W. H. BRANZELL.

SKYLIGHT.

APPLICATION FILED JULY 18, 1912.

1,044,740.

Patented Nov. 19, 1912.

2 SHEETS—SHEET 1.

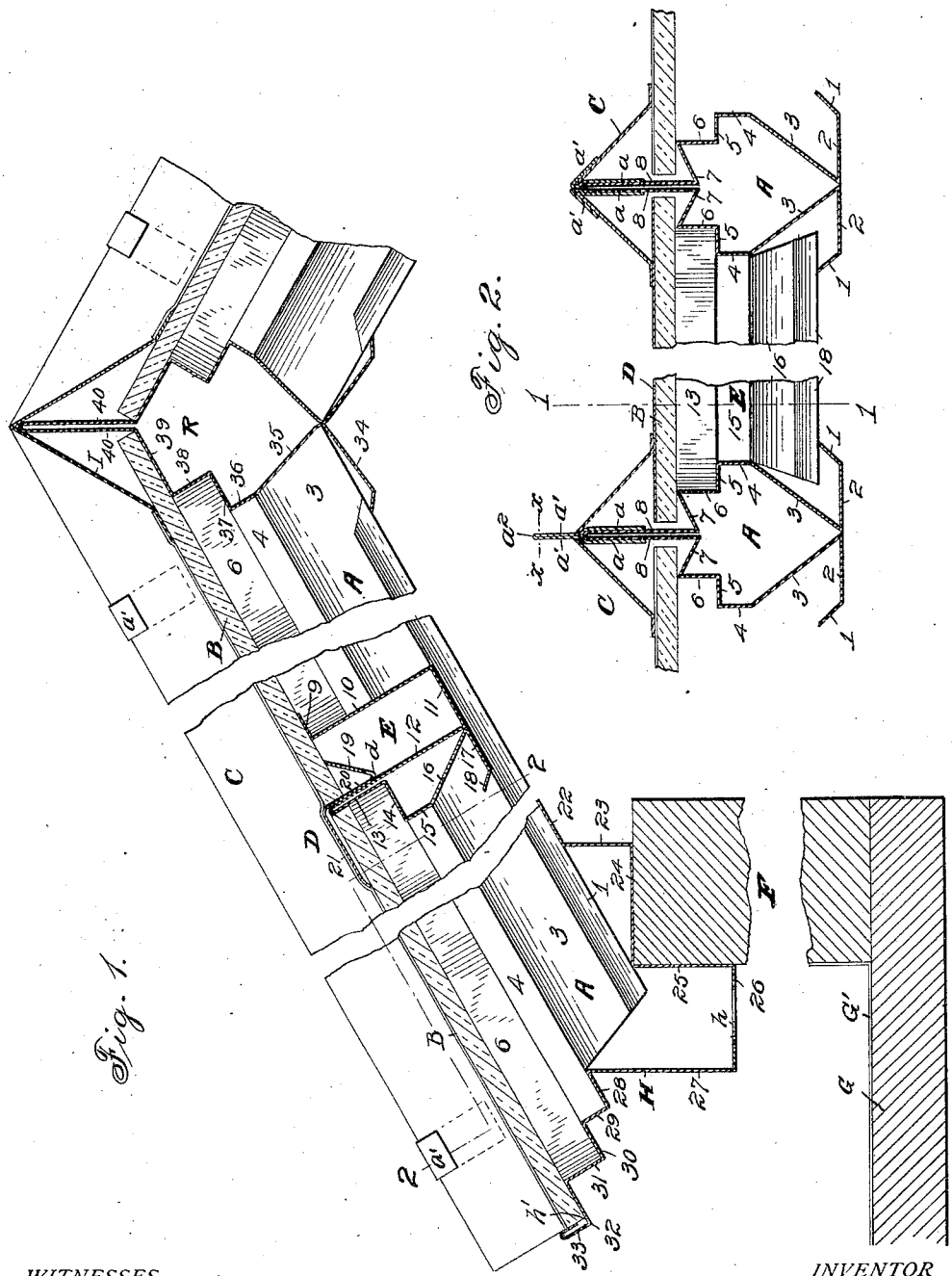

Fig. 1.

Fig. 2.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3.

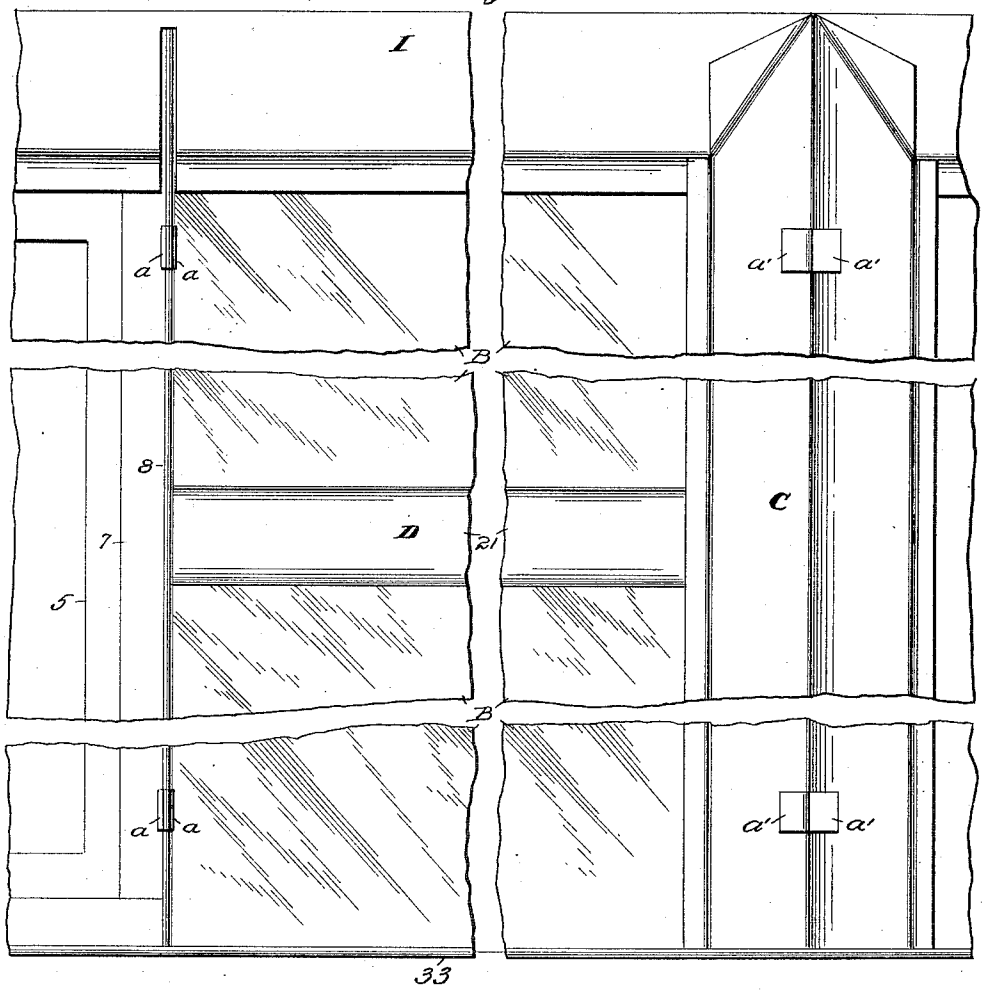


Fig. 5.

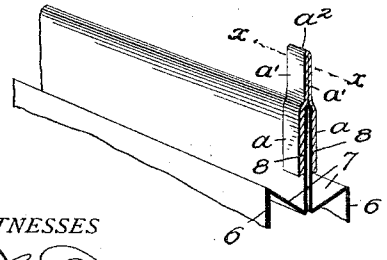
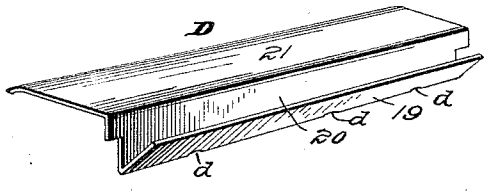


Fig. 4.



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UNITED STATES PATENT OFFICE.

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SKYLIGHT.

1,044,740. Specification of Letters Patent. Patented Nov. 19, 1912.

Application filed July 18, 1912. Serial No. 710,118.

To all whom it may concern:

Be it known that I, WILLIAM H. BRANZELL, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Skylights, of which the following is a specification.

My invention is designed to provide a skylight for roofs in which the panes of glass are incorporated in a frame of sheet metal, such as galvanized iron, without the use of any putty at the joints, or cement of any kind, and at the same time preserving water-tight joints, room for expansion and contraction, and permitting the skylight to be more conveniently transported and set up and more conveniently repaired if broken.

Skylights of this class have heretofore been made with inclined rafter-like main bars which are formed with up and down gutters to receive the water from the side edges of the glass panes and also with cross gutters arranged horizontally beneath the horizontal joints between the glass panes, which cross gutters deliver into the up and down gutters.

My invention is an improvement in this general type of skylight, and it consists in the novel construction and arrangement of parts which I will now proceed to describe with reference to the drawings, in which:

Figure 1 is a broken vertical section of one-half of a skylight taken through the glass panes in a plane between the inclined rafter-like supporting bars for the glass panes, the plane of the section being shown at line 1—1, Fig. 2. Fig. 2 is a broken transverse section, taken across the rafter-like bars in the plane 2—2 of Fig. 1. Fig. 3 is a broken top plan view with one of the longitudinal cap strips removed. Fig. 4 is a detail, in perspective view, of the cross cap for the horizontal joint between panes, and Fig. 5 is a sectional detail of the cleat for securing the longitudinal cap strip to the main rafter bar.

In the drawings A A are the main bars which occupy an inclined position, running up and down like rafters and sustaining the glass panes B.

E are composite cross bars which run beneath the horizontal joints of the glass panes and sustain them. H is the curb which runs along the lower edges of the skylight past the ends of the rafters, and forming a saddle-like support for the lower edge of the skylight upon the wooden frame F fixed to the sheathing G of the roof to sustain the skylight.

R is the ridge bar at the top or apex of the skylight, which connects with and holds the upper ends of the rafter-like main bars.

C is the longitudinal cap to cover the joint between the glass panes and the upper flange of the rafter-like main bars. I is a similar cap which covers the ridge bar, and D is a cross cap which covers the horizontal joint between the glass panes above the crossbar E.

Of the parts just described, the main rafter bars A, the ridge bar B, the composite crossbar E, and the curb H are all soldered together as a unitary, integral main frame. The glass panes B, cross cap D, longitudinal cap C, and ridge cap I are all detachable and are applied to the skylight either after the main frame is made and set up in place, or before being set up on the roof, if desired. The main rafter-like bars are provided with longitudinal, inclined gutters which carry off the water leaking through the up and down joints between the glass panes, and the crossbars are also provided with gutters which carry off the water leaking through the horizontal cross joints between the panes.

Such general type of skylight is not broadly new, but my invention comprises a construction and mode of bending and assembling these various members to make a very strong and greatly improved skylight adapted to large as well as small installations which I will now proceed to fully describe in detail.

The main bar A is formed of galvanized iron, both halves of which are exactly alike, see Fig. 2, and both halves of which are bent from one piece of sheet metal to form on each side an upturned flange 1, a gutter bottom 2, an inclined outwardly flaring wall 3, a short vertical wall 4, a horizontal step 5, a vertical wall 6, a depressed and inclined trough 7 and an upright flange 8, the flange 8 of one-half lying flat against the corresponding flange 8 of the other half and these two flanges at the top running continuously one into the other with a sharp bend to form a stiff upright rib which separates the glass panes.

The two halves of the bar are soldered together at the bottom to be mutually bracing in effect; the members 1 and 2 form the lower longitudinal gutter which receives the

water from the cross gutter of crossbar E; the vertical and horizontal walls 4, 5, 6 form abutting faces in both vertical and horizontal direction to which the crossbar E is soldered with double bracing seams which make a very strong frame; the upper gutter 7 receives water from the joints at the side edges of the glass panes, and the stiff, flat, and narrow, but double thick standing rib 8, 8 gives great vertical depth to the rafter to resist the heavy weight of large skylights, and also leaves, between the edges of the glass panes and the rib, free space for expansion and contraction from heat and cold without breaking the panes or opening joints with incidental leakage.

The composite crossbar E, see Fig. 1, is also made in one piece of sheet metal and is bent to form a flat upper flange 9 which occupies a plane immediately beneath the glass pane B which rests upon and is supported thereby, the flange 9 continuing down to form supporting wall 10, trough 11, upright supporting wall 12 which extends to the top of the upper surface of the lower glass pane and is then double and bent down upon itself at 13, then at right angles to form step 14, then down at 15 parallel to wall 12, then inclinedly and inwardly to contact with the lower edge of wall 12, then downwardly at 17 and upwardly at 18 to form a bottom cross gutter. Both the trough at 11 and gutter at 17 are extended outwardly at the ends and lap over and discharge their water into the lower longitudinal gutters 1, 2 of the main rafter bars, as seen in Fig. 2, while the ends of the members 13, 14, 15 extend to contact with and are soldered to the stepped members 4, 5, 6 of the main rafter bars to make a very strong and substantial bracing effect in both horizontal and vertical direction, so that the frame, when completed, will, even in the largest skylights, stand a very great weight of glass with incidental weight of snow and wind pressure without opening the seams, the principal point of value of this method of forming and joining being to make a powerfully strong frame which takes care of all incidental strains in the very largest skylights.

For taking care of the water which comes in at the joint between the upper glass pane and the lower one, I provide a cross cap D, see Fig. 1, whose length is equal to the space between the main bars and whose shape is shown in Fig. 4. It is formed with an inclined trough wall 19, see Fig. 1, whose upper edge lies in contact with the lower edge of the glass pane, an upright wall 20 that lies against the double wall 12, 13 of the crossbar, and a broad surface flange 21 at right angles to 20, which flange 21 lies against the upper surface of the lower glass pane D and extends some distance below its upper edge. The trough 19 is somewhat shorter than the cap 21 and has holes *d* in its lower angle. Now when the detachable cross cap D is in place, as in Fig. 1, the water that comes down from the upper glass pane B passes into the trough 19 and through holes *d* passes into the subjacent trough 11 and at the ends of the latter is discharged into the rafter gutters 1, 2, as seen in Figs. 1 and 2. Very little water can get between the lower glass pane B and the wall 13 of the crossbar, but such as does passes down drips over 14 and 15 into the subjacent cross gutter 17, 18 and then passes out at the ends thereof into the main rafter gutter 1, 2, Fig. 2, in a manner similar to the discharge of water from the trough 11.

The curb H, see Fig. 1, serves the threefold purpose of connecting the lower ends of the rafter-like main bars, collecting the water from the gutters, and forming a basic support for the skylight on the wooden frame F of the roof. This curb is made of one piece of sheet metal bent to form the flange 22, which fits against the bottom of rafter gutter 1, 2, vertical wall 23, right-angular bends 24, 25 to form a saddle that rests upon the wooden frame F, horizontal member 26 with drip holes *h*, through which the water from the lower rafter gutter 1, 2 drips onto the metal roof G′, vertical wall 27 and bends 28, 29, 30, 31, 32 and 33 which close the ends of the members 4, 5, 6, 7, 8 of the main rafter bar A, the bend 32 having drip holes *h′* through which the water from the upper gutter 7 drips onto the roof. All of these parts are soldered tightly together and the curb extends along the full horizontal length of the lower edge of the skylight.

The ridge bar R, Fig. 1, is also made in one piece of sheet metal and both sides are exactly alike. It is constructed by bending the metal to form a lower flange 34, which underlies the upper end of the rafter gutter, an inclined member 35 soldered to member 3 of the rafter, right-angular step members 36, 37, 38 soldered to the ends 4, 5, 6 of the rafter, inclined bend 39 which forms a seat for the upper end of the glass pane B and upright bend 40 which is returned upon itself, the form of the ridge bar being repeated on the other side for the other side of the skylight. The right-angular step members 36, 37, 38 correspond to and are soldered to the members 4, 5, 6, 7 of the rafter bars to make the same strong, stiff and double braced connection at the top which has already been described for the crossbar and curb.

To cover the joint between the glass panes and the standing rib 8, 8 of the rafter bar, a triangularly bent longitudinal cap bar C is employed whose lower edges are flanged outwardly and rest upon the glass panes, as

seen in Fig. 2. To hold it down in place the standing rib 8, 8 of the rafter bar has soldered to its opposite sides the two ends a, a of a copper cleat whose middle portion, see Fig. 5, is pinched together so as to lie in flat contact and the apex of the cap C is slotted just wide enough to receive the upper end of the copper cleat. The cap C is then slipped over the cleat, the cleat passing through the slot in the cap, and then a pair of shears is used to clip off the bent upper end a^2 of the cleat along the dotted line x—x. This resolves the cleat into two cleats a' a' which may then be turned down over the cap C, as shown in Figs. 1 and 2 to hold the cap down over the glass panes and the ends of the cross caps. Somewhat similar cleats, but made in two pieces, riveted or otherwise attached, have been employed, but as the upper ends of these separate cleats spread outwardly they cannot be readily entered through the slots in the cap. By making the cleat of copper and in one piece the upper end of the cleat may be pinched together to a minimum thinness and held together flat and thin by the continuity of the upper end of the cleat, so as to readily pass through a slot of minimum width in the cap and then, after the cap is applied and the rounded upper end a^2 of the cleat is cut off to form the two cleats a' a', the latter may be easily bent over in opposite directions to hold the cap down without any looseness and with a minimum width of slot in the cap.

To cover the standing rib 40 of the ridge bar, a similar ridge cap I is employed held by similar cleats, and this is put on before the cap C is applied, so that the upper edges of cap C overlie the ridge cap I and, when soldered to it, make an absolutely tight joint.

The use of putties and cements as preventives of leakage in skylights has never been entirely successful. This is due to several reasons. In some instances leaks were permitted by the oil or liquid drying out of the cement or putty, causing the putty to shrink away from the glass and frame, or crumble. Vibration in the building would also tend to loosen it. Uneven atmospheric pressure and temperature within the building, the sun and the wind or a slight shrinking in the wooden frame and uneven expansion of the metal frame and glass all have tendency to bring about leaks.

In my invention the glass is cut with ample allowance to permit the wooden frame its natural set, or to allow the metal and glass uneven shrinkage or expansion, without binding against the metal frame which would cause opening of seams or breaking of glass; therefore, the light may be termed self-adjusting.

The construction is of workmanlike method and both strong and rigid. Solder and rivets may be applied without injury to the system wherever there is occasion to add to its strength. It may be installed without danger of error on the part of the workman. The glass (if broken by flying objects or any cause beyond control) may be very easily removed and another glass put in place very securely in an extremely short time. It obviates the tearing up of the lights for reputtying and it is a thoroughly practical, simple, and strong construction.

An important feature of my invention is to be found in the laterally projecting step-like formation 4, 5, 6 of the rafters, the projection 14, 15 of the crossbar, and 36, 37 of the ridge bar. These lateral projections are formed in a plane below the plane of the glass pane seat and their function is to give great lateral and vertical stiffness and strength to the frame which permits of the successful construction of large skylights without risk of caving in from snow or wind pressure.

I claim:

1. A skylight frame comprising main rafter bars, crossbars, a ridge bar, and a drip receiving curb at the lower edge, the rafter bars being formed on each side with upper and lower gutters and formed between said upper and lower gutters with an inclined wall below and a step projection above, the crossbars being formed with cross gutters emptying into the lower gutters of the rafter bars and with a step projection whose walls are extended to and soldered to the step projection of the rafter bars, the ridge bar being formed at the lower edge with a flange and an inclined wall and with stepped projections above soldered to the upper ends of the members of the rafter bars, and the drip receiving curb at the lower end having stepped projections corresponding to the members of the rafter bars and soldered to the ends of the same.

2. A main rafter bar for a skylight, consisting of a single piece of sheet metal bent into two symmetrical halves, each half being formed with an upper and a lower gutter and at an intermediate point with right angularly bent members forming a step projection.

3. A ridge bar for a skylight, consisting of a single piece of sheet metal bent into two symmetrical halves, each half being formed with an underlapping lower flange, an upper return bent wall and at an intermediate point with right angularly bent walls forming a step projection.

4. A crossbar for connecting the rafter bars of a skylight at points between their ends, consisting of a single piece of sheet metal formed with an upper upright wall with glass supporting flange at the top, a trough at the bottom with upright wall bent

upon itself at the top, a second trough at the lower edge and formed at an intermediate point with a step projection.

5. A drip curb for a skylight made in a single piece of sheet metal and formed with an upper inclined flange, right angularly bent members forming a saddle for the supporting frame, a lower receiving gutter, and a series of right angularly bent members forming stepped projections.

6. A crossbar for connecting the rafter bars of a skylight at points between their ends, consisting of a single piece of sheet metal formed with an upper upright wall with glass supporting flange at the top, a trough at the bottom with upright wall bent upon itself at the top, a second trough at the lower edge and formed at an intermediate point with a step projection, in combination with rafter bars joined to the ends thereof and bent into step-like form to correspond thereto, glass panes resting upon the rafter bars and the flange of the crossbar, and a detachable cross cap for the horizontal joint between the panes, said cap being formed with an inclined trough member lying under the upper pane between the crossbar walls, and an overlapping flange lying over the lower pane.

7. The combination with the rafter bar having a standing rib and an overlapping longitudinal cap having slots in its apex; of a doubled sheet metal cleat made in one piece with its free lower ends secured to the opposite sides of the rib and with its collapsed upper parts lying flat against each other and running one side into the other with a continuous bend at the top which is adapted to be cut off to form two oppositely foldable cleats after being passed through the slot in the cap.

8. A main rafter for a skylight having at its upper edge a seat for the glass pane and along its lower edge a trough, and having in a plane below the glass pane seat and above the trough a laterally projecting stiffening member.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. BRANZELL.

Witnesses:
E. C. DUFFY,
A. R. STANTON.