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Cummings

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[54] **SKYLIGHT ASSEMBLY**

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Related U.S. Patent Documents

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Filed: **Apr. 30, 1985**

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[52] **U.S. Cl.** **52/200;** 52/72

[58] **Field of Search** 52/22, 72, 200, 204, 52/207, 213, 397

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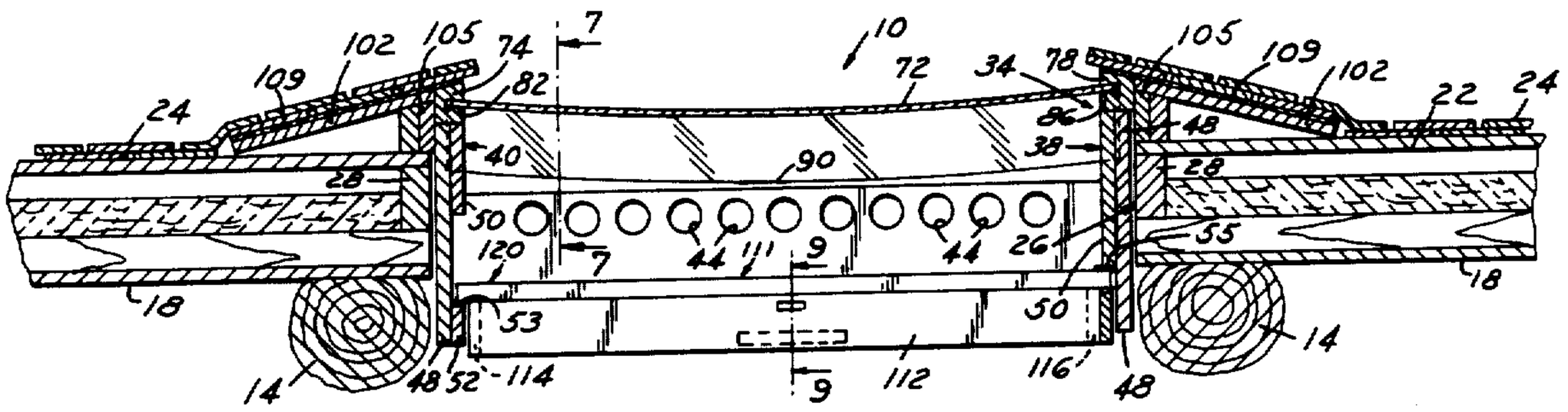
Primary Examiner—Richard E. Chilcot, Jr.
Attorney, Agent, or Firm—Ralph M. Burton

[57] **ABSTRACT**

A skylight assembly for a sloping roof is mounted so that the upper end may be tucked beneath the roof covering so that rain water will drain onto an outer skylight panel; the panel is concave and its lower end extends over the roof covering so that rain water will drain from the panel onto such covering; within and beneath the skylight there is an inner skylight panel mounted for movement to permit ventilation of the room beneath.

19 Claims, 5 Drawing Sheets



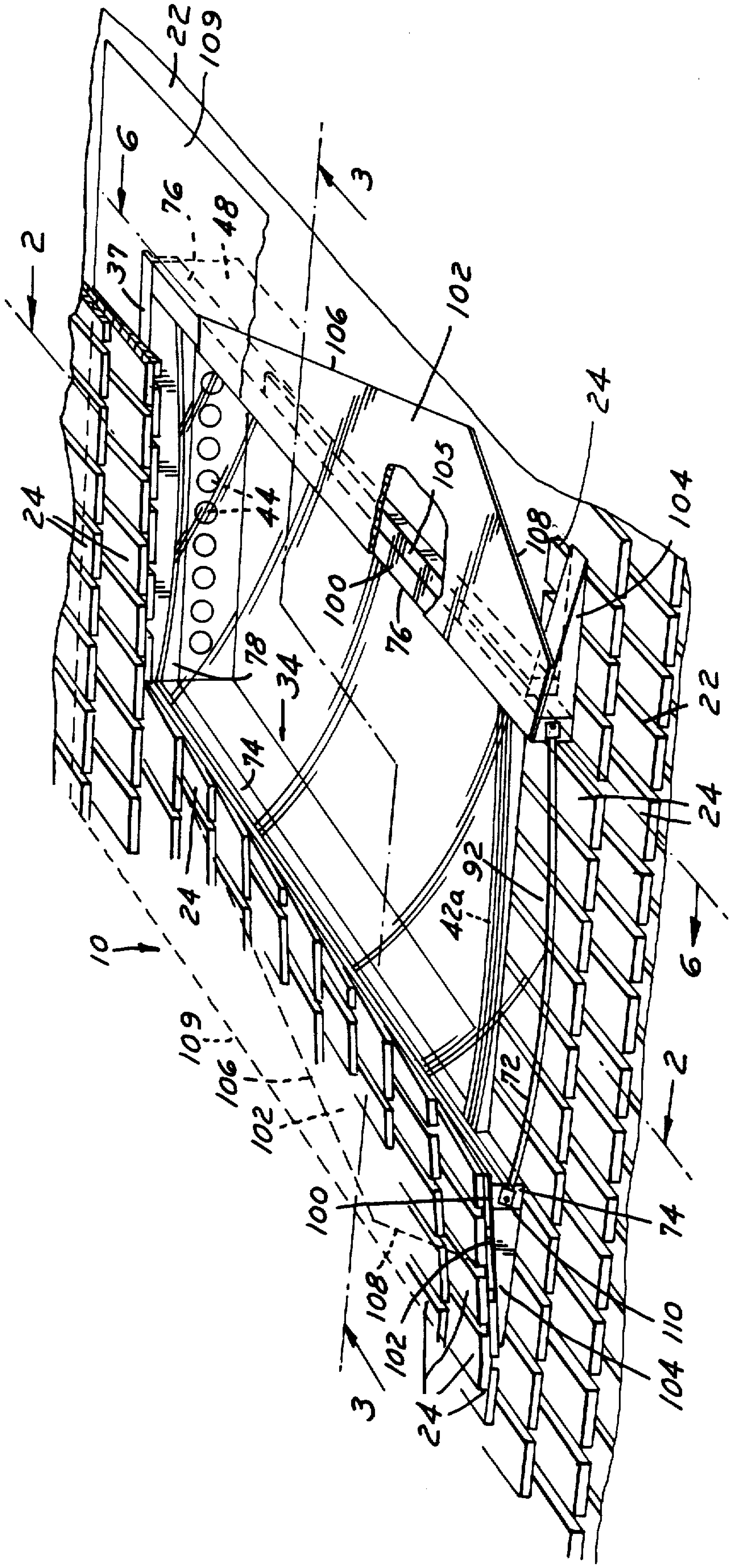

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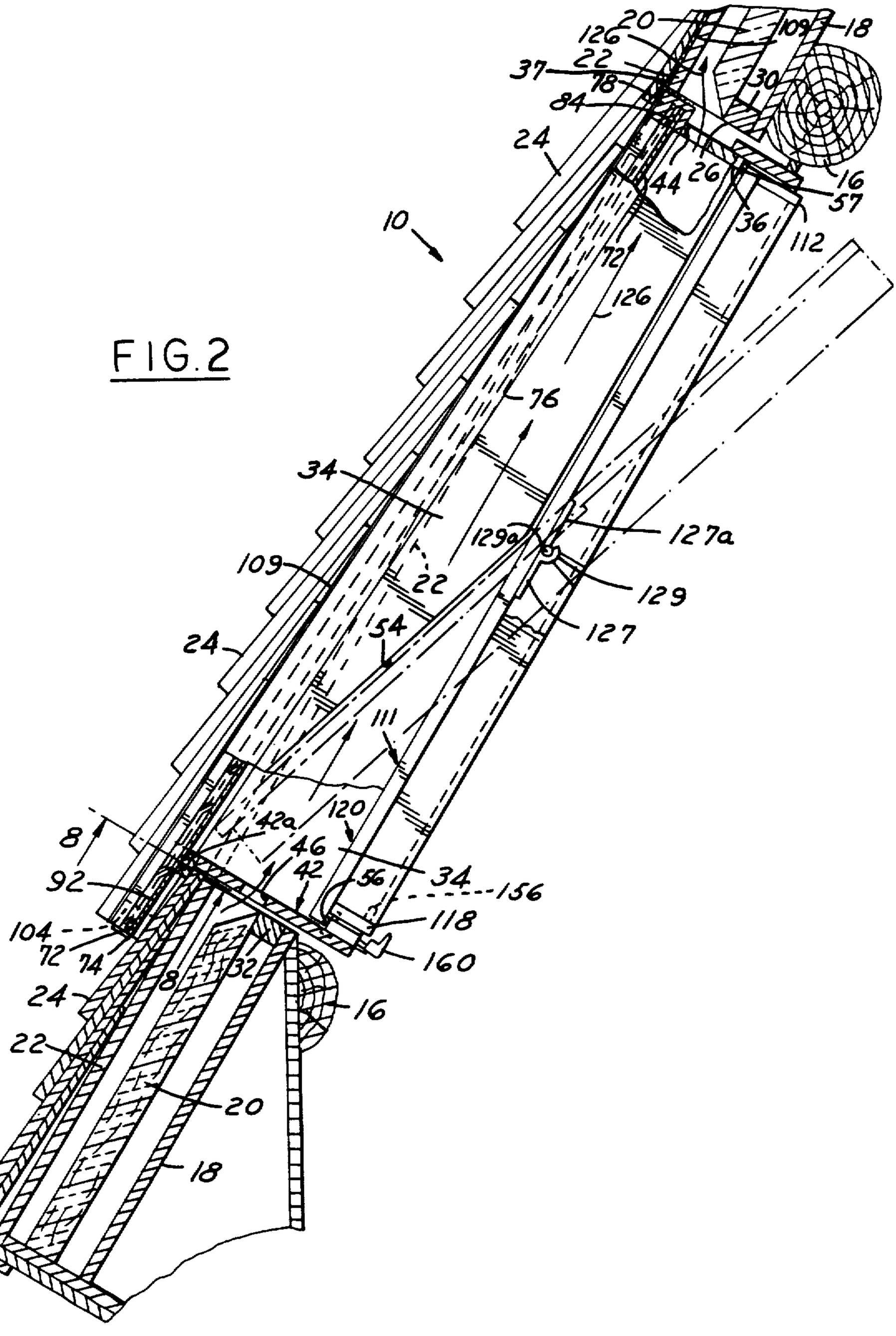
FIG. 1

FIG. 2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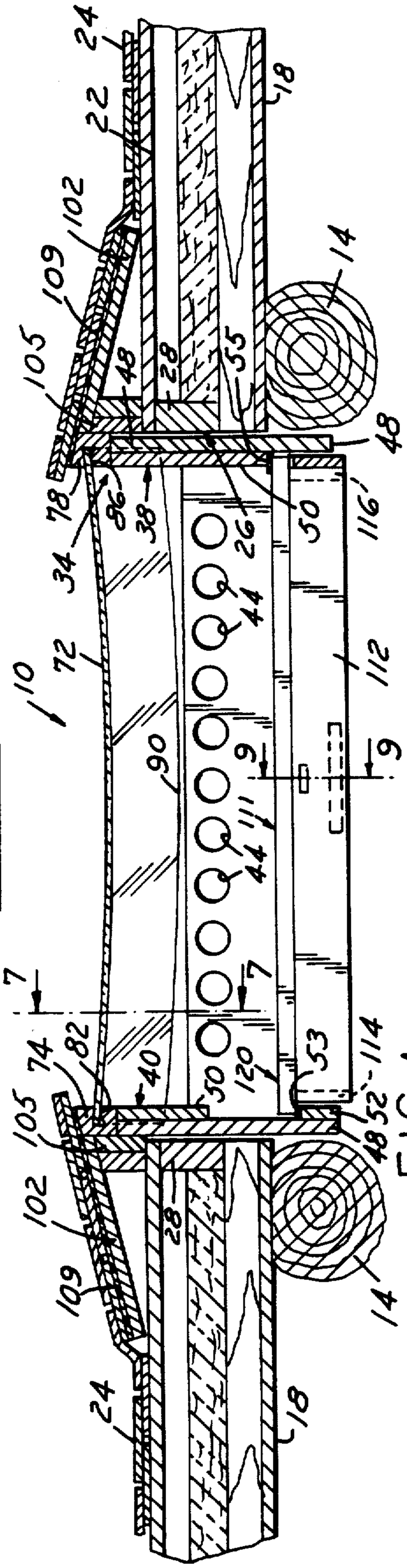


FIG.3

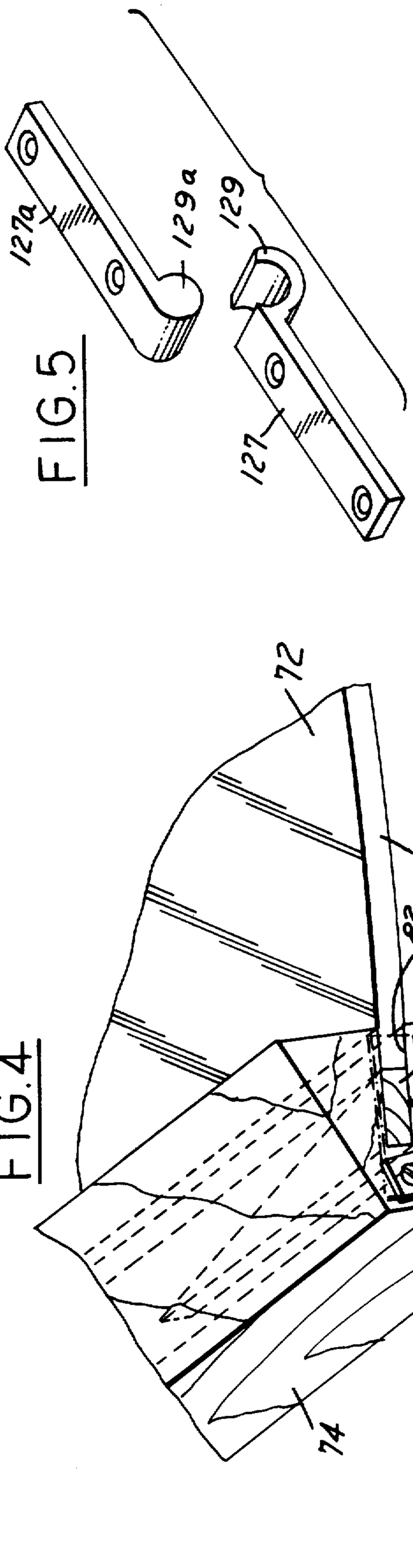


FIG.5

FIG.4

FIG. 6

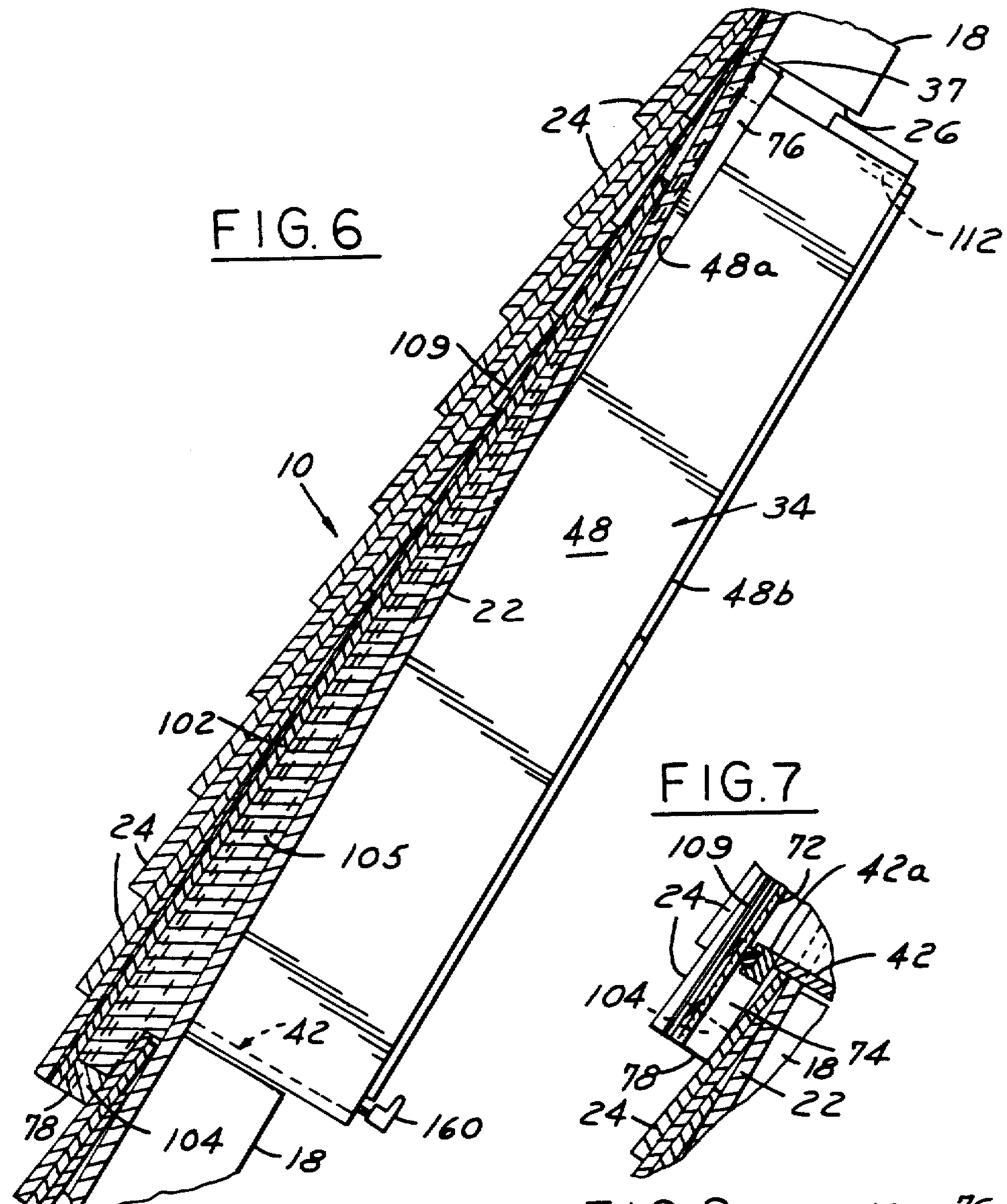


FIG. 7

FIG. 8

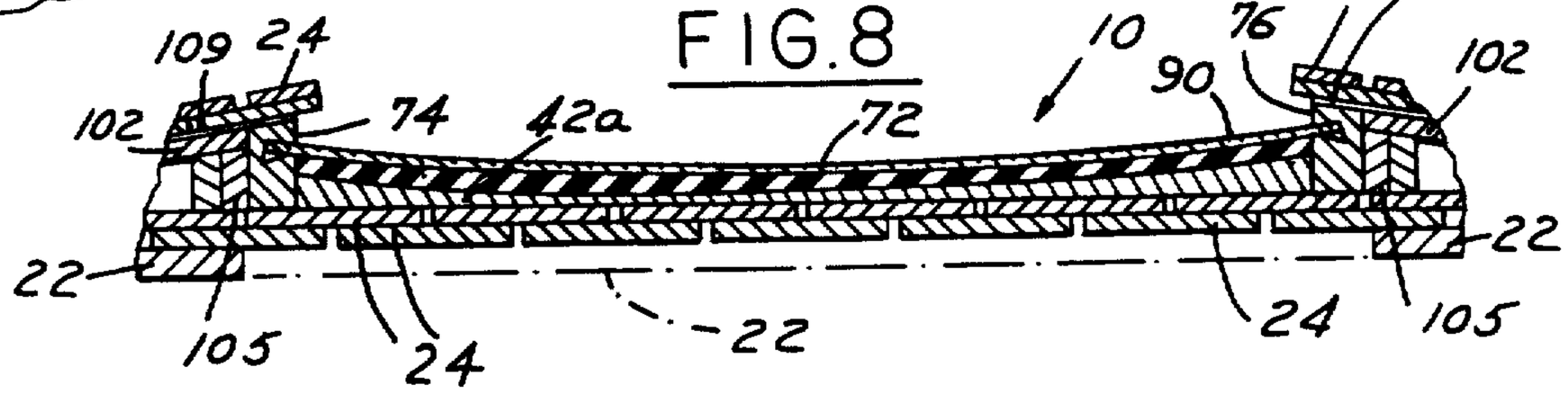
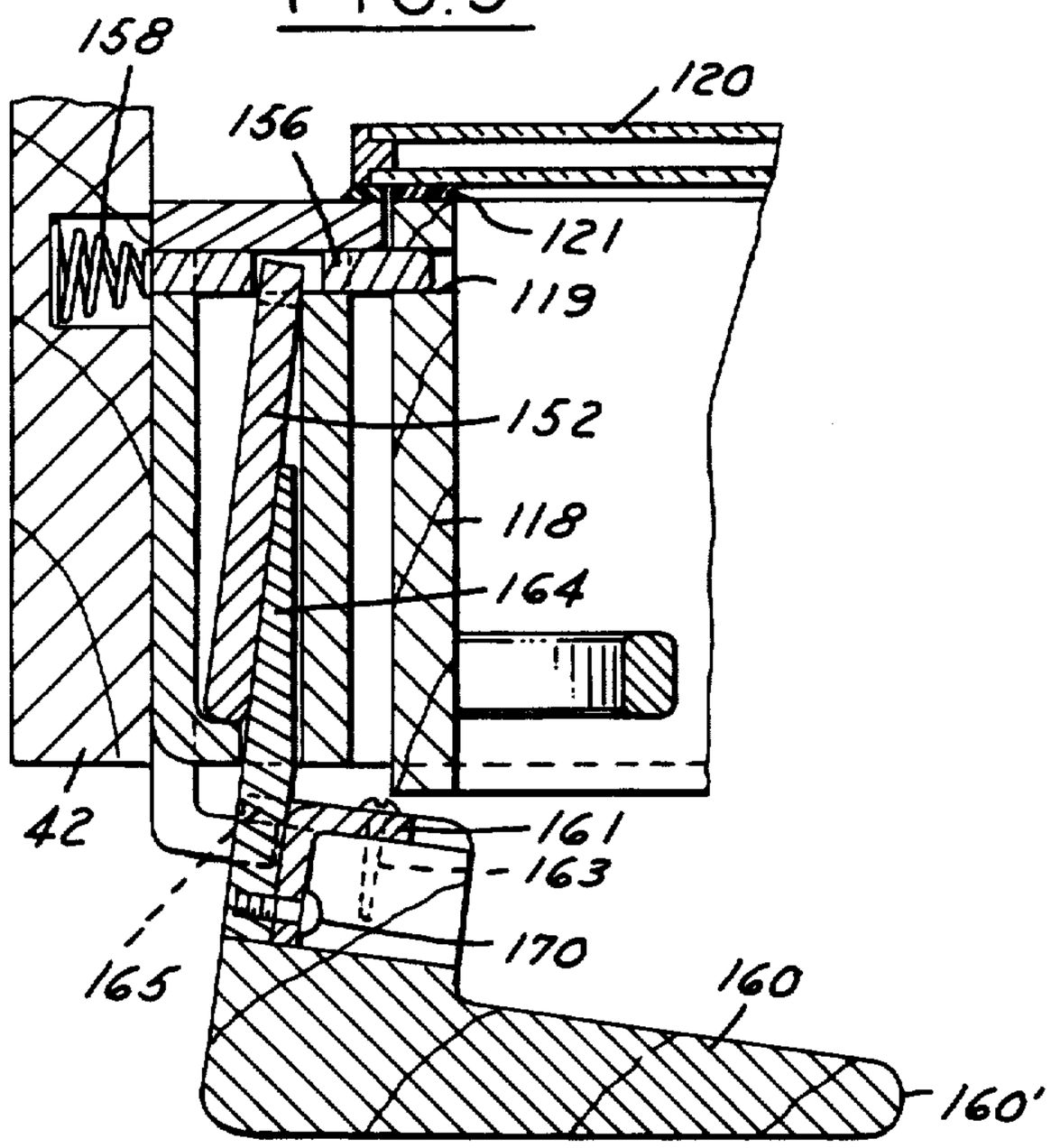


FIG. 9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120
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152
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164
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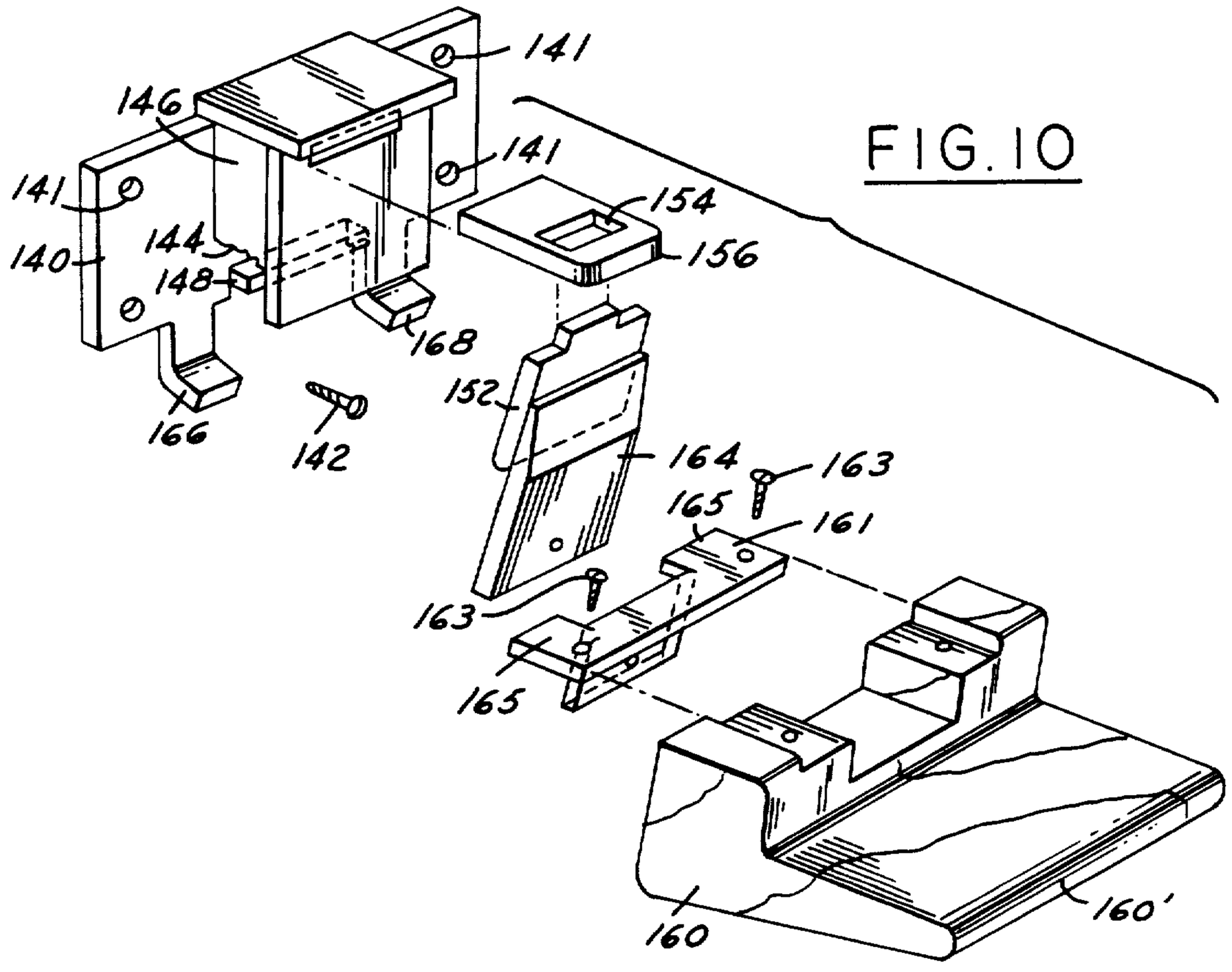
160'

FIG. 10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SKYLIGHT ASSEMBLY

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

DESCRIPTION

1. Field of Invention

This invention relates to a skylight assembly for a sloping roof.

2. Background of Invention

In providing a skylight for sloping roofs, there have been long-standing problems in making the skylight weather-tight at the joints with the roof, in particular, preventing water from leaking along the edges of the skylight into the room below. In addition, there has been a need to provide a skylight construction which will enable it to be readily installed in an existing roof in an expeditious manner and which will be weather-tight when the installation is completed.

There has also been a need to provide a skylight in which the skylight panel could be readily replaced in the event of its damage. In addition, there has been a need to provide a skylight design which would enable the skylight panel to admit light to the room below while at the same time insulating the panel to prevent heat losses therethrough. In addition, there has been the need to provide a skylight which will not be readily frosted by humidity within the room below, but which will be kept clear thereof by natural drafts within the building structure.

SUMMARY OF THE INVENTION

I have developed a skylight assembly which may be readily insulated in an existing roof structure in an expeditious manner and which will not unpleasingly interfere with the roofline and which may be readily sealed against the weather. The design is such that water on the skylight is channeled to the center line and may run off harmlessly onto the shingles or other roof covering on the slope below the skylight. In addition, the skylight panel may be readily removed for replacement or repair. The skylight panel is insulated from the room below the skylight by a separate inner skylight panel which is mounted for movement to permit ventilation of the room below. In addition, the space between the outside and inside skylight panels is vented to the space between the roof and the ceiling of the room in which the skylight is mounted whereby air movement through such space is promoted and frosting of the skylight thereby reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view with some of the shingles removed for clarity showing my skylight mounted in a sloping roof;

FIG. **2** is a cross-sectional view taken on line **2—2** of FIG. **1**;

FIG. **3** is a cross-sectional view taken on line **3—3** of FIG. **1**;

FIG. **4** is a perspective view showing the means for locking the outer skylight panel in place;

FIG. **5** is a perspective view of the inner skylight panel hinge;

FIG. **6** is an exploded view taken on the line **6—6** of FIG. **1**;

FIG. **7** is a fragmentary cross-sectional view taken on the line **7—7** of FIG. **3**;

FIG. **8** is a fragmentary cross-sectional view taken on the line **8—8** of FIG. **2**;

FIG. **9** is a fragmentary cross-sectional view taken on the line **9—9** of FIG. **3**; and

FIG. **10** is an exploded view of the locking mechanism of FIG. **9**.

BRIEF DESCRIPTION OF PREFERRED EMBODIMENT

A skylight assembly embodying my invention is shown in FIG. **1** mounted in the sloping roof **10** of a building structure. In the drawings, rafters **14** (see FIG. **3**) extend from the peak to the eaves along opposite sides of the skylight assembly with transverse members **16** (see FIG. **2**) extending between rafters **14** and framing the opening within which the skylight assembly is disposed. Overlying the rafters **14** and the transverse members **16** is an underlament **18** such as plywood sheeting. Over the sheeting is insulation **20**. Spaced above the insulation are roof boards **22** to which the shingles **24** are secured. Roof constructions may vary somewhat from that herein depicted, but in general, they will comprise rafters, sheeting on the rafters, insulation either above or below the sheeting and shingles overlying the whole.

My skylight assembly is intended to be mounted in a conventional sloping roof of the general construction above-described by cutting a hole **26** (see FIG. **3**) in the roof of a size and shape to complement the skylight casing (hereinafter described), framing such opening with tranverse members **16** which will extend between the rafters **14** as above-mentioned. The opening may be further framed with side members **28**, a header member **30** and a bottom member **32** whereby the opening in the roof is not only structurally supported but the opening is also neatly finished off.

The skylight assembly comprises a rectangular casing **34** which may be built of wood or any other suitable material, consisting of a header rail **36**, opposed side rails **38** and **40** and a bottom rail **42**. The rails are secured together at their meeting corners. The header and bottom rails may be provided with vent means in the form of apertures **44** and **46** to permit air blow beneath the roof through the space within the casing. The side rails **38** and **40** are of identical construction. Each includes, when the frame is formed of wood, three numbers **48**, **50** and **52**, secured together by any suitable fastening. Members **48** are connected at opposite ends to the header and bottom rails **36** and **42**. The members **50** overlie the members **48** on the inside of the frame and are cut diagonally at **54** (see FIG. **2**) to provide a space between the side rails through which the inside skylight panel **111** may pivot as shown in phantom outline in FIG. **2**, and to limit the opening movement of such panel. The member **52** extends downwardly along the lower edge of the member **48** from the pivot **129** for the inside panel to the bottom rail **42** and provides a ledge for a seal at **53** when the inner panel is closed. Another seal is provided along edge **55** of member **50** when the inner panel is closed. Another ledge for a seal is provided by member **56** along the lower edge of bottom rail **42** as shown in FIG. **2**, and another edge seal is provided along the bottom edge **57** of the header rail.

The casing **34** is supported at the header end in the roof opening on an angle member or the like **37**, one leg of which is fastened to a header member **76** atop the casing header **36**, and the other leg overlies the roof boards **22** with the upper edge of the casing at the header substantially flush with the roof boards as shown in FIGS. **1** and **2**. The lower end of the casing at the bottom rail is supported in the roof opening by the side members **74** and **78** as later explained.

The casing **34** includes means for mounting an outside translucent, preferrably transparent, skylight panel **72** which desirably may be formed of quarter-inch plexiglass. Such mounting means comprises three grooved members **74**, **76** and **78**, which are mounted on the upper edges of the side and header rails and constitute part of the casing **34**. Members **74**, **76** and **78** form an upper outside edge on the casing over which the roofing shingles **24** or other roof covering may extend to overhang somewhat the skylight panel **72**. Each of the members **74**, **76** and **78** is provided with a groove for receiving the marginal edge of the skylight panel, such grooves being shown at **82**, **84** and **86** in FIGS. **2–4** of the drawings. The panel is bowed downwardly thereby forming a concave or trough-like structure which extends longitudinally of the casing when the panel **72** is seated in the grooves as best shown in FIGS. **1** and **3**. The groove **84** in the header member is curved to receive the margin of the skylight panel and helps to hold it in its trough-like configuration. As shown in FIG. **4**, a wedge **87** is inserted in the groove **82**, a similar wedge being provided for the groove **86** in the opposite side rail, and such wedges serve to bow the panel **72** downwardly at its lower edge. The bottom rail member **42** is provided with a concave upper surface **90** which conforms the panel **72** to the concave configuration. A plate **110** swingably mounted on a fastener **109** may be moved upwardly (counter-clockwise) from the position shown in FIG. **4**, to overlie the wedge and marginal edge **92** of the skylight panel **72** to retain the same in place. The grooves **82** and **86** permit the panel **72** to be slidably inserted into the casing after the casing has been mounted in the roof opening. The lower end **92** of the outside skylight panel **72** overlies the shingles **24** adjacent the bottom rail **42** as best shown in FIGS. **1**, **2** and **8** whereby water collecting on the skylight panel will be channeled to the center of the panel as a result of its concave shape and will flow down the center of the panel to be deposited on the shingles **24** extending below the bottom rail **42**. Thus the skylight will shed water readily keeping it away from the side rails. It will be apparent that by grasping the lower edge **92** of the outside skylight panel, the same may be withdrawn downwardly for removal from the skylight assembly.

It will be noted in FIG. **1** that the side rail members **74** and **78** extend beyond the bottom rail **42** to overlie the shingles **24** of the roof and support the lower end of the casing **34** in the roof opening. To fill the space between the upper edges **100** of the members **74** and **78** and the surface of the shingles **24** adjacent the side rails, a polygonal flaring piece **102**, a filler triangle **104** and an elongated wedge-shaped member **105** are disposed on the roof adjacent each side rail as best shown in FIG. **1**. The flaring piece **102** is provided with a long edge **103** overlying the side rails and wedge **105** and also has tapering edges **106** and **108** which overlie the roof boards. Shingles **24** are laid over the flaring piece as shown in FIG. **1** to provide a smooth transition from the upper edges of the side rails to the roof line. A waterproof membrane **109** is laid around the two sides and the header rail of the skylight frame and over the upper edges of the frame. The membrane is disposed above the polygonal flaring piece **102** and extends out over the roof boards. The membrane serves to insure a watertight installation.

It will be noted from FIGS. **1** and **6** that the upper edge of the casing **34** is mounted in the roof opening slightly askew to the roof line with the member **76** atop the header rail **36** being disposed so that its upper edge is flush with the upper surface of the roof boards **22** while the members **74** and **78** are at least partially below the roof line at the header and are above the shingles adjacent the bottom rail. To accomplish this the upper edge **48**a of the casing sides **48** are cut at a long taper of from 2¼° to 6° and diverge from the lower edge **48**b from the header end toward the bottom rail end. In addition, the header rail comprising the header **36** and header rail member **76** are shallower than the bottom rail comprising the bottom rail **42** and the rail member **42**a. As a result of this construction, the exposed edge **48**b of the side rails and the lower edge **42**b of the bottom rail parallel the ceiling line while the outer edge of the casing overlies the roof boards and shingles adjacent the bottom rail yet is flush with the roof line at the header. As a consequence the shingles may be carried up over the casing sides and header and yet are beneath the side members **74** and **78** adjacent the bottom rail. The advantage of this construction will become apparent as this description proceeds.

Disposed within the casing spaced below the outside skylight panel **72** is a translucent (preferably transparent) inside skylight panel **111**. This panel comprises a rectangularly-shaped frame having header rail **112**, side rails **114** and **116** and a bottom rail **118**, suitably joined at their meeting ends. The inside skylight panel also includes a translucent or transparent panel element **120** which may be a double glazed panel as shown in FIG. **9** and bedded against the upper edge of the frame on a silicone sealant or the like **121**, with L-shaped retainers **123** overlying the upper face of the panel and extending down alongside the side rails **114** and **116** and secured thereto to hold the panel on the frame.

This inside skylight panel is mounted within the casing spaced from the outside skylight panel to provide an insulating air space therebetween and is movable to be opened to admit air to and from the room beneath the skylight into the space beneath the outside panel whereby air within such room may pass upwardly through the opening inside skylight panel and into the opening **44** to carry air from the room below up along the underside of the roof as shown by the arrows **126** in FIG. **2**. The inside skylight is mounted for pivotable movement as shown in phantom outline in FIG. **3** by hinge means disposed substantially at the center of balance of the inside skylight panel. The hinge means may comprise as shown in FIG. **5**, a pair of hinge elements **127** and **127**a with the former attached to the upper edge **53** of the member **52** and the latter to the side frame members of the inner skylight panel. The hinge elements have interfitting portions **129** and **129**a whereby the inner panel may be swung between the positions shown in FIG. **2**.

The inside skylight is locked in closed position by a latch assembly shown in FIGS. **9** and **10**. The latch assembly is mounted on the bottom rail **42** adjacent its lower edge. The latch assembly is mounted in a notch in the member **56** on the bottom rail **42**. The latch assem-

bly includes a plate **140** having holes **141** through which fasteners **142** extend into the bottom rail **42** to secure the latch thereto. On the plate **140** is a downwardly opening chamber **144** defined by walls **146** integral with the plate **140**. The bottom of the chamber is partially closed by an in-turned lip **148** pressed from the plate **140** and adapted to catch and pivotally support an actuating lever **152** the upper end of which is received within a notch **154** of a spring-loaded latching bolt **156**. The spring **158** for the bolt is disposed within a provided recess within the bottom rail **42**. The spring urges the latching bolt outwardly to enter a provided notch **119** in the bottom member **118** of the inside skylight.

Extending up into the lower end of the chamber **144** adjacent the lever **152** is a primary actuating lever **164**. This lever is attached to a handle assembly **160** having a mounting bracket **161** attached by fasteners **163** to the handle. Ears **165** of bracket **161** overlie the ears **166** and **168**. When the handle assembly **160** is attached by fastener **170** to the lever **164** the ears **165** are trapped above ears **166** and **168** within the handle assembly and the mechanism is thus locked together within the chamber **144**. However, upon removal of the fastener **170** the latching mechanism may be readily disassembled.

By lifting the handle **160** at its outer end **160'**, the handle is caused to pivot on the ears **166** and **168** causing the levers to shift the latching bolt **156** to the left as shown in FIG. **9** thereby disengaging the inside skylight and permitting it to be raised to the phantom outlined position of FIG. **2**. Conversely, when the skylight is tilted back to the solid outline position, it may be locked in its closed position.

It will be observed from a review of the disclosure herein that I have designed a skylight which may be installed and sealed in place without the use of metal flashing. It is only necessary for the installer after the skylight casing has been inserted and fastened in the roof opening to apply the trim pieces **104**, **105** and **102** and then cover them with the flexible membrane **109** as above indicated and finish the roofing by applying the shingles over the membrane to cover the exposed upper edges of the members **74**, **76** and **78**. The shingles adjacent the bottom rail **42** will simply butt up against such rail. The installer may desire to caulk such joint with urethane sealant or the like. The outside skylight panel is then inserted in the groove between the side rails and the panel slid upwardly to final position, forced into its bowed or concave condition by the header groove **84** and the wedges **87**, and then locked in place by the retainers **110**.

What is claimed is:

1. A skylight assembly for a sloping roof comprising in combination:

a rectangular casing having a header, side and bottom rails, to be received in a complementary-shaped hole in a roof;

a translucent outside skylight panel mounted in said casing and bridging the space between the rails and extending over and beyond the bottom rail; [and]

an inside translucent skylight panel disposed within the casing spaced from the outside skylight panel and bridging between the rails to form an air space between the panels;

means on said casing for supporting the *outside skylight* panel beneath the roof covering along the header and side rails while supporting the panel to overhang the roof covering along the bottom rail.

2. The invention defined by claim **1** wherein said outside skylight panel is of an elongated shallow trough-like configuration.

3. The invention defined by claims **1** or **2** wherein the side rails are disposed closer together than the width of the skylight panel in a flat planar configuration whereby the *outside* panel is held deformed in said trough-like configuration between the side rails.

4. The invention defined by claims **1** or **2** wherein the side rails are disposed closer together adjacent the bottom rail than the width of the *outside* skylight panel in a flat planar configuration whereby the panel is held deformed in said trough-like configuration between the side rails adjacent the bottom rail, and said header having means for engaging the *outside* skylight panel and holding it at the header in said trough-like configuration.

5. The invention defined by claims **1** or **2** wherein means are provided for supporting the *outside* skylight panel in the casing for slidable insertion or removal over the bottom rail of the casing.

6. The invention defined by claims **1** or **2** wherein an inside translucent skylight panel is disposed within the casing spaced from the outside skylight panel and bridging between the rails to form an air space between the panels.

7. The invention defined by claim **6** wherein *said* vent means are provided in the header and bottom rails to vent the space between the panels to spaces below the roof in which the assembly is mounted.

8. The invention defined by claim **1** or **2** wherein [an inside translucent skylight panel is disposed within the casing spaced from the outside skylight panel and] vent means are provided in the rails to allow air flow beneath the roof in which the skylight assembly is installed through the space between the two skylight panels.

9. A skylight assembly for sloping roof comprising common combination:

a rectangular casing having a header, side and bottom rails, to be received in a complementary shaped opening in a roof;

a translucent outside skylight panel mounted in said casing and bridging the space between the rails and extending over and beyond the bottom rail;

means on said casing for supporting the outside panel beneath the covering of a roof in which the assembly is installed along the header and side rails while supporting the panel to overhang the roof covering along the bottom rail;

an inside translucent skylight panel in said casing spaced below the outside skylight panel and bridging between the rails; and

means for supporting the inside skylight panel for swingable in movement toward and away from the outside skylight panel to vent the space between the panels into a room beneath the assembly.

10. Invention defined by claim **9** wherein said means for swingably supporting the inside skylight panel is disposed substantially at the center of balance of such panel.

11. Invention defined by claim **1** wherein said header rail is shallower than the bottom rail and the side rails taper from a shallower end at the header to a deeper end at the bottom rail whereby upon mounting the casing in a roof with the inside exposed surfaces of the side rails uniformly spaced from the underside of the roof, the header rail may be flush with the outside of the roof line while the bottom rail projects above the outside roof

line and the outside exposed edges of the side rails gradually taper upwardly away from the outside roof line from the header to the bottom rail; and

means for bridging between the roof line adjacent the side rails and the exposed surfaces of the side rails whereby a roof covering will make a gradual transition therebetween.

12. The invention of claim **11** wherein the side rails taper from the header rail to the bottom rail along the outside exposed surfaces of each at an angle of from between 2¼° to 6°.

13. The invention as defined in claim **11** wherein a waterproof flexible membrane extends from the header and side rails outwardly over the roof line to underlie a roof covering surrounding the skylight assembly when it is mounted in a roof.

14. A skylight assembly for a sloping roof comprising in combination:

a rectangular casing having a header, side and bottom rails, to be received in a complementary shaped opening in a roof;

said header rail being shallower than said bottom rail and the side rails tapering from a shallower end at the header to a deeper end at the bottom rail, whereby upon mounting the casing in a roof with the inside exposed surfaces uniformly spaced from the underside of the roof, the header rail may be flush with the outside of the roof line while the bottom rails projects above the roof line and the outside exposed edges of the side rails gradually taper upwardly away from the outside roof line from the header to the bottom rail;

a translucent outside skylight panel mounted in said casing and bridging the space between the rails and extending over and beyond the bottom rail, said translucent outside skylight panel being concave in a trough-like formation extending from the header rail to the bottom rail;

means on said casing for supporting the outside panel beneath the covering of a roof in which the skylight assembly is installed along the header and side rails while supporting the panel to overhang the roof covering along the bottom rail;

an inside translucent skylight panel swingably supported in said casing below the outside skylight panel and bridging between the rails;

means for locking the inside skylight panel in a closed position spaced substantially uniformly from said outside skylight panel; and

a vent means in the header rail and in the bottom rail to allow air flow from beneath the roof in which the skylight assembly is mounted into and from the space between the outside and inside skylight panels.

15. A skylight assembly for a sloping roof comprising in combination:

a rectangular casing having a header, side and bottom rails, to be received in a complementary-shaped hole in a roof;

a translucent outside skylight panel mounted in said casing and bridging the space between the rails;

an inside translucent skylight panel mounted in the casing spaced from the outside skylight panel and bridging the space between the rails to form an air space within the casing between the panels; and

vent means in the casing venting the space between the panels into the space below the roof in which the assembly is mounted.

16. The invention as in claim 15 further including means for supporting the inside skylight panel for movement between closed and open positions to vent the space between the panels directly into a room beneath the assembly.

17. The invention defined by claim 15 wherein the outside skylight panel extends over and beyond the bottom rail to overlie the roof adjacent the bottom rail.

18. The invention as defined by claim 15 wherein said vent means is provided in some of said casing rails.

19. The invention defined by claim 1 or 2 wherein vent means are provided in the casing to vent the space between the panels below the roof in which the assembly is mounted.

* * * * *