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Martin et al.

[11] **3,875,715**

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[54] **PREFABRICATED ROOFING MODULES**

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[*] Notice: The portion of the term of this patent subsequent to Sept. 24, 1990, has been disclaimed.

[22] Filed: **June 21, 1973**

[21] Appl. No.: **372,255**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 174,477, Aug. 24, 1971, Pat. No. 3,760,546.

[52] **U.S. Cl.** **52/309;** 52/468; 52/521; 52/540; 52/555; 52/556

[51] **Int. Cl.** **E04d 1/28;** E04d 1/36

[58] **Field of Search** 52/309, 314–316, 52/384, 394, 461, 467, 468, 471, 521, 555, 592, 540, 539

[56] **References Cited**

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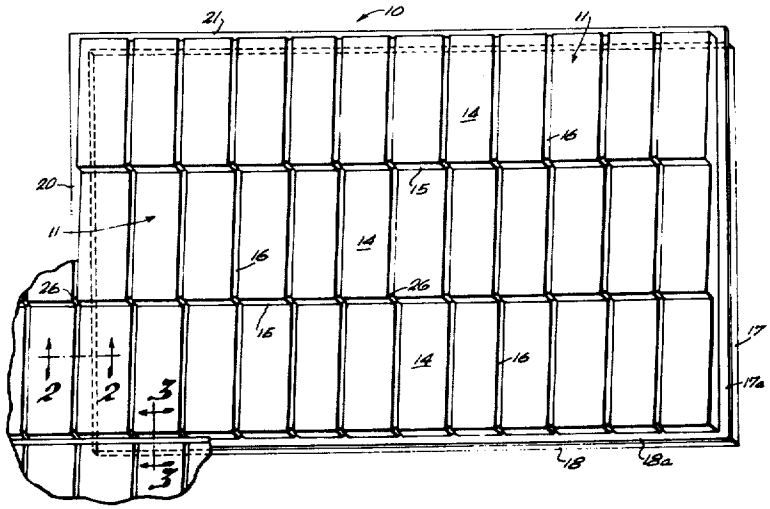
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Attorney, Agent, or Firm—Ernest H. Schmidt

[57] **ABSTRACT**

Prefabricated roof modules and associated prefabricated joining members are described for completing on-the-job roofing from the joists out in a single carpentry operation. The modules each comprise a sheet metal upper layer, a foamed synthetic plastic interior insulation layer, and a plywood sheathing lower layer. The sheet metal upper layer is embossed or press formed to simulate any desired roof deck construction, and is coated with a protective layer of vinyl resin of any desired color. The sheathing lower layer projects marginally outwardly of the embossed portion of the sheet metal upper layer at one pair of horizontal and vertical edges of the module, whereat it is overlapped in face-to-face relation with corresponding projecting flange portions of the sheet metal upper layer. Substantially identical marginal flange portions along the opposite vertical and horizontal portions of the sheet metal upper layer provide underlying undercuts in the sheathing for the interfitting reception of adjacent modules upon installation. Sealing finish strips of metal-faced foamed synthetic plastic material serve to both protect the waterproof juncture between adjacent modules and cover them in such a manner as to simulate ordinary roof construction.

8 Claims, 3 Drawing Figures



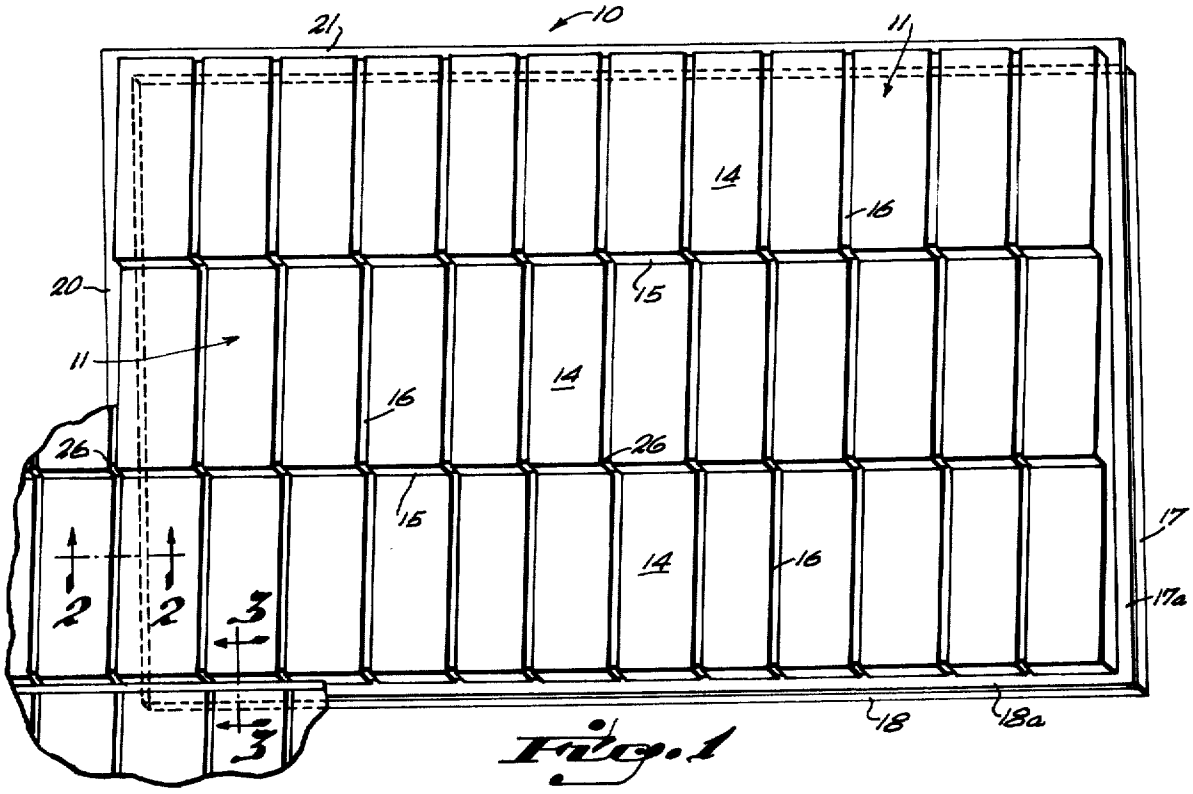


Fig. 1

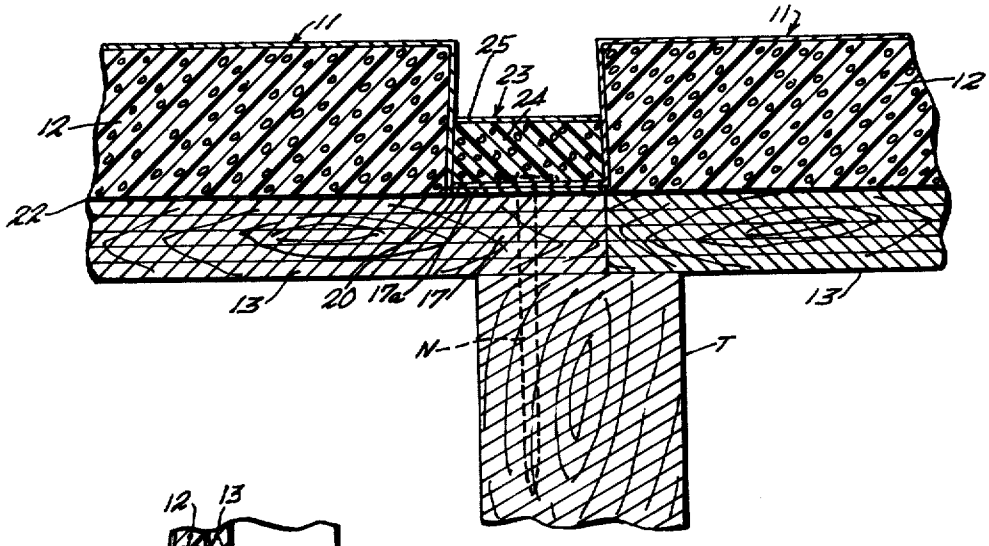


Fig. 2

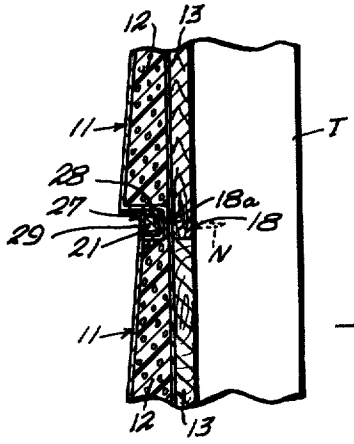


Fig. 3

PREFABRICATED ROOFING MODULES

This invention is a continuation-in-part of application Ser. No. 174,477, filed Aug. 24, 1971 and issued as Pat. Number 3,760,546 on Sept. 25, 1973 and is directed particularly to a roof construction comprising a plurality of roofing modules and module joining means adapted to be readily prefabricated at the factory and comprising sheathing, fire-proofing, insulation, outer covering and weather-proofing to enable roof construction from the rafters or trusses out in a single operation.

Heretofore, it has been common practice in roof construction to apply the sheathing, insulation, waterproofing and deck or outer covering in a series of individual layers ordinarily applied by different workmen having different skills.

It is, accordingly, the principal object of this invention to provide a prefabricated module in module joining means capable of being economically prefabricated and shipped to the job site for erection directly upon the trusses or rafters of a building under construction to complete roofing in a single constructional operation involving only carpentry skills thereby not only effecting substantial savings in labor, but also enabling completion of the roof in a substantially shorter time period than required in ordinary roof construction methods.

A more particular object of the invention is to provide an improved roofing module of the character described comprising an outer or deck layer of formed sheet metal the outside of which is press-shaped or embossed to simulate any desired conventional roof construction and the underside of which is provided with successive layers of insulation and sheathing.

Another object of the invention is to provide a prefabricated roofing module of the above nature which can readily be press formed and assembled in layers of the individual components in mass production by the use of power press techniques.

Still another object of the invention is to provide prefabricated roofing modules for use in roof construction at the job site wherein the mechanism for joining adjacent modules comprises off-set and inter-fitting layered portions of the module so arranged as to effect a plurality of juncture seals effecting water- and weather-proof integrity of the completed roof under all climate conditions and for long periods of time.

Yet another object of the invention is to provide a modular roof construction comprising a plurality of prefabricated roofing modules wherein the junctures between mutually adjacent modules are of such conformation and appearance as to simulate the juncture pattern of the individual simulated roofing units, such as tiles, comprising the roofing, to present the appearance in the finished roof of ordinary unit tile or roofing element construction.

Other objects, features and advantages of the invention will be apparent from the following description when read with reference to the accompanying drawings. In the drawings wherein like reference numerals denote corresponding parts throughout the several views:

FIG. 1 is an isometric view, as seen from above, of a prefabricated roof module embodying the invention;

FIG. 2 is a horizontal cross-sectional view, taken along the line 2—2 of FIG. 1 in the direction of the arrows and illustrating the vertical inter-fitting juncture of a pair of horizontally adjacent roofing modules embodying the invention, including the vertical joiner seal strip used in finishing the modular roofing insulation; and

FIG. 3 is a vertical cross-sectional view, taken along the line 3—3 of FIG. 1 in the direction of the arrows and illustrating the inter-fitting juncture of a pair of vertically adjacent roofing modules embodying the invention, including the horizontal joiner seal strip used in finishing the modular roofing installation.

Referring now in detail to the drawings, reference numeral **10** designates, generally, a preferred form of a prefabricated roofing module embodying the invention, the same being comprised of a formed sheet metal outer layer **11**, a foamed synthetic plastic interior insulating layer **12** and a plywood sheathing bottom layer **13**. The roofing module **10**, which will preferably be 8 feet long and 4 feet wide, i.e., 4 feet from the lower to the upper edge, has its sheet metal outer layer **11** stamped to simulate any desired outer covering such as, for example, tile shingles, as illustrated at **14**. As such, the sheet metal outer layer **11** is formed with equidistantly spaced, longitudinally extending steps or riser portions **15** simulating the lower ends of simulated tiles **14**, and a plurality of spaced depressions **16** simulating the spacing between tiles. The adhesive **22** used in joining the interior insulating layer **12** to the plywood sheathing bottom layer **13** will preferably be of such composition and thickness as to provide a waterproof membrane preventing the migration of moisture in either direction.

As best illustrated in FIG. **1**, the plywood sheathing bottom layer **13** projects marginally outwardly of the underside of the interior insulating layer **12** along one pair of vertical and horizontal edges thereof as indicated at **17** and **18**, respectively, and the formed sheet metal outer layer **11** is provided with corresponding marginal vertical and horizontal flange portions **17***a*, **18***a*, respectfully, cemented or otherwise secured in face-to-face abutting relation with respect to said sheathing projections. The plywood sheathing bottom layer **13** is of such size, as is best illustrated in FIG. **2**, as to be in registry with the opposite outer edges of the insulating layer **12**, and the corresponding vertical and horizontal edges of the sheet metal outer layer **11** project marginally outwardly of the plane of the upper surface of the plywood sheathing layer **13** thereat to provide vertical and horizontal flange portions **20**, **21**, respectively, of approximately the same width as that of the vertical and horizontal portions **17***a*, **18***a*, respectively.

FIG. **2** illustrates in vertical cross-section the interfitting juncture of a pair of vertically abutting, side-by-side roofing modules embodying the invention in roofing a house under construction. The modules are of such size as to span a multiple of rafters or truss members T, spaced as in ordinary roof framing construction, such as 16 inches on centers. As further illustrated in FIG. **2** the projecting vertical edge **17** and its associated vertical flange portion **17***a* of the sheet metal outer layer **11** will be received under the outwardly-extending vertical flange portion **20** comprising the sheet metal outer layer of the adjacent modular unit. The overlapping of the sheet metal outer layer **11** thus provides a wide, vertically extending seal between adjacent panels. As indicated at **23** in FIG. **2**, a sealing finish strip is provided for the purpose both of protecting the waterproof juncture between adjacent panels and covering such vertically extending junctures to simu-

late uniform tiling in the finished roof. The sealing strips **23** are applied, as by cementing in place, after the roofing modules **10** have been nailed to the roof rafters or trusses T as by nails N, and comprise an insulating layer **24** of foamed synthetic plastic material cemented or otherwise secured against the top of which is a sheet metal layer **25.** The sealing strip upper surface will preferably be formed along its length with inclines and steps, indicated at **26** in FIG. **1,** simulating the changes in level from one tile to another in the grout between simulated tiles in mutually adjacent modules, thereby presenting a uniform or monolithic appearance in the finished roof. It will be understood that the sealing strips **23** will be of such width as to press fit firmly in place, and when so applied with a suitable cement will not only be securely retained in place, but will also provide additional water-proofing of the vertically extending junctures between modules.

FIG. **3** similarly illustrates in vertical cross-section the interfitting juncture of a pair of horizontally abutting side-by-side roofing modules embodying the invention in roofing a house under construction. As illustrated in FIG. **3,** the projecting horizontal edge **18** and its associated horizontal flange portion **18***a* of the sheet metal outer layer **11** will be received under the outwardly extending horizontal flange portion **21** comprising the sheet metal outer layer of the adjacent modular unit. The overlapping of the sheet metal outer layer **11** thus provides a wide, horizontally extending seal between adjacent panels into which, after nailing in place as by nails N to the roof rafters or trusses along 16 inch centers, a horizontal sealing strip **27** is fitted and cemented by a suitable adhesive to complete the joining of adjacent modules in roofing a house under construction. The sealing strip **27** comprises a foamed synthetic plastic material insulating layer **28** covered with a sheet metal outer layer **29,** and is of such thickness as to finish flush with the upper surface of the lower simulated tiles to effect the appearance of overlapping tiles. Here again, it will be understood that the joining and sealing strip **27** will be of such width as to require press fitting in place, and when so applied with a suitable adhesive insures a water-proof seal along the horizontal junctures of adjacent roofing modules in the finished roof construction.

In the use of the roofing modules **10** and their associated joining strips, it is first to be noted that the size of the modules, being **8** feet from side-to-side, it such as to reach center to center between truss members or rafters spaced **16** inches on centers, as is common in building construction, so that overlapping of the modules occurs along such roof trusses or roof rafters, whereat they can be nailed in place as by the nails N. It will also be understood that whenever necessary to cut a module to fit the roofing job under construction, this can readily be done with a saber saw. The nails N preferably will have their shanks coated with a dry adhesive, and will be hammered in place by the use of a power tool so as tightly to compress overlapping portions of adjacent modules in place against the roof rafters or truss members, and thereby provide effective and permanent sealing against water leakage. The upper surfaces of the vertical and horizontal flange portions **20, 21,** respectively, of the sheet metal outer layer **11,** and/or the upper surface of the vertical and horizontal flange portions **17***a*, **18***a* respectively, of said sheet metal outer layer, will be coated with a suitable adhesive, either at the factory or at the job site during roof assembly, to enhance the water-tight juncture between modules. As hereinabove described, the vertical sealing strips **23** and the horizontal sealing strips **27** between modules not only mask the junctures to present a uniform tiled appearance in the finished roof, but also provide further water-proofing of the junctures.

The various edges, valleys, ridges and eaves in any particular roofing job can be finished or trimmed either in a conventional manner or by use of the various joining strips for these purposes which are illustrated and described in the above-identified patent of which this application is a continuation-in-part.

It is also to be understood that the outer surfaces of the modules **10** and their associated joining strips **23** and **27,** instead of being prefinished at the factory, could be coated after installation has been completed by spraying on a suitable material, with color as desired, such as a mixture of a cementitious material with an acrylic sealer or paint. By suitable choices of color in the sealer vehicle and texture in the cementitious material added thereto, a wide variety of unit tile roof constructions can be simulated.

While we have illustrated and described herein only one form in which the invention can conveniently be embodied in practice, this embodiment is presented by way of example only and not in a limiting sense. The invention, in brief, comprises all the embodiments and modifications coming within the scope and spirit of the following claims.

What I claim as new and desire to secure by Letters Patent is:

1. A roofing module comprising, in combination, a rectangular, formed sheet metal outer layer, a comparatively thick layer of insulating material attached to the underside of said outer layer, and a layer of sheathing secured against the underside of said layer of insulating material, said layer of sheathing having one vertical edge and one horizontal edge projecting marginally outwardly of said layer of insulating material, said sheet metal outer layer having integrally formed therewith a marginal first vertical flange portion and a marginal first horizontal flange portion overlapping said vertical and horizontal marginal portions, respectively, of said layer of sheathing in face-to-face relation with respect thereto, said formed sheet metal outer layer further being integrally formed with a second vertical flange portion and a second horizontal flange portion projecting marginally outwardly of corresponding edges of said insulating layer and said sheathing layer to provide undercuts for the reception of the marginally outwardly projecting vertical and horizontal portions of mutually adjacent modules in roofing assembly.

2. A roofing module as defined in claim **1,** wherein said layer of insulating material is of foamed synthetic plastic.

3. A roofing module as defined in claim **2,** wherein said outer layer is formed along its surface to simulate roof shingles.

4. A roofing module as defined in claim **3,** wherein the marginal projections of said layer of sheathing material and said vertical and horizontal flange portions of said sheet metal outer layer are substantially equal in projecting extent.

5. A roofing module as defined in claim **4,** including means for joining a pair of such modules placed edge-to-edge in interfitting relation in a roof assembly, said

joining means comprising an elongated strip of sheet metal and a comparatively thick layer of foamed plastic material secured against the underside of said metal strip, the width of said strip being slightly greater than the marginal projection of said vertical and horizontal flange portions of said sheet metal outer layer.

6. A roofing module as defined in claim **5,** wherein the elongated metal strip of said joining means is formed with steps along its length to simulate overlapping tile construction when fitted in place in the vertically extending recess between adjacent modules upon roof assembly.

7. A roofing module as defined in claim **6,** the length of the sheathing metal of which is a multiple of 16 inches.

8. A roofing module as defined in claim **7,** wherein the outer surface of the sheet metal is fluidize bed coated with a synthetic resin.

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