Jan. 1, 1946. H. H. CRAFTON 2,392,232

BUILDING CONSTRUCTION

Filed Sept. 9, 1944 2 Sheets-Sheet 1

Fig. 1.

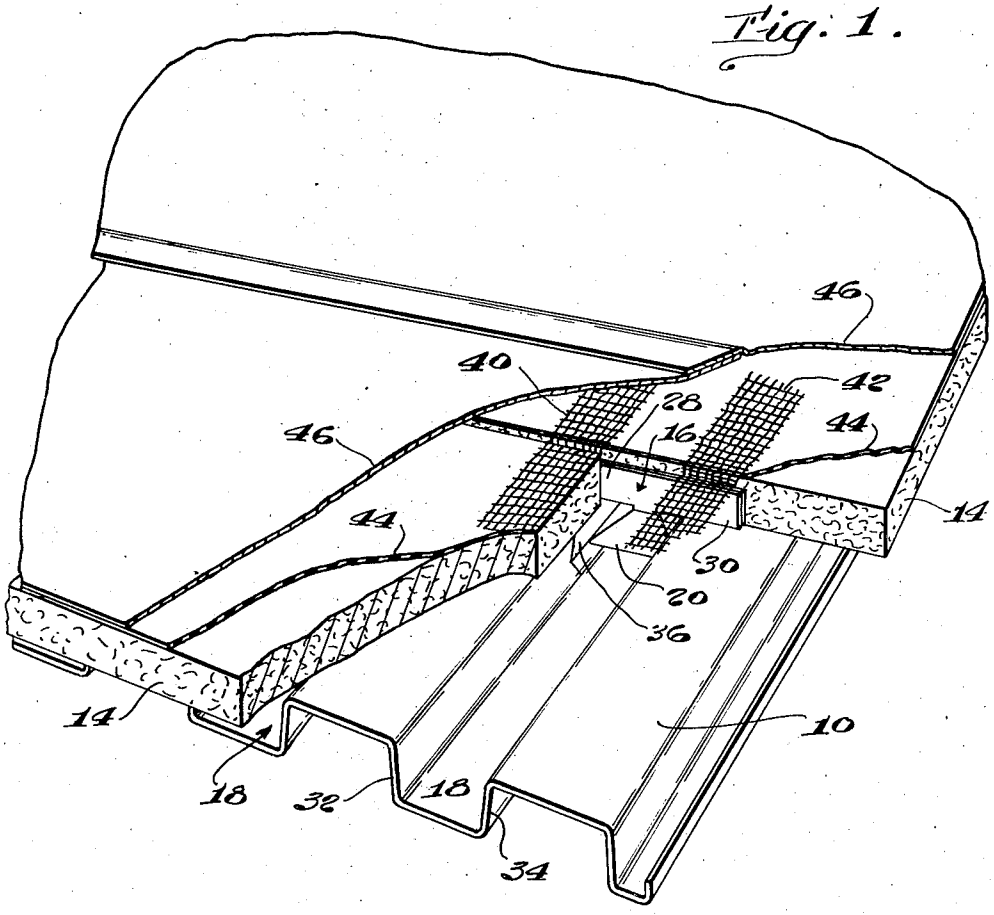


Fig. 2.

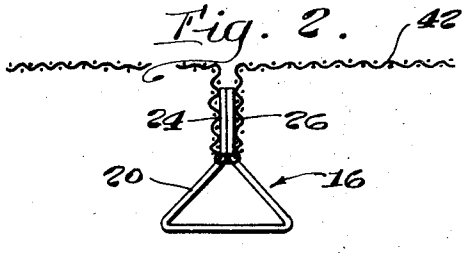
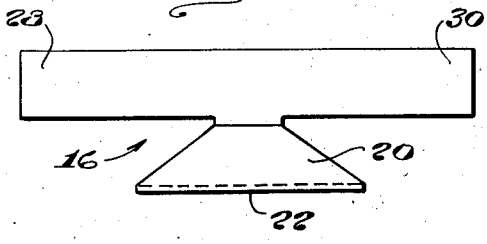


Fig. 3.



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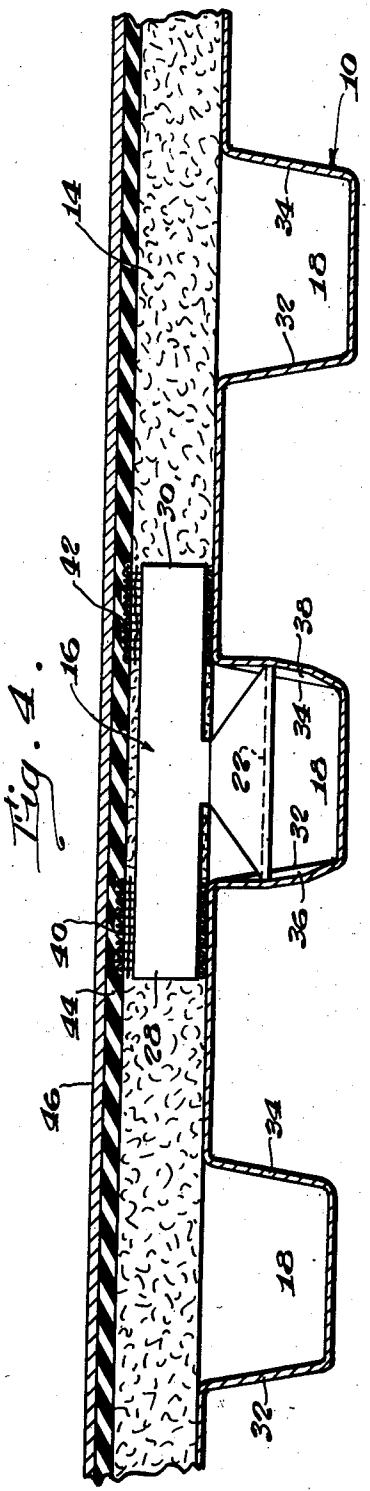


Fig. 4.

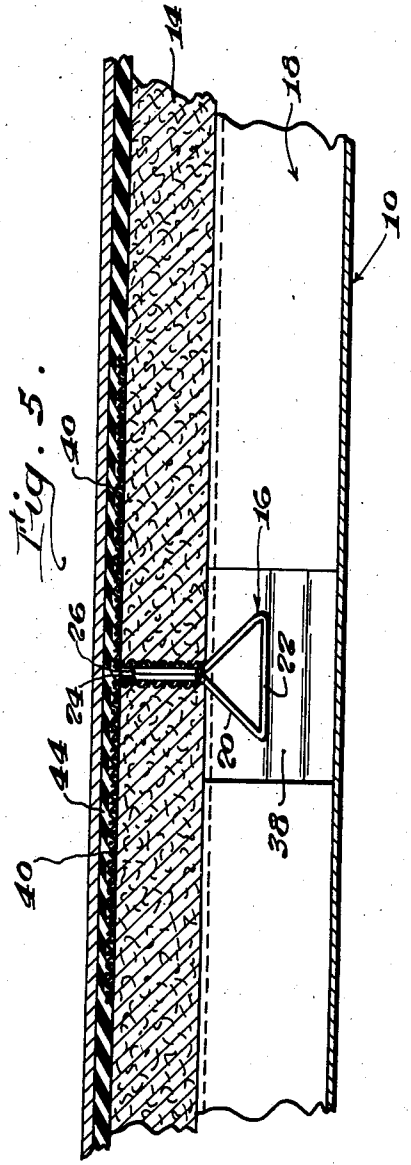


Fig. 5.

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BUILDING CONSTRUCTION

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Application September 9, 1944, Serial No. 553,316

12 Claims. (Cl. 108—6)

This invention relates to a building construction and more particularly to an insulated metal roof construction.

The object of the invention is to provide a novel and improved roofing construction embodying a metal roof deck and a preformed layer of insulating material erected upon the roof deck and in which provision is made for securing the insulation to the metal roof deck in a simple efficient and economical manner.

With this general object in view, and such others as may hereinafter appear, the invention consists in the roofing construction hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a perspective view of a metal roof deck upon which prefabricated insulating sheets of substantial thickness have been erected in accordance with the present invention; Figs. 2 and 3 are detail views in side and front elevations respectively of a fastening device employed in the present roof construction; and Figs. 4 and 5 are enlarged cross sectional views in end and front elevations respectively of a portion of the present roof structure.

In general, the present invention contemplates a roof construction embodying a corrugated metal roof deck upon which preformed insulating sheets or panels are erected and secured in a novel and superior manner. The insulated sheets may and preferably will be covered by the usual form of weatherproofing, such as waterproof roofing felt and a layer of asphalt adhesively securing the same to the upper surface of the insulation.

In order to secure the preformed insulating panels to the roof deck it has been the usual practice to bond such sheets to the upper surface of the roof deck by an adhesive such as asphalt. This has been found to be unsatisfactory and uneconomical when a corrugated roof deck is used because of the channeled structure of the upper surface of the roof deck which makes it difficult to obtain uniform distribution of the molten asphalt as the mopping operation tends to fill the channels with the adhesive material.

The present invention contemplates an insulated roof construction which lends itself particularly to the satisfactory erection and fastening of preformed insulating sheets to the upper surface of a corrugated roof deck either with or without an adhesive bond therebetween. In accordance with the present invention provision is made for mechanically fastening the individual insulating panels to the underlying roof deck and in the preferred embodiment of the invention, the fastening device comprises a metal clip or hook anchored to the roof deck and a perforated member which may be connected to or formed integrally with the clip and extended between the top surface of the insulation and the roofing or other covering, the perforated portions being embedded in the asphalt adhesive layer covering the insulation therebetween. As a result of this construction the insulating sheets are firmly and securely attached to the roof deck without the employment of an adhesive between the roof deck and the insulating sheets. In practice, the metal fastening clip is anchored in an enlarged or deformed portion between the side walls of an open cell of the corrugated roof deck, as will be hereinafter more fully described.

Referring now to the drawings, the metal roof deck, indicated generally at 10, may comprise the corrugated or cellular metallic building structure manufactured by H. H. Robertson Company and which is illustrated and described in the United States patent to Young, No. 1,867,433. In practice such a corrugated metal structure may comprise a plurality of sections of suitable lengths and widths to be conveniently handled, and, in the construction of the roof, the sections are erected upon the supporting frame work of the building and attached thereto. The roof sections are arranged to interlock along their longitudinal edges and are placed end to end in contiguous relation to form a floor or roof deck as fully described in said Young patent.

The insulating blocks or panels 14 may comprise any usual or preferred preformed insulating sheet material such as the insulating sheets commercially available under the trade name of "Masonite," "Celotex," or the like and, in constructing the present insulated roof structure, the insulating panels 14 are placed in position on top of the roof deck extending across the top of the corrugations therein as shown in Fig. 1. Fastening clips, indicated generally at 16, may then be secured in open cells 18 of the roof deck adjacent the edge of an insulating panel, as illustrated in Fig. 1. As best shown in Figs. 2 and 3, each fastening clip 16 comprises an integral piece of sheet iron having a lower or deck engaging portion 20 bent in a triangular shape in end elevation, see Fig. 2, the base 22 being laterally extended in side elevation, see Fig. 3, to fit within a widened portion of a cell, and, an upper portion comprising upstanding mem-

bers 24, 26 arranged face to face and having laterally extended portions 28, 30 which extend beyond the side walls 32, 34 of the open cell and on top of adjacent opposing corrugations.

As illustrated in Fig. 4, it will be observed that the side walls 32, 34 are upwardly diverging, so that the cell 18 is wider at the top than at the bottom. The fastening clip 16 may and preferably will be anchored between the upwardly diverging side walls 32, 34 by forming depressions 36, 38 therein on opposite sides of the cell opening 18, the base portion 22 of the clip being then forced therebetween as illustrated in Fig. 4. The base portion 22 being wider than the normal cell opening at this point is firmly held by the compressive force of the side walls tending to return to their normal or original shape.

In practice, the cell is preferably widened at the point desired by a wedge operated tool which is arranged to hold the cell open below the clip, permitting the latter to drop down to the position illustrated in Fig. 1, such a tool being illustrated and described in my copending application filed concurrently herewith. Thereafter, the tool is removed and as the expanding force is released, the side walls tend to spring back to their original shape to grip the base portion 22 tightly and firmly in position between the cell walls.

Prior to inserting the fastening clip 16, as above described, pieces of wire mesh 40, 42 are bent around the bottom and sides of the laterally extended portions 28, 30 respectively and then bent down at right angles so that upon installation of the fastening clip the wire mesh extends over the top of adjacent insulating panels, as clearly illustrated in Fig. 5.

After the insulating panels 14 have been thus positioned a coating of hot asphalt 44 is applied to the upper surface of the insulation and the portions of the wire mesh extended thereover to adhesively secure a layer of roofing paper 46 to the roof. As a result of this construction the laterally extended portions of the wire mesh 40, 42 are adhesively embedded in the asphalt 44 between the insulating panels 14 and the roof covering material 46. The wire mesh being hooked under the laterally extended portions 28, 30 of the fastening clip 16, operates to retain the insulating panels firmly and securely in place upon the roof deck 10.

From the above description of the preferred embodiment of the invention it will be seen that the present roof construction is simple and economical and eliminates the conventional "hot mopping" of the insulation to the corrugated roof deck. In practice it was found that the present fastening structure is capable of withstanding any normal forces tending to separate the insulation from the roof deck. In tests it was found that the final roof covering, which is adhesively secured to the top surface of the insulation by the asphalt coating, would separate from the asphalt before the fastening clip would release its hold in the roof deck, thus indicating that the fastening clip and the grip of the roof deck upon the portion of the clip inserted in an open cell thereof is greater than the adhesive strength of the asphalt holding the roofing paper to the insulation.

In practice, the fastening clips may be inserted in the open cells at suitable spaced intervals before or after a roof deck section is installed although they are preferably inserted in a cell adjacent the edge of a panel of insulation after the roof deck is installed. The wire mesh being relatively soft does not form a projection liable to break through the roofing paper when walked upon. It will be understood that in practice one or more layers of insulating sheets may be erected upon the roof deck and that more than one layer of roofing paper or other final roof covering may be applied as occasion requires. It will also be understood that in a roof structure of the character described when an adhesive waterproofing material such as molten asphalt applied to the upper surfaces of the insulating sheets comprises the final covering for the roof, the waterproofing material operates to adhesively secure those portions of the fastening devices extended over the upper surfaces of the insulating panels and in cooperation with the deck engaging portions of the fastening devices serve to retain the insulation firmly in place upon the roof deck.

While the preferred embodiment of the invention has been herein illustrated and described it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In a building construction, in combination, a corrugated metal roof deck, a plurality of preformed insulating sheets erected in contiguous relation upon the upper surface of the roof deck and extending across the corrugations therein, and a plurality of fastening devices anchored between opposed side walls of said corrugations and having portions of a substantial width and length providing a relatively large surface area extended over and adhesively secured to the upper surface of said insulating sheets for fastening the latter to the metal roof deck.

2. In a building construction, in combination, a corrugated metal roof deck, a plurality of preformed insulating sheets erected in contiguous relation upon the upper surface of the roof deck and extending across the corrugations therein, and a plurality of fastening devices anchored between opposed side walls of said corrugations and having perforated portions of a substantial width and length providing a relatively large surface area extended over and adhesively secured to the upper surface of said insulating sheets for fastening the latter to the metal roof deck.

3. In a building construction, in combination, a corrugated metal roof deck, a plurality of preformed insulating sheets erected in contiguous relation upon the upper surface of the roof deck and extending across the corrugations therein, and a plurality of fastening devices each comprising a fastening clip anchored between opposed side walls of said corrugations, and a perforated member engaged with said fastening clip and having portions of a substantial width and length providing a relatively large surface area extended over and adhesively secured to the upper surfaces of said insulating sheets for fastening the latter to said metal roof deck.

4. In a building construction, in combination, a corrugated metal roof deck, a plurality of preformed insulating sheets erected in contiguous relation upon the upper surface of the roof deck and extending across the corrugations therein, and a plurality of fastening devices each comprising a fastening clip anchored between opposed side walls of said corrugations, and a perforated member comprising a wire mesh engaged with said fastening clip and having portions of a substantial width and length providing a relatively large surface area extended over and adhesively secured to the upper surfaces of said

insulating sheets for fastening the latter to said metal roof deck.

5. In a building construction, in combination, a corrugated metal roof deck, a plurality of preformed insulating sheets erected in contiguous relation upon the upper surface of the roof deck and extending across the corrugations therein, and a plurality of fastening devices each comprising a fastening clip anchored between opposed side walls of said corrugations and extended upwardly between contiguous insulating sheets, and a perforated member engaged with said fastening clip and having portions of a substantial width and length providing a relatively large surface area extended over and adhesively secured to the upper surfaces of said insulating sheets for fastening the latter to said metal roof deck.

6. In a building construction, in combination, a corrugated metal roof deck, a plurality of preformed insulating sheets erected in contiguous relation upon the upper surface of the roof deck and extending across the corrugations therein, and a plurality of fastening devices anchored between opposed side walls of said corrugations and having portions of a substantial width and length providing a relatively large surface area extended over and adhesively secured to the upper surface of said insulating sheets for fastening the latter to the metal roof deck, said fastening devices being held in widened portions of said corrugations and retained solely by the compressive force of said side walls tending to return to their normal position.

7. In a building construction, in combination, a metal roof deck having a corrugated upper surface, a plurality of preformed insulating sheets erected in contiguous relation upon the upper surface of the roof deck and extending across the corrugations therein, a protective covering for the roof including an adhesive waterproofing material applied to the upper surfaces of said insulating sheets and a plurality of fastening devices anchored between opposed side walls of said corrugations and having portions of a substantial width and length providing a relatively large surface area extended over the upper surface of said insulating sheets and embedded in said adhesive waterproofing material for fastening the insulating sheets to the roof deck.

8. In a building construction, in combination, a corrugated metal roof deck, a plurality of preformed insulating sheets erected in contiguous relation upon the upper surface of the roof deck and extended across the corrugations therein, a fibrous protective covering bonded to the upper surfaces of said insulating sheets by a waterproofing adhesive, a plurality of fastening devices anchored between opposed side walls of said corrugations and having portions of a substantial width and length providing a relatively large surface area extended upwardly between contiguous insulating sheets and outwardly over the upper surfaces thereof, said outwardly extended portions being embedded in the waterproofing adhesive between said insulating sheets and said covering.

9. In a building construction, in combination, a metal roof deck, a plurality of preformed insulating sheets erected in contiguous relation upon the upper surface of the roof deck, and a plurality of fastening devices attached to the metal roof deck and having portions of a substantial width and length providing a relatively large surface area extending over and adhesively secured to the upper surfaces of adjacent insulating sheets for fastening the latter to the roof deck.

10. In a building construction, in combination, a metal roof deck having a corrugated upper surface, a plurality of preformed insulating sheets of substantial thickness erected in contiguous relation upon the upper surface of the roof deck and extending across the corrugations therein, a protective covering bonded to the supper surfaces of said insulating sheets by a waterproofing adhesive, a plurality of fastening clips anchored between opposed side walls of said corrugations and extended upwardly between contiguous insulating sheets, and perforated means engaged with said fastening clips and having portions of a substantial width and length providing a relatively large surface area extended between the upper surface of said insulating sheets and said covering, said portions being embedded in said waterproofing adhesive and cooperating with said fastening clips for securing the insulating sheets to the metal roof deck.

11. In a building construction, in combination, a metal roof deck having a corrugated upper surface, the open cells of said corrugations having upwardly diverging side walls, a plurality of preformed insulating sheets erected in contiguous relation upon the upper surface of the roof deck and extending across the open cells thereof, a plurality of fastening devices anchored between expanded portions of said open cells and retained by the compressive force of said cells tending to return to their normal positions, said fastening devices having cooperating portions of a substantial width and length providing a relatively large surface area extending over the upper surfaces of adjacent insulating sheets for fastening the latter to the metal roof deck.

12. In a building construction, in combination, a metal roof deck having a corrugated upper surface, the open cells of the corrugations having upwardly diverging side walls, a plurality of preformed insulating sheets erected in contiguous relation upon the upper surface of the roof deck and extending across the open cells thereof, a protective covering for the roof including an adhesive waterproofing material embodying asphalt applied to the upper surfaces of said insulating sheets, and a plurality of fastening devices anchored between expanded portions of the upwardly diverging side walls of said open cells and retained by the compressive force of said side walls tending to return to their normal positions, said fastening devices having cooperating perforated portions of a substantial width and length providing a relatively large surface area extended over the upper surfaces of adjacent insulating sheets, said adhesive waterproofing material penetrating through said perforations for securing said insulating sheets to the metal roof deck.

HENRY H. CRAFTON.