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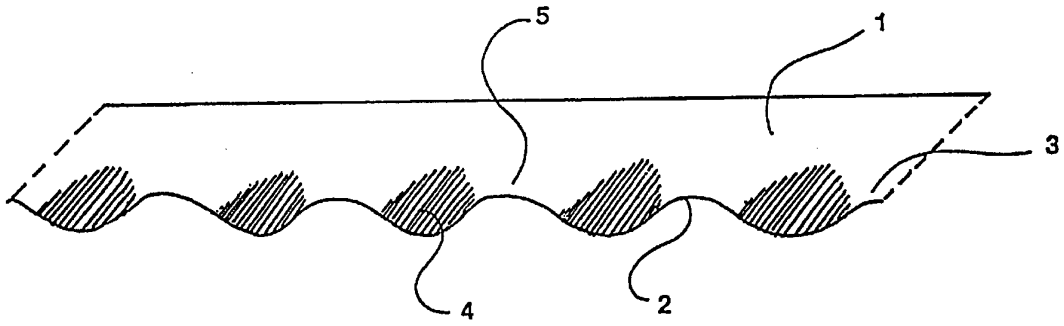

(57) **Abstract**

Method of cutting insulating materials by using a cutter or saw with a blade having a rectilinear cutting edge seen in the blade plane and provided with protrusions on the one or both sides, said protrusions having extremities which are located at a larger distance from the blade center than the corresponding portion of the blade which is not provided with protrusions. Blade for use in exercising the method.

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METHOD OF CUTTING INSULATION MATERIALS AND BLADE SUITABLE FOR USE IN CARRYING OUT SAID METHOD.

The present invention relates to a method of cutting insulation materials by means of a cutter or a saw with a blade provided with protrusions which extend from at least the one side of the blade in the region adjacent the cutting edge.

In particular, the invention relates to a method of cutting mineral fibre products, such as mineral fibre webs and boards.

The formation, laying out and mounting of insulating layers consisting of mineral wool often necessitate adaptation of the size of the mineral products used to the areas to be insulated, e.g. spaces between ceiling joists, sloping beams or other construction elements. Such adaptation is typically carried out by cutting such products by means of a manually operated saw.

The cutting of mineral fibre webs and/or boards into suitable sizes is also carried out on factory by means of mechanically operated saws. For instance blocks and/or boards for use as growth media as described in i.a. EP-0176134-b1 and EP-0389355-B1 are made by cutting mineral wool batts.

So far, conventional, manually operated saws have been widely used for manually cutting mineral wool products, e.g. hand saws, with saw blades having a cutting edge constituted of filed teeth set to alternate sides of the saw blade. The use of saws with saw blades provided with teeth or serrations produces large amounts of saw dust in the form of fibre fragments and torn-out fibres during the cutting of mineral fibre products. Such dust is a nuisance to the insulating workers and may also constitute a health hazard. Therefore, the cutting of mineral fibre products with such saws has to

be carried out under simultaneous removal of saw dust by suction and by using respiratory protective devices.

It has been attempted to carry out manual cuttings of mineral fibre boards and mats by using cutters with blades having waved instead of serrated or tooth-shaped cutting edges, i.e. blades with edges waved seen in the blade plane. The use of such cutters allows the amount of dust to be somewhat reduced, but those portions of e.g. a mineral fibre batt which have been cut through tend to exert a pressure on the cutter blade and thus hamper its movement relative to the mineral fibre product.

A large number of cutter blades are known for cutting foodstuffs, such as meat products, vegetables, e.g. tomatoes and fruits, and having varying edge shapes, cf. US patent No. 1793171, SE patent No. 105966, FR patent No. 1122521 and DK published patent application No. 152264 B.

It is a common feature of all the known cutter blades that the region adjacent to the cutting edge is wedge-shaped. In case of some of the known blades, the wedge-shaped portion is waved seen in a plane perpendicular to the cutter blade plane. However, the wave crests thus produced are within the planes defined by the opposite sides of the cutter blade.

US patent No. 2834108 discloses a cutter for cutting meat, fruits, vegetables, cake and the like, which is strongly waved in the region adjacent the cutting edge. However, the cutting edge of this known cutter is serrated and thus it would present the same disadvantages as the saws mentioned above in case it was used to cut insulating materials.

WO93/08960 describes a kitchen knife which is also provided with a wedge-shaped edge, wherein, however, the blade is provided with protrusions at a distance from the edge, which

protrusions serve to prevent the portions cut off with the knife from sticking to the knife blade.

The method according to the invention is characterized in using a blade having a rectilinear cutting edge seen the blade plane and where the extremities of the protrusions are located a larger distance from the blade center than the corresponding portion of the blade which is not provided with protrusions.

The use of such blade for cutting e.g. mineral fibre products has been found to allow a reduction of the amount of saw dust to a fraction of the amount produced when using blades with serrated edges, and to eliminate the tendency of the mineral fibre product to exert a pressure on the blade.

Attempts to manually cut through a mineral fibre board having a thickness of 18 cm and across a length of 60 cm by means of a hand saw and a saw with a saw blade according to the invention have shown that the use of the hand saw generated about 4.0 g of saw dust while the use of the saw with a saw blade according to the invention generated about 0.1 g of dust. In other words, the amount of dust was reduced by a factor 40 and this was obtained without any ensuing tendency to pinch the saw blade.

It is assumed that the highly reduced amount of saw dust is due to the mineral fibres being pushed to opposite sides of the blade and into the adjacent cutting planes rather than broken or torn apart as is the case when wedge-shaped and saws with teeth are used. It is assumed that the protrusions on the blade cause a groove to be formed which has a sufficient width to ensure that the saw blade is not pinched between the already cut-through portions of the mineral fibre product.

Cutting through mineral fibre products with a blade according to the invention generates on the cutting planes a pattern of parallel grooves which extend in the direction of movement of the saw blade.

It has surprisingly been found that the use of a blade according to the invention to cut mineral fibre products causes only little wear on the blade. Thus, in the tests carried out so far no wear has been observed.

According to the invention, the blade is preferably waved seen in a plane perpendicular to the blade in the region adjacent the cutting edge. However, it should be noted that blades may be used which have protrusions on only one side of the blade.

When a waved blade is used, the waves at the cutting edge may extend across the entire width of the saw blade but it is preferred that they extend only across a comparatively small portion thereof, e.g. 10-40%, and that the wave height (the outlay) gradually decreases to finally become zero in the direction away from the cutting edge.

Preferably, the waves are sinosoidal but other wave shapes may also be used. The wave length, i.e. the distance between two wave crests on the same side of the blade, and the wave height (the outlay) may vary within wide ranges, depending i.a. on the composition and density of the mineral fibre product. When a saw blade is to be used for cutting a mineral fibre product having a density of 100 about kg/m^3, the wave length is preferably between 10 and 40 mm and the outlay is about 5 mm.

The blade for use in the method according to the invention may have different shapes. It may for instance be of gradually decreasing height, such as a blade for a hand saw, or be belt or disc shaped. When a belt-shaped blade is used it has

a preferred thickness of from 0.1 to 1 mm, and preferably the waves extend across the entire width of the belt. The blade may be intended for manually operated saws or knives or for corresponding mechanically operated tools.

For cutting through comparatively loose mineral fibre products, blades with non-sharpened edges may be used but the cutting performance is increased by using sharpened edges.

The invention further relates to a blade as disclosed above, viz. a blade which is provided with protrusions in the area adjacent the cutting edge, which protrusions extend from at least the one side of the blade, and which is characterized in that its cutting edge is rectilinear seen in the blade plane, and that the extremities of the protrusions are located at a larger distance from the blade centre than the side of the corresponding portion of the blade which is not provided with protrusions.

The invention will now be described in further detail with reference to the drawings, where

fig. 1 is a perspective view of a saw blade according to the invention,

fig. 2 is a side view of the saw blade according to fig. 1, and

fig. 3 is a cross sectional view along the line III-III in fig. 2.

In the drawings 1 denotes a saw blade with a cutting edge 2. In a region 3 adjacent the cutting edge 2, the saw blade 1 is waved, the wave height, however, decreasing in a direction away from the cutting edge to finally become zero. The wave-shape seen in a direction parallel to the cutting edge 2 is, for the blade shown, sinosoidal and it comprises depressed zones 4 which alternate with protruding zones 5.

As used herein loosely coherent mineral fibre products designate mineral fibre products of a density of from about 10 to about 150 kg/m^3. Such mineral fibre products are typically longitudinally and/or vertically compressed and preferably consists of rock wool, glass wool or slag wool fibres.

C l a i m s

1. Method of cutting insulating materials by means of a cutter or a saw with a blade provided with protrusions which extend from at least the one side of the blade in the region adjacent the cutting edge, c h a r a c t e r i z e d in using a blade having a rectilinear cutting edge seen in the blade plane, and where the extremities of the protrusions are located at a larger distance from the center of the blade than the corresponding portion of the blade which is not provided with protrusions.

2. Method according to claim 1, c h a r a c t e r i z e d in that the blade is waved in the region adjacent the cutting edge seen in a plane perpendicular to the blade.

3. Method according to claim 2, c h a r a c t e r i z e d in that the waved portion of the blade is sinosoidal.

4. Method according to claims 2 or 3, c h a r a c t e - r i z e d in that the wave length of the waved portion is between 10 and 40 mm.

5. Method according to claims 2, 3 or 4, c h a r a c t e - r i z e d in that the wave height of the waved portion is largest in immediate proximity of the cutting edge, and that it decreases gradually in a direction away from the cutting edge.

6. Method according to any one of the preceding claims, c h a r a c t e r i z e d in that the cutting edge of the blade is sharpened.

7. Blade for cutter or saw suitable for cutting an insulating material, c h a r a c t e r i z e d in that its cutting edge is rectilinear seen in the blade plane and that the extremities of the protrusions are located at a larger

distance from the blade center than the corresponding portion of the blade which is not provided with protrusions.

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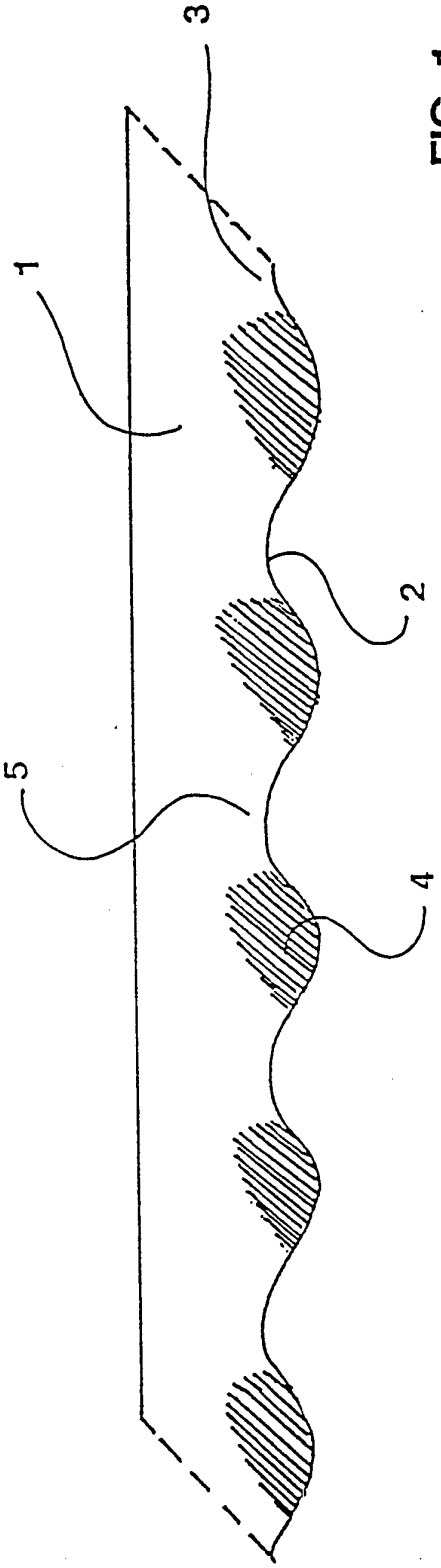

FIG. 1

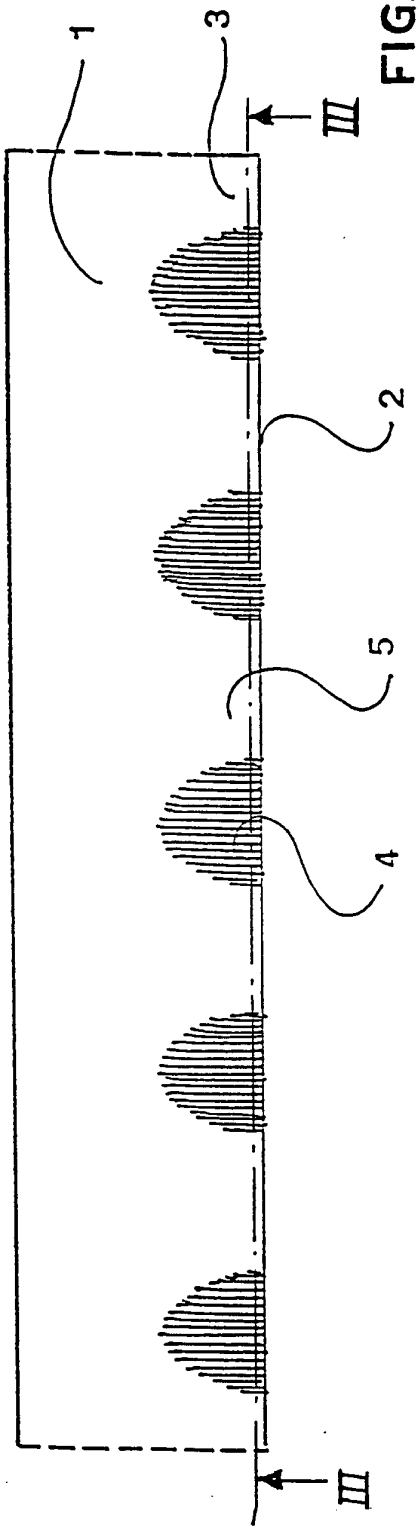

FIG.2

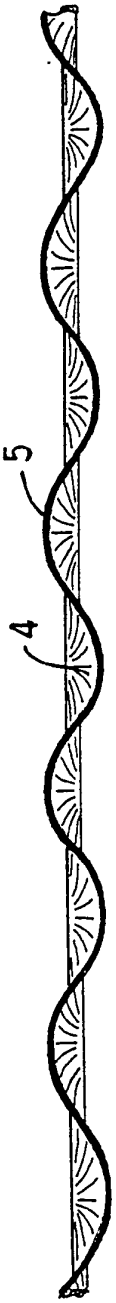

FIG.3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 95/00070

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B26B 9/02, B26D 7/00, C03B 37/16
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B26B, B26D, C03B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 2834108 (C.C. THOMPSON), 13 May 1958 (13.05.58)	7
A	GB, A, 2000118 (PARAISTEN KALKKI OY-PARGAS), 4 January 1979 (04.01.79)	1-7
A	WO, A1, 9005620 (OY PARTEK AB), 31 May 1990 (31.05.90), figure 7	1-7

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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1 June 1995	13 -06- 1995
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 2834108	13/05/58	NONE	
GB-A- 2000118	04/01/79	BE-A,A- 868338	16/10/78
		CA-A- 1080117	24/06/80
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		EP-A- 0444066	04/09/91