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FASTENING UNIT FOR INSULATING ROOFS

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Fig. 1.

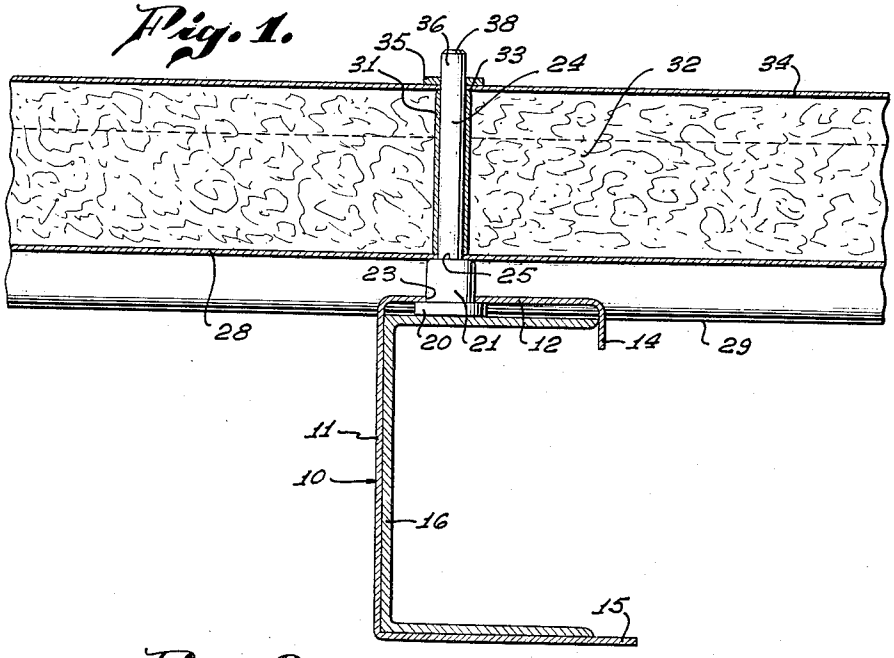
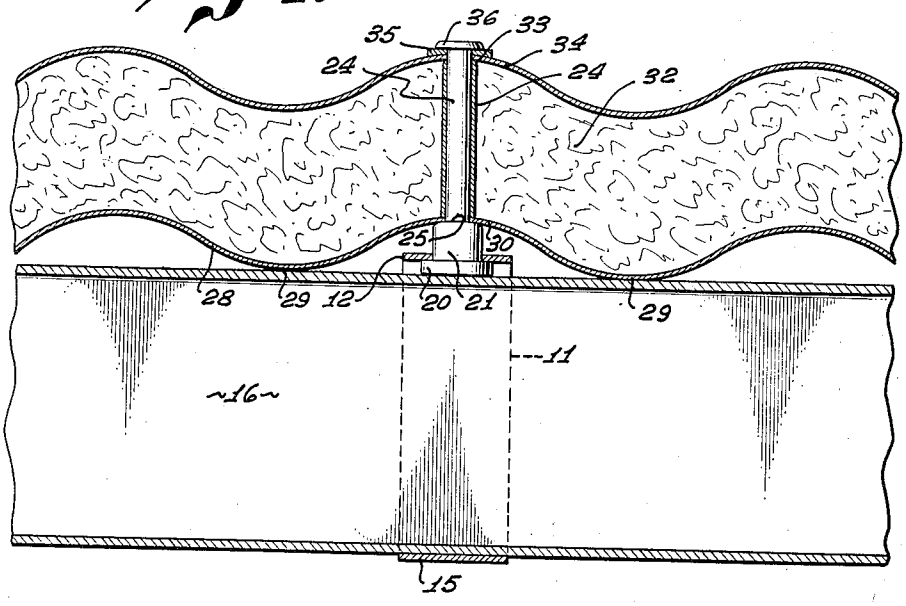


Fig. 2.



INVENTOR.
GEORGE D. WIDMAN,
BY
Henry H. Snelling
ATTORNEY.

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FASTENING UNIT FOR INSULATING ROOFS

George D. Widman, Gardena, Calif.

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6 Claims. (Cl. 108—33)

This invention relates to coverings for roofs or side walls of the type in which a layer of insulation is held between two sheets of corrugated or shaped metal or any other suitable sheet material and is secured to structural elements such as channels, I-beams, or other structural supports. The principal object of the present invention is to provide a fastening unit comprising a strap carrying a pin to impale and secure in place the two sheets and the insulation between them, such unit also including a sleeve on the pin to act as a spacer, a seal for the lower sheet, and a firm support for the upper sheet which is held in place by a washer and heading, in rivet fashion, the top portion of the pin.

A further object of the invention is to provide an efficient but relatively inexpensive pin having a head to rest upon a structural support, a standard to support a lower roofing sheet, and a small diameter post to extend through alined holes in the lower roofing sheet and the upper roofing sheet, such holes being made by striking the sheets in turn when resting upon the top of the post of the pin.

It is an object of the invention to form a roofing or siding joint which can be made without the erection of scaffolding under a roof or inside the side wall of a structure and without deformation of the corrugations of the roofing or siding sheet, and with complete water-proof quality for the covering.

In the drawings:

Figure 1 is a central side elevation;

Figure 2 is an elevation at right angles thereto showing a slightly modified construction.

For convenience of description the invention will be illustrated as applied to a roof but it should be remembered the words up, down, above, etc. are not limiting but are used solely for simplicity of expression, the invention applying to any application of an insulating layer to a structural wall, ceiling, roof, floor, etc.

The retaining strap **10** includes a back **11**, a top **12** with a downturned flange **14**, and a bottom **15** meeting the back **11** at a right angle and of a length equal to the top **12** and its flange **14**. The configuration shown facilitates slipping the strap **10** on a purlin **16**, here shown as a channel, after which the flange **14** and the extending end of the bottom **15** may be bent to fit the inside surfaces of the two flanges of the purlin.

The pin or fastener has a head **20**, which preferably rests directly on the top surface of the purlin **16**, a shank portion **21** snugly engaging a circular hole **23** in the strap so that the pin has no movement with respect to the strap. Above the shank or standard **21** is an elongated post or stem **24**, coaxial with the shank portion and of smaller diameter, thus forming a shoulder **25** which is curved or domed to agree in diametric cross section with the inside curve of a ridge of a corrugated sheet **28**, the bottoms of the valleys **29** of which rest directly upon the purlin **16** when the shoulder **25** is in engagement with the inside of a ridge **30**.

A snug-fitting sleeve **31** is mounted on the post **24** and is of a length equal to the thickness of the layer **32** of insulation when compressed. The upper end of this sleeve may be curved as at **33** exactly like the shoulder **25** and for the same purpose, the better to support a corrugated sheet, in this case the upper roofing sheet **34**. A readily deformable washer **35** fits the stem **24** above the corrugated sheet **34**.

In Figure 1 the washer **35** is shown just before the upper tip **36** of the pin has been headed to form a rivet, while in Figure 2 this top **36** has been riveted over and the washer bent to conform with the outside curve of the upper sheet **34**. This latter, and the lower sheet **28**, are not deformed in any manner except for the holes punched in them by the tip or upper end **36**. The usual and well-known method of punching holes for a single sheet is to rest the sheet upon a pin supported on the structural steel beam and strike the sheet firmly with a rubber mallet while the pin is in exact registry with the top of a ridge in the sheet.

In the previous art there has been but one sheet so the rivet portion was quite small and short. In the present device, the smaller diameter portion **24** is quite long and may be of one diameter. The insulation **32** may be of any preferred type, rock wool batting for example or a fiber glass pad frequently being used. The present step-rivet, with its sleeve, form an important advance in the art as these together not only space the two corrugated sheets apart, impale the insulation, and seal the holes in the two sheets, but also permit all operations to be carried out in safety and convenience from above the roof, thus avoiding the necessity for placing any kind of support just under the roof.

The annular curve of the top of the sleeve and of the shoulder at the top of the shank **21** exactly fit the inside surface of the crown or ridge of the corrugated sheet and is of importance as if a sharp shoulder were used, there would be great danger of injuring the sheet by punching it excessively when striking the sheet placed over the end of the pin or rivet, with the customary rubber hammer. It is almost impossible to judge exactly the force of the blow although experience greatly aids in doing this. However, it is obvious that if a blow were struck with too much force it would not only punch the hole where the small portion of the rivet pierces the sheet but would continue on and the sharp shoulder would provide a second punching action and the sheet could easily be forced below the shoulder where it would have no support and no sealing action whatsoever. It would take a much harder blow, one hard enough in fact, to tear the sheet around the circumference of the rivet if the sheet should come in contact with a round seat. In contrast, a square seat establishes a preliminary minimum contact, so the cutting edge readily tears the sheet with a blow but little greater than that which is proper.

The procedure for building the roof is as follows:

First, place a sheet of corrugated material in accurate position over the rivet, strike the sheet to impale it on the pin.

Second, place the sleeve over the rivet (this sleeve preferably should fit tight enough so that it may be driven down on the corrugated sheet and firmly hold it in place).

Third, impale the insulation over the sleeve. This is easily done by hand and requires no blow from the rubber mallet.

Fourth, impale the second sheet of corrugated material (using the rubber mallet) exactly the same as the first was impaled.

Fifth, place the washer **35** and head the rivet.

The fastener is of relatively unyielding metal, usually aluminum, of such strength as readily to penetrate an ordinary corrugated roofing sheet, and the pin itself is of one piece from the head **20** to the rivet tip **38**, so

that the upper sheet is supported from the purlin by a single solid piece of metal which is anchored to the purlin and this avoids any tendency of the roof to move under pressure from above because of the firm support given by the annular surfaces which engage the sheet in full line contact on both sides of the axis of the pin and the sleeve. The angle between the curved surface and the surface of the post or stem is obviously greater than 90° as that would be the angle if the shoulder of the shank or the top of the sleeve were sharp. It is preferred that the strap be of the same metal as the pin and sleeve and that the pin be secured to the strap before the latter is bent around the purlin flanges, although obviously it could be peened after the strap has been accurately positioned.

What I claim is:

1. In combination, a purlin, a headed pin resting on the purlin, means anchoring the pin to the purlin, said pin having a large diameter portion at the headed end and a smaller diameter portion coaxial therewith and of a number of times greater length, the annular shoulder between the portions being rounded, a corrugated sheet with the bottom surfaces of its valleys resting on the purlin and a bottom surface of a ridge resting upon the rounded shoulder, a second corrugated sheet, means between the corrugated sheets urging them apart, and a head on the pin limiting movement of the second sheet away from the first sheet.

2. In combination, a purlin, a headed pin resting on the purlin, means anchoring the pin to the purlin, said pin having a large diameter portion at the headed end and a smaller diameter cylindrical portion coaxial therewith and of greater length, the annular shoulder between the portions being rounded, a corrugated sheet with the bottom surfaces of its valleys resting on the purlin and the bottom surface of a ridge resting upon the rounded shoulder, a sleeve of shorter length than the smaller diameter portion and slidable snugly thereon to seal the sheet on the shoulder, a layer of insulation on the sheet and impaled on the sleeve, an upper sheet engaging the insulation and resting upon the top of the sleeve, and means above the upper sheet for holding the upper sheet firmly against the sleeve and sealing the hole in the sheet, said means being in part, at least, integral with the pin.

3. A roofing sheet fastening unit for attachment to a purlin including a strap having a back, a bottom and a top, a pin in the top of the strap proximate the back, said pin having a head engaging the top, a larger diameter portion integral with the head, and a smaller diameter coaxial portion forming with the other portion a shoulder, and an elongated sleeve on the smaller portion and of less length so as to expose a rivet portion extending above the sleeve, in which unit the top of the strap has a down-turned flange and the bottom and back are each straight and meet at right angles to facilitate fitting a purlin, the shoulder is domed, and the sleeve frictionally engages the portion of the pin it surrounds so as to hold a sheet impaled on the pin firmly against the domed shoulder.

4. The unit of claim 3 in which the pin and the strap are of aluminum, the larger diameter portion is less than half the length of the smaller diameter portion, the pin is firmly anchored in the strap, a readily deformable washer fits the portion of the pin above the sleeve, and the portion of the pin above the washer is of sufficient length to be deformed into a rivet head holding a roofing sheet between the washer and the sleeve.

5. In combination, a post, a sheet secured to the post, a sleeve frictionally slidable on the post and engaging the sheet to form a seal, a sheet of corrugated metal impaled on the post and resting upon the top of the sleeve, and means including a portion of the post for holding the corrugated metal sheet in firm contact with the top of the sleeve.

6. The combination of claim 5 in which the two sheets are parallel sheets of corrugated metal with their ridges and valleys in alinement, the space between them is filled with compressed insulation material, and the top of the sleeve is annularly curved to fit snugly the curve of the bottom of the ridge of the upper corrugated sheet, and the holding means includes a washer and the deformable end of the post.

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