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(54) **TUBULAR SKYLIGHT WITH DOME
FLASHING AND PROTECTIVE
CORRUGATION**

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285/43

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52/22, 72, 58-62, 97, 747.11; 362/150, 147,
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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,544,391 A	6/1925	Budd et al.	52/547
1,557,616 A	10/1925	Riley	52/547
2,641,204 A	6/1953	Young	52/546
3,124,427 A	3/1964	Chomes	29/183
3,646,717 A	3/1972	Parker	52/548
4,314,433 A	2/1982	Hulcombe	52/521
4,339,900 A	7/1982	Freeman	52/200

4,480,534 A *	11/1984	Sloan	454/182
4,635,409 A	1/1987	Vandemore	52/60
4,664,390 A *	5/1987	Houseman	277/606
4,682,454 A	7/1987	Simpson et al.	52/200
4,730,426 A	3/1988	Weisner et al.	52/200
4,733,505 A	3/1988	Van Dame	52/22
4,809,468 A	3/1989	Bareiss	52/22
4,966,819 A *	10/1990	Schatz et al.	428/603
5,010,700 A	4/1991	Blair	52/199
5,046,292 A *	9/1991	Sampson et al.	52/200
5,053,266 A *	10/1991	Hesketh et al.	428/192
5,099,622 A	3/1992	Sutton	52/200
5,226,263 A	7/1993	Merrin et al.	52/58
5,435,780 A	7/1995	Ayles	454/199
5,546,712 A	8/1996	Bixby	52/200
D382,347 S	8/1997	Grubb	D25/52
5,655,339 A	8/1997	DeBlock et al.	52/200
D389,254 S	1/1998	Grubb	D25/199
D390,976 S	2/1998	Weston	D25/199
5,878,539 A	3/1999	Grubb	52/200

(Continued)

FOREIGN PATENT DOCUMENTS

EP 38222 * 10/1981

(Continued)

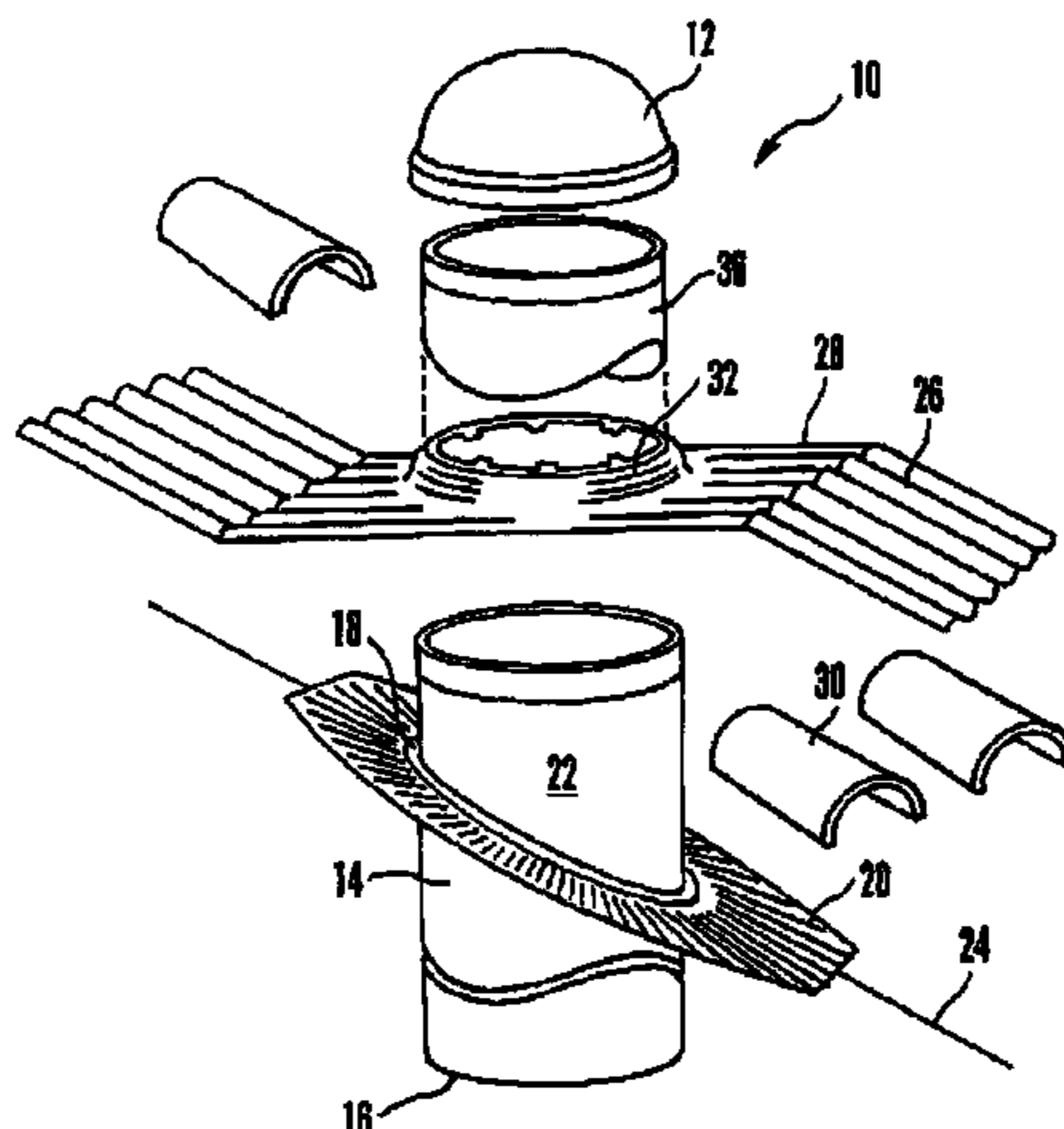
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(57) **ABSTRACT**

In a tubular skylight, a corrugated Aluminum sheet is formed with a hole that is pressed into a curb which is fastened over the turret of a roof-mounted skylight flashing. Roof tiles above the dome of the skylight are placed onto the sheet, while below the dome the sheet is placed over roof tiles and manually conformed thereto, owing to the corrugations. Any water that leaks past tiles above the dome will be directed by the sheet around the curb and down onto the tops of tiles that are below the dome, thereby providing a water seal for the skylight.

17 Claims, 1 Drawing Sheet



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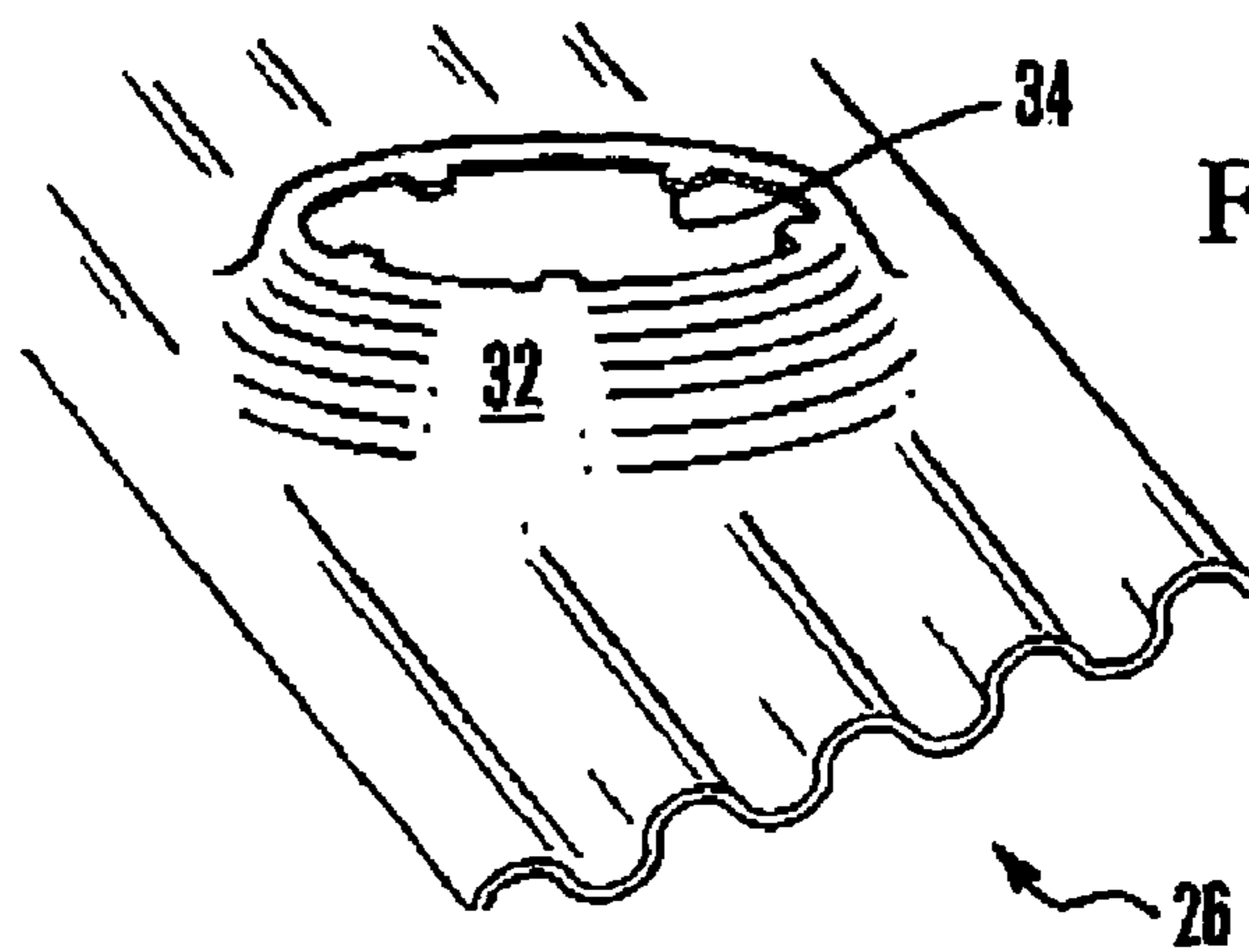
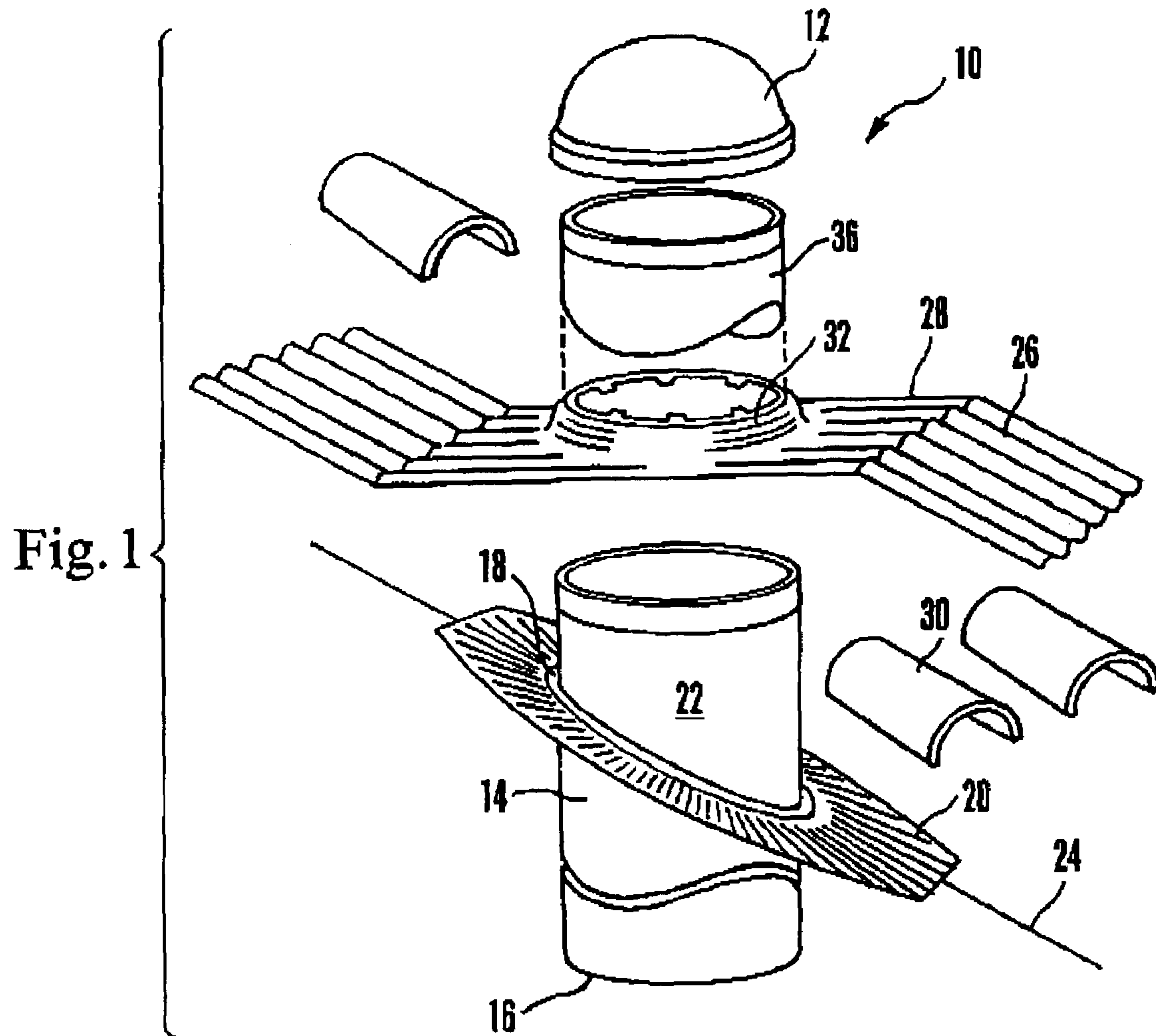
U.S. PATENT DOCUMENTS

5,896,712 A	4/1999	Chao	52/200
5,896,713 A	4/1999	Chao et al.	52/200
RE36,496 E	1/2000	Sutton	52/200
6,212,834 B1 *	4/2001	Lindgren	52/200
6,263,624 B1	7/2001	Hoy et al.	52/200
6,813,864 B1 *	11/2004	Landis	52/200
2003/0150175 A1	8/2003	Rillie	52/200

FOREIGN PATENT DOCUMENTS

JP	10-37410	*	2/1998
JP	11-306819	*	11/1999
WO	WO 94/00654	*	1/1994
WO	WO 99/13180	*	3/1999

* cited by examiner



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TUBULAR SKYLIGHT WITH DOME FLASHING AND PROTECTIVE CORRUGATION

FIELD OF THE INVENTION

The present invention relates to skylights.

BACKGROUND OF THE INVENTION

Skylights are used to illuminate buildings in a pleasing and energy-conserving way. Tubular skylights such as those made by the present assignee typically have a roof-mounted transparent cover or dome, a light conveying tube assembly extending down from the dome into the building to a ceiling, and a light diffuser plate covering the bottom of the tube at the ceiling.

To mount the dome on the roof, a flashing typically is provided. The flashing may have a flat skirt that is inclined to match the incline of the roof, and a cylindrical turret extending vertically upward from the skirt. The dome is fastened to the turret, with the tube assembly also engaging the turret to establish a single continuous light passageway through the dome and down into the tube assembly.

Many roofs are tiled. To install a skylight, some of the tiles typically are removed to expose the flat roof substrate, and the skirt of the flashing is then positioned over a hole that is cut into the roof substrate. The tiles are then replaced around the flashing.

The present invention is an improvement to prevent subsequent water leakage from the upper tile surface around the flashing/tile penetration down onto the roof substrate. Previous solutions include placing three or four rectangular pieces of board or other material to fill the gap between the tile penetration and cylindrical turret. While such an arrangement is not without utility, as recognized herein in the context of tubular skylights (and, concomitantly, round flashing turrets), placing several rectangular pieces around a round hole will result in incomplete coverage through which water can flow. Moreover, the present invention recognizes that the previous use of lead pieces, used because of its malleability such that it can be conformed by hand around the tops of the lower tiles, entails structural and health risks. The present invention still further understands that rectangular multi-layer corrugated sealing pieces such as are disclosed in U.S. Pat. No. 6,503,601 not only fail to account for the above-noted geometric mismatch between tubular skylights and rectangular sealing pieces, but also require comparatively elaborate multi-layer construction.

SUMMARY OF THE INVENTION

A tubular skylight includes a transparent dome, a flashing coupled to the dome to mount the dome on a roof, and a skylight tube depending downwardly from the dome. The system also includes a sheet of corrugated metal mounted on the roof and coupled to the flashing. The sheet has a circular hole defining a periphery closely spaced from the flashing. Owing to the corrugations, the sheet is conformable to roof tiles to provide a water seal, as well as a rodent and insect barrier.

In a preferred embodiment, the sheet is formed with a curb circumscribing the hole, and the curb is coupled to the flashing. In one non-limiting implementation, the flashing defines an upper circular edge and bendable tabs extend radially inwardly from the curb of the sheet. The tabs may be bent over the edge to engage the sheet with the flashing

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without the need for fasteners. The sheet may be made of Aluminum, or it may be made of Copper, Lead, malleable Zinc, plastic, or rubber. Preferably, the corrugations of the sheet extend generally parallel to the incline of the roof when the sheet is mounted on the roof.

In another aspect, a method for mounting a tubular skylight includes receiving a corrugated single piece sheet defining a hole and a curb rising above and circumscribing the hole. The method further includes engaging the curb with a skylight flashing on a roof with an upper portion of the sheet being disposed underneath at least one roof tile above the flashing and with a lower portion of the sheet being disposed on top of at least one roof tile below the flashing. A skylight cover can then be coupled with the flashing.

In still another aspect, a lighting system includes a transparent skylight cover, a light diffuser, and a tubular structure extendable between the cover and diffuser. A single corrugated sheet is configured for circumscribing the tubular structure between the cover and the diffuser to impede water leakage through a roof above which the cover is to be disposed.

The details of the present invention, both as to its structure and operation, can best be understood in reference to the accompanying drawings, in which like reference numerals refer to like parts, and in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially exploded perspective view of the present skylight with corrugated sealing member, with portions cut away; and

FIG. 2 is a perspective view of the corrugated sealing member.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring initially to FIG. 1, a skylight is shown, generally designated **10**, that includes a roof-mounted hard plastic transparent dome **12**, an internally reflective light conveying tube assembly **14** covered by the dome **12**, and a ceiling-mounted light diffuser plate **16** covering the bottom end of the tube assembly **14**. The preferred skylight **10** is a tubular skylight. A metal flashing **18** having a flat skirt **20** and generally cylindrical turret **22** rising at an incline from the skirt **20** is mounted over a circular hole (not shown) that is cut into a roof **24** of a building by means known in the art to support the dome **12**.

A preferably unitary single piece sheet **26** of corrugated metal such as Aluminum is mounted on the roof **24**. As shown in FIG. 1, the sheet **26** is coupled to the flashing **18** in accordance with disclosure below. As can be appreciated in cross-reference to FIGS. 1 and 2, the sheet **26** has a circular hole formed in it which defines a periphery **28** that is closely spaced from the turret **22** of the flashing **18**. In accordance with present principles, the sheet **26** is conformable to roof tiles **30**, and in particular the sheet **26** conforms over the top of roof tiles **30** that are below the turret **22**, to provide a seal.

With more specificity in reference to FIG. 1, the sheet **26** is formed with a cylindrical or frusto-conical shaped curb **32** that circumscribes the hole. To form the curb **32**, a hole is cut into the sheet **26** and then the portion of the sheet **26** that is adjacent the hole to pressed into the curb configuration shown. Then, in the preferred embodiment as best shown in FIG. 2, the top of the curb **32** is bent inwardly to a horizontal

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orientation and then cut to define plural bendable tabs **34** for coupling the sheet **26** to the flashing **18**. Specifically, the tabs **34**, which extend radially inwardly from the curb **32** of the sheet **26**, can be manually bent over the top edge of the flashing **18** to engage the sheet **26** with the flashing **18** without the need for fasteners.

With the above disclosure in mind, and now referring back to FIG. 1, tiles can be removed from the roof **24** and the flashing **18** positioned on the roof with the skirt **20** flat against the roof **24** as shown. Tiles **30** below the flashing **18** can be placed back on the roof **24**. Then, the corrugated sheet **26** can be fitted over the turret **22** of the flashing **18**, with the curb **32** of the sheet **26** circumscribing the turret **22**. The tabs **34** can then be bent over the top edge of the turret **22**, and tiles **30** above the flashing **18** replaced over the upper part of the sheet **26** as shown in FIG. 1. Preferably, the elongated corrugations defined by the sheet **26** extend generally parallel to the incline of the roof **24** as shown in FIG. 1 when the sheet **26** is mounted on the roof **24**.

Next, if desired a flashing extension **36** can be fastened by, e.g., screws to both the dome **12** and the flashing **18** and/or curb **32** to couple the flashing **18** to the dome **12**. The flashing extension **36** can be established by one or more tubes. In any case, owing to the corrugations of the sheet **26**, a person can easily deform the sheet **26** as necessary to generally conform to the tiles **30** that are below the dome **12** and that lie underneath the lower portion of the sheet **26**.

With this invention, any water that leaks down past tiles **30** which are above the dome **12** will be directed by the sheet **26** around the curb **32** and down onto the tops of tiles **30** that are below the dome **12**, thereby providing a water seal for the skylight **10**.

While the particular TUBULAR SKYLIGHT WITH DOME FLASHING AND PROTECTIVE CORRUGATION as herein shown and described in detail is fully capable of attaining the above-described objects of the invention, it is to be understood that it is the presently preferred embodiment of the present invention and is thus representative of the subject matter which is broadly contemplated by the present invention, that the scope of the present invention fully encompasses other embodiments which may become obvious to those skilled in the art, and that the scope of the present invention is accordingly to be limited by nothing other than the appended claims, in which reference to an element in the singular is not intended to mean "one and only one" unless explicitly so stated, but rather "one or more". All structural and functional equivalents to the elements of the above-described preferred embodiment that are known or later come to be known to those of ordinary skill in the art are expressly incorporated herein by reference and are intended to be encompassed by the present claims. Moreover, it is not necessary for a device or method to address each and every problem sought to be solved by the present invention, for it to be encompassed by the present claims. Furthermore, no element, component, or method step in the present disclosure is intended to be dedicated to the public regardless of whether the element, component, or method step is explicitly recited in the claims. No claim element herein is to be construed under the provisions of 35 U.S.C. §112, sixth paragraph, unless the element is expressly recited using the phrase "means for" or, in the case of a method claim, the element is recited as a "step" instead of an "act". Absent express definitions herein, claim terms are to be given all ordinary and accustomed meanings that are not irreconcilable with the present specification and file history.

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What is claimed is:

1. A tubular skylight, comprising:

a transparent dome;

a flashing coupled to the dome to mount the dome on a roof, the flashing having an upwardly-projecting portion;

a skylight tube depending downwardly from the dome; and

a sheet of corrugated metal mounted on the roof and coupled to the flashing, the sheet having a circular hole formed therein with corrugations entirely surrounding the hole, the hole defining a periphery closely spaced from the flashing, the sheet being conformable to roof tiles to provide a seal, wherein the sheet is formed with a curb circumscribing the hole, the curb being coupled with the upwardly-projecting portion of the flashing, the sheet and the curb being a single unitary piece of metal.

2. The skylight of claim 1, wherein the upwardly-projecting portion of the flashing defines an upper circular edge and the skylight further comprises plural bendable tabs extending radially inwardly from the curb of the sheet and being bendable over the edge to engage the sheet with the flashing without the need fit fasteners.

3. The skylight of claim 2, further comprising a flashing extension coupling the flashing to the dome.

4. The skylight of claim 3, wherein the flashing extension is engaged with the dome and flashing using fasteners.

5. The skylight of claim 1, wherein the sheet is made of a single piece of material including at least one of: Aluminum, Copper, Lead, malleable Zinc.

6. The skylight of claim 1, wherein the roof defines an incline and the sheet defines elongated corrugations extending generally parallel to the incline when the sheet is mounted on the roof.

7. A method for mounting a tubular skylight, comprising: receiving a corrugated single piece sheet defining a hole and a curb rising above and circumscribing the hole, wherein the sheet has corrugations entirely surrounding the curb;

engaging the curb with a skylight flashing mounted on a roof having a slanted orientation defining a pitch with an upper portion of the sheet relative to the pitch of the roof being disposed underneath at least one roof tile above the flashing and with a lower portion of the sheet relative to the pitch of the roof being disposed on top of at least one roof tile that is located lower on the roof than is the flashing; and

coupling a skylight cover with the flashing, the flashing extending through the corrugated sheet.

8. The method of claim 7, wherein the flashing defines an upper circular edge and the sheet includes plural bendable tabs extending radially inwardly from the curb of the sheet and being bendable over the edge to engage the sheet with the flashing without the need for fasteners.

9. The method of claim 7, further comprising engaging a flashing extension with the flashing and cover.

10. The method of claim 7, wherein the sheet is made of Aluminum.

11. The method of claim 7, wherein the roof defines an incline and the sheet defines elongated corrugations, and the method includes orienting the sheet with the corrugations generally parallel to the incline.

12. The method of claim 11, further comprising deforming the sheet to conform to at least one roof tile.

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13. A lighting system comprising:
a transparent skylight cover;
a light diffuser;
a tubular structure extendable between the cover and
diffuser; and
a single corrugated sheet configured for circumscribing
the tubular structure between the cover and the diffuser
to impede water leakage through a roof above which
the cover is to be disposed, wherein the sheet is formed
with a curb, the curb being coupled to a flashing,
wherein flashing defines an upper circular edge and the
sheet further comprises plural bendable tabs extending
radially inwardly from the curb of the sheet and being
bendable over the upper circular edge to engage the
sheet with the flashing without the need for fasteners.

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14. The system of claim **13**, wherein the flashing is
couplable to the cover to mount the cover on a roof, at least
one skylight tube being configured for depending down-
wardly from the cover.

⁵ **15.** The system of claim **14**, wherein the sheet has a hole
formed therein, the hole defining a periphery closely spaced
from the flashing.

16. The system of claim **14**, further comprising a flashing
extension coupling the flashing to the cover.

¹⁰ **17.** The system of claim **13**, wherein the sheet is made of
a material selected from the group consisting of: Aluminum,
Copper, Lead, malleable Zinc.

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