March 21, 1939. R. A. PLUMB 2,151,148

ROOF TILE

Filed March 3, 1938 2 Sheets-Sheet 1

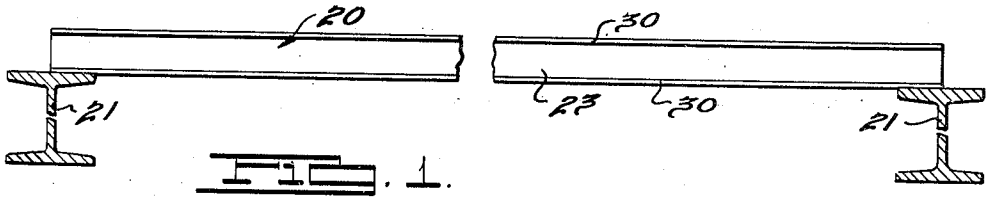


FIG. 1.

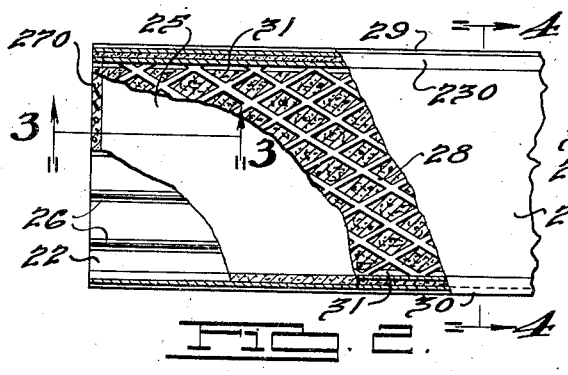


FIG. 2.

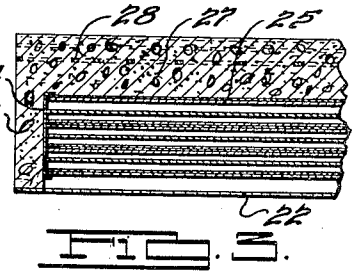


FIG. 3.

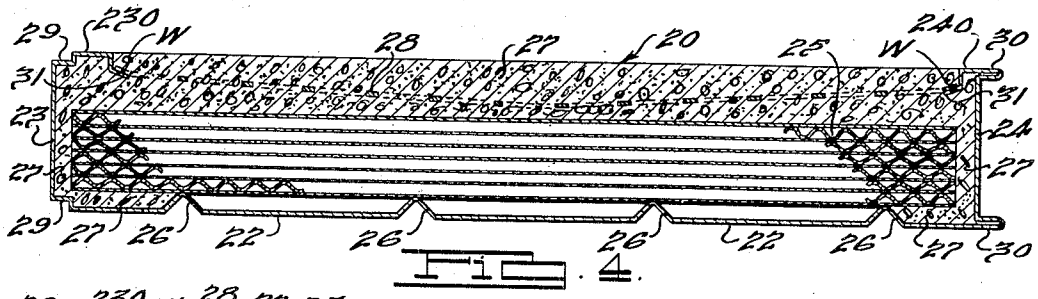


FIG. 4.

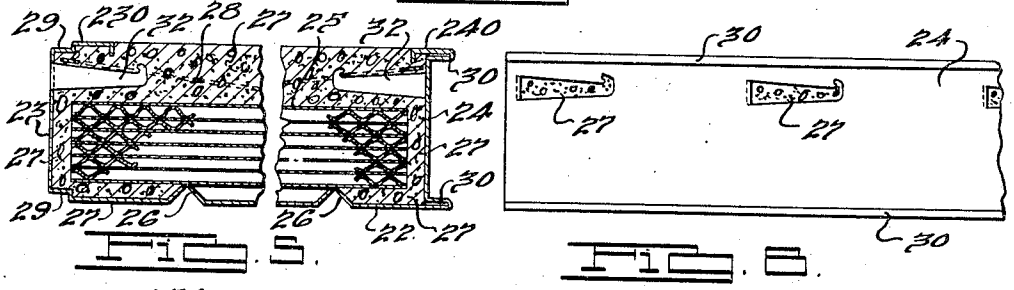


FIG. 5.

FIG. 6.

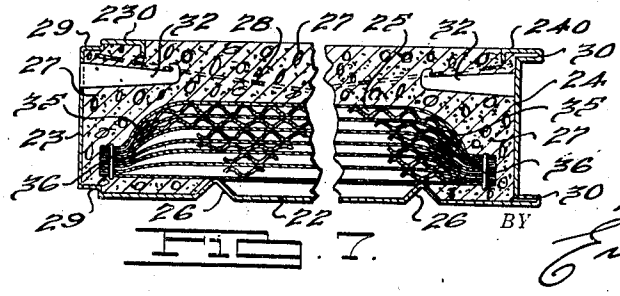


FIG. 7.

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March 21, 1939. R. A. PLUMB 2,151,148

ROOF TILE

Filed March 3, 1938 2 Sheets-Sheet 2

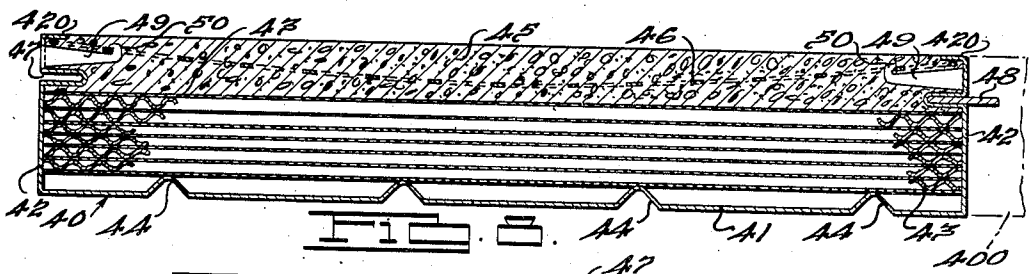


Fig. 8.

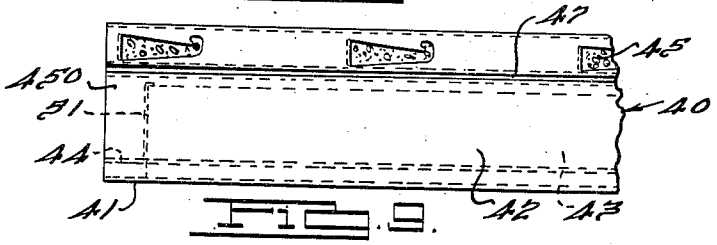


Fig. 9.

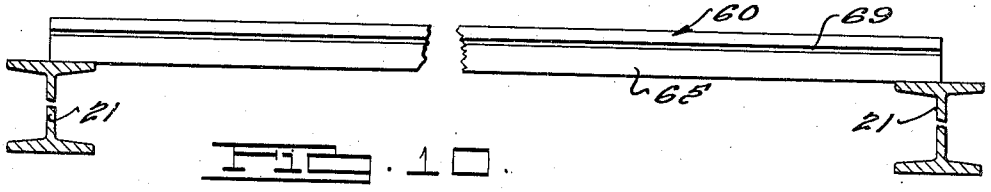


Fig. 10.

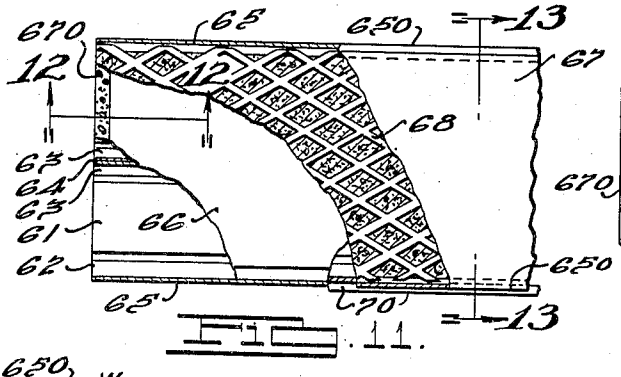


Fig. 11.

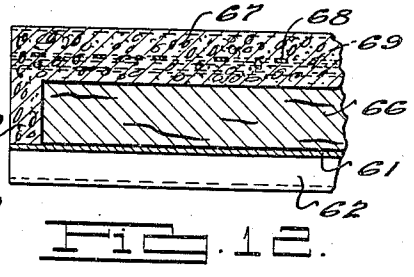


Fig. 12.

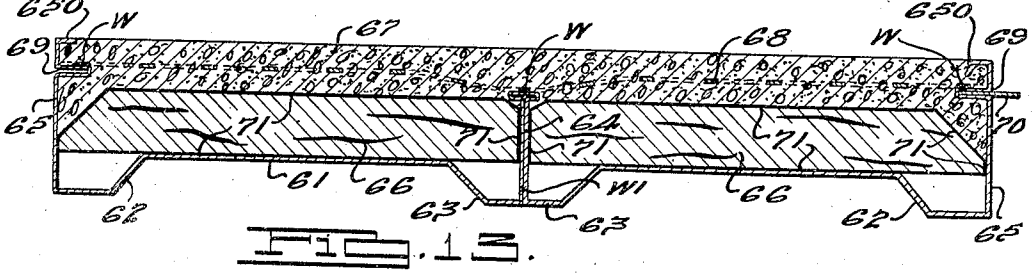


Fig. 13.

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UNITED STATES PATENT OFFICE

2,151,148

ROOF TILE

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Application March 3, 1938, Serial No. 193,685

16 Claims. (Cl. 72—68)

This invention relates to composite factory fabricated building units and in particular to insulated load supporting building units adapted for use as roof tile which also may be employed advantageously in floor and wall construction.

The roofs of buildings are ordinarily constructed of suitable load supporting members such as wood plank, concrete slabs, steel tile, concrete tile, or other material presenting a hard surface over which a water proof roofing material is placed, the said wood plank, concrete slabs, steel tile, concrete tile or the like being supported on beams or purlins spaced at suitable intervals usually from four to eight feet on center which in turn are supported on roof girders or trusses, all according to the particular design of the roof structure. In order to avoid heat losses through the roof construction from within the building during the winter months and to prevent the admission of heat from the sun's rays during the summer months, a layer of insulation such as cork board or sheets of fibrous cellular material is generally used as heat insulation and placed between the supported roof surface and the waterproof roofing material placed thereon.

It is readily observed that not only does it require three operations to complete an insulated roof, namely, the construction of the structural roof, the placing of insulating material thereover, and the placing of the waterproof roofing on the said insulating material, but, because of the cellular fibrous nature of various insulating materials generally employed over the structural roof surface, the construction of a roof cannot proceed during damp, rainy or snowy weather because of the harmful saturation of the various types of insulating materials employed during the laying of the insulating material and before the waterproof roofing is placed thereover. Also, it is expensive to handle the various types of fibrous insulating material generally employed as roof insulation on or about a construction job because it must be stored off the ground to avoid saturation by capillary attraction and because it must be covered to avoid saturation from moisture in the air, rain or snow.

Because of the fact that the various types of fibrous insulating materials generally employed to insulate roofs contain many voids and are subject to being easily dented when concentrated loads are placed thereon, it is obvious that waterproof roofing placed thereover is continually subject to being dented, punctured and otherwise harmed by walking thereover, the placing of concentrated loads thereon and by other traffic to which roofs are generally subjected.

It is not desirable to use wood plank for roof construction because of the fire hazard thereof; poured concrete roof slabs are extremely expensive because of the necessary forming therefor and the time required for the setting thereof; steel roof tile becomes twisted, dented and otherwise bent out of shape during shipping and erection; and concrete roof tile is easily broken, chipped or cracked during shipment and erection and is costly to erect because of its weight in comparison to the wood plank and steel tile for which it is generally substituted.

With the foregoing in view, the main object of this invention is to provide a unitary factory fabricated roof tile which carries its own insulation and provides the economy of eliminating the usual separate field operation of placing roof insulation after the erection of the usual structural roof surface and before the laying of the waterproof roofing thereover.

Another object of the invention is to provide a factory fabricated insulated roof tile unit capable of resisting weather during shipment and construction whereby to admit of its use under all weather conditions and thereby eliminate the necessity of holding up the construction of a roof during damp, rainy and snowy weather as heretofore required to avoid harmful saturation of the various types of cellular and fibrous insulating material generally employed over the structural roof and below the waterproof roofing.

Another object of the invention is to provide a unitary factory fabricated insulation carrying roof tile having a metal base and sides which serve as a form during manufacture of the same and which provide a hardened cementitious weather protection over the insulating material employed therein.

Another object of the invention is to provide a composite insulation carrying roof tile having a metal base and sides and a topping of reinforced cementitious material fabricated in such a manner as to cause the metal base and sides and the reinforced topping of cementitious material of the said composite tile to act together as a unitary whole to provide resistance against compressive, flexural and shearing stresses to which the said roof tile may be subjected.

Another object of the invention is to provide a composite insulation carrying roof tile having a metal base and sides and a topping of reinforced cementitious material fabricated in such a manner as to cause the metal base and sides

and the reinforced topping of cementitious material of the said composite tile to act together as a unitary whole to provide resistance against compressive, flexural and shearing stresses to which the said roof tile may be subjected without any load being carried by the insulation material employed therein.

Another object of the invention is to provide a complete unitary composite insulation carrying roof tile unit having a metal base and sides and topping of cementitious material fabricated and reinforced to act together as a unitary whole in resisting flexural stresses, which is capable of being stored and erected in all types of weather without harmful effects to the insulation thereof, and which is capable of supplying the long wanted demand for a roofing unit which is substantially free from breakage during shipping, handling and erection.

Another object of this invention is to provide a composite roof tile composed of a metal base and sides, suitable insulation material, and a reinforced cementitious topping, the said tile having a high insulation value and which is so constructed as to protect the insulation thereof during erection and the placing of roofing thereover, being substantially free from breakage during shipment and erection, and which is capable of acting as a unitary whole in resisting compressive and flexural stresses without subjecting the insulation thereof to resist any stress whatsoever.

Other objects of the invention will become apparent by reference to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary side elevational view of a roof tile embodying the invention supported on roof beams or purlins.

Fig. 2 is a fragmentary plan view of the roof tile shown in Fig. 1 with portions thereof broken away to better show the invention.

Fig. 3 is an enlarged fragmentary longitudinal view taken on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged cross sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is a fragmentary cross sectional view similar to Fig. 4 showing how the reinforcement of the cementitious topping of the roof tile disclosed in Figs. 1 to 4 inclusive may be bonded to the metal sides thereof without welding.

Fig. 6 is a fragmentary side elevational view of the modified form of the invention shown in Fig. 5.

Fig. 7 is an enlarged cross sectional view similar to Fig. 5 showing how the insulation of the roof tile disclosed in Figs. 1 to 6 inclusive may be formed along the sides of the tile to provide additional cementitious material at the sides to resist vertical and horizontal shearing stresses when the said tile is used on long spans or to support heavy loads.

Fig. 8 is an enlarged cross sectional view showing another embodiment of the invention in which none of the cementitious topping extends around the sides of the insulation therein.

Fig. 9 is a fragmentary elevational view of the embodiment of the invention disclosed in Fig. 8.

Fig. 10 is a fragmentary side elevational view of still another embodiment of the invention.

Fig. 11 is a fragmentary plan view of the construction disclosed in Fig. 10 with certain portions thereof broken away to better illustrate the invention.

Fig. 12 is an enlarged fragmentary longitudinal view taken on the line 12—12 of Fig. 11.

Fig. 13 is an enlarged cross sectional view taken on the line 13—13 of Fig. 11.

Referring now to the drawings wherein like numerals refer to like and corresponding parts throughout the several views, the composite roof tile 20 disclosed in Figs. 1 to 7 inclusive and shown supported on roof beams or purlins 21 in Fig. 1 is composed, in general, of a metal base 22 with vertically disposed sides 23 and 24 preferably formed integral therewith by being bent upwardly therefrom, a block of insulation material 25 slightly narrower and slightly shorter than the said metal base 22 preferably supported in spaced relationship thereabove by a plurality of suitable ribs 26 formed in the said base 22, a cementitious topping 27 disposed above the said insulation 25 and preferably extending around the sides and ends thereof as best indicated in Figs. 3 and 4, and a mesh or other suitable reinforcement 28 for the said topping 27 preferably welded to or supported from the upper portion of the vertically disposed sides 23 and 24 in a manner similar to the construction shown in Figs. 4 and 5.

The sides 23 and 24 of the embodiment of the invention disclosed in Figs. 1 to 7 inclusive are formed male and female respectively by crimping the top and bottom of the side 23 as indicated by the numeral 29 in Figs. 4, 5 and 7 and by forming the side 24 with upper and lower laterally protuberant edges 30, the said sides 23 and 24 when so formed provide means for accomplishing a tongue and groove joint between adjacent roof tiles when erected in lateral juxtaposition with respect to each other.

The tops 230 and 240 respectively of the sides 23 and 24 are preferably turned inward as indicated in Figs. 4, 5 and 7 to provide protection against breakage at the upper corners of the roof tile 20. An inwardly and downwardly projecting strip 31 may be formed integral with the top of the sides 23 and 24 as indicated in Fig. 4 onto which the reinforcing mesh 28 of the cementitious topping 27 may be welded at W, or, in order to disperse with welding and to provide suitable anchorage and means for the accurate placement of the reinforcing mesh 28 of the cementitious topping 27, suitable arms 32 preferably having upwardly disposed hooked lugs 33 formed on the ends thereof may be stamped and bent inward from the sides 23 and 24 to a position normal thereto as best shown in Figs. 5, 6 and 7.

Although the insulation 25 is shown in the embodiment of the invention disclosed in Figs. 1 to 7 inclusive to be of cellular corrugated paper or cardboard which is preferably treated to avoid the absorption of moisture from the cementitious material 27, any insulation material may be substituted therefor providing the said insulation material substituted is capable of repelling moisture at least for a time sufficient for the cementitious topping 27 to set and harden. If the insulation 25 is not waterproof per se, it may be dipped in hot asphalt or the like to make the same water repellant during the setting of the cementitious material 27. A suitable mask 34 is preferably placed over the ends of the corrugated paper or cardboard insulation 25 as indicated in Fig. 3 to prevent the cementitious material 270 from running in the ends thereof prior to setting. If required, the said cementitious material 27 and 270 may be provided with some sort of integral waterproofing sufficient to make the said cementitious topping 27 and ends 270 of the roof tile 20 water repellant or waterproof whereby to avoid any possibility of the said tile absorbing water from

rain or melting snow during shipment and erection.

The sides of the said insulation 25 may be formed as indicated by the numeral 35 in Fig. 7 by compressing the sides thereof from the top downward and stapling the said sides in the compressed position by a plurality of staples 36, or otherwise if other than corrugated paper insulation material is used, to provide an additional mass of cementitious material 27 alongside the sides 23 and 24 of the roof tile to aid in resisting vertical and horizontal shears in cases where the roof tile is used on long spans and when the said tile is subjected to heavy loading.

In the embodiment of the invention disclosed in Figs. 1 to 7 inclusive it is obvious that the arrangement of the several parts of the composite roof tile 20 is such as will permit the metal base 22 to resist the tensile stresses of flexure, will cause the metal sides 23 and 24 and the cementitious material 27 adjacent thereto to resist the horizontal and vertical shearing stresses of the composite tile, and will cause the cementitious topping 27 reinforced by the mesh 28 or the like to resist not only the compressive stresses of flexure of the composite tile but will prevent crushing of the insulation material 25 therein due to the fact that the said topping 27 spans laterally between the side 23 and the side 24 of the said composite tile. Also, the tops 230 and 240 of the metal sides 23 and 24 aid the cementitious topping 27 and the reinforcing mesh 28 in resisting compressive stresses of flexure of the composite tile 20. In fact, all of the elements of the said composite roof tile 20 except the insulation 25 thereof act together as a unitary whole to provide resistance against the flexural stresses to which the said tile may be subjected.

The said insulation 25 being completely surrounded by the cementitious material 27 and 270 and the metal base 22 is completely protected from moisture during shipment and erection.

The composite roof tile 40 disclosed in Figs. 8 and 9 is similar in many respects to the composite roof tile 20 hereinbefore described and shown in Figs. 1 to 7 inclusive. Referring now particularly to Figs. 8 and 9, the composite roof tile 40 is composed, in general, of a metal base 41 with vertically disposed sides 42 preferably formed integral therewith by being bent upwardly therefrom, a block of insulation material 43 of a width equal to the distance between the said vertically disposed sides 42 and of a length slightly shorter than the said metal base 41 preferably supported in spaced relationship thereabove on a plurality of suitable ribs 44 formed in the said base 41, a cementitious topping 45 disposed solely above the said insulation 43 except at the ends and as indicated by the numeral 450 in Fig. 9, and a mesh or other suitable reinforcement 46 for the said topping 45 preferably supported from the upper portion of the vertically disposed sides 42 in a manner similar to the construction shown in Fig. 8, however, the said reinforcement 46 may be welded to the said vertically disposed sides 42 in any desired manner, not shown, but as suggested in Fig. 4. The sides 42 of the embodiment of the invention disclosed in Figs. 8 and 9 are preferably formed to provide a longitudinally disposed slot 47 therein for receiving a spline 48 by means of which a joint between adjacent roof tiles may be accomplished during the erection of the said roof tiles 40 in lateral juxtaposition with respect to each other as indicated by the dot and dash lines 400 in Fig. 8.

The tops 420 of the sides 42 are preferably turned inward as indicated in Fig. 8 to provide protection against breakage for the upper corners of the roof tile 40.

In order to provide suitable anchorage and means for the accurate placement of the reinforcing mesh 46 of the cementitious topping 45, suitable arms 49 preferably having upwardly disposed hooked lugs 50 formed on the ends thereof may be stamped and bent inward from the sides 42 to a position normal thereto as best indicated in Figs. 8 and 9.

Although the insulation 43 is shown in the embodiment of the invention disclosed in Figs. 8 and 9 to be of cellular corrugated paper or cardboard which is preferably treated to avoid the absorption of moisture from the cementitious material 45, any insulation material may be substituted therefor providing the said insulation material substituted is capable of repelling moisture at least for a time sufficient for the cementitious topping 45 to set and harden. If the insulation 43 is not waterproof per se, it may be dipped in hot asphalt or the like to make the same water repellant during the setting of the cementitious material 45. A suitable mask 51 is preferably placed over the end of the corrugated paper or cardboard insulation 43 as indicated in Fig. 9 to prevent the cementitious material 450 from running in the end thereof prior to setting. If required, the said cementitious material 45 and 450 may be provided with some sort of integral waterproofing sufficient to make the said cementitious topping 45 and ends 450 of the roof tile 40 water repellant or waterproof whereby to avoid any possibility of the said tile absorbing water from rain or melting snow during shipment and erection.

In the embodiment of the invention disclosed in Figs. 8 and 9 it is obvious that the arrangement of the several parts of the composite roof tile 40 are such as will permit the metal base 41 to resist the tensile stresses of flexure, will cause the metal sides 42 and the cementitious material 45 near the top thereof and adjacent thereto to resist the horizontal and vertical shearing stresses of the composite tile, and will cause the cementitious topping 45 reinforced by the mesh 46 or the like to resist not only the compressive stresses of flexure of the composite tile but will prevent crushing of the insulation material 43 therein due to the fact that the said topping 45 spans laterally between the vertically disposed sides 42 of the said composite tile, the said cementitious topping 45 being supported on that portion of the vertically disposed sides 42 bent inwardly above the insulation material 43 for providing the longitudinally disposed spline slots 47 as hereinbefore described. Also, the tops 420 of the metal sides 42 aid the cementitious topping 45 and the reinforcing mesh 46 in resisting compressive stresses of flexure of the composite tile 40. In fact, all of the elements of the said composite roof tile 40 except the insulation 43 thereof act together as a unitary whole to provide resistance against the flexural stresses to which the said tile may be subjected.

Still another embodiment of the invention is disclosed in Figs. 10 to 13 inclusive wherein the composite roof tile 60 shown supported on the roof beams or purlins 21 comprises, in general, a metal base 61 preferably having a pair of longitudinally disposed laterally spaced depending ribs 62 and a pair of adjacent longitudinally disposed central depending ribs 63 formed to

provide a central vertically disposed longitudinal T-shaped member 64, vertically disposed sides 65 preferably formed integral with the said metal base 61 by being bent upwardly from the bottom of the said longitudinally disposed laterally spaced depending ribs 62 of the said base 61, blocks of insulation material 66 each of a width equal to the distance between the said central ribs 63 and a vertically disposed side 65 and of a length slightly shorter than the said metal base 61 preferably placed on the said metal base 61 equidistant from the ends thereof, a cementitious topping 67 disposed solely above the said insulation 66 except at the ends as indicated by the numeral 670 in Fig. 12, and a mesh or other suitable reinforcement 68 for the said topping 67 preferably supported from and welded to the top of the said upwardly disposed central T-shaped member 64 and the vertically disposed sides 66 in a manner similar to the construction shown in Fig. 13, the position of the weld being indicated by the letter W in the drawings.

The two sides of the vertically disposed longitudinal T-shaped member 64 are preferably welded together either continuously or at suitable intervals as indicated by the character W—1 in Fig. 12. The said weld W—1 increases the lateral bending strength of the composite roof tile 60.

The sides 65 of the embodiment of the invention disclosed in Figs. 10 to 13 inclusive are preferably formed to provide a longitudinally disposed slot 69 therein for receiving a spline 70 by means of which a joint between adjacent roof tiles may be accomplished during the erection of the said roof tiles 60 in lateral juxtaposition with respect to each other.

The tops 650 of the sides 65 are preferably turned inward as indicated in Fig. 8 to provide protection against breakage at the upper corners of the roof tile 60.

The insulation 66 in the embodiment of the invention disclosed in Figs. 10 to 13 inclusive may be of any suitable cellular or fibrous material and is preferably dipped in a hot asphalt or other suitable waterproofing material to provide a moisture proof coating 71 therearound. It is readily observed that if a hot asphalt coating 71 is used around the insulation 66 the said insulation 66 becomes cemented thereby to the metal base 61, the sides 65 and the T-shaped vertically disposed central member 64 whereupon moisture from the cementitious topping 67 is repelled from the said insulation material 66 prior to and after the said cementitious topping 67 has set and hardened. Likewise, moisture from or through the cementitious ends 670 is prevented from entering the end of the said insulation material 66. It is preferable that if the cementitious material 67 and 670 is not waterproof per se, that some sort of suitable integral waterproofing may be provided to make the said cementitious topping 67 and ends 670 of the roof tile 60 water repellant or waterproof whereby to avoid any possibility of the said roof tile 60 absorbing water from rain or melting snow during shipment and erection.

In the embodiment of the invention disclosed in Figs. 10 to 13 inclusive it is obvious that the arrangement of the several parts of the composite roof tile 60 are such as will permit the metal base 61 to resist the tensile stresses of flexure, will cause the metal sides 65 and the cementitious material 67 near the top thereof and adjacent thereto to resist the horizontal and vertical shearing stresses of the said composite tile, and will cause the cementitious topping 67 reinforced by the mesh 68 or the like to resist not only the compressive stresses of flexure of the composite tile 60 but will prevent crushing of the insulation material 66 therein due to the fact that the said topping 67 stands laterally between the vertically disposed sides 65 of the said composite tile, the said cementitious topping 45 being supported on that portion of the vertically disposed sides 65 bent inwardly above the insulation material 66 for providing the longitudinally disposed spline slots 69 as hereinbefore described. Also, the central longitudinally disposed T-shaped member 64 together with the reinforcing mesh 68 welded thereto provide the necessary horizontal and vertical shear resistance to permit the central depending ribs 63 and cementitious topping 67 to resist the tensile and compressive stresses of flexure at the longitudinal central portion of the said roof tile 60. Also, the tops 650 of the metal sides 65 aid the cementitious topping 67 and the reinforcing mesh 68 in resisting compressive stresses of the composite roof tile 60 at the sides thereof. In fact, all of the elements of the said composite roof tile 60 except the insulation 66 thereof act together as a unitary whole to provide resistance against the flexural stresses to which the said roof tile 60 may be subjected.

It is obvious that the applicant herein has provided either in the embodiment of the invention disclosed in Figs. 1 to 7 inclusive, the embodiment of the invention disclosed in Figs. 8 and 9 or in the embodiment of the invention disclosed in Figs. 10 to 13 inclusive a complete unitary factory fabricated composite insulation carrying roof tile in which the metal base and sides and topping of cementitious material are suitably bonded together and are caused to act together as a unitary whole in resisting flexural stresses, and has provided a composite roof tile which carries its own insulation and which is capable of being stored and erected in all types of weather without harmful effects to the insulation thereof, and has provided a roof tile which is capable of supplying the existing demand for a roofing unit which is both strong and light, which carries its own insulation, which may be economically manufactured in large quantities, which is substantially free from breakage during shipping, handling and erection, and which provides a fire safe insulated roofing construction capable of being manufactured and erected at a minimum of cost.

Although but three specific embodiments of the invention have been disclosed and described herein it will be observed that various changes including the size, shape, arrangement and details of the various parts thereof may be made without departing from the spirit of the invention and it is not intended to limit the scope thereof other than by the terms of the appended claims.

I claim:

1. A pre-fabricated structural building unit comprising a metal base, metal sides formed upwardly from the said metal base, inturned flanges along the top of the said metal sides, insulation shallower than the said building unit disposed between the said metal sides, a cementitious topping over the said insulation, and reinforcement for the said cementitious topping adapted to cause the said cementitious topping and metal portions of the building unit to act together as a unitary whole in resisting flexural stresses.

2. A pre-fabricated structural building unit comprising a metal base and metal sides, insulation within said building unit, a cementitious top-

ping over the said insulation, and reinforcement for said cementitious topping anchored to the metal sides whereby to cause the entire building unit except the said insulation to act as a unitary whole in resisting flexural stresses.

3. A pre-fabricated structural building unit comprising a metal base and metal sides, inturned flanges along the top of the said metal sides, insulation within said building unit, a cementitious topping over the said insulation, and reinforcement for the said cementitious topping anchored to the said inturned flanges whereby to cause the entire building unit except the said insulation to act as a unitary whole in resisting flexural stresses.

4. A pre-fabricated structural building unit comprising a metal base, metal sides formed upwardly from the said metal base, inturned flanges along the top of the said metal sides, insulation shallower than the said building unit disposed between the said metal sides, ribs formed in the said metal base adapted to support the said insulation in spaced relationship above the said metal base and provide a plurality of air spaces between the said insulation and the said metal base, and a reinforced cementitious topping over the said insulation.

5. A pre-fabricated structural building unit comprising a metal base, metal sides formed upwardly from the said metal base, inturned flanges along the top of the said metal sides; insulation shallower, shorter and narrower than the said building unit disposed in spaced relationship between the said metal sides and inwardly with respect to the ends of the said metal base and sides; ribs formed in the said metal base adapted to support the said insulation in spaced relationship above the said metal base and provide a plurality of air spaces between the said insulation and the said metal base, a reinforced cementitious topping over the said insulation, and cementitious material extending across the ends and along the sides of the said insulation within the length of the said building unit.

6. A pre-fabricated structural building unit comprising a metal base and metal sides, insulation within said building unit, ribs formed in the said metal base adapted to support the said insulation in spaced relationship above the said metal base and provide a plurality of air spaces between the said insulation and the said metal base, a cementitious topping over the said insulation, and reinforcement for said cementitious topping anchored to the metal sides whereby to cause the entire building unit except the said insulation to act as a unitary whole in resisting flexural stresses.

7. A pre-fabricated structural building unit comprising a metal base and metal sides, inturned flanges along the top of the said metal sides, insulation within said building unit, ribs formed in the said metal base adapted to support the said insulation in spaced relationship above the said metal base and provide a plurality of air spaces between the said insulation and the said metal base, a cementitious topping over the said insulation, and reinforcement for the said cementitious topping anchored to the said inturned flanges whereby to cause the entire building unit except the said insulation to act as a unitary whole in resisting flexural stresses.

8. A pre-fabricated structural building unit comprising a metal base and metal sides, insulation within said building unit, a centitious topping over the said insulation, and reinforcement for said cementitious topping anchored to the metal sides whereby to cause the entire building unit except the said insulation to act as a unitary whole in resisting flexural stresses, the said insulation being sufficiently water repellant whereby to prevent absorption of moisture thereby during the setting of the said cementitious material.

9. A pre-fabricated structural building unit comprising a metal base, metal sides formed upwardly from the said metal base, inturned flanges along the top of the said metal sides, insulation shallower than the said building unit disposed between the said metal sides, a reinforced cementitious topping over the said insulation, and means for making the said insulation water repellant whereby to prevent the absorption of moisture thereby during the setting of the said cementitious material.

10. A pre-fabricated structural building unit comprising a metal base and metal sides, insulation within said building unit, a cementitious topping over the said insulation, reinforcement for said cementitious topping anchored to the metal sides whereby to cause the entire building unit except the said insulation to act as a unitary whole in resisting flexural stresses, and means for making the said insulation water repellant whereby to prevent the absorption of moisture thereby during the setting of the said cementitious material.

11. A pre-fabricated structural building unit comprising a metal base and metal sides, an upwardly disposed longitudinal central rib formed in the said metal base, insulation within the said building unit disposed between the sides and upwardly disposed central rib thereof, a cementitious topping over the said insulation, and reinforcement for said cementitious topping anchored to the said metal sides and upwardly disposed central rib whereby to cause the entire building unit except the insulation to act as a unitary whole in resisting flexural stresses.

12. A pre-fabricated structural building unit comprising a metal base and metal sides, a pair of central and a pair of outer longitudinal ribs formed in the said metal base depending therebelow, an upwardly disposed longitudinal central rib formed in the said metal base, insulation within the said building unit disposed between the sides and upwardly disposed central rib thereof, a cementitious topping over the said insulation, and reinforcement for said cementitious topping anchored to the said metal sides and upwardly disposed central rib whereby to cause the entire building unit except the insulation to act as a unitary whole in resisting flexural stresses.

13. A pre-fabricated structural building unit comprising a metal base and metal sides, an upwardly disposed longitudinal central rib formed in the said metal base, insulation within the said building unit disposed between the sides and upwardly disposed central rib thereof, a cementitious topping over the said insulation, reinforcement for said cementitious topping anchored to the said metal sides and upwardly disposed central rib whereby to cause the entire building unit except the insulation to act as a unitary whole in resisting flexural stresses, and means for making the said insulation water repellant whereby to prevent absorption of moisture thereby during the setting of the said cementitious material.

14. A pre-fabricated structural building unit comprising a metal base and metal sides, a pair

of central and a pair of outer longitudinal ribs formed in the said metal base depending therebelow, an upwardly disposed longitudinal central rib formed in the said metal base, insulation within the said building unit disposed between the sides and upwardly disposed central rib thereof, a cementitious topping over the said insulation, reinforcement for said cementitious topping anchored to the said metal sides and upwardly disposed central rib whereby to cause the entire building unit except the insulation to act as a unitary whole in resisting flexural stresses, and means for making the said insulation water repellant whereby to prevent absorption of moisture thereby during the setting of the said cementitious material.

15. A pre-fabricated structural building unit comprising a metal base and metal sides formed to provide a tongue and grooved joint between adjacent building units when juxtaposed, insulation within the said building unit, a cementitious topping over the said insulation, reinforcement in said cementitious topping anchored to the said metal sides whereby to cause the said building unit except the said insulation to act as a unitary whole in resisting flexural stresses.

16. In combination, a plurality of pre-fabricated structural building units juxtaposed with respect to each other; each of the said building units composed of a metal base and metal sides crimped to provide inwardly disposed longitudinally extending grooves therein near the top thereof, insulation within the said building unit, a topping of cementitious material over the said insulation, reinforcement in the said cementitious topping welded to the said crimps in the metal sides whereby to cause the entire building unit except the insulation thereof to act together as a unitary whole in resisting flexural stresses; a metal spline frictionally disposed in adjacent longitudinal extending grooves of juxtaposed building units whereby to provide a tight joint therebetween and cause the juxtaposed building units to act together while resisting the stresses of flexure.

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