

[54] METAL ROOF CONSTRUCTION
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16828
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52/483, 52/573
[51] Int. Cl. E04d 13/10, E04b 7/00
[58] Field of Search 52/87, 88, 90, 483, 93,
52/24, 25, 26, 479, 480, 481, 512, 549, 552,
618, 622, 716, 717, 573; 85/37

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[57] ABSTRACT
In the described Metal Roof Construction a sheet
metal roof cover is secured to a roof by first securing
a plurality of beams to the roof trusses, the beams hav-
ing outwardly extending flanges below their upper
cover-supporting surfaces. The cover and flanges have
aligned openings and a pin having an enlarged spheri-
cal head fits snugly in each cover opening and extends
loosely through each flange opening, the pins being
enlarged below the flanges to secure the cover to the
beams whereby the pins can move with expansion and
contraction of the roof covering.

9 Claims, 5 Drawing Figures

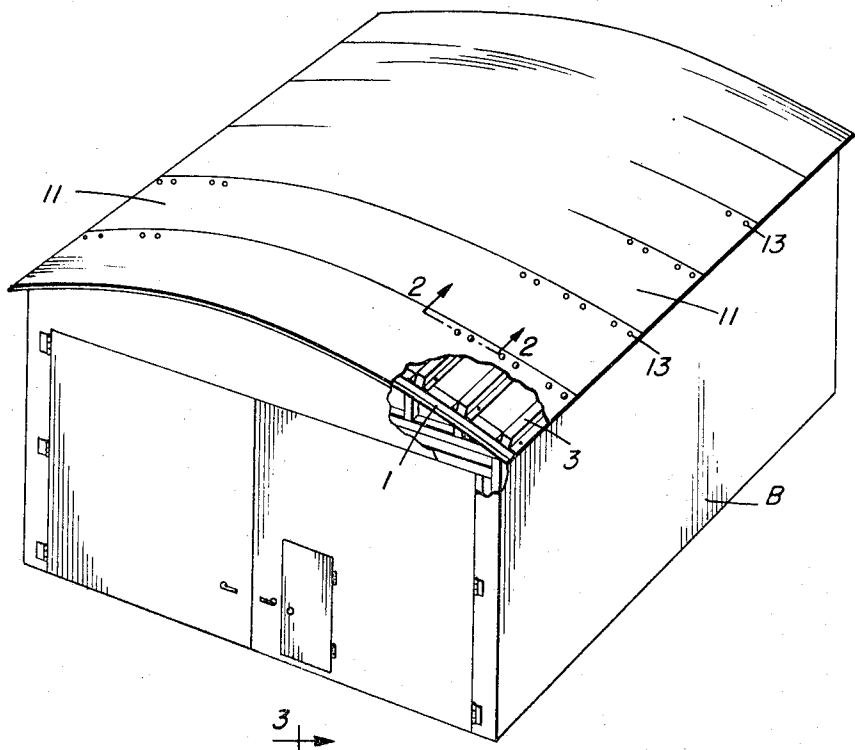


FIG. 1

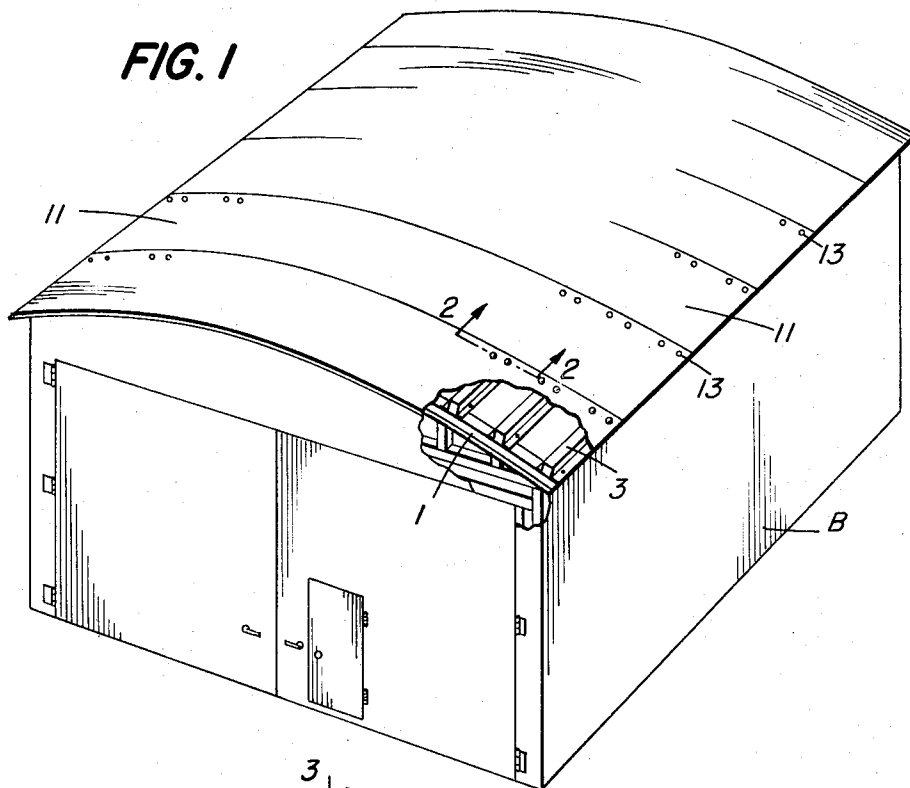


FIG. 2

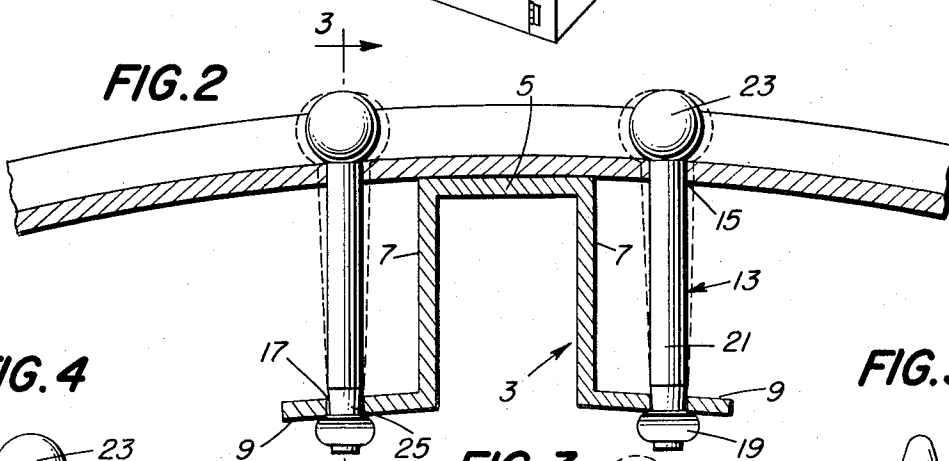


FIG. 4

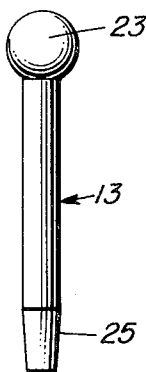


FIG. 3

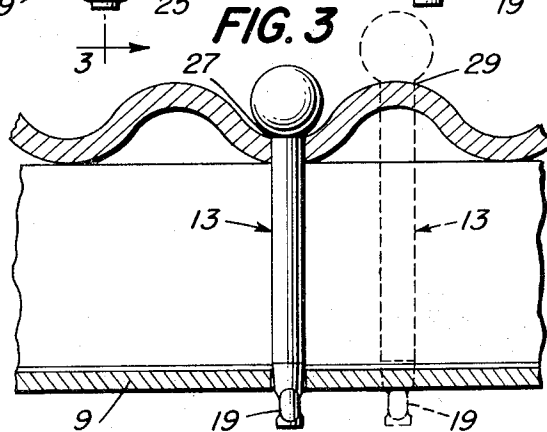
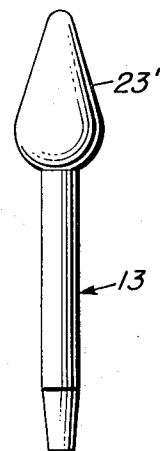


FIG. 5



METAL ROOF CONSTRUCTION

INVENTION BACKGROUND

Sheet metal roof coverings have usually been fastened to their underlying supports, where the latter are of wood, by nails driven into the wood through openings in the sheet metal. Where metal roof trusses form the support for the sheet metal covering, the latter is usually secured thereto by passing a bolt through an opening in the sheet metal and one in the truss member and tightening the bolt by a nut at the free end of the bolt. With the sheet metal roof so secured, it has been found that the openings in the sheet metal, through which the nails or bolts pass, soon become enlarged thus allowing rain water to enter. The enlargements are due to expansion and contraction of the sheet material in accordance with changes in temperature, which cause movements of the material relative to the fixed nails or bolts.

THE INVENTION

In order to overcome the problem of leakage caused by enlargement of the apertures in the sheet material as explained above, I propose to utilize metal roof supports for the metal roof covering and secure the latter to the supports by metal pin fasteners which pass through openings drilled in the covering and supports. The pin fasteners are each provided with an enlarged head, the base of which is of spheroidal shape, the shanks of the pins fitting snugly within the openings in the sheet metal and loosely within the openings in the metal supports. The free ends of the pins which pass through the openings in the supports, are enlarged in one dimension by squeezing them in another dimension to lock the pins in place. The openings in the supports are provided in flanges which project outwardly from the sides of the supports and which are spaced below their upper supporting surfaces on which the covering rests. This spacing is provided in order to utilize a pin of sufficient length so that its overall expansion and contraction will provide it with the proper length to move with the roof covering as the material of the latter expands and contracts.

It is therefore an object of the invention to provide a metal roof which will not leak.

It is a further object of the invention to provide a metal roof which can expand and contract without enlarging the openings through which roof securing means extend.

It is another object of the invention to so secure a metal roof covering to its supports that the securing means expands and contracts with the material of the covering and moves therewith.

The above and other objects will become apparent as the description of the invention proceeds with specific reference to the drawings in which:

FIG. 1 shows in perspective, a building structure provided with a bow truss roof utilizing my invention, a portion of the roof covering being removed.

FIG. 2 is a cross-section along line 2—2 of FIG. 1 showing the pin fasteners securing the roof covering to the supports.

FIG. 3 is a cross-section along line 3—3 of FIG. 2.

FIG. 4 is a front view of one form of locking pin.

FIG. 5 is a front view of a locking pin having a head portion of modified shape.

DESCRIPTION OF INVENTION

The invention as hereinafter described is shown as being applied to a building B provided with a bow-truss roof structure. Extending transversely of the roof trusses in spaced parallel relation to each other, are a plurality of roof cover supporting members 3. These supporting members as shown, are in the form of inverted U-shaped channels in cross-section, each having an end wall 5 and a pair of side walls 7, 7. The free ends of the side walls are provided with outwardly projecting flanges 9, 9 which rest on the trusses and are secured thereto in any well known manner as by welding or by being bolted thereto. Supported on the outer surface of the inverted U-shaped channel members 3 is the sheet metal roof covering, here shown as being corrugated, but which may also be of planar form, if so desired. The sheet metal roof sections 11 are secured to the support members 3 by pins, shown generally as 13, each passing through an opening 15 in the roof covering and a substantially aligned opening 17 in the flange 9. The pin is locked against removal by an enlargement thereon just below the flange 9.

In practicing my invention, the beams which are to support the roof covering are placed directly on the roof trusses to extend transversely thereto, the beams being in spaced parallel relation to each other. Although a bowed roof is illustrated, the metal covering applied in accordance with my teaching may be used on any form or shape of roof. What is necessary is that the beams which support the roof covering be provided with flanges such as 9 spaced below the uppermost surfaces of the beams. While here shown as a metal beam of inverted U-shaped form in cross-section, such beam may be of solid wood, to the respective sides of which an angle iron is secured to provide the aforesaid flanges.

After securing the supporting beams 3 on the truss members, the sheet metal roof covering 11 is placed on the upper surfaces of the beams, one section at a time. Spaced openings 15 are drilled in the covering at locations overlying the portions of the flanges extending between the truss members. Openings 17 are also drilled in the flanges in substantial alignment with the openings in the covering 11. To secure the sections of roof covering to the support beams, a metal pin member 13 having a shank portion 21 which is preferably circular in cross-section, is driven through each pair of aligned openings. The head portions 23 of each of the pins is preferably of spheroidal shape and the shank portion 21 is of a diameter to fit snugly within the opening 15. The lower portion of the pin which passes through opening 17 may be tapered as shown at 25 or its diameter reduced sufficiently to provide a loose fit therein. The taper also helps in driving the pin into opening 15. If desired, the shank portion of the pin may be of uniform diameter and the opening 17 of greater diameter than the shank portion to provide a loose fit therefor. To lock the pins in place and for securing the roof cover to the support beams, the free end of each of the pins is squeezed as at 27 in a direction normal to its axis to provide the protrusions 19 below the lower surface of the flange, such protrusion extending in directions normal to the direction of the squeezing force.

Where the roofing material is of corrugated metal, the openings 15 for receiving the pins 13 may be located in the troughs 27 without any danger of leakage,

since the enlarged head 23 together with the snug fit of the shank of the pin within the opening 15 prevent rain from entering. The openings 15 in the roof covering may also be provided in the crest portions 29 of the corrugated covering so that leakage of rain will be greatly minimized. The enlarged heads 23 of the pins may be made of such dimensions as to perform the further function of a snow guard. In FIG. 5, the head portion 23' of the pin is shown as being enlarged in an axial direction for possibly more effective action as a snow guard, but it still retains the spheroidal shaped base portion of the pin shown in the other figures.

It can therefore be seen from the above, that an effective securing means for a sheet metal roof has been provided, such that the disadvantage of the prior art securing devices with their consequent rain leakage problems have been overcome. With the herein disclosed securing system, changes in temperature will cause both the roofing material 11 and the metal pins 13 to expand and contract. As the roofing material moves in accordance with such temperature changes, the upper portions of the pins will move therewith due to their loose fit within the openings 17 in the flanges. The distance between the flanges 9 and the roofing material is such that the length of the pins extending therebetween and the coefficient of expansion of the material thereof will provide sufficient overall expansion to partake of the movement of the roof material and yet retain the roof covering against undue movements in a high wind. As explained previously, where the roofing material moves due to contraction or expansion against the fixed nail or bolt passing through openings therein, as in the prior art, the material about the openings enlarges by tearing, thus allowing the entrance of water. However, if the securing means can partake of the movements of the roofing material due to contraction and expansion but still retain such covering against undue movements due to high winds, no substantial enlargement of the openings will take place.

Obviously many modifications and variations of the present invention are possible in the light of the above disclosure and it is to be understood that such modifications and variations are included within the spirit and scope of the appended claims.

What is desired to be secured by United States Letters Patent is:

1. In a roof construction for a building, means for supporting a sheet metal roof cover which comprises, a plurality of laterally spaced elongated members each having an upper surface for supporting the cover and a wall extending normal to said surface, flange means spaced from said surface projecting laterally from the wall and extending beyond said surface, a sheet metal cover supported on the upper surfaces of the members and having a series of spaced openings therein, said flange means having openings therein which are normally in substantial alignment with respective openings in the cover, means for securing the cover on the surfaces comprising a pin extending through each of a pair of aligned opening in the cover and flange means and provided with an enlarged head overlying the opening in the cover, said pin being of a size to provide a snug fit within the opening in the cover and having a tapered portion

converging downwardly passing through the opening in the flange means,

the opening in the flange means being of a size relative to the tapered portion as to confine the pin against translational movement in any lateral direction but to allow the pin to rock in any direction about the wall of the opening as the head of the pin moves with the sheet in its expanding and contracting movements.

2. In a roof construction in accordance with claim 1 wherein at least the base portion of the enlarged head of the pin is of spheroidal shape.

3. In a roof construction in accordance with claim 2 wherein the remaining portion of the enlarged head is of extended height and width to provide an effective snow guard.

4. In a roof construction according to claim 1 in which there are means for maintaining the pin against removal which comprises an enlargement adjacent the free end of the pin below the flange means, a second wall means, openings in the second wall means being no larger than the respective aligned means in the metal cover.

5. In a metal building wall assembly having an exterior metal sheath, comprising

elongated structural support members in substantially parallel, laterally spaced relation,

each of the support members having an outwardly facing first wall means against which the metal sheath engages, and a second wall means spaced inwardly of the first wall means, extending substantially parallel thereto and having at least a portion projecting beyond the edge of the first wall means, longitudinally spaced openings in the second wall means located in the portion projecting beyond the first wall means,

openings in the metal sheath normally in substantial alignment with the respective openings in the second wall means,

an elongated metal pin member extending through each pair of substantially aligned openings,

the pin members each having a snug fit in the opening in the sheath and an enlarged head portion at one end bearing against the outer surface of the sheath, the portion of the pin passing through the opening in the second wall means tapering to converge toward its other end and fitting said opening so as to be incapable of translational movements in any lateral direction therein,

the length of each pin between the openings in each pair, allowing it to rock about the wall of the opening in the second wall means as the one end of the pin moves with the sheath in its expanding and contracting movements.

6. In a metal building wall assembly according to claim 5 wherein the first wall means each include a planar outer surface and a wall extending transversely thereto,

the second wall means comprising a wall extending laterally from the transversely extending wall.

7. In a metal building wall assembly according to claim 5 wherein the structural support members comprise the roof rafters of the building.

8. In a metal building wall assembly according to claim 6 wherein the first and second wall means are in substantially parallel transversely spaced relation and connected by a transversely extending wall.

9. In a metal building wall assembly according to claim 5 wherein the openings in the second wall means are no larger than the respective aligned openings in the metal sheath.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,796,014 Dated March 12, 1974

Inventor(s) VERNON H. GARBRICK

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 4, lines 4 and 5 (column 4, lines 19 and 20),

cancel "a second wall means,";

line 5, (column 4, line 20) before "openings"

reinsert --the--;

line 5, (column 4, line 20) "second wall" should
be --flange--.

Signed and sealed this 6th day of August 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents