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(54) COMPOSITE BUILDING ELEMENT

(71) We, ROCKWOOL INTERNATIONAL A/S, a Danish Company, of Hovedgaden 501, 2640 Hedehusene, Denmark do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:-

The present invention relates to a composite, load bearing construction element to be used as a vertical or horizontal member in a wall or roof construction in houses with a high grade thermal insulation.

The increasing cost of fuel in recent years has necessitated use of thermal insulation in thicker layers than was normal a few years ago. In outer walls and roofing the use of mineral wool in slabs with a thickness of 20 cm is now considered to be profitable. If the interspaces between the load carrying members of a skeleton construction are to contain insulation layers of this thickness, the construction members must have a cross-section of 5 × 20 cm or 7.5 × 20 cm. Wooden elements of such dimensions, however, have become increasingly expensive in recent years. Also their heat transmission characteristics are not entirely satisfactory.

A composite load bearing element according to the invention comprises a core formed of a bonded mineral fibre material and having a substantially rectangular cross-section with two shorter faces and two longer faces, and wooden members of substantially the same width as the shorter faces secured to the shorter faces.

The load bearing element is primarily intended for use in those positions, such as roofs and walls, where it has to provide substantial thickness and the longer faces of the element thus define the thickness of the structure formed from the elements. The wooden members are then on the inside and the outside the element, and thus on the faces of the structure formed from the elements, and the bonded mineral fibre core spans the thickness of the structure.

The wooden members extend along the entire length of the load bearing element and as shown in the Example below they can carry a much greater load than when the mineral wood is absent. The wooden members are of substantially the same width as the faces of the core against which they are secured. In the drawing below they are shown as being of exactly the same width and whilst this is preferred it is not essential. The wooden members are secured to the bonded mineral fibre material by any convenient manner, gluing generally being appropriate.

Bonded mineral fibre materials suitable for use in the invention are known and are often termed bonded mineral fibre felts or felts of mineral wool. Suitable products comprise mineral fibres, preferably glass-, stone- or slagfibres, with an addition of small amounts of an organic bonding agent, for example phenolformaldehydersin, bonding together the fibres at their intersections. A suitable mineral fibre felt for the core of the construction element according to the invention may have a porosity of 0.92 to 0.96.

The invention is illustrated with reference to the accompanying drawing. The drawing shows a section of a skeleton wall under constructions. The vertical members are brought in place and are covered with 9 mm wood-fibre boards on both sides, and in the drawing a portion of the load carrying member and parts of the fibre boards are seen. The vertical, load bearing construction element comprises a core 1, consisting of bonded mineral fibre felt and two wooden members 2 and 2′ connected thereto by gluing. The fibre boards 3 and 3′ are connected with the wooden members by means of nails 4.

Example

A vertical construction element was composed of a core of mineral fibre felt with a porosity of 0.94 and a cross section of 5 × 15 cm, and two wooden members with a cross section of 5 × 2.5 cm, the total cross section of the construction element being 5 × 20 cm.

If the skeleton wall is to carry the weight of parts of the house above the wall, the wooden members alone are to transfer this load to the structure below because of the much lower modulus of elasticity of the mineral fibre felt. Also in the case of the total load being placed on one of the wooden members, the vertical building element has to be safe with respect to collapsing. A vertical element according to the above example was cut to have a length of 1.80 m, and one of the wooden members was exposed to an increasing compression load in its longitudinal direction. No collapse was experienced at a load of 5000 kp. The wooden member alone with a length of 1.80 m collapses at a load of 900 kp.

WHAT WE CLAIM IS:-

1. A composite load bearing element comprising a core formed of a bonded mineral fibre material and having a substantially rectangular cross-section with two shorter faces and two longer faces, and wooden members of substantially the same width as the shorter faces secured to the shorter faces.

2. An element according to claim 1 in which the wooden members are secured to the shorter faces by gluing.

3. An element according to claim 1 or claim 2 in which the bonded mineral fibre material has a porosity of 0.92 to 0.96.

4. An element according to claim 1 substantially as herein described with reference to the accompanying drawing or with reference to the Example.

5. A wall or roof formed of elements according to any preceding claim arranged with the wooden members defining the faces of the wall or roof.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*