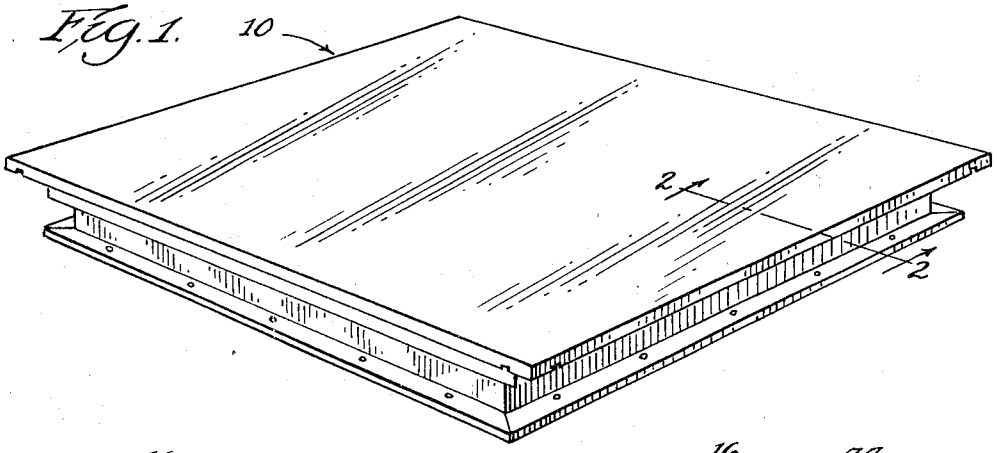
April 29, 1969 D. E. HELMA 3,440,779

SKYLIGHT

Filed Oct. 2, 1967 Sheet 1 of 2

Fig. 1.



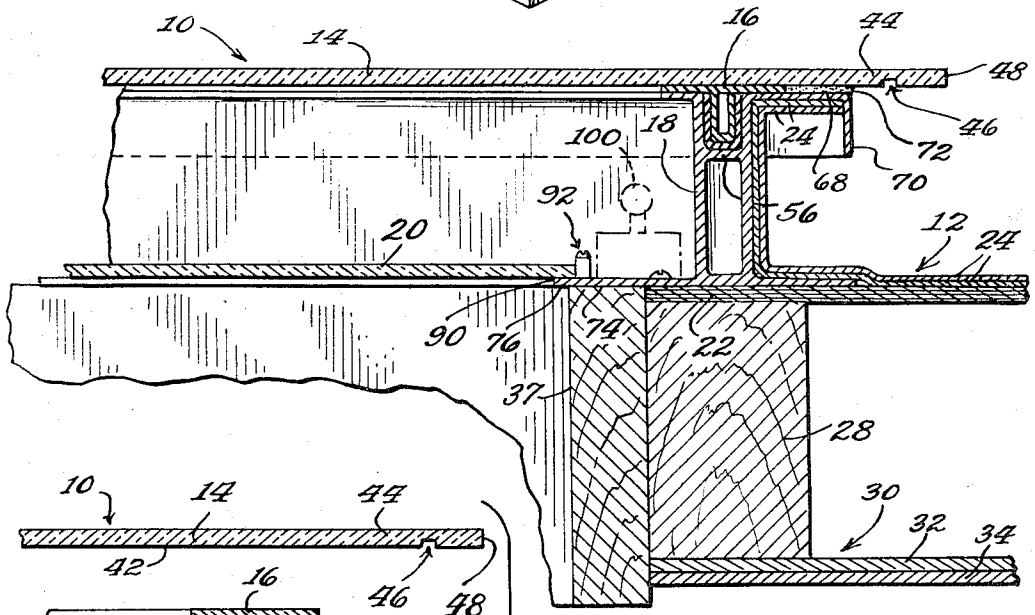


Fig. 2.

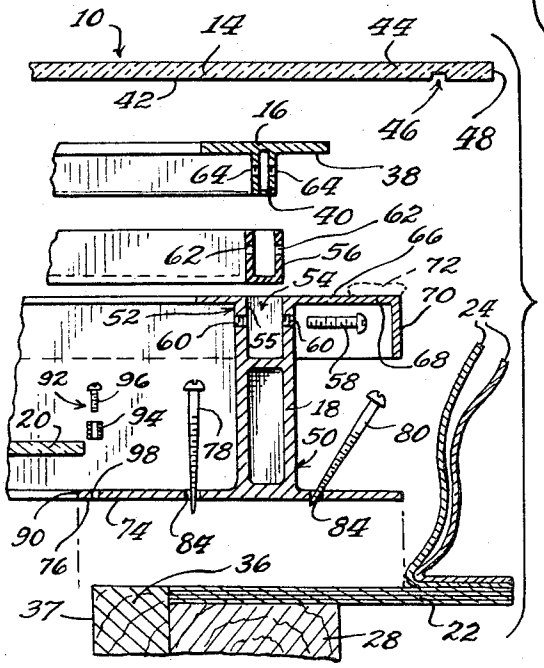


Fig. 4.

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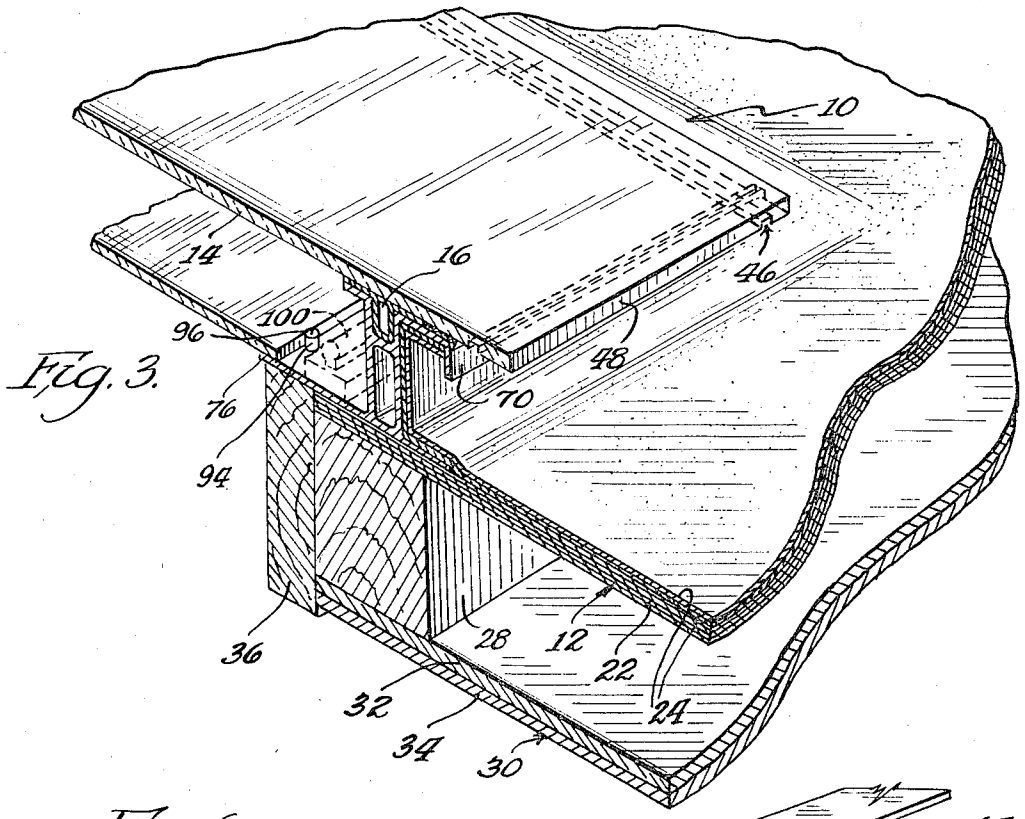


Fig. 3.

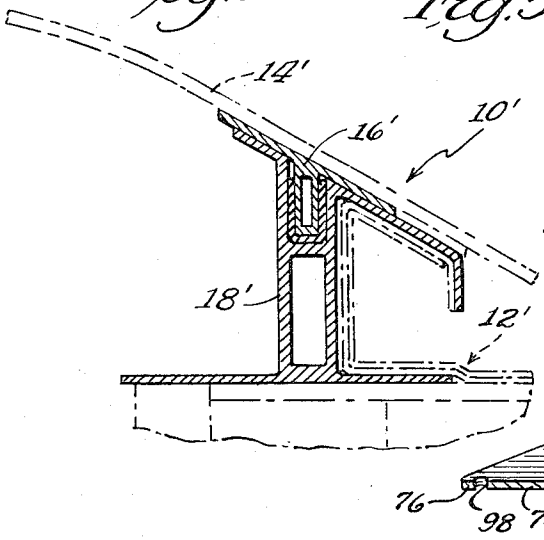


Fig. 6.

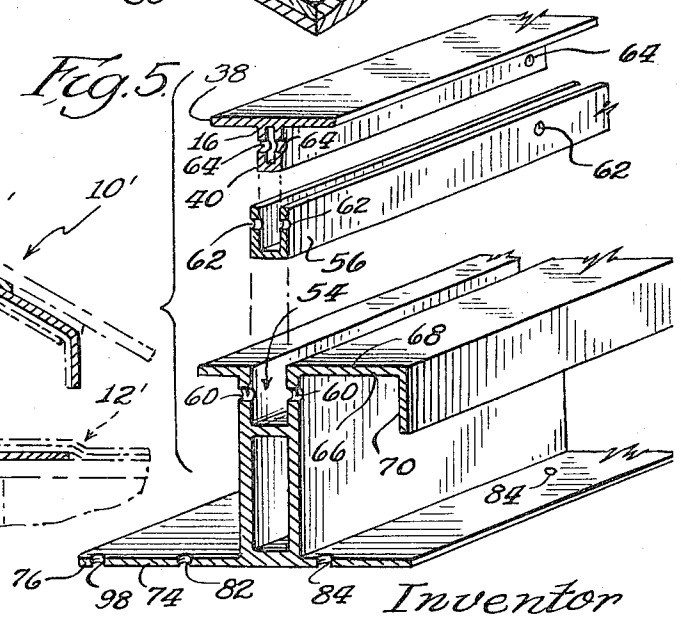


Fig. 5.

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SKYLIGHT

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U.S. Cl. 52—97 10 Claims

ABSTRACT OF THE DISCLOSURE

A skylight characterized by an improved edge construction in which a depending portion of a first frame member is received by a recessed receiving portion of a second frame member.

Background of the invention

This invention relates to a skylight which is characterized by an improved edge construction.

In the building arts, it is conventional for a skylight to comprise a number of totally or partly disassembled component parts which must be assembled as the skylight is installed on a roof. In such a skylight, the edge construction is particularly important. The edge construction should be effective for securely holding the glass or plastic light-transmitting sheet members of the skylight, and for withstanding attacks by the forces of weather. It should be adapted for simple assembly and installation, and for simple disassembly for repairs such as replacement of the glass or plastic light-transmitting parts of the skylight. The component parts of the edge construction should be uncomplicated and should be adapted to simple and inexpensive fabrication techniques such as extrusion.

Summary

It is the object of this invention to provide a skylight which is characterized by an improved edge construction.

In a skylight which embodies the principles of this invention, the improved edge construction is characterized principally by interfitting first and second frame members. The first frame member has a sheet-supporting portion, which is affixed to a light-transmitting outside sheet member, and a depending portion, which depends from the sheet-supporting portion. The sheet supporting portion may comprise a flange which is affixed to the underside of the light-transmitting outside sheet member. The second frame member has a base portion, which is adapted to be mounted fixedly to a roof adjacent to a skylight opening in the roof, and a receiving portion, which is adapted to receive the depending portion of the first frame member such that the first and second frame members interfit. The base portion may comprise a flange which is adapted to rest upon and to be mounted fixedly to the roof adjacent to the skylight opening. The flange of the base portion may be adapted to support a light-transmitting inside sheet member. The receiving portion may embody a recess which is adapted to receive the depending portion of the first frame member. The recess may comprise a channel which is adapted to receive the depending portion of the first frame member. Resilient means at least partly lining the recess may be provided for seating the depending portion of the first frame member within the recess.

It is one feature of this invention that each frame member may be fabricated by extrusion. Aluminum stock or other suitable stock may be used for the extrusions.

It is another feature of this invention that the cross-section of each frame member is regular along the entire periphery of the skylight. Accordingly, to form continuous unitary rectangular frame members, straight frame pieces may be joined together at right angles, in any suitable manner, such as by welding mitered pieces.

It is another feature of this invention that the frame members interfit along the entire periphery of the skylight.

It is another feature of this invention that the interfitting frame members may be removably locked together in a suitable manner such as by means of screws.

It is another feature of this invention that the outside sheet member and the first frame member may be removed easily from the second frame member to facilitate replacement of the outside sheet member or other repairs.

It is another feature of this invention that the flange portion of the first frame member may be affixed to the underside of the outside sheet member by means of a suitable adhesive sealant, such as a silicone sealant, which is capable of securely bonding together materials having different thermal expansion coefficients.

It is another feature of this invention that the resilient means for seating the stem portion of the first frame member within the recess resiliently deforms to a certain extent to allow and compensate for a certain amount of relative displacement of the interfitting frame members due to thermal expansion, warpage, or some other cause.

These and other objects, features, and advantages of this invention will be evident from the detailed description to follow.

In order to acquaint those skilled in the art with the manner of practicing this invention, a presently preferred embodiment of this invention will be described with the aid of the annexed drawings.

Brief description of the drawings

FIGURE 1 is a top perspective view of a skylight which embodies the principles of this invention.

FIGURE 2 is a fragmentary sectional view, which is taken substantially along the section line 2—2 of FIGURE 1, showing in vertical section the skylight of FIGURE 1 installed on a roof of the built-up type.

FIGURE 3 is a fragmentary sectional view, which also is taken substantially along the section line 2—2 of FIGURE 1, showing in section in top perspective the skylight and roof shown in FIGURE 2.

FIGURE 4 is a fragmentary sectional view, which is similar to FIGURE 2, showing in vertical section the skylight and roof shown in FIGURE 2 and further showing the screws employed in assembling and installing the skylight, with certain elements in exploded relationship.

FIGURE 5 is a fragmentary detail from FIGURE 4, showing in top perspective portions of the edge construction of the skylight shown in FIGURE 4, with the elements in exploded relationship.

FIGURE 6 is a fragmentary sectional view, which is analogous to FIGURE 2, showing a possible modification within the scope of this invention.

Description of the preferred embodiment

FIGURE 1 illustrates a skylight **10** which embodies the principles of this invention. The structure of the skylight **10** is regular along the entire periphery of the sky-

light 10; thus the structure shown in FIGURE 2 through 5 typifies the structure along the entire periphery of the skylight 10. As shown in FIGURES 2 through 5, the skylight 10, which is a non-ventilating skylight, generally comprises a light-transmitting outside sheet member 14, a first frame member 16, a second frame member 18, and a light-transmitting inside sheet member 20. The skylight 10 is installed on a roof 12 of the built-up type.

The built-up roof 12 on which the skylight 10 is installed, is an example of one of a number of types of differently constructed roofs which may be used with skylights that embody the principles of this invention. As shown, the roof 12 is either horizontal or gently sloping. It generally comprises at least one layer of sheathing 22, which may be made of exterior plywood, and multiple layers of roofing felt 24 or similar material, which are cemented together and to the sheathing 22 by means of a bituminous cement (not shown) or some other suitable substance. In addition, gravel (not shown) or similar filler may be spread either over the roofing felt 24 or over an intermediate paving layer (not shown) of a bituminous substance or some similar material, in accordance with conventional roofing practices.

A structural curb 28, which may be made of wood, is mounted in any suitable manner to the underside of the sheathing 22. A ceiling 30 is suspended in any suitable manner from the underside of the structural curb 28. The ceiling 30 which is shown is an example of one of a number of types of differently constructed ceilings which may be used with skylights that embody the principles of this invention. As shown, the ceiling 30 comprises two layers of sheathing 32 and 34, which may be made of plasterboard or some other suitable material. A finishing curb 36, which may be made of finished wood, is mounted in any suitable manner to the structural curb 28 so as to conceal the butt ends of the roof sheathing 22 and of the ceiling 30. The finishing curb 36 serves to outline a skylight opening 37 in the roof 12 and the ceiling 30, as will be understood. For the purposes of this disclosure, the curbs 28 and 36 are considered to be parts of the roof 12.

The frame members 16 and 18 preferably are continuous unitary frame members which correspond in outline to the skylight opening 37. A rectangular outline, such as is shown, is preferred; this permits the frame members 16 and 18 to be extruded as straight pieces which may be mitered and welded or otherwise joined at right angled corners, so as to form continuous unitary frame members. The formation of these corners may be accomplished in any known manner, and therefore need not and will not be illustrated or further described herein. It should be understood that the principles of this invention may be embodied in skylights designed to fit circular or otherwise non-rectangular skylight openings.

The light-transmitting sheet members 14 and 20 preferably are continuous flat sheets of laminated, heat-resistant, safety plate glass. Continuous sheets are preferred over sheets which comprise multiple panes. Flat sheet members are preferred over sheet members which have a bubble shape, a dome shape, or some other shape which is not flat. Plate glass of the specified type is preferred over other glass materials or plastic materials. The sheet members 14 and 20 may be clear, tinted, white, opalescent, or otherwise light-transmitting.

The first frame member 16, which is generally T-shaped in cross section, has a sheet-supporting flange portion 38 and a depending portion 40 which depends from and is integral with the flange portion 38. The first frame member 16 is affixed upon its flange portion 38 to the underside 42 of the outside sheet member 14, allowing a portion 44 of the outside sheet member 14 to extend beyond the flange portion 38 of the first frame member 16. The first frame member 16 may be affixed to the outside sheet member 14 in any suitable manner, such as by means of a suitable adhesive means, such as a silicone sealer, which is capable of securely bonding together glass and aluminum or other dissimilar materials having different thermal expansion characteristics. Conventional, downwardly directed drip-directing groove means 46, which tends to promote localized dripping of rainwater or condensation, is provided in the underside 42 of the extended portion 44 of the outside sheet member 14, beyond the flange portion 38 of the first frame member 16 and adjacent and parallel to each edge 48 thereof.

The second frame member 18, which is generally columnar in cross-section, has a base portion 50, which is adapted to be mounted fixedly to the roof 12 adjacent to the skylight opening 37, and a receiving portion 52, which is adapted to receive the depending portion 40 of the first frame member 16.

The receiving portion 52 of the second frame member 18 embodies a longitudinally extending recess 54, which comprises a three-sided channel 55, and which is at least partly lined by resilient means 56. The resilient means 56, which may be formed of neoprene or of some other suitable material, is provided for seating the depending portion 40 of the first frame member 16 within the recess 54. The resilient means 56 provides a weather-tight seal between the frame members 16 and 18, and allows and compensates for a certain amount of relative displacement of the frame members 16 and 18 such as may occur due to thermal expansion, warpage, or some other cause. The depending portion 40 of the first frame member 16 is removably locked in place within the recess 54 in any suitable manner, such as by means of a plurality of self-tapping screws 58. The screws 58 threadably engage suitable apertures 60 in the receiving portion 52 of the second frame member 18, pass through suitable apertures 62 in the resilient means 56, and threadably engage suitable apertures 64 in the stem portion 40 of the first frame member 16. The screws 58 are spaced regularly about the frame members 16 and 18. The second frame member 18 has a flange 66 extending from its receiving portion 52 and supporting the underside of the flanged portion 38 of the first frame member 16. The flange 66 has an extension 68, which extends beyond the flanged portion 38 of the first frame member 16, and a depending lip 70, which depends from the extension 68 of the flange 66 and forms flashing directed generally toward the roof 12 and away from the light-transmitting outside sheet member 14. The space which is beyond the flanged portion 38 of the first frame member 16 and between the extension 68 and the outside sheet member 14 is filled by weatherproof putty 72 or some other suitable sealing means. This putty 72 or other sealing means serves to protect the bond between the underside 42 of the outside sheet member 14 and the flange portion 38 of the first frame member 14.

The base portion 59 of the second frame member 18 may be mounted to the roof 12 in any suitable manner. As shown, the base portion 50 of the second frame member 18 is formed with a flange 74 which is adapted to rest upon and be mounted to the roof 12. At least some of the multiple layers of roofing felt 24 having been folded back temporarily, as shown in FIGURE 3, the flange 74 is positioned over the finishing curb 36 and the sheathing 22 with an inner edge portion 76 of the flange 74 overhanging the finishing curb 36. A plurality of wood screws 78 on the inner side and a plurality of wood screws 80 on the outer side are provided for fastening the second frame member 18 in place; these screws 78 and 80 pass through suitable apertures 82 and 84, respectively, in the flange 74, and are threadably anchored in the sheathing 22 and the structural curb 28. The screws 80 may be canted over, as shown in FIGURE 4, in order to facilitate the use of hand tools in installing the second frame member 18. After the second frame member 18 has been fastened in place by means of the screws 78 and 80, the multiple layers of roofing felt 24, which have been folded back temporarily, may be cemented

together and to the second frame member as far as the depending lip or the flashing **70**, as shown in FIGURES 2 and 3, by means of the bituminous cement or other substance which is used elsewhere to cement the roofing felt **24**. The depending lip or the flashing **70** protects the cemented edges of the roofing felt **24** from the forces of weather. The roofing felt **24** provides a weatherproof seal between the second frame member **18** and the sheathing **22**. To augment this seal, one or more underlying layers of roofing felt (not shown) may be cemented between the flange **74** and the sheathing **22** before the second frame member is fastened in place.

The inner edge portion **76** of the flange **74** serves to support the light-transmitting inside sheet member **20**, which should be of such expansiveness as to cover and slightly overhang the opening **90** that is framed by the inner edge portion **76** of the flange **74**. If it is substantially horizontal when it is in place, and if it is not to be subjected to disturbances that would tend to cause it to slide, the inside sheet member **20** may simply be rested in place upon the inner edge portion **76** of the flange **94**. Otherwise, and in any case, additional holding means **92** may be provided. As shown, each of the holding means **92** comprises a collar **94** which is employed over a self-tapping screw **96** threadably engaging a suitable aperture **98** in the flange **74**. The holding means **92** may be spaced regularly along the periphery of the inside sheet member **20**.

The inside sheet member **20** may be omitted in simplified forms of the skylight **10**. However, its inclusion results in the creation of a heat-insulative dead-air space between the outside and inside sheet members **14** and **20**. Also, the inside sheet member **20** serves as a base which is more convenient than the outside sheet member **14** for the application of sun-shading media, or decorative media (not shown) such as color transparencies or diffraction grating means.

It may be convenient to provide within the skylight **10** artificial lighting means, such as the fluorescent lighting means **100** which is shown in phantom lines in FIGURES 2 and 3; as shown, the flange **74** provides a convenient situs for locating such artificial lighting means.

The skylight **10** is assembled and installed as follows: the layers of roofing felt **24** are peeled back; the second frame member **18** is fastened in place on the sheathing **22** and on the finishing curb **36** by means of the screws **78** and **80**; the inside sheet member is lowered into place, and, the outside sheet member **14** having been affixed to the sheet-supporting flange portion **38** of the first frame member **16** and the resilient means **56** having been fitted within the recess **54**, the depending portion **40** of the first frame member **16** is fastened in place in the recess **54** in the receiving portion **52** of the second frame member **18** by means of the screws **58**; and the layers of roofing felt **24** are cemented in place. Removal of the screws **58** allows the stem portion **40** of the first frame member **16** to be removed from the recess **54** of the receiving portion **52** of the second frame member **18** for replacement of the inside or outside sheet members **14** or **20** or for other repairs.

FIGURE 6 illustrates the modified construction of a skylight, which embodies the principles of the invention, in which a generally pyramidal or hip-roofed outside sheet member may be used in place of a flat sheet member. In FIGURE 6, the reference numbers with primes are applied to elements and features which are similar to like-numbered elements and features shown in the preceding figures, and a non-flat outside sheet member **14'** is shown in phantom lines.

Other modifications and improvements within the scope of this invention will be suggested by this disclosure to those skilled in the art.

What is claimed is:

1. In a skylight which is adapted to be mounted to a roof so as to cover a skylight opening in the roof, the combination comprising a light-transmitting outside sheet member, a first frame member having a sheet-supporting portion which is affixed to the light-transmitting outside sheet member and having a depending portion which depends from the sheet-supporting portion, and a second frame member having a base portion which is adapted to be mounted fixedly to the roof adjacent to the skylight opening and having a receiving portion which is adapted to receive the depending portion of the first frame member such that the first and second frame members interfit, the depending portion of the first frame member being received by the receiving portion of the second frame member, the second frame member having an upper flange extending from its receiving portion, the upper flange having a depending lip forming flashing which is directed generally toward the roof and away from the light-transmitting outside sheet member.

2. The combination of claim **1** wherein the base portion of the second frame member comprises a lower flange which is adapted to rest upon and to be mounted fixedly to the roof adjacent to the skylight opening.

3. The combination of claim **2** further comprising a light-transmitting inside sheet member which is supported by the lower flange of the second frame member.

4. The combination of claim **1** wherein the receiving portion of the second frame member embodies a recess which is adapted to receive the depending portion of the first frame member such that the first and second frame members interfit, the depending portion of the first frame member being received by the recess.

5. The combination of claim **4** further comprising resilient means at least partly lining the recess for seating the depending portion of the first frame member within the recess.

6. The combination of claim **1** wherein the sheet-supporting portion of the first frame member comprises a flange which is affixed to the underside of the light-transmitting outside sheet member.

7. The combination of claim **6** wherein the light-transmitting outside sheet member extends beyond the flange of the first frame member and has drip-directing groove means formed on its underside beyond the flange of the first frame member.

8. In a skylight which is adapted to be mounted to a roof so as to cover a skylight opening in the roof, the combination comprising a light-transmitting outside sheet member having an underside which faces inwardly with respect to the roof, a first frame member having a sheet-supporting portion which is affixed to the light-transmitting outside sheet member and having a depending portion which depends from the sheet-supporting portion, and a second frame member having a base portion which is adapted to be mounted fixedly to the roof adjacent to the skylight opening and having a receiving portion which is adapted to receive the depending portion of the first frame member such that the first and second frame members interfit, the depending portion of the first frame member being received by the receiving portion of the second frame member, the sheet-supporting portion of the first frame member comprising a flange which is affixed to the underside of the light-transmitting outside sheet member, the second frame member having an upper flange extending from its receiving portion and supporting the flange of the first frame member, the upper flange of the second frame member having a depending lip forming flashing which is directed generally toward the roof and away from the light-transmitting outside sheet member.

9. The combination of claim **8** wherein the upper flange of the second frame member extends beyond the flange of the first frame member, the combination further comprising deformable sealing means which is applied beyond the flange of the first frame member between the upper flange of the second frame member and the underside of the light-transmitting outside sheet member.

10. In a skylight which is adapted to a roof so as to

cover a skylight opening in the roof, the combination comprising a light-transmitting outside sheet member having an underside which faces inwardly with respect to the roof, a first frame member having a sheet-supporting flange portion which is affixed to the underside of the light-transmitting outside sheet member and having a depending portion which depends from the sheet-supporting flange portion, and a second frame member having a base portion which comprises a lower flange adapted to rest upon and to be mounted fixedly to the roof adjacent to the skylight opening and having a receiving portion which embodies a channel adapted to receive the depending portion of the first frame member such that the first and second frame members interfit, the depending portion of the first frame member being received by the channel, the second frame member having an upper flange extending from its receiving portion and supporting the sheet-supporting flange portion of the first frame member, the upper flange of the second flange member having a depending lip forming flashing which is directed generally

toward the roof and away from the light-transmitting outside sheet member.

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U.S. Cl. X.R.

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