very attractive effect when light is shining therethrough.

Figs. 2, 3 and 4 show more detail of the interlocking arrangement of the various I-beams. The peripheral I-beam **17** has a horizontal base flange **22** that extends outwardly for a considerable distance because this becomes the base of the skylight per se and will be sealed to the roof or curb, depending on which is available. If desirable the free end of the base flange may extend downwardly when the skylight is to fit over a curb. In addition, the skylight unit per se may include a raised curb which is attached to (e.g., welded) or extended as part of the peripheral frame (note Fig. 10 for one type of an integral curb). The vertical member **23** has an inwardly extending horizontal flange **24** positioned midway between the upper plate **26** and the lower plate **27**, both plates being serrated on the outer surfaces **28**. The upper plate **26** is further provided with a pivotal locking flange **29** that pivots around the weakened radius **31**.

The spanning I-beams **18** are quite simple, having a vertical member **32**, a top plate **33**, a bottom plate **34**, and a middle plate **36** which is positioned so that it will ride immediately above the middle flange **24** of the peripheral beam. The short I-beams **19** have a vertical member **37**, a top plate **38**, bottom plate **39** and a middle plate **41**. In fact, the short beams are the same stock as the spanning I-beams **18** but turned upside down so that middle plate **41** rides immediately below the middle flange **24** of the peripheral beam. However, the reason for reversing the spanning and short beams is to avoid notching the middle plate on either of the beams when they are joined. Both the spanning and short beams are notched as seen in Figs. 2 and 3 to mesh with each other and the peripheral beams.

The four peripheral I-beams **17** are first joined together preferably by welding at mitered corners **42**. The spanning beams **18** are then placed diagonally between the two longer peripheral beams and driven into a transverse position. Subsequently the short beams **19** are similarly placed between the spanning beams. When the frame **16** has been finished, there will be numerous serrated surfaces exposed both upwardly and downwardly. An adhesive will be applied thereon and a pair of light transmitting panels **43**, **43** laminated thereto. Since the upper panel is more exposed ultimately to wind, rain and the elements, we have provided a locking flange **29**

which is bent down over the top of the panel to hold same in position and to insure no leakage at the joint. Adhesive may also be applied between the panel and the locking flange.

We have found that the two I-beams necessary, i.e., that used for the peripheral beam and that used for the interior beams can readily be made of aluminum extrusions. The light transmission panels may be made of fiberglass reinforced polyester p'astic which has excellent insulation and transmission characteristics. However, our concept is not limited to the materials from which these structures are formed. Moreover, we do not intend to limit ourselves to securing the plastic to the grid by adhesives. This could be done in various other ways although to secure a water-tight unit, we have found adhesives to be preferable.

Figs. 5, 6 and 7 show modified peripheral beams that may be used for supporting frame structures. In Fig. 5, the I-beam 44 is provided wtih a top plate having an internal flange 46 and an external flange 47, the latter being wedge-shaped with the largest dimension on the exterior perimeter. The plastic panel 48 is laminated to the top of the plate. An open-ended U-shaped guard element 49 is inserted over the end of the plastic panel 48 and under the external flange 47 and bent upwardly to parallel the wedge shape of the external flange so that the guard element cannot easily slide off. It may be additionally secured with adhesive. In Fig. 6, a standard I-beam 51 is provided with a top plate 52 to which is laminated the plastic panel 53 without additional elements. In Fig. 7, the peripheral beam 54 has only a top internal flange 56 to which is laminated the plastic panel 57.

In Fig. 8 there is shown another modified peripheral beam 58 which is essentially C-shaped with a base flange 59 extending outwardly to form the base of the skylight. The vertical member 61 is provided with a top internal flange 62 and a bottom internal flange 63, each of which have a rib 64 at the end facing the other rib. The internal beams 66 are simple I-beams. Plastic panels 67, 67 are laminated to the beams as shown in previous units. The base flange 59 is shown laying on the roof 68 near the skylight opening 69. If the roof is provided with a curb, the outer portion of flange 59 may extend downwardly.

Figs. 9 and 10 show a separately formed double and spaced panel unit 71 that is subsequently mounted in a separate frame. The mounting frames of both units are the same except for the base element that rests on the flat roof or curb. The peripheral I-beams 72 and the interior beams 73 have the same cross-section and are provided with top T-bars 74 and bottom T-bars 76, bath T-bars being provided with grooves 77, 77. The interior beams are notched to form ears 78 to interlock with the grooves 77. Plastic panels 79, 79 are laminated to the I-beam grid to make a separate unit.

In Fig. 9 is shown an upside-down right angle base member 81 which serves as the base member for the skylight in case of a curb 85 and is attached thereto by a series of screws 82. The base member has a depending flange 83 and a horizontal flange 84 provided at its interior end with a small upturned ear 86. The horizontal flange is also provided with an upwardly extending channel member 87 which is provided at spaced intervals with weep holes 116.

In Fig. 10 the base member 88 forms an artificial curb which extends above the roof and below the double and spaced panel unit 71. The base member is provided with a horizontal base flange 89, a vertical flange 91 extending upwardly from a point intermediate the ends of the base flange, and a horizontal support flange 92 extending inwardly from the top of the vertical flange 91. The horizontal support flange is provided at one end with an upwardly extending channel member 93 which is provided at spaced intervals with weep holes 117, a small upturned ear 94 at the other end, and a pair of downwardly extending flanges 96, 96 below to form a channel therebetween. The horizontal base flange 89 has an associated pair of upwardly extending flanges 97, 97 to form a channel and a panel 98 is held in place by and between these channels to form a hollow artificial curb space which is normally filled with insulation 99.

The light transmitting unit 71 is positioned on horizontal flange 84 in Fig. 9 and support flange 92 in Fig. 10 with adhesive 101 underneath the periphery of the unit and resting against the respective ears 86 and 94 to form a tight seal. The retaining member 102 is the same in both modifications and includes a top inwardly extending horizontal flange 103 that fits around the entire top peripheral edge of the light transmitting unit 71 and is secured thereto by adhesive 104. A vertical member 106 depends from the top flange to a point intermediate the vertical extent of the light transmission unit. A horizontal base member 107 extends outwardly from the bottom of the vertical member 106 and is provided with a depending flange 108 at its outer end and a series of openings 109 at spaced intervals in alignment with the channel members 87 or 93 to permit bolts 111 to pass through the openings and be secured into channel member 87 or 93 to pull the retaining member downwardly and to hold it into position. The channel members may be previously threaded at the proper points or a machine screw may be used to cut its own threads in the channel members. The horizontal base member 107 is provided with an upwardly and inwardly extending gutter 112 inside the vertical member 106. Weep holes 113 are provided at spaced intervals at the bottom of the vertical member 106 to collect possible seepage.

The light transmission panels shown herein may be made of glass, plastic, or any other diaphanous, i.e., transparent or translucent, material used in skylight construction and we prefer to use a polyester, light stabilized, thermosetting resin that is reinforced with fiberglass. This material can be easily colored if desired, is practically unbreakable, has an excellent insulation value, and transmits a high percentage of light in a diffused state. Moreover, the material can be easily cut or sawed and adheres readily to metal with adhesives.

The metal framework shown herein is generally very satisfactory if made from aluminum extrusions because they are light in weight, fairly easy to cut or saw, and have good strength for this purpose. However, other metals and materials are considered within the scope of our invention.

Various I-beams or similar structures have been shown to form the gridwork for supporting the laminated light transmission panels. Fig. 6 shows a conventional I-beam, Figs. 9 and 10, I-beams with T-bars, Figs. 7 and 8, beams with flanges extending only from one side, Fig. 5. I-beam with a wedge on one side of the plate, and Figs. 2 and 3, an intermediate plate or flange extending to one side only. It will be appreciated that various combinations are possible with these various modifications and within the scope of our invention. Thus middle flanges, T-bars, wedgeshape, one-sided flanges, etc., may be combined with the modifications on which the particular feature is not now shown. The same holds true for the mounting arrangements for a curb or on a flat roof.

Serrations have been shown on the adhering surfaces of most of the I-beams to hold the adhesive after pressure is applied to the plastic panel. This only serves to cause better adhesion but is not considered a necessary feature of our invention.

Almost any design or pattern can be formed in the framework of I-beams instead of the M shown in Fig. 1. These designs may be formed by inserting light transmitting colored materials, e.g., thin transparent plastic films. In addition, a translucent or opaque material in selected compartments will create a design by casting a

shadow, although not a colored one, and is considered within the scope of our invention.

We claim:

1. A skylight comprising a frame formed of longitudinally extending peripheral extruded I-beams, said peripheral beams being provided with a top plate, a bottom plate, a substantial base flange extending outwardly from the bottom plate, and an internally extending flange midway between the said top and bottom plate; spanning extruded I-beams extending parallel to each other and transversely across said frame, said spanning beams being provided with a top plate, a bottom plate, a cross-bar slightly above the vertical mid-point of said spanning I-beam so as to fit just above the internally extending flange of said peripheral flange, and notches interlocked with said top and bottom plates and middle flange of said peripheral I-beams; short extruded I-beams extending parallel to each other and transversely of said spanning I-beams, said short I-beams being provided with top plates, bottom plates and notches interlocked with said top and bottom plates and internal flange of said peripheral flanges and said top and bottom plates and said cross-bar of said spanning flanges; said top plates of said I-beams all being on the same top plane and said bottom plates of said I-beams all being in the same bottom plane generally parallel to said top plane; and a

diaphanous light transmitting panel secured to each group of said plates.

2. A skylight as calimed in claim 1 wherein said short I-beams are additionally provided with cross-bars slightly below the vertical mid-point of said short I-beam that just fit under the internal mid-flange of said peripheral flange.

3. A skylight as claimed in claim 1 wherein said peripheral I-beams are additionally provided with an integral locking flange extending from and above said top plate that is deformable into position immediately over the top and edge of the associated panel to secure it in position.

4. A skylight as claimed in claim 1 wherein selective compartments formed by said short I-beams contain material to transmit colored light only.

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