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(54) **Method for manufacturing a building element, and precursor for such building element**

(57) Method for manufacturing a building element (3) with an edge (21) that is irregular, that comprises steps A and B in order, whereby step A is the formation of a moulding (20), and step B is the hardening of the moulding (20), whereby step A comprises steps A1 and A2, whereby step A1 is the formation of a precursor (2) of the moulding (20), whereby the precursor (2) has a surface (12) with a ridge (9) whereby the ridge (9) has two sides (13, 14), and whereby step A2 is the removal of the ridge (9) by exerting a force (G) on it (9) to break off the ridge (9).

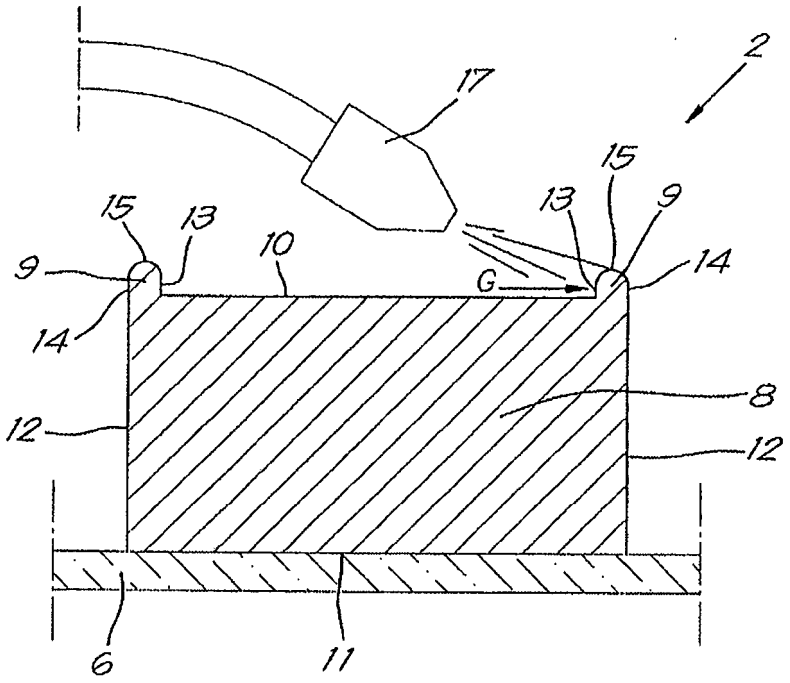

Fig.5

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Description

[0001] The present invention relates to a building element and a precursor for it.

[0002] More specifically the invention concerns building elements such as clinkers, facing bricks and other stony constructional elements that must satisfy both technical building and aesthetic requirements.

[0003] Many people find it attractive to give a building or paving, for example, a characteristic and aesthetically attractive visual effect by using old reused building elements such as facing bricks. In general they have less regular shapes than modern building elements, which is primarily shown by the edges, where surfaces of the building element concerned come together, presenting damage and other imperfections such that these edges have an irregular or fanciful form over their length.

[0004] However, old building elements are very expensive and of limited availability. Hence, new building elements are also made, which are then made such that they appear old.

[0005] There are essentially two methods for this.

[0006] The first is that a moulding, i.e. a piece that has the desired shape of the end product but does not have to have its final hardness, is formed in a mould and then exposed to conditions that result in it hardening. The mould here has such a shape that irregular edges are formed directly when forming the moulding in the mould.

[0007] However, these building elements have the disadvantage that the surface structure of the irregularities is the same as the rest of the building element, and is not also irregular as is the case with the real damage of a previously formed undamaged building element.

[0008] These building elements, because they are made in moulds, are also mutually identical, or only available in a limited number of variations, which becomes clear when they are arranged in a pattern.

[0009] For both reasons the real visual effect of an old building element manufactured according to this method is only achieved to a limited extent.

[0010] The second method comprises the manufacture of building elements without damage, which are then aged quickly by exposing them to the action of hard tools, such as steel pellets and chains, or by rotating them in a drum.

[0011] However, this has the disadvantage that this is an extra production step, which brings about extra costs, whereby the production step also generates a lot of noise and dust.

[0012] Moreover, the machines used for this purpose are generally very expensive to acquire and maintain.

[0013] There is also a risk that such a method exposes a building element to forces that are too high, and is thus no longer suitable for use as a building element. This thus yields a certain loss during production, whereby a relatively large effort is also required to check for excessive damage of the individual building elements from such a production step.

[0014] The purpose of the present invention is to provide a solution to at least one of the aforementioned and other disadvantages by providing a method for manufacturing a building element with surfaces and edges, whereby at least one edge is irregular, that comprises steps A and B in order, whereby step A is the formation of a moulding of a hardenable basic substance, and step B is the exposure of the moulding to conditions that result in the hardening of the basic substance with sufficient sturdiness for use as a building element, whereby step A comprises steps A1 and A2, whereby step A1 is the formation of a precursor of the moulding, whereby the precursor has at least one surface with at least one ridge whereby the ridge has two sides, and whereby step A2 is at least the partial removal of the ridge by exerting a force on a side of the ridge to entirely or at least partially break off the ridge, to form the moulding or a further precursor thereof.

[0015] In this way an accelerated aged building element is obtained, for example a clinker or facing stone, with random irregular edges, without the risk of excessive damage of the building elements and thus loss, and without the use of expensive and heavy tools to damage the hardened building elements.

[0016] This method also has the advantage that it is a very cheap method.

[0017] Moreover less dust and noise is produced.

[0018] Preferably the two sides of the ridge are a first side turned towards the middle of the surface and a second side turned away from the middle of the surface, whereby in step A2 the force is exerted on the first side whereby the ridge is affixed such that the second side and another surface of the precursor together form one geometrical plane.

[0019] In this way the ridge is on the intersecting line of two surfaces of the building element, so that the damage deliberately made is limited to the edge formed by this intersecting line.

[0020] In a further preferred variant the force is at least partly exerted by blowing air against the side.

[0021] This is an easy and cheap method for breaking off the ridge from the precursor.

[0022] In another preferred variant, step A3 is performed after step A2, whereby step A3 is the brushing of at least the part of the surface on which the ridge is or was located. This has the advantage that if parts of the ridge have still not been completely removed, they are removed in step A3. The sharp, crumbly edges that are obtained in step A2 are also made rather more even, such that the edges appear more realistically damaged.

[0023] In another preferred variant, in step A1 the surface is provided with a ridge that runs at least largely around the periphery of the surface.

[0024] Thereby all edges around a surface are given an irregular aged appearance. As when using a building element, one surface is generally completely visible, this easily gives the desired result in the construction made with such a building element.

[0025] In a further preferred variant the distance between the sides of the ridge is variable over the length of the ridge.

[0026] The ridge thus has a variable width. As the quantity of material removed from an edge of the precursor is strongly related to the width of the ridge, more variation in the irregularity of the edges can be obtained in this way.

[0027] In a further preferred variant, step A1 is at least partially implemented by placing the desired quantity of basic substance in a mould, placing a stamp on this that exerts pressure on the basic substance, whereby the stamp and the mould differ in size in such a way that a split occurs between the stamp and the mould around the periphery of the stamp, whereby the ridge is formed in this split.

[0028] This is an easy way to form a precursor, which makes use of standard production means with suitable stamps fitting in the mould, and by only adjusting the stamps.

[0029] Because there is space between the stamps and moulds, they do not grate against one another, possibly with basic substance between them and wear and tear in the moulds and stamps is thereby greatly reduced.

[0030] The invention also concerns a precursor for the manufacture of a building element, whereby the precursor has surfaces and edges, whereby the precursor has at least one surface with at least one ridge, whereby the precursor is made of concrete cement, and whereby the ridge has a lower density than the other part of the precursor.

[0031] With the intention of better showing the characteristics of the invention, a preferred variant of the method according to the invention and a preferred embodiment of a precursor according to the invention are described hereinafter by way of an example, without any limiting nature, with reference to the accompanying drawings, wherein:

Figure 1 schematically shows a perspective view of a part of a device for implementing a step of the method according to the invention;
figure 2 shows a top view of the detail of the device of figure 1 indicated with the arrow F2;
figure 3 shows a side view of a cross-section according III-III of the detail of the component in figure 2;
figure 4 shows a perspective view of an intermediate product of the method;
figure 5 shows a side view of a next step of the method according to the invention;
figure 6 shows a side view of the second intermediate product;
figure 7 shows a perspective view of the second intermediate product of figure 6;
figure 8 shows a side view of a further step of the method according to the invention; and
figure 9 shows a perspective view of a third intermediate product and also the end product of the method according to the invention.

[0032] Figures 1 to 3 schematically show a mould 1 with nine compartments during a first production step for a first precursor 2 for a concrete paving clinker 3.

[0033] Each of these compartments of the mould 1 is provided with a vertically movable stamp 4, on which pressure F can be exerted, on each stamp 4 separately or on a number or all stamps 4 together.

[0034] As is clear in figure 2, the stamp periphery 5 has an irregular form and a stamp 4 is smaller than a compartment of the mould 1, and preferably is positioned not completely central with respect to a compartment.

[0035] The mould 1 is placed on a base plate 6.

[0036] When the stamp 4 is placed in the compartment, between a compartment of the mould 1 and a stamp 4, a split 7 is formed with a width B that varies over its length, depending on the form of the stamp periphery and the positioning of the stamp 4 with respect to the compartments of the mould 1.

[0037] The first production step to manufacture the first precursor 2 is simple and as follows.

[0038] The necessary quantity of a moist quantity of hardenable basic substance 8, in this case concrete cement, is placed in each compartment of the mould 1. This necessary quantity depends on the desired thickness of the final clinker 3 and can easily be calculated and/or determined experimentally.

[0039] Then the stamps 4 are positioned and pressure is exerted on the basic substance 8 by means of the stamps 4. Hereby the basic substance 8 is also subject to vibration, for example by having a vibration installation, act on the moulds 1, the stamps 4 or the base plate 6.

[0040] Due to the combined effects of the pressure and the vibration, the basic substance 8 is compacted to form the first precursor 2, which is still in the mould 1.

[0041] A small part of the basic substance 8 is pressed into the split 7 here, such that a ridge 9 is formed on the first precursor 2, which, because it has not been subject to the pressure of a stamp 4 is less compacted than the other part of the first precursor 2.

[0042] By now removing the stamps 4 and the mould 1, separate first precursors supported by the base plate 6 are obtained, as shown in figure 4. These first precursors 2 are made of moist non-hardened basic substance 8, which, because of the compaction, already has sufficient strength to preserve the form obtained.

[0043] The first precursors 2 are beam shaped with a top surface 10, a bottom surface 11 and four sides 12. The ridge 9 is on the top surface 10, and has a first side 13 that is oriented towards the middle of the top surface 12, and a second side 14 that is turned away from it.

[0044] The ridge 9 also has a top 15.

[0045] Over the length of the ridge 9 the distance between the first and second sides 13 and 14 varies, and thus the width of the ridge 9.

[0046] The ridge 9 is completely around the periphery of the top surface 12 and is placed on the edges of it, so

that the second side 14 and the sides 12 are in the same geometrical plane. The ridge 9 has a lower density than the other part of the first precursor 2.

[0047] Figure 5 shows a second production step in which a second precursor 16 is made from a first precursor 2. An intermediate product in the formation of this second precursor is shown in figures 6 and 7.

[0048] This second production step consists of a force being exerted against the first or second side 13 or 14 of the ridge 9.

[0049] In this example, but not exclusively, this force G is exerted against the first side 13 by compressed air blown out of a nozzle 14, which is directed at this first side 13.

[0050] The ridge 9 breaks off under the influence of the force, at the place along its length where the force G is exerted. In general this breakage is not precisely at the transition between the ridge 9 and the top surface 10.

[0051] Generally the breakage is lower and a variable part of the compacted basic substance 8, that is under the ridge 9 and which forms the intersecting line between the top surface 10 and a side 12, is broken off with it, whereby near the edge 18 where they contact one another small and variable quantities of material from both the top surface 10 and the side 12 are removed together with the ridge 9.

[0052] As a result the edge 18 that is defined by the top surface 10 and a side 12 has an irregular form.

[0053] In order to get the entire or approximately entire ridge 9 removed, the force G is exerted over the entire length of the ridge 9, albeit not necessarily always in the same direction or with the same intensity.

[0054] As a result the second precursor 16 is formed.

[0055] This production step is implemented when the first precursor 2 has still not hardened enough such that the force G exerted on the ridge is sufficient to make it break off.

[0056] The variable width over the length of the ridge 9, which is caused by both the irregular stamp periphery 5, and by the non-central positioning of the stamp 4 in a compartment of the mould 1, contributes, in addition to random factors concerning the precise place where a fracture plane in a heterogeneous basic substance occurs, to the quantity of material taken away with the removal of the ridge 9 varying randomly and the edge 18 thus acquiring a randomly damaged appearance.

[0057] The intermediate product shown in figures 6 and 7 is between the first precursor 2 and the second precursor 16, whereby one side of the ridge 9 at an edge 18 has already been removed and the other three sides 12 at the edges of the top surface 10 are still present.

[0058] In a third production step, shown in figure 8, by using a rotating brush 19 that moves over the top surface 10 of the second precursor in the direction of the arrow P, the second precursor 16 is converted into a moulding 20, i.e. a piece that already has the final desired shape of the end product, but which still has to undergo a hardening step.

[0059] Hereby the brush 19 has two primary functions. The first function is that any parts of the ridge 9 left behind in the previous production step are removed. The second function is that any sharp unevenness on the second precursor 16, caused by small parts of basic material 8 broken off together with the ridge 9, is made less sharp, without however removing the random nature of the irregularity of the edge 18.

[0060] In figure 8 this is shown by means of edge 18, which shows the situation before this edge has been treated by the brush 19 and by edge 21, which shows the edge 18 after treatment by the brush 19.

[0061] After the third production step the moulding 20, which is shown in figure 9, only has to be hardened into the clinker 3. In this specific example whereby the basic substance is concrete cement, this is done by giving the basic substance sufficient time to harden.

[0062] In other cases, for example when the basic substance is clay, another treatment is needed, for example firing in a kiln.

[0063] Figure 9 also shows the end product, the clinker 3, which has the same shape as the moulding 20. This clinker 3 has irregular edges 21 that give the desired aged appearance to this clinker 3.

[0064] Because the ridge 9 on the first precursor 2 extends completely around the periphery of the top surface 10, all four edges 21 of the clinker have these irregular edges, such that, if a number of clinkers 3 are laid next to one another, all visible edges are aged.

[0065] It goes without saying that it is possible to apply the method according to the invention, not to four but to all numbers of edges between one and the total number of edges of the building element.

[0066] Although a third production step is described in this example, this third production step is optional. In brief it is also possible to consider the second precursor 16 as a moulding 20 that is ready to be hardened. As a result the character of the irregularity of the edges 21 can be varied according to need.

[0067] Further supplementary treatments, beyond the treatments described on the first or second precursor 2 or 16 to obtain a moulding 20, are also possible.

[0068] The above describes a mould as a piece with a larger number of compartments. It is also possible to use individual moulds, each with one compartment. For the invention a mould with a number of compartments can also be considered and described as a set of individual moulds.

[0069] The present invention is by no means limited to the embodiment of the precursor and the variants of the method, described as an example and shown in the drawings, but a precursor of the method according to the invention can be realised in all kinds of variants and in different ways, without departing from the scope of the invention.

Claims

1. - Method for manufacturing a building element (3) with surfaces (10, 11, 12) and edges, whereby at least one edge (21) is irregular, that comprises steps A and B in order, whereby step A is the formation of a moulding (20) of a hardenable basic substance (8), and step B is the exposure of the moulding (20) to conditions that result in the hardening of the basic substance (8) with sufficient sturdiness for use as a building element (3), **characterised in that** step A comprises steps A1 and A2, whereby step A1 is the formation of a precursor (2) of the moulding (20), whereby the precursor (2) has at least one surface (12) with at least one ridge (9) whereby the ridge (9) has two sides (13, 14), and whereby step A2 is at least the partial removal of the ridge (9) by exerting a force (G) on a side (13,14) of the ridge (9) to entirely or at least partially break off the ridge (9), to form the moulding (20) or a further precursor (16) thereof.

2. - Method according to claim 1, **characterised in that** the two sides of the ridge are a first side turned towards the middle of the surface and a second side turned away from the middle of the surface, whereby in step A2 the force is exerted on the first side.

3. - Method according to claim 2, **characterised in that** the ridge is affixed such that the second side and another surface of the precursor together form one geometric plane.

4. - Method according to any one of the previous claims, **characterised in that** the force is at least partly exerted by blowing air against the side.

5. - Method according to any one of the previous claims, **characterised in that** a step A3 is implemented after step A2, whereby step A3 is the brushing of at least the part of the surface on which the ridge is or was located.

6. - Method according to any one of the previous claims, **characterised in that** in step A1 the surface is provided with a ridge that runs at least largely around the periphery of the surface.

7. - Method according to any one of the previous claims **characterised in that** the distance between the sides of the ridge is variable over the length of the ridge.

8. - Method according to any one of the previous claims, **characterised in that** step A1 is at least partly implemented by placing the desired quantity of basic substance in a mould, by placing a stamp on this that exerts pressure on the basic substance, whereby the stamp and the mould differ in size in such a way that a split occurs around the periphery of the stamp between the stamp and the mould, whereby the ridge is formed in this split.

9. - Method according to any one of the previous claims, **characterised in that** the hardenable basic substance is a concrete cement.

10. - Method according to claims 8 and 9, **characterised in that** while the stamp is positioned, the basic substance is compacted by subjecting it to vibrations.

11. - Method according to any one of the previous claims, **characterised in that** the hardenable basic substance is clay.

12. - Method according to any one of the claims 8 to 11, **characterised in that** the distance between the sides of the ridge is variable over the length of the ridge because the stamp is of such a shape and/or positioned such that the width of the split is variable.

13. - Method according to any one of the previous claims, **characterised in that** it is used for making clinkers.

14. Precursor for the manufacture of a building element, whereby the precursor has surfaces and edges, **characterised in that** the precursor has at least one surface with at least one ridge, whereby the precursor is made of concrete cement, and whereby the ridge has a lower density than the other part of the precursor.

15. - Precursor according to claim 14 for the manufacture of clinkers with irregular edges.

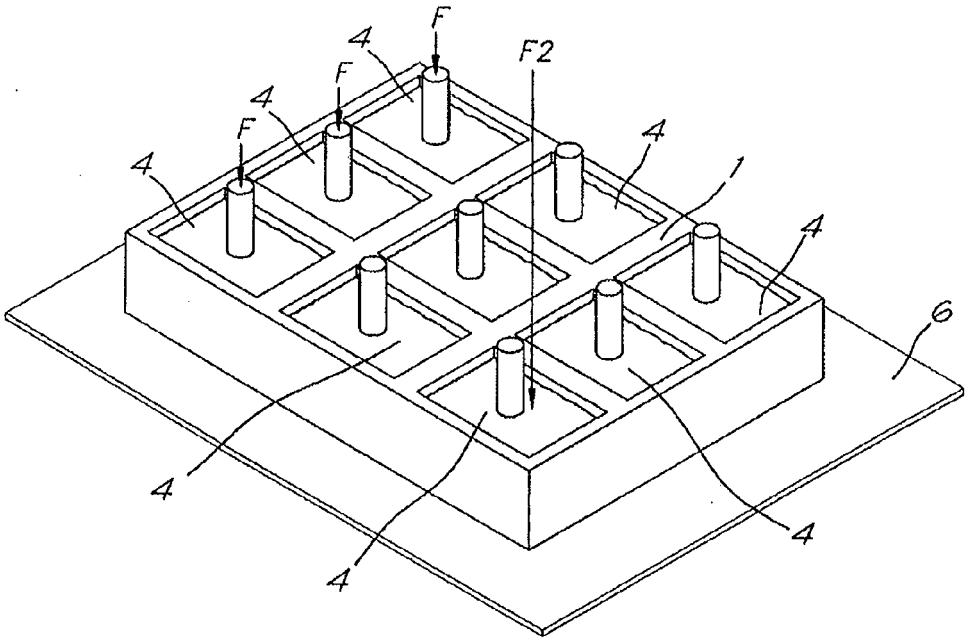

Fig. 1

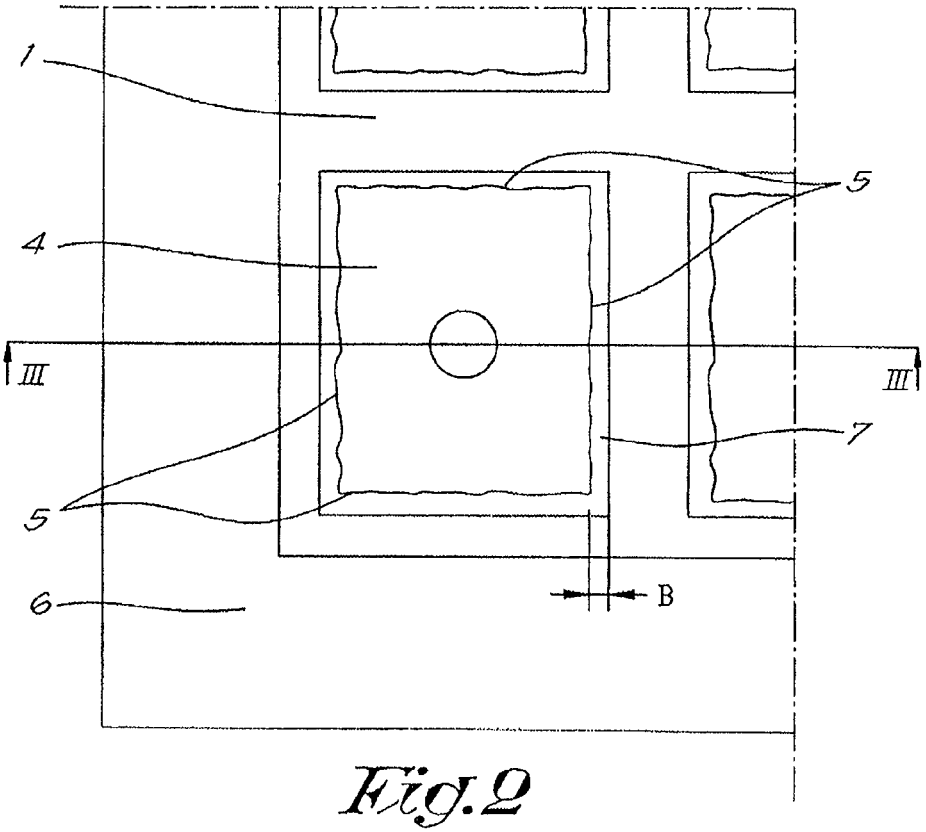

Fig. 2

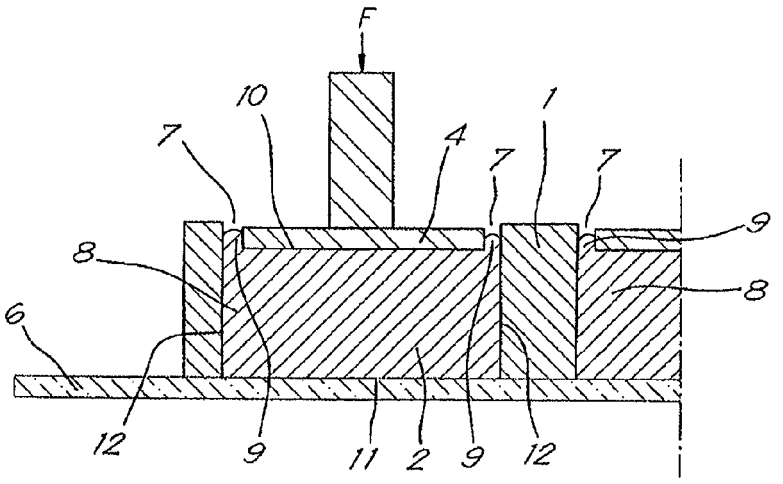
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Fig.3

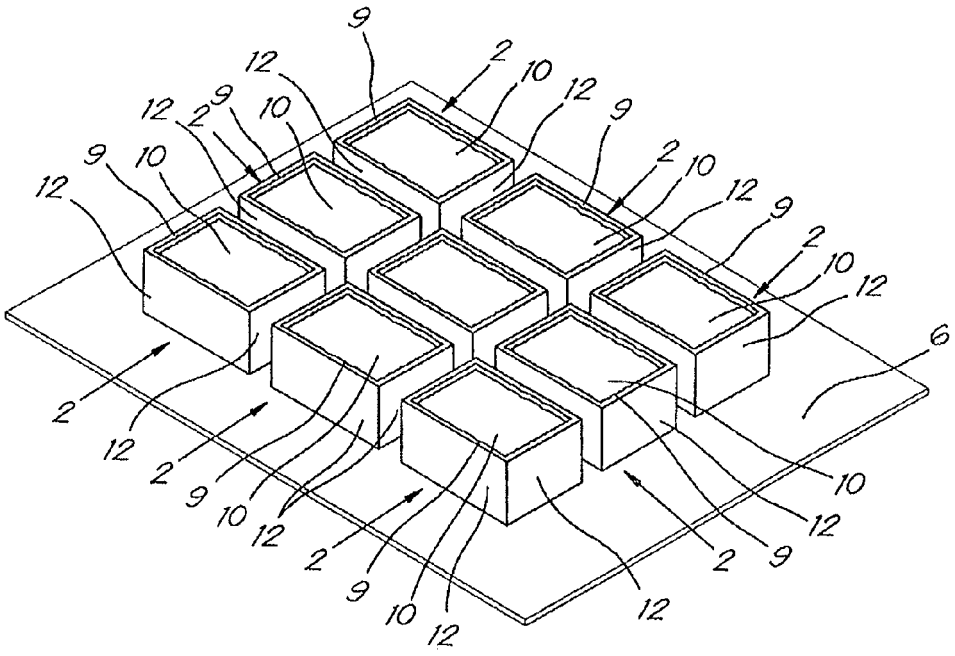
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Fig.4

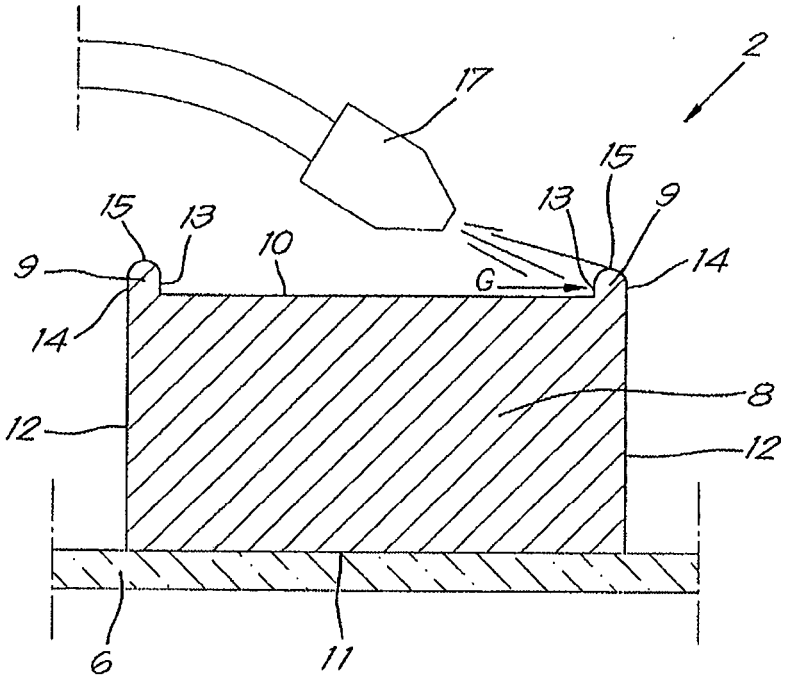

Fig.5

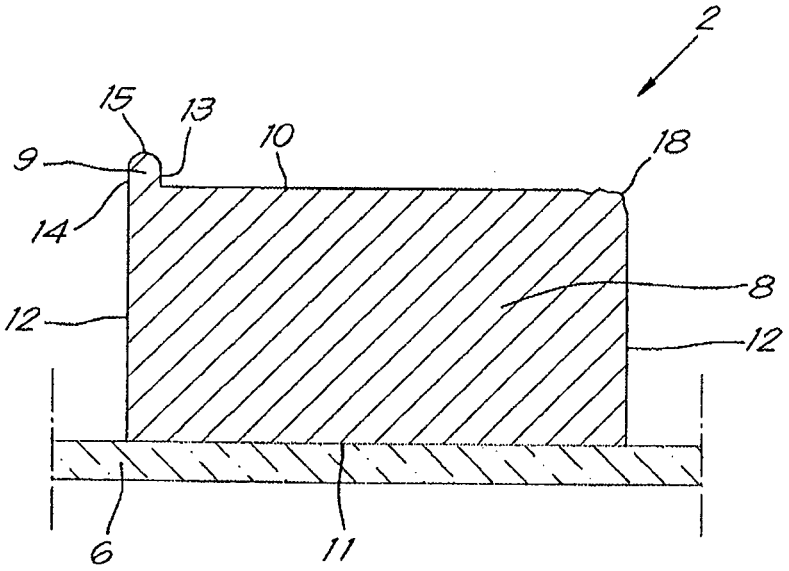

Fig.6

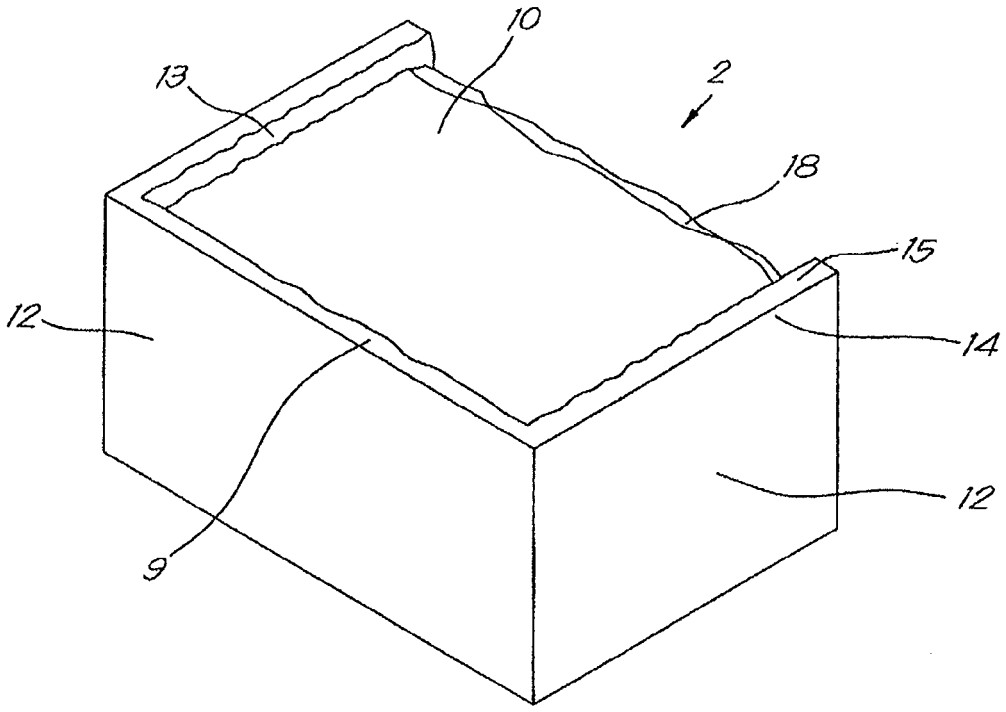

Fig.7

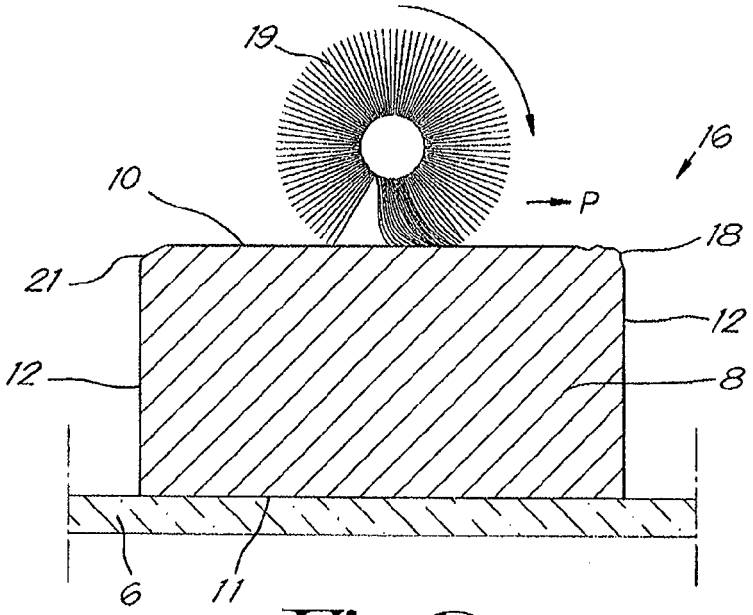

Fig.8

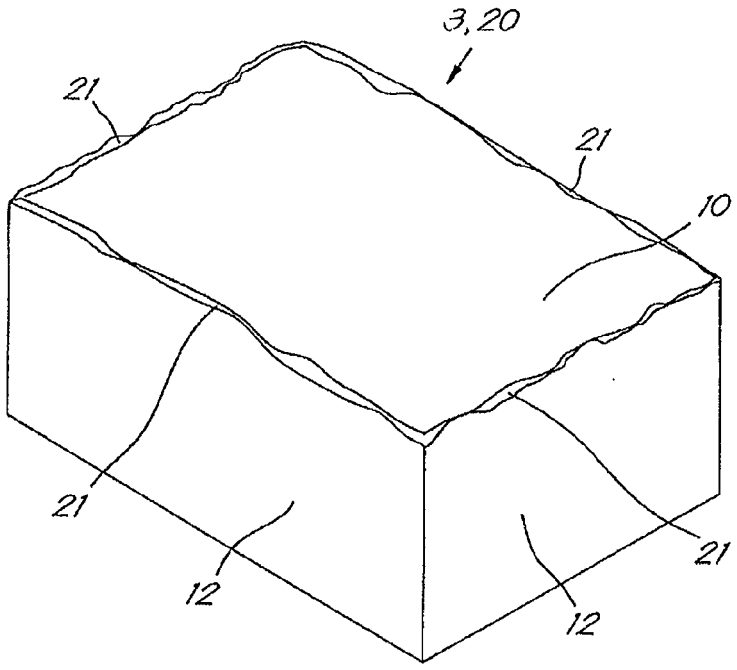

Fig.9

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EUROPEAN SEARCH REPORT

Application Number
EP 12 00 8472

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	WO 02/092285 A2 (GLS IND INC [US]; PRICE RAYMOND R [US] PF IND INC [US]; PRICE RAYMOND) 21 November 2002 (2002-11-21) * figures 1,6,7 *	1,9,14, 15 4	INV. B28B11/08
Y	WO 2006/136009 A1 (RINOX INC [CA]; CORREIA HORACIO [CA]) 28 December 2006 (2006-12-28) * See numerals 42 and 46 -; figures 2,3,4,7,15 *	4	
A	US 6 540 501 B1 (BOTT TIMOTHY ALLEN [US]) 1 April 2003 (2003-04-01) * claims 1-5; figures 5,7 *	1	
A	DE 19 09 193 A1 (LINDVALL NILS ERIK LENNART) 16 July 1970 (1970-07-16) * claims 1,2; figure 1 *	1	
			TECHNICAL FIELDS SEARCHED (IPC) B28B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 April 2013	Boone, John

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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03-04-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 02092285 A2	21-11-2002	AU 2001264636 A1	25-11-2002
		CA 2447315 A1	21-11-2002
		WO 02092285 A2	21-11-2002
WO 2006136009 A1	28-12-2006	EP 1885534 A1	13-02-2008
		WO 2006136009 A1	28-12-2006
US 6540501 B1	01-04-2003	CA 2350979 A1	21-05-2002
		US 6540501 B1	01-04-2003
DE 1909193 A1	16-07-1970	DE 1909193 A1	16-07-1970
		DE 6907223 U	13-09-1973
		GB 1253116 A	10-11-1971
		SE 325815 B	06-07-1970

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82