

(19)



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(11)

EP 0 693 599 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
23.10.1996 Bulletin 1996/43

(51) Int Cl.⁶: **E04C 2/292**

(21) Application number: **95830312.5**

(22) Date of filing: **18.07.1995**

(54) **Insulating panel for buildings**

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Panneau isolant pour le bâtiment

(84) Designated Contracting States:
AT BE DE ES FR GB

(30) Priority: **18.07.1994 IT TO940583**

(43) Date of publication of application:
24.01.1996 Bulletin 1996/04

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Description

The present invention relates to insulating panels used in buildings, to provide insulating roofs or walls.

In the manufacture of panels for the above indicated use, it is necessary to satisfy simultaneously a number of needs which quite often are indeed in contrast with each other.

Firstly, it is desired that the panel has the requested insulating features along with good characteristics of resistance to mechanical stresses. Secondly, it is desired that the structure of the panel enables a high modularity to be obtained, to be understood both as a possibility of coupling more panels to each other, to obtain continuous insulating surfaces, and as the possibility of providing panels of sizes even very different from each other without causing thereby any relevant variation in the producing cycle, which preferably is a continuous working cycle.

All the above indicated needs must then be agreed with the main need consisting in that the panel must have the simplest possible structure, so that the cost of manufacture may be reasonably reduced.

In its previous Italian Patent Application No. TO91A000698 filed on 16 September 1991 and laid open to public inspection on 16 March 1993, the Applicant has already proposed an insulating panel for buildings, comprising:

- a layer of insulating fibrous materials, such as rock or mineral wool, with fibres oriented in a direction orthogonal to the general plane of this layer,
- two corrugated metal sheets applied to the two opposite faces of the insulating layer, with the interposition of respective layers of adhesive material.

The panel previously proposed by the Applicant is able indeed to brilliantly solve all the above indicated needs.

The object of the present invention is that of further improving the panel of the previous proposal, above all from the stand point of the characteristics of heat insulation and the characteristics of mechanical resistance.

In view of achieving this object, the invention provides an insulating panel for buildings, of the type previously proposed by the Applicant, characterized in that:

- said insulating layer is constituted by a plurality of substantially parallelepipedal blocks of a fibrous insulating material, with the fibres arranged orthogonally to the general plane of the panel,
- said blocks are arranged side by side in the plane of the panel along parallel and juxtaposed rows, with the blocks of each row offset with respect to the blocks of every adjacent row,
- each block has end surfaces and longitudinal side surfaces having steps of complementary shape, so as to fit at each side into an adjacent block providing

thereby a labyrinth-like interstice.

Due to said features, the panel according to the invention provides a plurality of advantages. Firstly, the provision of the insulating layer by means of a plurality of blocks arranged side by side is advantageous from the manufacture standpoint and from the standpoint of the resistance characteristics of the panel, since said blocks can be obtained from a continuous panel of fibrous material and thereafter arranged with the fibres of the insulating material directed orthogonally to the general plane of the panel which is to be obtained, so that in use said fibres are subject to an axial load exerted by the metal sheets between which the insulating layer is interposed, to the advantage of the resistance of the structure. At the same time, the provision of the insulating layer by means of many blocks arranged side by side assures anyway high characteristics of heat insulation, since the transfer of heat through the interstices between the various blocks is substantially prevented by that these interstices have a labyrinth-like configuration, because of the step-like shape of the end walls and the longitudinal side walls of each block.

Further features and advantages of the invention will become apparent from the description which follows with reference to the annexed drawings, given purely by way of non limiting example in which:

- figure 1 is a partial and exploded perspective view of a panel provided according to the present invention, to be used as a roof,
- figure 2 is a perspective view of a block of insulating material used to provide the insulating layer of the panel,
- figures 3, 4 are partial and cross-sectional perspective views which show the arrangement of the blocks forming the insulating layer of the panel, and
- figure 5 is a variant of figure 1 which relates to a panel to be used as a wall.

With reference to figure 1, numeral 1 generally designates an insulating panel which can be used in buildings to provide walls or roofs, comprising a bottom metal sheet 2. The metal sheet 2 is a corrugated sheet, i.e. it has parallel ribs in a longitudinal direction obtained for example by calendering or rolling a metal sheet having a thickness of about 0,5-1 mm. The face of the metal sheet 2 which is to be inside the panel 1 is coated with a layer of adhesive material 3, preferably fire-proof material, e.g. constituted by an adhesive including polyurethane and/or polyisocyanide resins with thickness for example of about 2 mm. The adhesive material 3 is used to apply the bottom sheet 2 to an insulating layer 4 whose structure will be described more in detail hereinafter.

On the opposite face of the insulating layer 4 there is applied an upper metal sheet 5, which also is corrugated, and which, in the case of the example illustrated

in figure 1, has a plurality of longitudinal ribs 5a alternated to higher longitudinal ribs 5b. Also in this case metal sheet 5 is bonded to the insulating layer 4 with the interposition of adhesive material of the above described type, which also forms beads 6 filling the ribs 5b. Alternatively, ribs 5b may be filled with elements of mineral fibres suitably shaped. Ribs 5b have for example a height of about 40-100 mm. They provide the upper metal sheet 5 and the panel in its entirety with characteristics of bending resistance in the longitudinal direction (i.e. in the direction of extension of ribs 5a, 5b) which are particularly high.

In the case of the example of figure 1, the rigidity effect given by ribs 5b is still higher due to the adhesive material filling the ribs.

The two metal sheets 2, 5 can be advantageously shaped at the opposite ends of the panel, as diagrammatically illustrated at 2a, 5c and 2b, 5d, according to a general male and female configuration, so as to enable more panels to be arranged side by side to provide continuous roofs.

The layer of insulating material 4 is constituted by a plurality of blocks 7 arranged side by side in the plane of the panel along many parallel and juxtaposed rows. Each block 7 is obtained by cutting a panel of fibrous insulating material, such as rock wool, glass wool or mineral wool, each block 7 being oriented after cutting so as to have its fibres directed orthogonally to the general plane of the panel, i.e. directed along the direction of double arrow A in figure 1. With reference to figure 2, each panel 7 has an upper surface 7a, a lower surface 7b, two end surfaces 7c and 7d and two side longitudinal surfaces 7e and 7f. As clearly apparent in figure 2, end surfaces 7c, 7d and the longitudinal side surfaces 7e, 7f have complementary steps 8a, 8b and 8c, 8d. With reference to figures 3, 4, blocks 7 are arranged side by side in the plane of the panel along many rows A, B, C which are parallel and juxtaposed to each other, with the blocks of each row A, B, C offset with respect to the blocks of the adjacent row. As clearly apparent from figures 1, 3 and 4, the complementary steps formed at the end surfaces and the longitudinal side surfaces of each block 7 enable the various blocks to be fitted into each other providing thereby at each side of each block a labyrinth-like interstice. The labyrinth-like interstices thus formed provide a high heat insulation even at high temperatures. At the same time, the structure of the panel can be obtained with a relatively simple process, of a continuous type, and at a low cost. At the same time, the panel has high characteristics of mechanical resistance, due to the configuration of the metal sheets, and the arrangement of the block 7 of insulating material with the fibres oriented orthogonally to the plane of the panel.

Figure 5 shows a variant of figure 1, which relates to a panel to be used as a wall, which differs from the panel of figure 1 only because the upper metal sheet 5' is identical to the bottom sheet 2.

Claims

1. Insulating panel for buildings, comprising:

- 5 - a layer of a fibrous insulating material (4) such as rock or mineral wool, with the fibres oriented in the direction orthogonal to the general plane of said layer (4),
- 10 - two corrugated metal sheets (2, 5) applied to the two opposite faces of the insulating layer (4), with the interposition of respective layers of adhesive material (3, 6),

characterized in that:

- 15 - said insulating layer (4) is constituted by a plurality of substantially parallelepipedal blocks (7) of fibrous insulating material, with the fibres arranged orthogonally to the general plane of the panel,
- 20 - said blocks (7) are arranged side by side in the plane of the panel in a number of parallel and juxtaposed rows (A, B, C) with the blocks (7) of each row offset with respect to the blocks of every adjacent row,
- 25 - each block has end surfaces (7c, 7d) and longitudinal side surfaces (7e, 7f) having steps of complementary shape (8a, 8b; 8c, 8d) so as to fit at each side into an adjacent block (7) providing thereby a labyrinth-like interstice.

2. Panel according to claim 1, characterized in that said adhesive material includes polyurethane and/or polyisocyanide resins.

Patentansprüche

1. Isolierplatte für Gebäude, die umfaßt:

- 40 - eine Schicht eines isolierenden Fasermaterials (4), wie beispielsweise Stein- oder Mineralwolle, wobei Fasern in der Richtung senkrecht zur allgemeinen Ebene der Schicht (4) ausgerichtet sind,
- 45 - zwei gewellte Bleche (2, 5), die an den zwei einander gegenüberliegenden Flächen der Isolierschicht (4) angebracht werden, wobei sich entsprechende Schichten Klebstoffmaterial (3, 6) dazwischen befinden,

dadurch gekennzeichnet, daß

- 50 - die isolierende Schicht (4) durch eine Vielzahl im wesentlichen parallelepipedförmiger Blöcke (7) eines Faserisoliermaterials gebildet wird, wobei die Fasern rechtwinklig zur allgemeinen

Ebene der Platte angeordnet sind,

- die Blöcke (7) nebeneinander in der Ebene der Platte in parallelen und benachbarten Reihen (A, B, C) angeordnet sind, wobei die Blöcke (7) jeder Reihe in bezug auf die Blöcke jeder angrenzenden Reihe versetzt sind, 5
- jeder Block Stirnflächen (7c, 7d) und Längsseitenflächen (7e, 7f) mit Absätzen komplementärer Form (8a, 8b; 8c, 8d) hat, die an jeder Seite in einen angrenzenden Block (7) passen, so daß auf diese Weise ein labyrinthartiger Zwischenraum entsteht. 10

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2. Platte nach Anspruch 1, **dadurch gekennzeichnet, daß** das Klebstoffmaterial Polyurethan und/oder Polyisocyanidharze enthält.

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Revendications

1. Panneau isolant pour bâtiments, comprenant :

- une couche d'un matériau isolant fibreux (4), par exemple de laine de roche ou de laine minérale, ayant des fibres orientées en direction perpendiculaire au plan général de la couche (4), et 25
- deux feuilles métalliques ondulées (2, 5) appliquées aux deux faces opposées de la couche isolante (4) avec interposition de couches respectives d'une matière adhésive (3, 6), 30

caractérisé en ce que :

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- la couche isolante (4) est constituée de plusieurs blocs pratiquement parallélépipédiques (7) d'un matériau isolant fibreux, les fibres étant placées perpendiculairement au plan général du panneau, 40
- les blocs (7) sont placés côte à côte dans le plan du panneau en un certain nombre de rangées parallèles et juxtaposées (A, B, C), les blocs (7) de chaque rangée étant décalés par rapport aux blocs de chaque rangée adjacente, et 45
- chaque bloc possède des surfaces d'extrémité (7c, 7d) et des surfaces longitudinales (7e, 7f) ayant des gradins de formes complémentaires (8a, 8b ; 8c, 8d) destinés à s'ajuster de chaque côté dans un bloc adjacent (7) avec formation de cette manière d'un interstice en labyrinthe. 50

2. Panneau selon la revendication 1, caractérisé en ce que le matériau adhésif contient des résines de polyuréthane et/ou de polyisocyanate. 55

Fig. 1

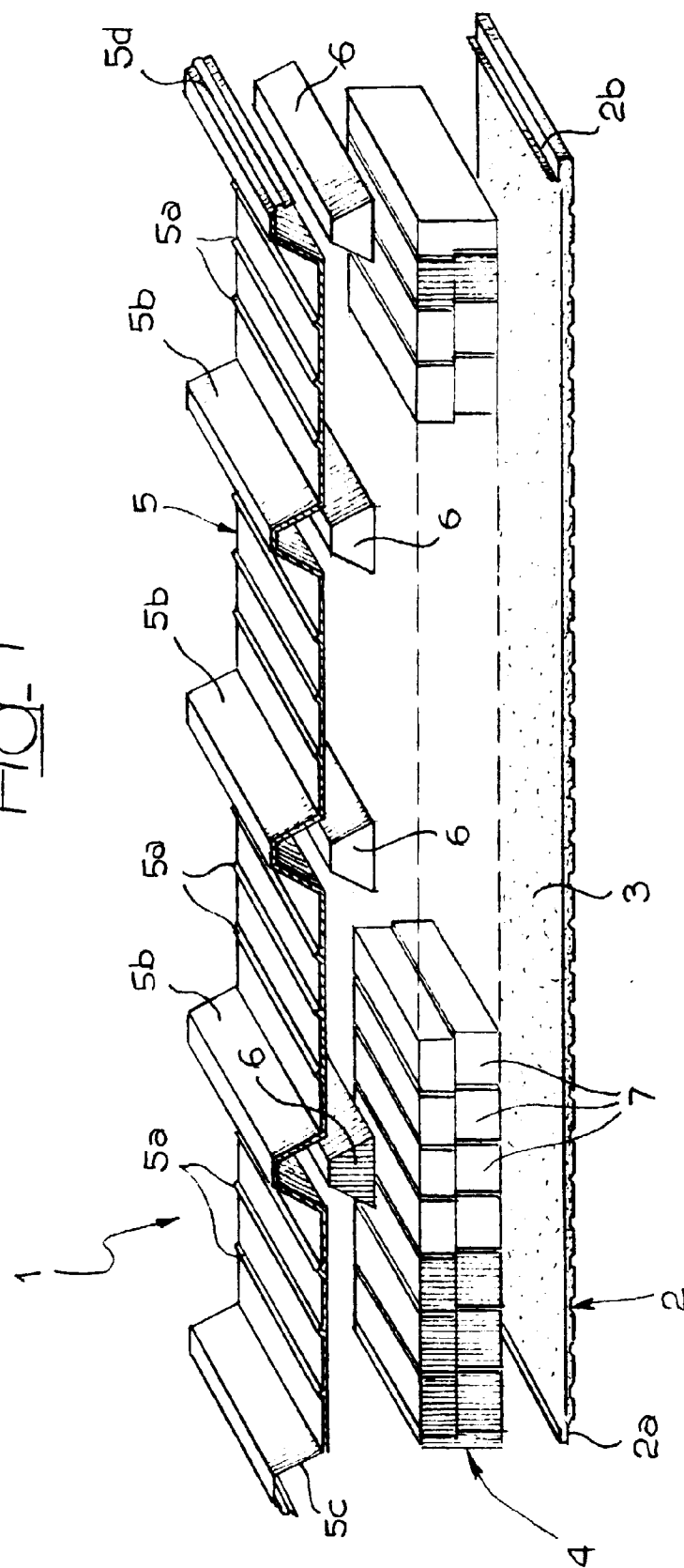


Fig. 2

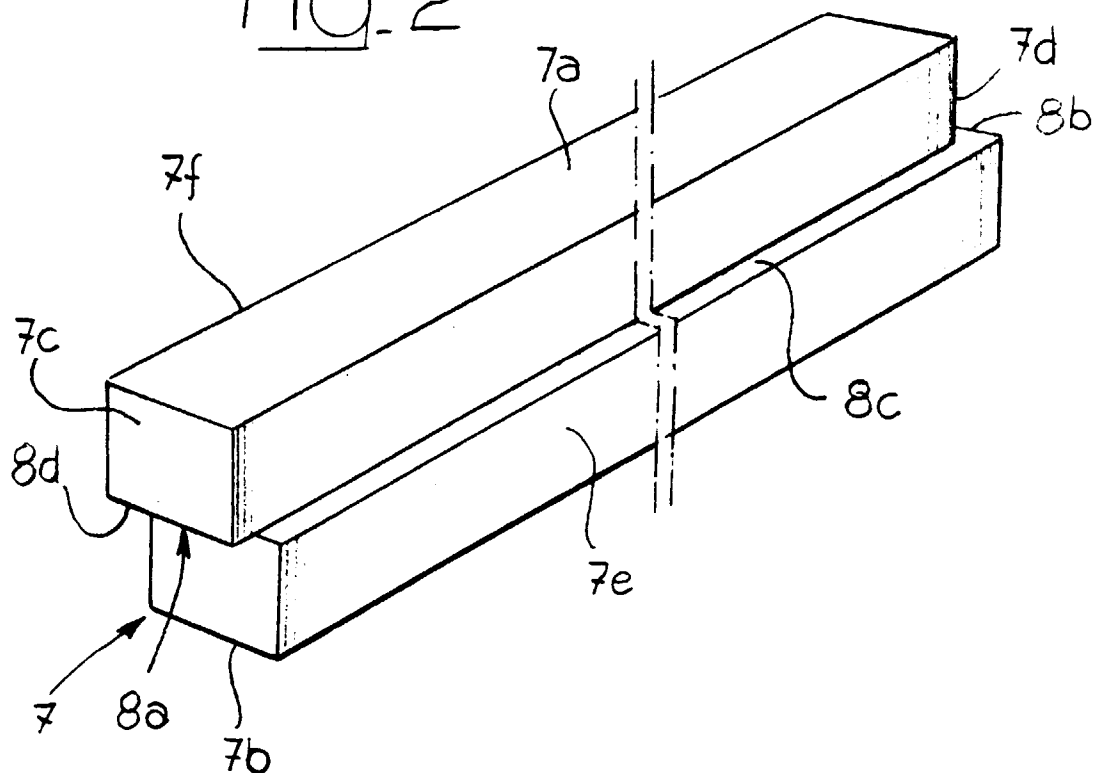


Fig. 3

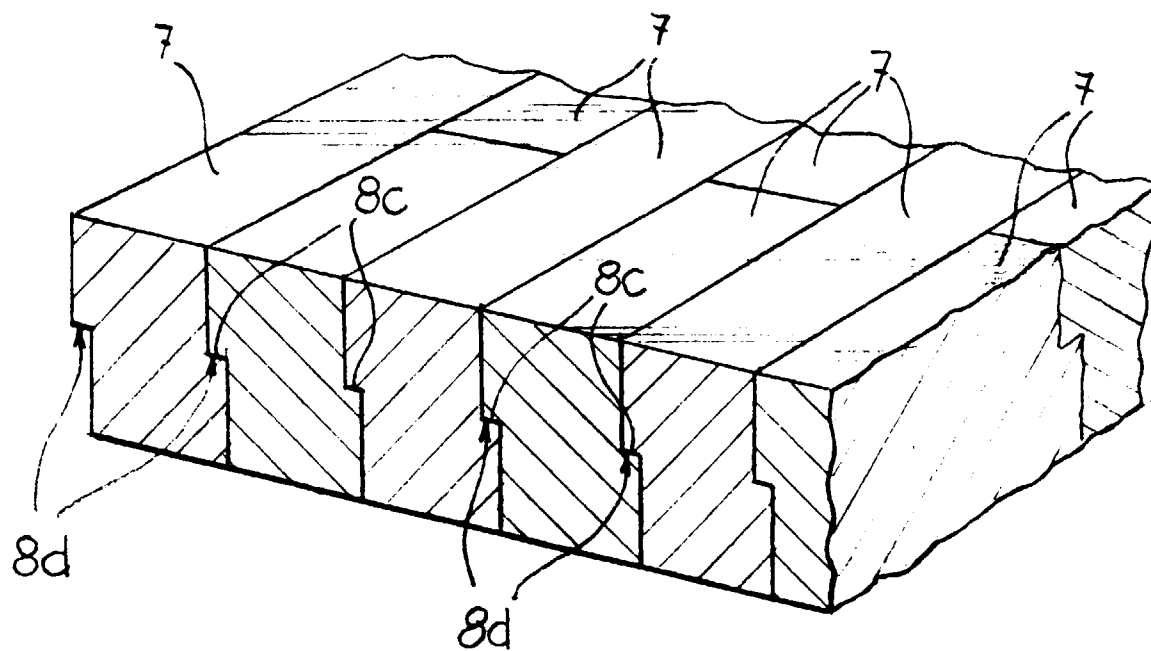


Fig. 4

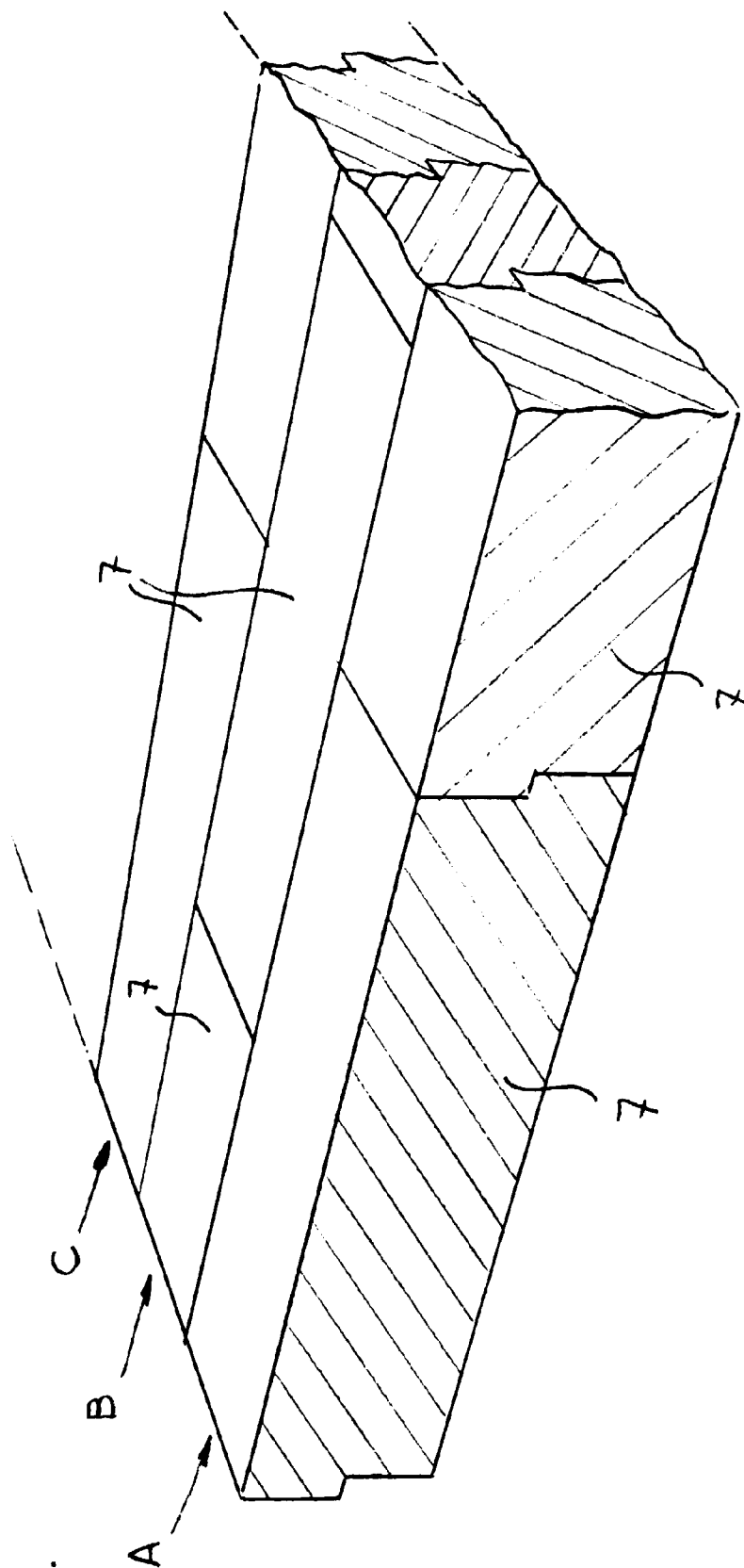


Fig. 5

