

[54] GLASS FIBER REINFORCED GYPSUM
BUILDING COMPONENTS AND METHOD

[76] Inventor: **Harold James William Payne,**
Whispering Pines, Raby Mere,
Chester, England

[22] Filed: **May 6, 1974**

[21] Appl. No.: **463,306**

Related U.S. Application Data

[62] Division of Ser. No. 328,968, Feb. 2, 1973, Pat. No.
3,839,836.

[30] **Foreign Application Priority Data**

Feb. 4, 1972 United Kingdom..... 5396/72

[52] U.S. Cl. **156/41; 52/593; 156/250**

[51] Int. Cl. **E04c 1/10; E04c 2/06**

[58] Field of Search **156/41, 42, 45, 250;**
52/508, 593, 309, 594, 595, 519, 527, 588

[56] **References Cited**

UNITED STATES PATENTS

2,238,017	4/1941	Duncan.....	156/45 X
3,230,128	1/1966	French.....	156/250
3,555,756	1/1971	Curran et al.....	52/519 X

FOREIGN PATENTS OR APPLICATIONS

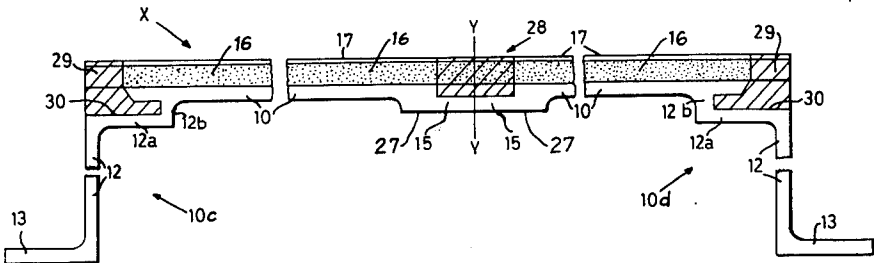
1,204,541 9/1970 United Kingdom..... 52/309

Primary Examiner—Price C. Faw, Jr.
Attorney, Agent, or Firm—Harry B. Keck; George E.
Manias

[57] **ABSTRACT**

A roof deck formed from glass-fiber reinforced gypsum, a roof deck fabricated from such units and a method for making the units. The units have, in cross-section, a flat web; a depending offset tongue along one edge of the web; a depending bight portion inset from the other edge of the web; a projecting shoulder extending from the bight portion generally parallel with the web and extending outwardly beyond the said other edge of the web; a side wall depending from the outboard edge of the shoulder; a flange extending from the base of the side wall; a groove formed by the second edge of the web, the bight and part of the projecting shoulder. The depending offset tongue of one roof deck unit is adapted to engage the groove of an abutting roof deck unit when the flanges of the two units rest on a common plane.

2 Claims, 4 Drawing Figures



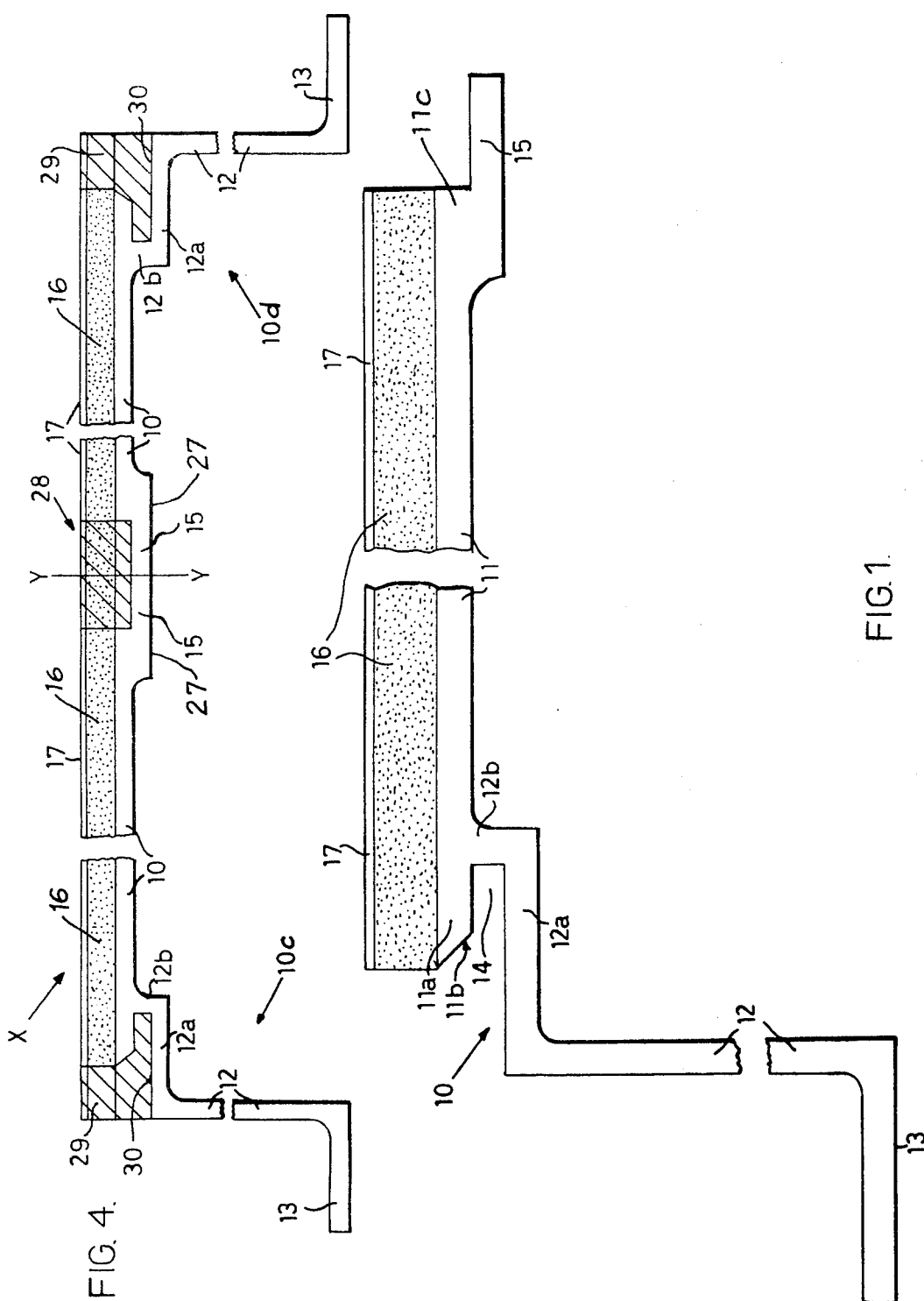


FIG. 1.

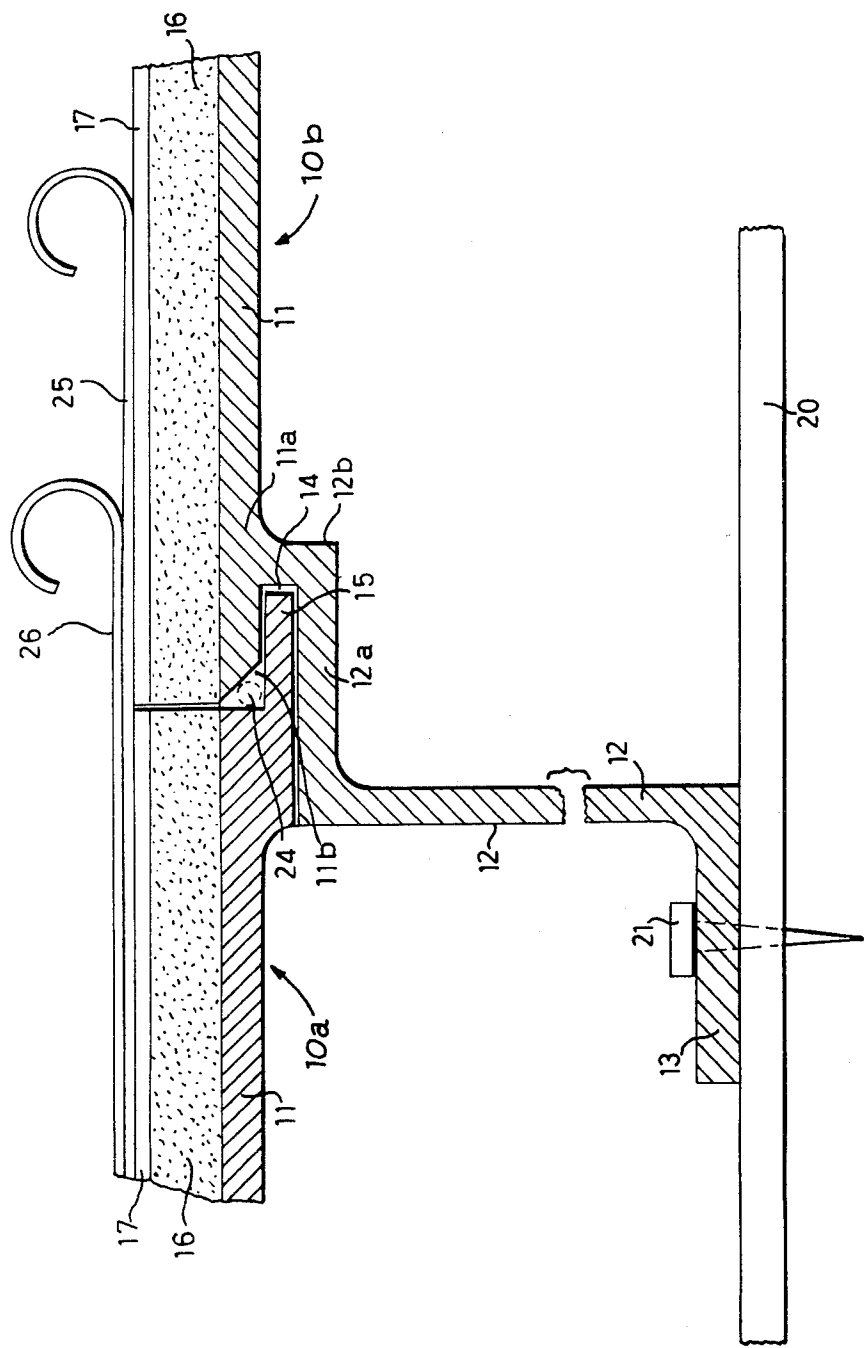
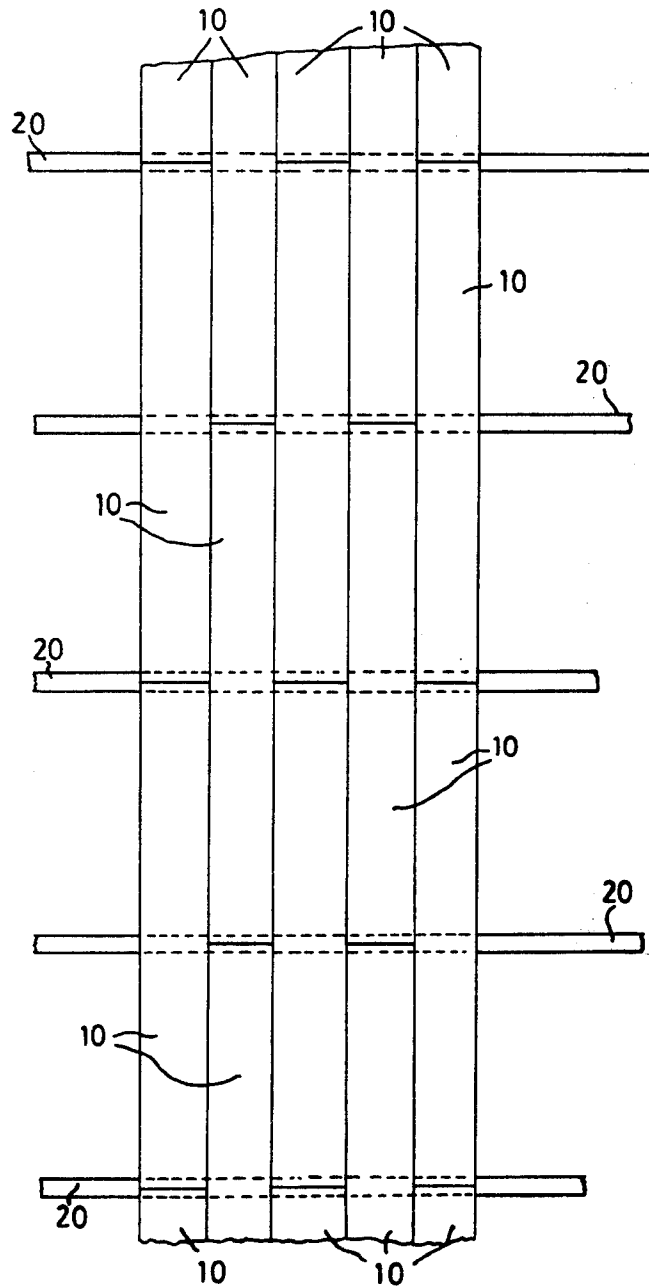


FIG. 2.

FIG. 3.



GLASS FIBER REINFORCED GYPSUM BUILDING COMPONENTS AND METHOD

CROSS-REFERENCES TO RELATED APPLICATIONS

This is a division of application Ser. No. 328,968 filed Feb. 2, 1973 now U.S. Pat. No. 3,839,836 and assigned to the assignee of the present invention.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention is concerned with building components fabricated from glass-fiber reinforced gypsum (GRG) and more especially to roof deck constructions utilizing such components, and has for its object to provide a fire resistant roof deck having good span capabilities, having an aesthetically attractive, self-colored undersurface which can be employed as a ceiling for the subjacent space, and which has inherent installation properties which provide economy in construction.

2. Description of the Prior Art

Glass-fiber reinforced gypsum (hereinafter usually referred to as GRG) is the product described in British Pat. No. 1,204,541 and is formed by combining calcium sulphate hemihydrate with a stoichiometric weight of water and with 6 to 15 per cent by weight of glass fibers. GRG also may contain incidental additives for achieving smoothness, whiteness, desired colorings, improved bonds with the glass fiber reinforcement, et cetera. Such additives might include, for example, powdered clay, pigments, dyes, sizes, binders, surfactants, reactive silicone primers or mold release agents.

As described in British Pat. No. 1,204,541, GRG compositions possess good flexural strength, impact resistance, tensile strength and densities. British Pat. No. 1,204,541 proposes the use of GRG for making plaster boards, moldings or extrusions for construction use in walls, floors, ceilings or roofs. Such articles have good fireproof characteristics and high strength, particularly flexural strength and impact strength.

SUMMARY OF THE INVENTION

A roof deck unit is formed from glass-fiber reinforced gypsum and comprises:

- a flat rectangular web;
- a depending offset tongue extending along a first longitudinal side of the web;
- a depending bight portion inset from the second longitudinal side of the web; a projecting shoulder extending from the bight generally parallel with the web and extending outwardly beyond the second longitudinal side of the web;
- a side wall depending from the outboard edge of the projecting shoulder;
- a flat flange extending from the base of the side wall; and
- a groove formed by the second edge of the web, the bight and part of the projecting shoulder.

The offset tongue has a thickness which is less than the throat dimension of the groove whereby a tongue of one such roof deck unit may be engaged in the groove of a contiguous roof deck unit. The top surface of the web is coated with an insulating layer of foamed plastic material, such as foamed polyisocyanurate or foamed fire retardant polyurethane. A water resistant finishing sheet is bonded to the top of the insulating layer.

Preferably the underside of the second longitudinal edge of the web is chamfered to facilitate entry of a tongue from another roof deck unit. Alternatively the entry may be facilitated by pointing the outboard edge of the offset tongue.

A roof deck can be assembled by combining the described roof deck units side by side upon generally parallel roof purlins or rafters. The tongues of each unit are engaged in the grooves of the contiguous units and fasteners extend through the base flanges of each roof deck unit into the supporting purlins or rafters. The roof deck can be completed on the building site by applying to the weather resistant finishing sheet one or more layers of a water resistant material such as sanded bituminized felt sheets.

A novel method is provided for fabricating the roof deck units in continuous strips, two at a time, with the offset tongues of each unit being connected. The double units are coated with the insulating layer and the finishing layer is applied. Thereafter the finishing layer, insulating layer and selected portions of excess GRG are removed to provide the requisite groove suitably dimensioned to accommodate irregularities in the thickness of the insulating layer.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an end elevation of a roof deck unit according to the invention;

FIG. 2 is a fragmentary sectional elevation of contiguous portions of two engaged roof deck units;

FIG. 3 is a plan view of a series of units laid upon roof purlins to form a roof deck; and

FIG. 4 is an end elevation of two roof deck units illustrating a novel method of manufacturing roof deck units.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

FIG. 1 shows a roof deck unit 10 having a flat rectangular web 11 having a first longitudinal side 11c and a second longitudinal side 11a; having a depending offset tongue 15 extending along a first longitudinal side 11c of the web 11; having a depending bight portion 12b inset from the second longitudinal side 11a of the web 11; having a projecting shoulder 12a extending from the bight 12b generally parallel with the web 11 and extending beyond the second longitudinal side 11a of the web 11; a side wall 12 depends from the outboard edge of the projecting shoulder 12a; a base flange 13 extends from the base of the side wall 12; and a groove 14 is formed by the second edge 11a of the web 11, the bight 12b and part of the projecting shoulder 12a. The offset tongue 15 has a thickness which is less than the throat dimension (that is the distance between the undersurface of the web 11 and the upper surface of the projecting shoulder 12a) of the groove 14 whereby, as shown in FIG. 2, a tongue 15 of one roof deck unit 10a may be engaged in the groove 14 of a contiguous roof deck unit 10b.

The upper surface of the web 11 has bonded thereto a layer 16 of a foamed plastics material, for example, foamed polyisocyanurate or foamed fire retardant polyurethane. Preferably the foamed plastics material is applied by direct in situ foaming and preferably the insulating layer 16 has a thickness from 5 to 50 millimeters. The top surface of the insulating foam layer 16 is covered with a layer 17 of water resistant sheet such as

sanded bituminized roofing felt. The GRG may have a thickness from about 5 to 30 millimeters. It is not necessary that the web 11 have the same thickness as the bight 12b or the projecting shoulder 12a or the side wall 12 or the base flange 13 or the tongue 15. The individual roof deck units have a covering width corresponding with the width of the web 11. That width may be about 30 to 120 centimeters. The overall height of the roof deck unit from the bottom of the base flange 13 to the top of the layer 17 may be from about 3 centimeters to 30 centimeters. The lengths of the roof deck units are from about 1 meter to about 10 meters. Preferably the length is equal to twice the distance between individual purlins, e.g., a length of 6 to 8 meters is provided for purlin spacing of 3 to 4 meters. The length is selected as required by the building needs and also is selected to permit ease of installation of the units.

A typical roof deck assembly is shown in FIG. 3 wherein the roof deck units 10 are laid in side by side and end to end on generally parallel roof purlins 20. Structural fasteners such as screws, rivets are driven through the base flanges 13 into the purlins 20 as shown in FIG. 2. Preferably the roof deck units 10 are laid in a staggered end to end disposition as illustrated in FIG. 3. It is also preferable that the roof deck units 10 have a length equal to twice the distance between the individual purlins 20, for example, a preferred length is 6 to 8 meters where the purlins 20 are spaced apart by 3 to 4 meters.

As shown in FIG. 1, the second longitudinal edge 11a preferably is provided with a chamfered edge on the underside of the web to facilitate entry of the offset tongue from an adjacent roof deck unit. The chamfer 11b also permits the use of a suitable sealing material 24 to reduce the permeability of the resulting roof deck structure.

It will be seen that the roof deck units 10 are assembled such that the GRG is protected from moisture. The roof deck is completed by applying several layers 25, 26 of a water resistant roofing material such as a sanded bituminized roofing felt. It will be observed from FIG. 2 that the upper surfaces of the covering layers 17 of the roof deck units 10a and 10b are coplanar. The resulting roof deck assembly has a good fire rating because of its inherent fire retardant construction, and also has good acoustical and thermal insulation properties because of the insulating layer 16.

A preferred method of manufacturing the roof deck units is illustrated in FIG. 4 where a duplex unit X is initially produced having the profile shown in FIG. 4. This duplex unit is covered with a complete insulating layer 16 and a complete finishing sheet 17. The duplex unit X includes a roof deck unit 10c and a roof deck unit 10d which are connected along the first longitudinal edges thereof. As shown in FIG. 4, separate portions 28

and 29 are cross-hatched to indicate components which are initially present during the formation of the duplex unit X and which are subsequently removed by milling or planing to produce two of the roof deck units 10c, 10d.

During the milling or planing operation for removing the GRG, the insulating layer and the finishing sheet, the undersurface 27 of the two tongues 15 is precisely machined to establish a predetermined thickness between that surface 27 and the top surface of the finishing sheet 17. The same dimension is provided between the upper surface 30 of each shoulder 12a and the top surface of the finishing sheet 17. After the milling and planing is completed, the duplex unit X is cut along the central longitudinal plane Y—Y to produce two of the roof deck units 10c and 10d. Regardless of the variation and irregularities in the thickness of the insulating layer 16, the finishing sheets 17 will have their upper surfaces coplanar as a result of the described process for forming the units. Hence despite some variation in the thickness of the insulating layers 16, the variations will not create visually apparent irregularities in the exposed surface of the assembled roof deck units.

I claim:

1. The method of making a roof deck unit having a glass fiber reinforced gypsum web, a depending tongue extending along a first longitudinal side and a depending bight portion extending along the second longitudinal side, said web being covered with an insulating layer of foamed plastics material, and having a water resistant finishing sheet applied to the top of the said insulating layer, comprising forming two units from glass fiber reinforced gypsum in a duplex structure with the said first longitudinal sides of each said web being integral and contiguous, the webs of the two units in said duplex structure having a plane upper surface extending uninterruptedly from the second side edge of one unit to the second side edge of the other unit in the duplex structure, applying the said insulating layer uninterruptedly over the said plane upper surface and applying the said water resistant finishing sheet over the said insulating layer and thereafter removing three lengthwise strips of finishing sheet, insulating layer and glass fiber reinforced gypsum to form the offset for the tongues and to form the groove.

2. The method of claim 1 wherein the distance from the top of the finishing sheet to the bottom of the said groove is related to the distance from the top of the finishing sheet and the bottom of the said offset tongue so that the tongues will engage the grooves of adjoining units and provide a level top surface appearance despite variations in the thickness of the said insulating layer.

* * * * *