Title of the Invention: Building with insulated roof panels, and roof panels therefor
Abstract Title: Building with insulated roof panels

A building having a roof comprising at least one spaced pair of rafters 6 has installed an insulating panel 5 having upper and lower skins with thermally insulating material therebetween and where in use, the insulating panel is installed in place of a glazing panel in buildings such as conservatories. The panel has on at least the sides received by the rafters an edge portion 5a of a predetermined thickness, while the remainder of the panel has a thickness substantially greater than said predetermined thickness whereby to provide substantially lower thermal conductivity. The rafter may be an aluminium extrusion and the insulating panel may have skins of aluminum sheet with an expanded polyurethane core. The panels may secured with adhesive or clips. An insulating panel is also claimed.

Fig 2
BUILDING WITH INSULATED ROOF PANELS, AND ROOF PANELS THEREFOR

Field of the Invention

This invention relates to a building having insulated roof panels therein, and to roof panels for such a roof.

Background to the Invention

Glazed conservatories and porches have been popular additions to houses for some years, but their construction has tended to limit their usability at least at certain times of the year. In the UK, these types of structures are exempted from planning and building regulations if certain criteria are met, such as size and structural separation from the house so that it is considered essentially temporary. The result is that the structures are cheaper and more lightweight than conventional regulated buildings, and typically do not meet modern standard for thermal insulation. In the winter, heat losses through the glazed roof in particular mean that it is not economic to keep the conservatory warm, while in the summer and with the sun fully on the structure, it can become too hot for comfort inside.

Various proposals have been made to use double-walled plastics glazing panels in place of glass to try to increase the thermal insulating properties, but these still fall far short of currently required standards for building roof insulation. There have also been proposals to modify the supporting structure to permit double layers of such panels, or even spaced-apart layers, and while these undoubtedly offer better thermal insulation than a single layer, they are still not sufficient significantly to improve the usability of the structure. In addition, they require specially modified supports to accommodate the double or multiple layers, which means that it is generally not possible to use such systems to improve existing structures.

Summary of the Invention

According to the invention, there is provided a building having a roof comprising at least one spaced pair of rafters adapted to receive and retain between them at least one glazing panel of a predetermined thickness, the roof having installed in place of the glazing panel or at least one of the glazing pan-
els an insulating panel having upper and lower skins with thermally insulating material therebetween, the panel having on at least the sides received by the rafters an edge portion of said predetermined thickness, while the remainder of the panel has a thickness substantially greater than said predetermined thickness whereby to provide substantially lower thermal conductivity.

Other features of the invention are set out in the claims.

In accordance with the invention, an existing glazed conservatory, for example, can be converted into a sun-room meeting current standards of thermal efficiency by replacing at least the major part of the glazing panels in the roof with lightweight insulating panels. It is also possible to achieve an appearance that matches the existing roofing material of the house to which the conservatory is attached.

**Brief Description of the Drawings**

In the drawings, which illustrate exemplary embodiments of the invention:

Figure 1 is a sectional end elevation of a portion of a timber rafter with insulating panels fitted;

Figure 2 is a corresponding view to that of Figure 1, but showing an extruded aluminium rafter;

Figure 3 is a similar view of a timber hip rafter with the panels fitted; and

Figure 4 is a view of a portion of a conservatory building illustrating the roof structure.

**Detailed Description of the Illustrated Embodiment**

Referring first to Figure 1, a conventional timber conservatory is constructed with timber rafters 1 on which the glass or other glazing panels are mounted by laying the panels on the upper surfaces of the rafters, with suitable resilient sealant beading between, and then securing a capping strip 2 over the gap between adjacent sheets. The capping strip carries resilient sealant beading 3 along its underside to engage the glazing panels to hold them in place and to prevent ingress of water which could damage the timber. The capping strip can be simply pinned into the rafter with pins 4. In accordance with the invention, the glazing panels are replaced with insulating panels 5 which are typically formed as hollow bodies fabricated from aluminium sheet, into which are insert-
ed expanded polyurethane insulating boards (or other insulating material), the panels then being sealed to enclose the insulating material. The panels 5 have a general thickness significantly greater than the glazing panels they replace, for example 100mm or more, in order to achieve insulation values in accordance with current building regulations. However, in order to enable the panels to fit with existing structures, the panels 5 are constructed with a marginal portion 5a of the same thickness as the glazing panels they replace, along at least the sides thereof which fit on to structural members of the building.

Figure 2 illustrates the equivalent view for an extruded aluminium rafter 6, which is essentially an inverted T-shape, with the arms of the T formed into a shallow tray 7 to conduct any water which penetrates the joint away to the guttering running along the lower edge of the roof. The insulating panels 5 rest on the upturned edges of the tray 7, and are held in place and protected by aluminium capping 8 which clips into a narrow channel 9 along the uppermost edge of the inverted T-shape and has downwardly-extending legs 8a which bear against the upper surface of the marginal portions 5a of the insulating panels 5. The legs 8a can be provided with resilient sealing strips along them, both to limit ingress of water and to contact the panels to hold them in place more securely.

Figure 3 shows a timber hip rafter 10 with the insulating panels 5 resting on the angled upper surfaces thereof, held in place by a capping strip 2 pinned in place as in Figure 1.

Figure 4 shows a portion of a conservatory adapted in accordance with the invention. A conservatory will typically include a brick or timber base, windows 20 mounted thereon, and a roof structure consisting of rafters connecting to a wall of a house or to a hip rafter extending from a corner of the building diagonally to the wall of the house. A rainwater gutter 21 extends along the lower edge of the roof. The transparent or translucent glazing panels which normally form the roof, typically of double-walled plastics or glass double-glazing units, are replaced with insulating panels 5 resting on the rafters and hip rafters as hereinbefore explained with reference to Figures 1 to 3, and held in place with capping 8, the ends of which are provided with covers for the sake of cleanli-
ness and better appearance. The spaces beneath the capping may be filled with insulating material, for example shaped plastics foam.

To improve the appearance of the roof, the insulating panels 5 may be provided with the appearance of tiles or slates, by first pressing the aluminium sheet which is to form the upper skin in a shaped die to provide the tile or slate shapes, and then finishing the panel with a suitable textured paint or other finish to simulate more closely the appearance of conventional tiles or slates. Since the method of fixing leaves gaps between the panels, infill flat metal sheets configured to give the correct tile or slate appearance are attached to the rafters between the sheets. These may be simply glued direct to the capping on the rafters or provided with members underneath to permit the attachment while bringing the upper surface level with the uppermost surfaces of the adjacent panels 5. The spaces beneath the infill sheets and between the adjacent panels, i.e. over and around the rafters, may be filled with insulation material to ensure continuity of thermal insulation across the roof.

The lowermost edge of each insulating panel 5 is preferably also of the reduced thickness, to facilitate discharge of rainwater into the gutter 21, and the transition between that portion and the remainder of the panel may be at an oblique angle to assist in directing the flow of water down the panel and into the gutter.

It will be appreciated that, while the insulating panels are most suitably formed from aluminium sheet, other materials could be employed, such as plastics, suitably treated to be fire-resistant, and the insulating material within can be any lightweight material with low thermal conductivity, although again treated to ensure fire-resistance. The use of stepped insulating panels enables existing buildings, such as conservatories, to be readily adapted to extend their usability, while new buildings can be constructed using existing structural elements, without the need to redesign to accommodate thicker materials. This can result in significant cost savings.

In order to provide additional light in the building, one or more insulating panels may be omitted, and high-insulating value double-glazed windows installed instead.
CLAIMS

1. A building having a roof comprising at least one spaced pair of rafters adapted to receive and retain between them at least one glazing panel of a predetermined thickness, the roof having installed in place of the glazing panel or at least one of the glazing panels an insulating panel having upper and lower skins with thermally insulating material therebetween, the panel having on at least the sides received by the rafters an edge portion of said predetermined thickness, while the remainder of the panel has a thickness substantially greater than said predetermined thickness whereby to provide substantially lower thermal conductivity.

2. A building according to Claim 1, wherein each rafter is an aluminium extrusion having a flange for receiving the edge of the lower face of the panel, and means for receiving a retaining member which engages the edge of the upper face of the panel.

3. A building according to Claim 1 or 2, wherein the upper and lower skins of the or each insulating panel are fabricated from aluminium sheet.

4. A building according to Claim 1, 2 or 3, wherein the thermally insulating material is expanded polyurethane.

5. A building according to any preceding claim, wherein the thickness of the greater part of the or each insulating panel is at least ten times the thickness of the edge portions.

6. A building according to any preceding claim, wherein the roof comprises a plurality of said insulating panels, and wherein the upper surface of the panels is configured to simulate the appearance of a conventional roofing surface.

7. A building according to Claim 6, wherein infill panels also configured to simulate the appearance of a conventional roofing surface are attached to the upper surfaces of the rafters.

8. A building according to Claim 7, wherein the infill panels are secured to the rafters by adhesive.

9. A building according to Claim 7, wherein the infill panels are adapted to clip on to the rafters.
10. A building having a roof substantially as described with reference to, and/or as shown in, the drawings.

11. An insulating panel having upper and lower skins with thermally insulating material therebetween, and having on at least two sides thereof an edge portion of a first thickness, while the remainder of the panel has a thickness substantially greater than said first thickness.

12. An insulating panel according to Claim 11, comprising a planar first face and wherein the opposite face is stepped between the edge portion and the remainder of the panel.
Application No: GB1021005.2
Examiner: Helen Harrop
Claims searched: 1-12
Date of search: 19 April 2011

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

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- & Member of the same patent family
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Field of Search:
Search of GB, EP, WO & US patent documents classified in the following areas of the UKC X:
Worldwide search of patent documents classified in the following areas of the IPC
E04B; E04C; E04D
The following online and other databases have been used in the preparation of this search report
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