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GB A 2051910
GB 1244155
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(58) Field of search
E1D

(54) Integrated roofing structure

(57) An integrated roofing structure composed of an upper roofing panel 1, a lower ceiling panel 2, a plurality of binding battens 3 connecting the roofing and ceiling panels together and an insulated material filled therein so as to form an integrated structure having multiple functions for roofing, ceiling and heat insulation.

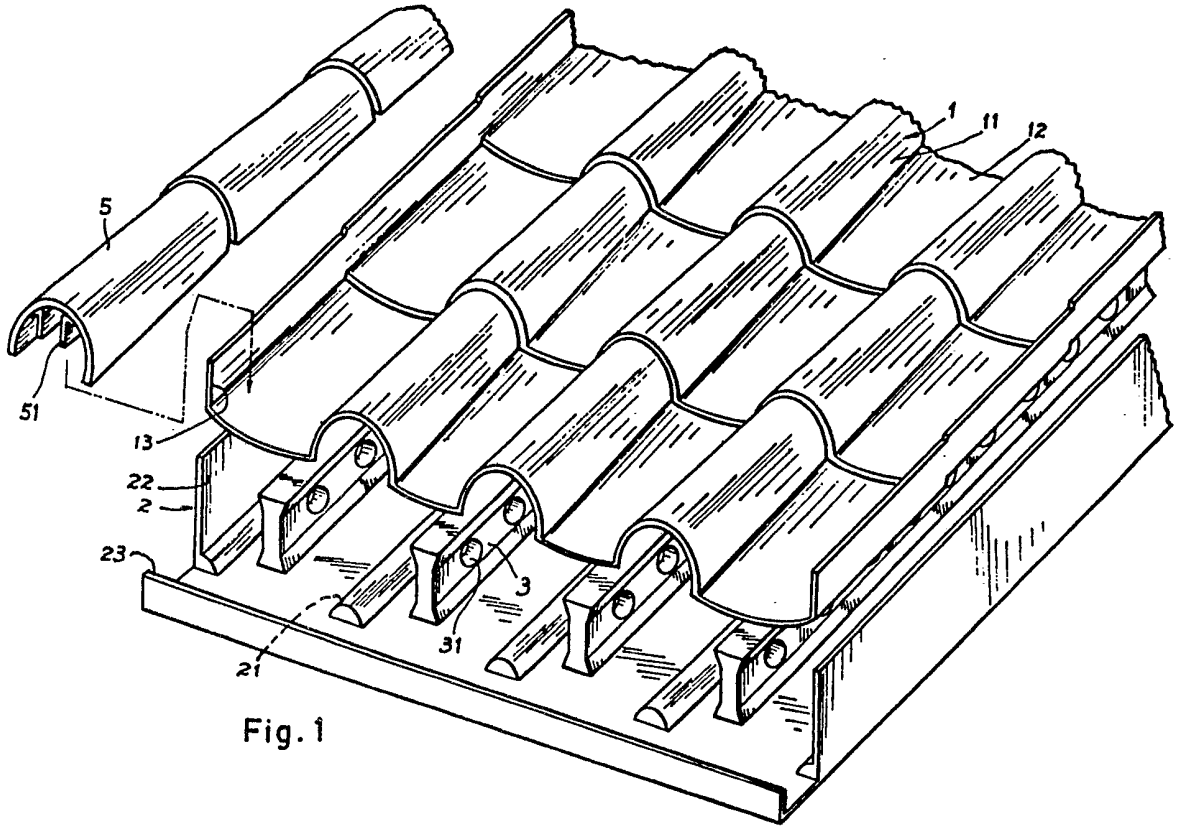


Fig. 1

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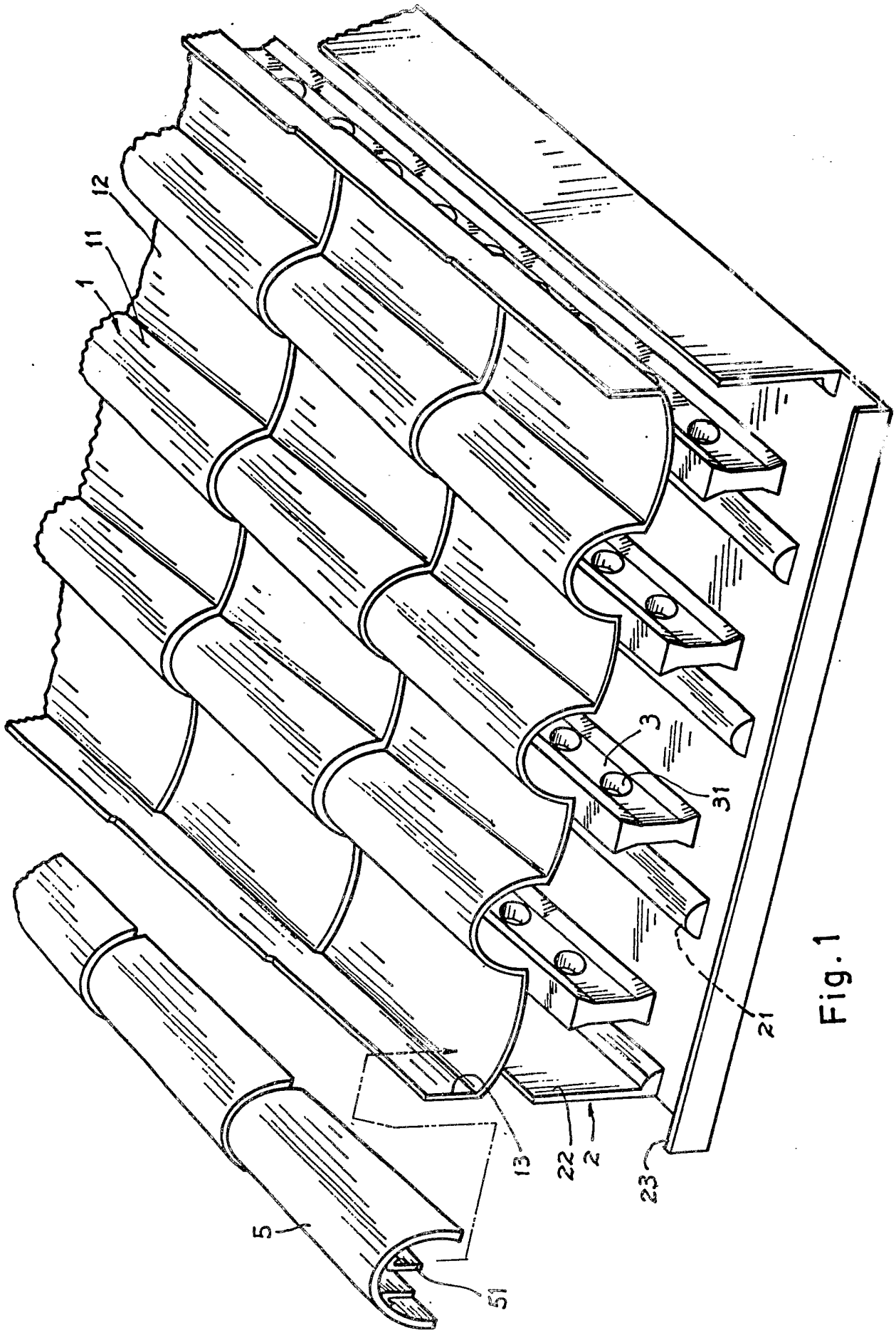


Fig. 1

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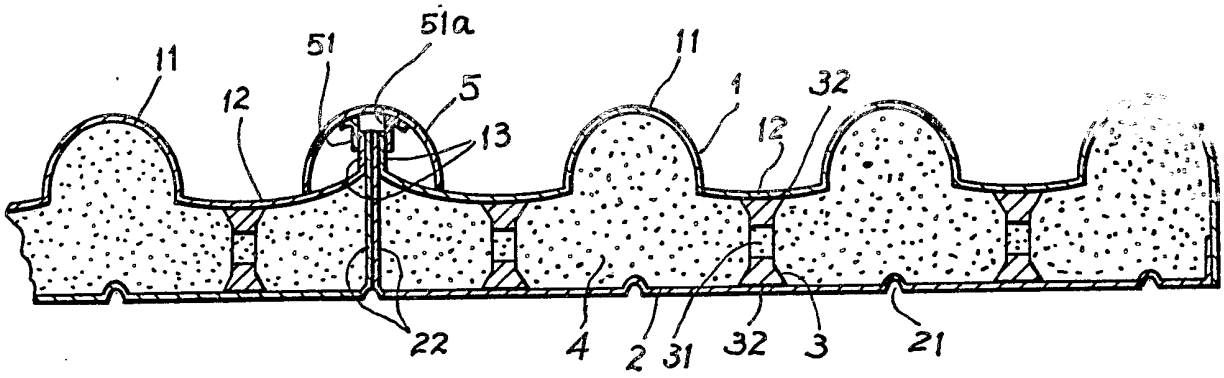


Fig. 2

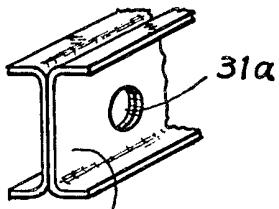


Fig. 3

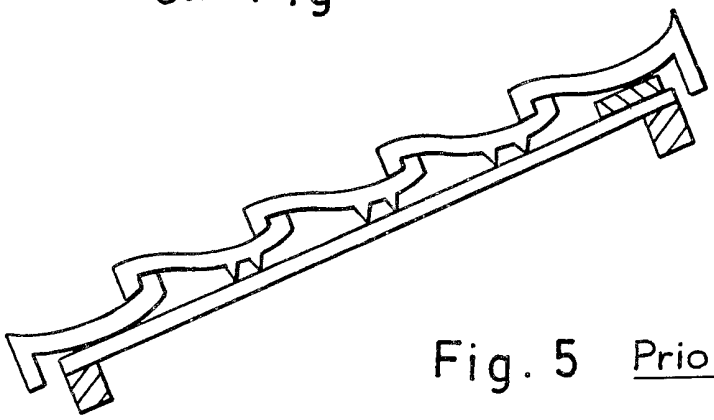


Fig. 5 Prior Art

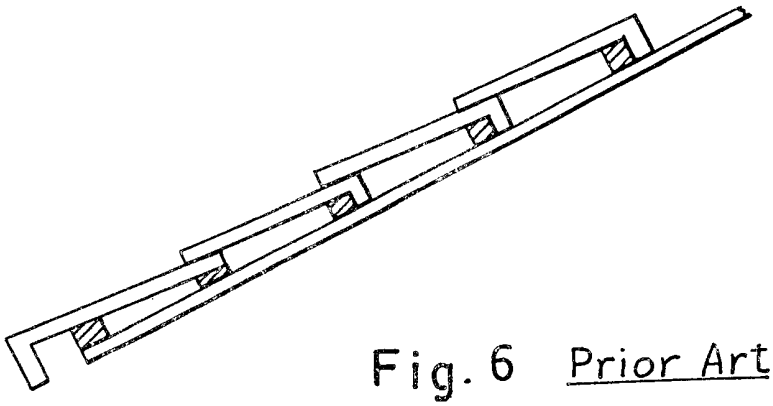


Fig. 6 Prior Art

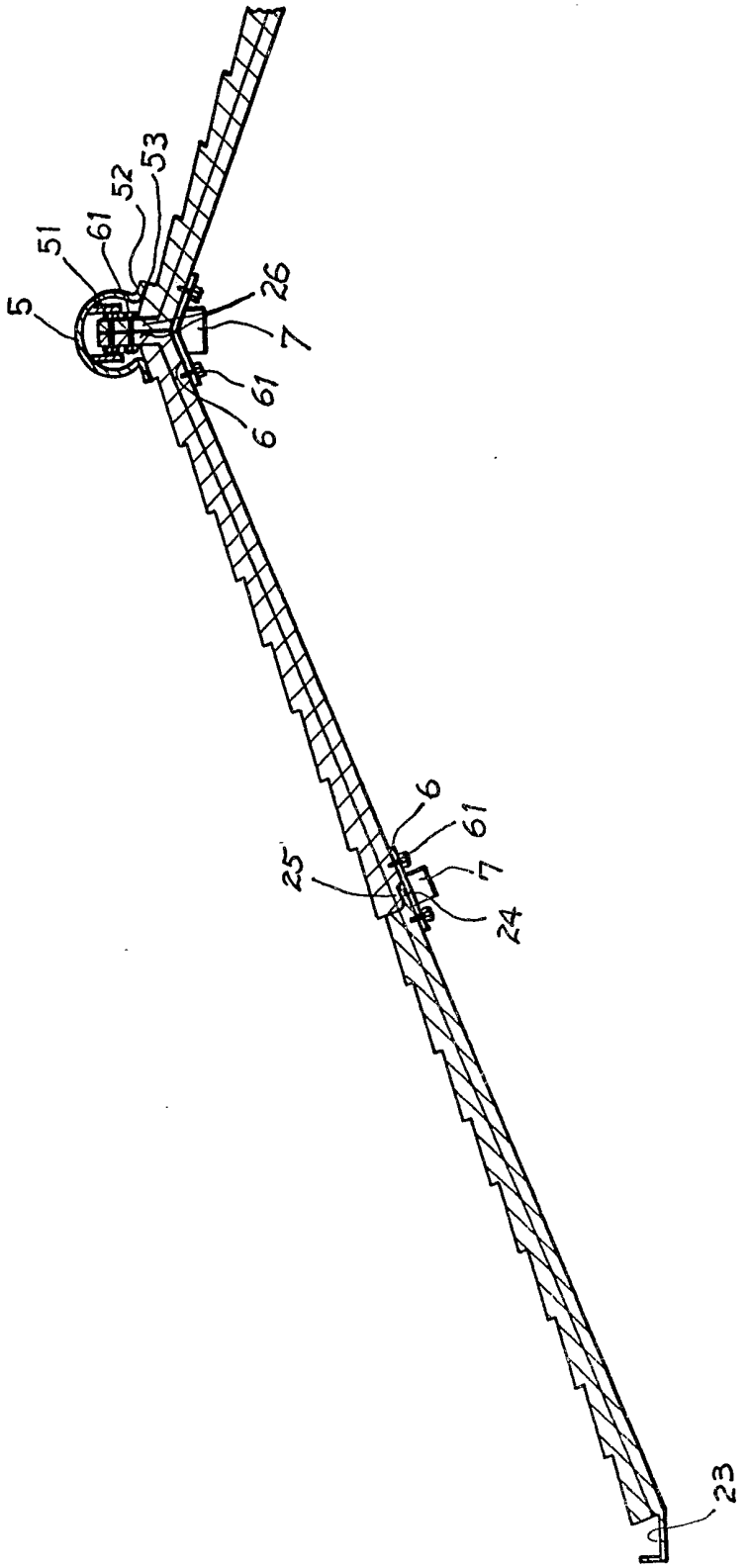


Fig. 4

SPECIFICATION

Integrated roofing structure

This invention relates to roof structure, particularly an integrated roofing structure.

Conventional roof consisting of a plurality of tiles should be built from tile to tile as Figs. 5 and 6 shown. Either pantiles or flat tiles are generally made from baked clay or ceramic materials and are easily broken during construction or maintenance for roofing a house or a building. Each tile is independently built onto another tile so that once finishing a roof, a long period of time will lapse to increase construction cost and inconvenience for the construction work. If an insulated layer is provided under the roofing tiles to reduce solar heat especially in hot season or areas, a separated layer of insulated material should be further installed under roofing tiles to increase the initial cost when building a new roof or increase the maintenance cost when renew a used roof. If for building a prefabricated house or office, a ceiling with suitable decoration shall be further fitted under the roof so as to increase production or construction cost therefor.

The present inventor has found the defects of conventional roofs and invented the present integrated roofing structure.

The object of the present invention is to provide an integrated roofing structure composed of an upper roofing slate, a lower ceiling plate, a plurality of binding battens connecting roofing slate and ceiling plate together and an insulated material filled therein so as to form an integrated structure having advantages of fast fabrication, easy construction, and multiple functions for roofing, ceiling and heat insulation.

An embodiment of this invention is described by way of example, with reference to the drawings in which:

Figure 1 is a perspective illustration of the present invention.

Figure 2 is a partial sectional drawing of the present invention.

Figure 3 shows another preferred batten in accordance with the present invention.

Figure 4 is a side-view illustration showing the assembly of several units of the present invention.

Figure 5 shows conventional roof consisting of pantiles.

Figure 6 shows conventional roof composed of flat tiles.

As shown in Figs. 1 and 2, the present invention comprises: an upper roofing slate 1, a lower ceiling plate 2, a plurality of binding battens 3 connecting the upper slate 1 and the lower plate 2, and an insulated material 4 filled within upper slate 1 and lower plate 2.

Upper roofing slate 1 is made integratedly by molding a polymer material such as fiber glass reinforced plastics to form a plurality of combinations each combination composed of a convex tile portion 11 and a concave tile portion 12 or to form any other style to imitate the tiles with decorative designs. Every slate 1 is formed with side connecting edges 13 for longitudinally connecting another neighbouring slate 1.

Lower ceiling plate 2 is also made integratedly by molding a polymer material such as fiber glass reinforced plastics (FRP) to form a plate which may be formed with decorated grooves or features 21 during molding processing. Each plate 2 is formed with side connecting edges 22 for connecting another neighbouring plate 2 longitudinally.

Binding batten 3 is made from wooden material or from FRP or other suitable materials as shown in Fig. 3. Each batten 3 is formed with several traverse holes 31 or 31a either for saving material cost or for penetrating insulated material 4 therethrough. For connecting the upper slate 1 with the lower plate 2, adhesive 32 may be provided to strongly bind them together.

The insulated material 4 is filled between upper slate 1 and lower plate 2. Insulated material 4 may be chosen from polyurethane (PU) foaming material and may be directly foamed in suit within the space formed by upper slate 1 and lower plate 2. During foaming process, the PU foam may penetrate through holes 31 to homogeneously fullfil the space and also form an insulation lining therebetween. Naturally, other suitable insulated materials may be used in the present invention. The batten 3 is formed as H shape as shown in Fig. 3.

When combining several units of the present invention to construct a tile roofing as shown in Fig. 4, one lower ceiling plate 2 lowerly extends to form a gutter 23 and extends upwards to form a joint extension 24 and another plate 2 is lowerly formed with another joint extension 25. Two joint extensions 24, 25 can be assembled by fixing bolts or screws 61 on a washer 6 and supported by beams 7. For finishing the ridge covering as Fig. 4 shown, a hipe tile 5 is further provided to fit the two units of the present invention. If for longitudinally combining the two units of this invention as Fig. 2 shown, a hip tile 5 may also be provided for their connection. Such a hip tile 5 as shown in Figs. 1 and 2 comprises a fixing clamp 51a for stably fastening all the connecting edges 13, 22 so as to connect two neighbouring units together. If for connecting the two units to cover the ridge as Fig. 4 shown, the clamp 51a serves to fasten the two connecting edges 26 formed on ceiling plate 2. A washer 6 and several bolts 61 are used for their combination which is supported by beam 7. The hip tile 5 shown in Fig. 4 is also formed with side extensions 52 which may be coated with adhesive 53 so

as to be bound on roofing slates 1. The present invention may be performed with skylight/ventilation holes by those dkilled in the art.

The present invention is superior to any conventional tiled roofings with the following advantages:

1. The structure provides multiple functions for roofing, ceiling and solar heat or cold weather insulation.

2. The roofing slate and ceiling plate are all integratedly produced by molding process for saving production and construction cost. The colors, shapes or any decorative feature can be easily prefabricated for diversified applications and for saving cost.

3. The structure is water, weather, heat resistant and strong enough to prolong its service life and minimize the maintenance cost.

4. All the integrated parts are prefabricated so that the complete units can be fastly assembled in construction site to facilitate the house construction and save the installation cost as well.

CLAIMS

1. An integrated roofing structure comprising: an upper roofing slate made integratedly by molding process; a lower ceiling plate made integratedly by molding process; a plurality of binding battens respectively connecting said upper roofing slate and said lower ceiling plate; and an insulated material filled within said upper roofing slate and said lower ceiling plate, whereby said upper slate, said lower plate, said battens are all connected together and filled with said insulated material to form an integrated unit for multiple functions as roofing, ceiling and heat insulation.

2. An integrated roofing structure according to Claim 1, wherein said upper roofing slate is formed with a plurality of combinations each combination composed of a convex tile portion and a concave tile portion, each slate being formed with side connecting edges for longitudinally connecting another neighbouring slate.

3. An integrated roofing structure according to Claim 1, wherein said upper roofing slate is made from fiber glass reinforced plastics or other polymers.

4. An integrated roofing structure according to Claim 1, wherein said lower ceiling plate is preformed by molding process with decorative grooves or features thereon and also formed with side edges for connecting the neighbouring plates.

5. A roofing structure according to Claim 1, wherein said binding batten is formed with several traverse holes thereon for penetrating said insulated material when making the integrated roofing structure unit and is coated with adhesive thereon to bind said upper state and said lower plate.

6. A roofing structure according to Claim 1, wherein said insulated material is a polyurethane foam directly foaming in situ between said upper slate and said lower plate and through said traverse holes on said battens.

7. A roofing structure according to Claim 1, wherein a separated hip tile is provided to cover the ridge or to connect the two units of said integrated roofing structure, said hip tile being formed therein with a clamp for fastening all side edges of said upper slate and said lower plate.

8. A roofing structure according to Claim 1, wherein said ceiling plate is lowerly formed with gutter and is upperly formed with a joint extension so as to connect another ceiling plate which is lowerly formed with another joint extension, whereby two said joint extensions are connected by bolts or screws.

9. A roofing structure according to Claim 8, wherein said ceiling plate is upperly formed with a side extension so as to connect with another ceiling plate which is also upperly formed with a side extension, both side extensions being connected by bolts or screws and hip tile being applied to fasten said side extensions and cover the ridge.

10. A roofing structure and arranged substantially as herein described with reference to any of the figure of the drawings.

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