(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 045 280 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.07.2016 Bulletin 2016/29

(51) Int Cl.:
B28B 11/00 *(2006.01)* ***B28B 11/10*** *(2006.01)*

(21) Application number: **16151656.2**

(22) Date of filing: **18.01.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **17.01.2015 NL 2014150**

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(54) METHOD FOR SHAPING A MALLEABLE MATERIAL

(57) The invention relates to a method for shaping malleable material, comprising of:
- depositing a chunk of malleable material (1) on a carrier surface (101), wherein the carrier surface (101) extends parallel to a first direction.

The method is characterized by:
- compressing the chunk of malleable material (1) in a second direction (x) after it has been deposited, wherein
- the second direction (x) lies perpendicularly of the first direction;
- the compressing of the chunk of malleable material (1) comprises of pushing in the second direction (x) against the chunk of malleable material (1) with a first surface (107) of a mould (102);
- a second surface (108) of the mould (102) lying opposite the carrier surface (101) is moved together with the first surface (107) in the second direction (x) during the compression; and
- pressing creases, which are formed by the compression in a surface of the chunk of malleable material (1) facing toward the second surface (108), against the second surface (108) by means of the compression.

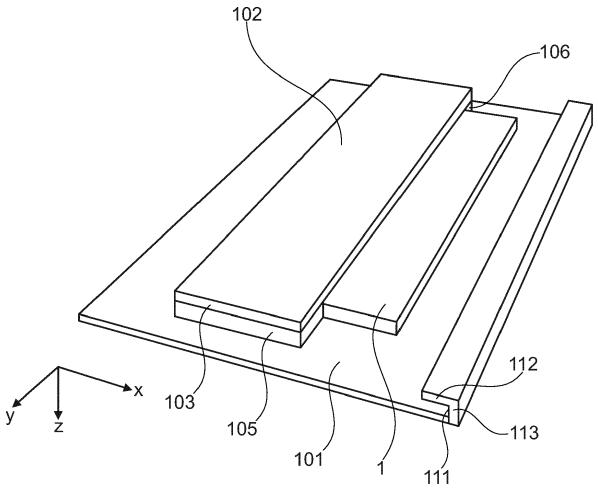

Fig. 1

EP 3 045 280 A1

Description

[0001] Method for shaping malleable material, comprising of depositing a chunk of malleable material on a carrier surface, wherein the carrier surface extends parallel to a first direction. The invention also relates to a stone product.

[0002] In a known manner of making brick slips with a surface which is irregular in a particular way and which appears grained and sanded such that it is designated as handmade and the brick slips as hand-moulded brick slips, hand-moulded bricks are first made and only then are brick slips made from these bricks. A mould is used to produce the hand-moulded bricks. The mould has a bottom, two side walls, two end walls and an opening for arranging and removing clay. The bottom, side walls and end walls are mounted fixedly on each other in order to form a container with fixed dimensions. The mould is roughly 230 mm long, 115 mm wide and 55 mm high. The side walls are roughly 230 mm long and 55 mm high. The end walls are roughly 115 mm wide and 55 mm high. Sand is first sprinkled in the mould. A quantity of clay, the clot of clay, is rolled through sand or sawdust and thrown into the sanded mould. Because the clot of clay sanded on the surface is thrown into the mould the clot of clay deforms, whereby it acquires an irregular surface on the sides parallel to the throwing direction, i.e. on the sides adjacent to the side walls and the end walls of the mould. Such an irregular surface is grained, whereby the form of the graining is determined in that, through the contact of the clay with the bottom, the clot of clay deforms and, because of the deformation, is pushed against the side walls and end walls. The side of the clot of clay facing toward the bottom of the mould and the side facing toward the opening of the mould do not obtain the desired irregular surface. The side facing toward the bottom thus obtains the form of the bottom of the mould.

[0003] For the desired irregularity in the clot of clay has to be thrown with force into the mould. Because the mould must hereby be able to absorb force, the bottom, side walls and end walls are fixedly mounted on each other so as to prevent possible shifting relative to each other.

[0004] After the clay has been removed (released) from the mould by turning the mould so that the opening faces downward, the clay is dried. During drying the clay shrinks by about 5 to 15% so that the dried clay measures about 210 by 100 by 50 mm. The degree of shrinkage depends on, among other factors, the properties of the clay. The greater part of the sound or sawdust detaches from the sides of the clay. The dried clay is heated in a kiln so that a brick is formed. Any sawdust which may be present is burnt in the kiln, and any sand which may still be present against the clay on the outside will drop off the clay, which imparts a special irregular surface structure with graining.

[0005] Brick slips are then sawn from the brick such that the brick slips each have an irregular grained surface, i.e. such that each has a surface which earlier faced toward one of the side walls. With the dimensions of the mould and the desired dimensions of the brick slip (about 210 mm long, 50 mm high and about 20 mm thick), two brick slips will therefore come from one brick. One corner strip of a length of 210 mm, a width of 100 mm, a height of 50 mm and a thickness of 20 mm can also be sawn from the brick.

[0006] This method of sanding, shaping in a mould, drying and firing is not efficient when it is desired to make thin brick slips. The dimensions of the mould cannot be adapted to the desired dimensions of the brick slips because the dimensions of the brick slips are such that the removal (release) of the clay from a narrow mould by turning the mould so that the opening faces downward results in many cases in a deformation of the clay. When the clay deforms the clot of clay shaped by the mould is no longer usable for making brick slips. The clot of clay shaped by the mould often deforms when it adheres to the mould and is pressed therefrom because the shaped clay from a narrow mould is thinner than shaped clay from a mould for a brick. The width of the mould is therefore made larger than the height for the purpose of enabling easier release of the clot of clay from the mould.

[0007] Sawing brick slips from a brick requires energy, saw blades and is wasteful of clay. Because the clay is quarried and transported to a brickworks, kneaded and mixed, thrown into a mould, dried and fired, there is an additional energy loss.

[0008] The object of the invention is to provide a method wherein it is not necessary to remove the clay from the mould by turning the mould so that an opening faces downward.

[0009] The object is achieved in that the invention provides a method with an embodiment as according to claim 1.

[0010] When material is compressed pushing takes place in a direction against this material, whereby the dimension in this direction decreases and at least partially increases in one or more other directions.

[0011] When malleable material is compressed creases occur in surfaces of this material due to internal shear forces.

[0012] Because the compression forms creases which are pressed against the second surface, the creases acquire a particular shape. The creases are formed here on the surface facing toward the second surface and not on the surface facing toward the first surface. The shape of the first surface is hereby of only indirect importance for the shape of the surface with the creases following compression. The shape of the creases, and thereby the surface facing toward the second surface, is further special because the second surface is moved in the second direction together with the first surface.

[0013] Because the compression and the forming of the creases take place only after depositing of the chunk of malleable material, it is not necessary for the first surface to be present during depositing of the chunk of malleable material. Nor is it necessary for the first surface to

be mounted fixedly on the carrier surface in order to absorb force because the depositing of the chunk of malleable material need not take place with force since the creases are formed only later. It is therefore not necessary to reverse the mould to release the chunk of malleable material via an opening from the mould.

[0014] The malleable material is for instance clay. Malleable clay comprises sufficient moisture so that it is to a certain extent plastically kneadable. Clay comprises clay particles of differing size and shape because these are formed in natural and random manner. The order of the clay particles in the chunk of malleable material is also random. it is therefore unpredictable where creases will occur and how large they will be and what precise shape they will take on during performing of the method. The surface of the chunk of malleable material facing toward the second surface hereby acquires a unique form.

[0015] The method can be a method for shaping building products such as brick slips.

[0016] In a further embodiment of the invention a method is provided as according to claim 2.

[0017] Because the distance between the second surface and the carrier surface is greater than the maximum thickness which the chunk of malleable material has before compression, the creases can be formed in the space between the second surface and the chunk of malleable material at rest, i.e. the chunk of malleable material before the first surface is pushed against it, before they are pushed against the second surface.

[0018] Because they are first pushed when at rest in the space between the second surface and the chunk of malleable material and then against the second surface, they take on a characteristic appearance.

[0019] In a further embodiment of the invention a method is provided as according to claim 3.

[0020] By displacing the chunk of malleable material relative to the carrier surface the shear forces in the chunk of malleable material are influenced in a manner such that the creases are further specially formed so that a desired appearance can be obtained.

[0021] When the malleable material comprises clay, displacement of the chunk of malleable material will also vary due to the variation in size, shape and position of the clay particles, this contributing toward a unique form of the creases.

[0022] In a further embodiment of the invention a method is provided as according to claim 4.

[0023] Because the distance between the first surface and the second surface is kept constant during the compression, the second surface does not move in the first direction. Because the first surface and the second surface are surfaces of an object and have a fixed relative position and relative orientation, it is easy to move both the first surface and the second surface during the method.

[0024] It is moreover advantageous to keep the relative position and relative orientation of the first surface and the second surface constant, since no account need be taken of fouling or wear due to relative movement, for instance as a result of malleable material being left behind. The malleable material clay is certainly left behind easily since it adheres easily to many surfaces and, because of the constituents therein, easily causes wear.

[0025] In another embodiment of the method according to the invention the first surface and the second surface are mutually adjacent surfaces of an object, and are displaceable separately of each other parallel to the carrier surface.

[0026] Because the second surface can be displaced independently of the first surface, after shaping of the chunk of clay the second surface can first be retracted, wherein the first surface prevents shifting of the chunk of clay over the carrier surface. Such an embodiment is particularly suitable for clay which easily remains adhered to the surfaces.

[0027] The forming of a so-called waterstruck (wasserstrich) brick appearance is moreover simplified by retracting the second surface while the first surface retains the shaped clay.

[0028] In a further embodiment of the invention a method is provided as according to claim 6.

[0029] Because during compression the chunk of malleable material increases the distance between the second surface and the carrier surface with a force which is produced by the compression and thereby the deforming of the chunk of malleable material, a special shape of the creases is obtained which is other than if the distance is kept constant. The special shape is for instance desirable for aesthetic reasons during application of the method for producing brick slips.

[0030] In a further embodiment of the invention a method is provided as according to claim 7.

[0031] Interstices occur between the creases relative to each other and the second surface. The shape of the creases is influenced by enclosing a further material there. Because the further material comprises sprinklable particles (e.g. a granulate, a powder) or a liquid, the creases can displace the further material when the creases are formed. An interaction thus occurs which affects the shape of the creases.

[0032] In a preferred embodiment the layer of sprinklable particles consists of sand, sawdust or other granulate, such as of:

- oxides of iron, manganese or other mineral
- lime, or
- ground brick,
- schist, or

instead of a granulate a powder such as used nowadays in brickworks during firing of bricks to prevent the adhesion of clay to moulds and other surfaces or to form graining or to colour the outer side of the brick.

[0033] In a preferred embodiment the particles of the sprinklable material adhere less to each other than to the

malleable material of the chunk, whereby after the compression the second surface adheres less and can be removed more easily. In respect of weight the further material consists for instance for more than a quarter of moisture.

[0034] In a preferred embodiment the interstices are wholly filled with the further material for a period at the end of the compression. The shape of the creases are hereby directly influenced as far as the second surface by the further material, this imparting a characteristic shape to the creases.

[0035] In a preferred embodiment the particles are selected such that they are not compressible and do not flow away during the compression.

[0036] In a preferred embodiment the further material is removed after the compression.

[0037] In a further embodiment of the invention a method is provided as according to claim 8.

[0038] Sprinkling is a simple method of arranging the further material and also results in an irregular distribution of the particles, this contributing toward a characteristic irregular surface of the chunk of malleable material after compression.

[0039] In a further embodiment of the invention a method is provided as according to claim 9.

[0040] Because the chunk of malleable material is deposited onto the carrier surface, the particles are not arranged between the chunk of malleable material and the carrier surface. The surface between the chunk of malleable material and the second surface can hereby have a layer of sprinklable particles other than the surface between the chunk of malleable material and the carrier surface.

[0041] Where the layer of particles between the chunk of malleable material and the second surface is intended to contribute toward shaping of the creases, creases are not desirable in the surface of the chunk of malleable material facing toward the carrier surface. When in a preferred embodiment a layer of additional particles is arranged before compression between the chunk of malleable material and the carrier surface, this layer of additional particles is then preferably thinner than the layer of particles and preferably consists of smaller particles than the layer of particles between the chunk of malleable material and the second surface.

[0042] In a preferred embodiment the layer of additional particles comprises sand, just as the layer of particles. The layer of additional particles is drier than the layer of particles and in respect of weight consists for instance for about a quarter of moisture. The sand in the layer of additional particles is further purer than the sand in the layer of particles.

[0043] In a preferred embodiment the layer of particles between the chunk of malleable material and the second surface moreover comprises material which imparts a colour to the surface.

[0044] In a further embodiment of the invention a method is provided as according to claim 10.

[0045] Because the chunk of material is pressed against the third surface during compression and the third surface moves along with the first surface, possible creases in the surface of the chunk of malleable material facing toward the second surface continue uniformly to the edge of the surface of the chunk of malleable material facing toward the third surface. If the third surface were not to move, the creases at the edge would look different from those in the centre of the surface of the chunk of malleable material facing toward the second surface, for instance because they would diverge in a direction opposite to the second direction.

[0046] In a further embodiment of the invention a method is provided as according to claim 11.

[0047] Because during compression the chunk of malleable material is bounded between the carrier surface, the first surface, the second surface, the third surface and the fourth surface, the maximum outer dimensions of the chunk of malleable material, with the exception of the dimension in the first direction, are fixed.

[0048] In a further embodiment of the invention a method is provided as according to claim 12.

[0049] Because the chunk of malleable material is pushed in the first direction against the fifth surface, the chunk of malleable material is further bounded and it is possible to ensure that parts of the space which have possibly not yet been filled are nevertheless filled with malleable material of the chunk.

[0050] In a further embodiment of the invention a method is provided as according to claim 13.

[0051] The size of the chunk of malleable material is limited by the severing to the size corresponding to the distance between the first surface and the cut.

[0052] In a further embodiment of the invention a method is provided as according to claim 14.

[0053] Because the part protrudes over the edge of the carrier surface on which the chunk of malleable material has been deposited and the cut runs along the edge, the severed part will easily be separated in distance from the non-severed part by gravitational force.

[0054] In a further embodiment of the invention a method is provided as according to claim 15.

[0055] Clay and loam are malleable materials. The method is advantageous in forming building materials of clay or loam, such as a brick slip, because the brick slip here acquires a characteristic surface with creases.

[0056] Another object of the invention is to provide a stone product which can be made with an efficient method.

[0057] According to an aspect of the invention, the invention further provides a stone product manufactured according to the method of the invention, wherein the stone product is a brick or brick slip.

[0058] Because the chunk of malleable material comprises one surface with creases and can be made to size, optionally with only one cut in non-fired product, the stone product, i.e. the product after firing of the clay, is recognizable and can be distinguished from the prior art prod-

uct wherein the brick strips are sawn from the fired hand-moulded brick.

[0059] Such a sawn surface is recognizable in that it is flatter than the surface of the chunk of malleable material which faced toward the carrier surface of the mould during the compression. The grooves of the sawteeth are however often visible as circular arcs in the sawn surface. In the case of a brick slip made according to the aspect of the invention the surface facing toward the carrier surface during the compression is typically not flat because the malleable material also shrinks further during the drying and firing (sintering), both steps which have to be followed in order to produce a brick slip. This shrinkage differs locally over the chunk because the material has a random distribution in properties of the particles present therein, such as diameter and shape, and can moreover differ locally in respect of mixing ratio.

[0060] A stone product according to the invention has a surface which faces toward the carrier surface during the compression. In the stone product this surface can however be for instance curved (convex or concave) (for instance a curvature of 1 to 2 mm along a length of 21 mm), even when the carrier surface is flat. When a number of stone products according to the invention which have further been made under the same conditions, for instance in a batch, are compared this surface will then be found to be deformed at random.

[0061] Examples of embodiments of the invention will be described hereinbelow using the accompanying schematic figures. Corresponding components are designated in the figures with corresponding reference symbols. The components are not necessarily provided with a reference symbol in all figures. The schematic figures are not necessarily to scale and some features may be exaggerated in order to better illustrate and elucidate the invention. In the description of the examples use is made of a Cartesian system of coordinates with coordinate axes in an x-direction, a y-direction and a z-direction in a right-hand orientation. The negative z-direction is used for a vertical upward direction, i.e. the positive z-direction is the direction in which gravitational force acts.

[0062] The examples do not attempt to provide an exhaustive list of examples or to otherwise limit the invention to the precise configurations as shown in the figures or described in the following detailed description.

Figure 1 shows a mould which according to the method is pushed partially over a chunk of clay,
Figure 2 shows a mould,
Figure 3 shows a mould which according to the method has been placed on a carrier surface but which is not yet compressing the chunk of clay,
Figure 4 shows a mould which according to the method is placed against the stop,
Figures 5A and 5B show two steps of a second embodiment of the method according to the invention.

[0063] In a first embodiment of a method according to the invention clay, a malleable material, is mixed and a quantity of clay is separated as a chunk (1) (figure 3). The quantity of clay in the chunk lies between predetermined limits in respect of weight or dimensions. The chunk is formed by laying a part of the mixed clay in a first rectangular mould part and rolling a roller over edges of the first mould part. This creates a rough tablet. By pressing a second, likewise rectangular mould part with at least the height of the edges of the first mould part into the rough tablet, the shaped tablet has the height of the edge of the first mould part and in addition the dimensions of the second mould part. Clay lying outside the second mould part but inside the edge of the first mould part is discharged or kneaded again. The shaped tablet is also rectangular with a length 11, a width b1 and a height h1. The length 11 is greater than the width b1, which is greater than the height h1. This shaped tablet forms the chunk of malleable material which will be further processed. The chunk is thus pre-shaped to some extent.

[0064] The chunk (1) of malleable material is deposited onto a carrier surface (101). Carrier surface (101) is flat and perpendicular to the direction of the gravitational force (the z-direction in figure 1) and faces upward. This upward direction opposite to the direction of the gravitational force forms a first direction. The chunk (1) of malleable material hereby lies with a first chunk surface (3) on carrier surface (101). A second chunk surface (4) lying opposite first chunk surface (3) faces away from carrier surface (101). Over this second chunk surface (4) is sprinkled a layer (2) of sand, wherein the sand is to some extent moist so that it lumps together and forms an uneven layer (2) of sound.

[0065] The thickness of the layer (2) of sand and the uniformity of the distribution of the sprinklable particles affect the result as desired: deep or less deep creases, creases arranged uniformly over the whole second chunk surface (4) or particularly in the centre or at the edges. The use of somewhat moister sand influences for instance the uniformity of the distribution of the sprinklable particles on the second chunk surface (4).

[0066] A mould (102) is then placed on carrier surface (101) (figure 3). Mould (102) comprises an upper plate (103) and a first edge (104), a second edge (105) and a third edge (106). First edge (104), second edge (105) and third edge (106) together form a U-shaped edge wherein second edge (105) and third edge (106) form the legs of the U and first edge (104) the base of the U. First edge (104) has a first surface (107) which faces toward the space between second edge (105) and third edge (106) and is rectangular and flat. Upper plate (103) has a second surface (108) which also faces toward the space between second edge (105) and third edge (106) and is rectangular and flat and lies perpendicularly of first surface (107) (figure 2 and figure 3).

[0067] The distance between second edge (105) and third edge (106), and thereby the length of first surface (107), is slightly greater than the length 11. The chunk of clay has otherwise also taken on a slightly different

shape as a result of being deposited, and no longer has the exact dimensions of the shaped tablet.

[0068] Second edge (105) comprises a third surface (109) facing toward a fourth surface (110) of third edge (106). Third surface (109) and fourth surface (110) are rectangular, flat and parallel to each other and have the same dimensions. Third surface (109) and fourth surface (110) lie perpendicularly of both first surface (107) and second surface (108).

[0069] Mould (102) is placed on carrier surface (101) with second surface (108) facing toward carrier surface (101), wherein first surface (107) faces toward the chunk (1) of malleable material and is aligned with a side of the chunk of malleable material which has roughly the length 11. First surface (107) is slightly longer than the length 11. The height of first surface (107), third surface (109) and fourth surface (110), and thereby the distance between second surface (108) and carrier surface (101), is slightly greater than h1. The distance between second surface (108) and carrier surface (101) is thereby greater than the maximum height (here also the thickness) of the chunk (1) of malleable material.

[0070] First surface (107) is then perpendicular to a second direction (in figure 1 the x-direction) which lies perpendicularly of the first direction. Third surface (109) and fourth surface (110) lie perpendicularly of a third direction (in figure 1 the y-direction).

[0071] Mould (102) is pushed over carrier surface (101) in the second direction, wherein first surface (107) comes up against the chunk (1) of clay (figure 1). Mould (102) is thus pushed over the chunk (1) of malleable material. Mould (102) is pushed further in the second direction. Because the clay is tacky, it adheres to some extent to carrier surface (101), this depending to greater or lesser extent on the plasticity, and the related tackiness, of the clay. The chunk (1) of clay will hereby be compressed due to the pressure and displace relative to carrier surface (101). Shear forces in the chunk (1) of clay will here ensure that the chunk (1) of clay deforms. The clay forms creases in both the first direction and in the third direction (and the direction opposite thereto). The creases come against second surface (108) as well as against third surface (109) and fourth surface (110). Because second surface (108), third surface (109) and fourth surface (110) move together with first surface (107), the creases take on a shape other than if this were not the case.

[0072] The creases on second chunk surface (4) moreover run through uniformly to the edges of second chunk surface (4) which are adjacent to third surface (109) and fourth surface (110) and do not diverge in the negative x-direction, as would be the case if third surface (109) and fourth surface (110) were not to move together with second surface (108).

[0073] Because the surfaces of the chunk of clay facing toward third surface (109) and fourth surface (110) are not sanded, the creases therein are however partially or wholly closed up again. Between second surface (108) and the surface of the chunk (1) of clay, the second chunk surface (4), facing toward it this is not the case because sand is present in the interstices between the creases and the second surface. The particles in the sand (sand grains) do not adhere, or hardly so, to the second surface and are poorly compressible. During forming of the creases the creases push particles apart so that they enter the interstices. After the compression the creases thus protrude into and through the layer of sprinklable particles.

[0074] On the surface of the chunk (1) of clay facing toward second surface (108), the second chunk surface (4), the creases protrude between grains of sand of the layer (2) of sand sprinkled onto the chunk (1) of clay.

[0075] Third surface (109) and fourth surface (110) are shorter than the width b1. As a result the chunk (1) of clay does not fit wholly into the space between first surface (107), second surface (108), third surface (109) and fourth surface (110). Because of the continuing movement, a sliding movement, of mould (102) the chunk (1) of clay is pressed against a fifth surface (111) of a stop (113) (figure 4). Fifth surface (111) faces toward first surface (107), is flat and has the same form and dimensions as first surface (107). An edge of carrier surface (101) already lies in the foregoing steps against fifth surface (111).

[0076] Because the chunk (1) of clay is pushed against fifth surface (111) by the sliding movement of mould (102), the chunk (1) of clay properly fills the space between first surface (107), second surface (108), third surface (109) and fourth surface (110).

[0077] Mould (102) is also pushed with the sliding movement (figure 4) against an overhang suspended in the direction of mould (102) over carrier surface (101). The overhang is suspended over a distance a1 from the fifth surface above carrier surface (101), wherein above is here understood to mean that it has a smaller z-coordinate. Carrier surface (101) is now retracted in a direction opposite to the second direction through a distance equal to the distance a1.

[0078] A part of the chunk (1) of clay now hangs over the edge of the carrier surface which previously lay against the fifth surface.

[0079] The stop (113) is now moved in the z-direction (i.e. in the direction opposite to the first direction), whereby a part of the chunk (1) of clay is severed along the edge of carrier surface (101).

[0080] Because carrier surface (101) has already been shifted through the distance a1 relative to the chunk (1) of clay, an overhang (112) can move along the edge of carrier surface (101). The cut is perpendicular here to the second direction.

[0081] At this stage of the method the creases protrude through the layer (2) of sand against second surface (108). The distance between second surface (108) and carrier surface (101) hereby corresponds to the maximum height (here also the thickness) of the chunk of malleable material at the end of the compression.

[0082] Finally, mould (102) is removed, whereby the compression of course also ceases, and the clay is dried

and fired so that a stone product for the building industry results. After firing the sand is removed by being shaken off the stone product. In this embodiment the stone product is a flat brick slip because the carrier surface is flat. The creases which have been formed typically resemble the creases of a brick strip which has been made by hand according to the known method as described above.

[0083] In a second embodiment the method is largely similar to the method of the first embodiment. A difference however is that the upper plate is movable relative to the first surface and that the first surface is pushed against the chunk of malleable material with a force such that the chunk of malleable material displaces the second surface so that the distance between carrier surface (101) and the second surface (108) becomes greater.

[0084] In this embodiment the upper plate can for this purpose be arranged between the first surface, the second surface and the third surface of the U-shaped edge with outer edges which lie closely against first surface (107), second surface (108) and third surface (109) but which can move in the first direction in use.

[0085] The upper plate has a length corresponding to the length of first surface (107) and a width corresponding to the length of third surface (108), in both cases such that the upper plate can move therealong. The height of first surface (107), second surface (108) and third surface (109) is greater than in the first case so that the upper plate remains between first surface (107), second surface (108) and third surface (109) at different settings of the spring pressure. Mould (102) hereby comprises a first part which comprises the U-shaped edge and a second part which comprises the upper plate. The second part is connected via a frame to the first part, in this embodiment via a rod of the frame which is mounted on first edge (104). The upper plate is suspended with a spring from a further rod of the frame. The further rod is slidable relative to the rod so that in use upper plate (103) can be slid or pushed in the z-direction to the carrier surface.

[0086] Before the compression the upper plate is carried downward to a position in which second surface (108) does not yet come into contact with the layer (2) of sand but is closer than the desired maximum thickness of the compressed chunk of malleable material. Second surface (108) here has a first distance from carrier surface (101) which is therefore greater than the maximum thickness of the chunk of malleable material before compression.

[0087] Compression takes place however with so much force that the creases are pushed with a force against second surface (108) such that the distance between second surface (108) and carrier surface (101) is increased to a second distance counter to the spring force of a spring pushing the upper plate toward carrier surface (101) during the compression. The spring pressure is preferably adjustable. At the end of the compression the creases come up against the second surface and the second distance hereby corresponds to the maximum thickness of the chunk of malleable material at the end of the compression.

[0088] In a third embodiment of the method according to the invention the method is largely similar to the method of the first embodiment. Carrier surface (101) is however not flat, but for instance arcuate or angular in order to manufacture respectively an arcuate or angular brick strip. Second surface (108) on upper plate (103) has the same form as carrier surface (101) so that it can enclose a chunk (1) of malleable material of uniform thickness. First surface (107) is not rectangular but has the same form as carrier surface (101). As stated, fifth surface (111) has the same shape and dimensions as first surface (107), and that is also the case in this embodiment.

[0089] Third surface (109) and fourth surface (110) are not parallel in this embodiment.

[0090] In the case of an arcuate plate the plate is formed as if it forms a part of a cylinder having an axis of symmetry parallel to the second direction (the x-direction). Carrier surface (101) hereby lies on an outer diameter of this axis of symmetry. Third surface (109) and fourth surface (110) each lie parallel to a line passing through the axis of symmetry.

[0091] Upper plate (103) has the same form as carrier surface (101).

[0092] The overhang (112) has a shape which follows the shape of carrier surface (101) and fifth surface (111). In the case of an arcuate carrier surface (101) fifth surface (111) is not rectangular. Overhang (112) connects to fifth surface (111) and second surface (108).

[0093] In the case of the angular plate the carrier surface (101) lies against an inner corner of the chunk (1) of malleable material and defines an angle of 90 degrees. Third surface (109) and fourth surface (110) lie here at the same angle, so also at 90 degrees.

[0094] During dosing of the quantity of malleable material account is moreover taken of the desired volume, which must of course be calculated differently here. During aligning of mould (102) first surface (107) is indeed arranged more or less parallel to the surface of the chunk (1) of malleable material facing toward first surface (107). Third surface (109) and fourth surface (110) are such here that in principle they slide closely along the chunk (1) of malleable material when mould (102) is pushed in the second direction (x-direction) (except when the chunk (1) of malleable material is pressed against third surface (109) and fourth surface (110) by the compression).

[0095] In the third embodiment the forming of the creases by the compression is the same as in the first embodiment.

[0096] With appropriate modifications the method of the third embodiment can otherwise also be performed with the method of the second embodiment instead of with that of the first embodiment.

[0097] In a fourth embodiment of the method according to the invention the method is substantially the same as the method of the first, the second or the third embodiment. In this embodiment the chunk (1) of malleable material is however not laid in the first mould part and the

second mould part before being deposited on carrier surface (101). The chunk of malleable material is instead dosed via extrusion and deposited on carrier surface (101) immediately after leaving a die opening during the extrusion. The extrusion is such that the chunk (1) of malleable material is already pre-shaped to some extent as a tablet, just as in the above embodiments.

[0098] In a fifth embodiment, which is advantageously combined with the fourth embodiment, the second edge (105) and third edge (106) are mounted on carrier surface (101). First edge (104) is mounted on upper plate (103) and forms therewith a first part of mould (102). Second edge (105), third edge (106) and carrier surface (101) form a second part of mould (102). The chunk (1) of malleable material is deposited between second edge (105) and third edge (106) onto carrier surface (101). After the layer (2) of sand has been sprinkled over the chunk (1) of malleable material, the first part of mould (102) is placed onto carrier surface (101) such that first edge (104) can be pushed through between second edge (105) and third edge (106) against the chunk (1) of malleable material, wherein the upper plate faces with second surface (108) toward the chunk (1) of malleable material in order to compress and shift along the chunk (1) of malleable material.

[0099] The forming of the creases continues in the same way during the compression as in the first embodiment.

[0100] In a sixth embodiment which can be combined with any of the foregoing embodiments the layer of sprinklable particles, instead of consisting of sand, consists of sawdust or another granulate, such as of:

- oxides of iron, manganese or other mineral
- lime, or
- ground brick,
- schist (a type of slate which occurs naturally but also as mining residue), or

instead of a granulate a powder such as used nowadays in brickworks during firing of bricks to prevent the adhesion of clay to moulds and other surfaces or to form graining or to colour the outer side of the brick.

[0101] The particles do not adhere to each other, or at least do so to lesser extent than the malleable material adheres to the second surface, and they thereby reduce the adhesion of the malleable material, such as clay, to the second surface, and furthermore are therefore easily sprinklable. The particles are preferably selected such that they are not compressible and do not flow away during compression.

[0102] Although this embodiment also makes use of a layer of sprinklable particles, the layer is arranged on the chunk of malleable material by throwing instead of sprinkling.

[0103] In this sixth embodiment the sprinklable particles are also removed during a later step of the method.

[0104] In a seventh embodiment the method is largely similar to that of the first or second embodiment. Third surface (109) and fourth surface (110) are however not parallel but at a slight angle so that the chunk (1) of malleable material is easier to release from mould (102). The normal to third surface (109) and fourth surface (110) do both lie in the plane perpendicularly of the x-direction but at an angle relative to the y-direction (the third direction). The angle between each of the normals and the y-direction is for instance smaller than or equal to 2 degrees or smaller than or equal to 1 degree.

[0105] First surface (107) also lies at an angle such that the normal to first surface (107) makes an angle with the second direction (the x-direction) for instance smaller than or equal to 2 degrees or smaller than or equal to 1 degree. This is also in order to facilitate release.

[0106] In an eighth embodiment the method is largely the same as any of the foregoing embodiments. In this embodiment the surfaces of the chunk (1) of malleable material facing during the compression toward first surface (107), third surface (109), fourth surface (110) and fifth surface (111) are also sanded with a non-stick layer of sand. The non-stick layer of sand on these surfaces is however thinner than the layer (2) of sand on the surface facing toward second surface (108) during compression.

[0107] The non-stick layer is for instance arranged by sprinkling a layer of granulate, for instance sand, all round the chunk of malleable material. The sand is finer than the particles of the layer (2) of sand on the surface facing toward second surface (108) during compression and it is drier and purer than the sand in the layer (2) of sand on second chunk surface (4), so that it is arranged more uniformly in a thinner layer than the layer (2) of sprinklable particles.

[0108] This non-stick layer is intended only to ensure that the chunk of malleable material can be removed easily from the mould or from the carrier surface after forming of the creases. Creases are preferably usually avoided in these surfaces.

[0109] In this embodiment the layer (2) of sprinklable particles are arranged in a later step over the non-stick layer so that the non-stick layer is located between the chunk (1) of malleable material and the layer (2) of sprinklable particles.

[0110] In an alternative embodiment the anti-adherent layer is arranged by being sprinkled or thrown on carrier surface (101), second surface (108), third surface (109) and fourth surface (110) of the mould, as well as on fifth surface (111), after the respective surfaces have been wetted slightly in order to allow sufficient adhesion of the sand of this thin non-stick layer. The layer (2) of sprinklable particles is then arranged after the chunk (1) of malleable material has been deposited on carrier surface (101) and, after mould (102) has been pushed over the chunk (1) of malleable material, is located between the chunk (1) of malleable material and the non-stick layer.

[0111] In a ninth embodiment the method is largely similar to the first embodiment. The method differs in the

sense that, while carrier surface (101) is retracted in the direction opposite to the second direction, a movable support plate simultaneously slides along with carrier surface (101). The chunk (1) of malleable material hereby no longer hangs over the edge of the carrier surface but is supported by the movable plate. The movable plate has for this purpose a surface configured to connect to the edge of carrier surface (101) and preferably runs through up to fifth surface (111) when the carrier surface is retracted to the maximum in the direction opposite to the second direction, so here the same as through a distance a1. This method is advantageous in preventing deformation in the case of a very thin chunk (1) of malleable material or when the malleable material is highly plastic.

[0112] After carrier surface (101) has been retracted, the movable plate is moved together with the stop during severing of a part of the chunk (1) so that the remaining part is deformed as little as possible.

[0113] Figures 5A and 5B show two steps of a second embodiment of the method according to the invention. Provided here is a mould (200) which is partially the same as mould (102) of the foregoing figures.

[0114] A chunk of clay (202) is arranged on a carrier surface (201). The chunk of clay (202) is pressed here in the same way as above against surface (203). In this embodiment of mould (200) this surface (203) forms part of a beam (204) of C-shaped cross-section, which beam (204) is displaceable in vertical direction relative to the horizontal carrier surface (201). The edge (205) can thus be severed from the chunk of clay (202) using beam (204).

[0115] It is also possible to opt for an L-shaped cross-section of beam (204) instead of the C-shaped cross-section, wherein the beam is open on the underside. The severed clay can hereby be removed more easily from the beam.

[0116] Similarly to the foregoing embodiment, the chunk of clay (202) arranged on carrier surface (201) is further shaped by first surface (206) and second surface (207). After shaping of the chunk of clay (202) the second surface (207) is first displaced horizontally parallel to carrier surface (201) so that the upper side of the chunk of clay (202) is released, and whereby an improved water-struck appearance is also obtained.

[0117] Finally, first surface (206) can be displaced, for instance to slide the shaped piece of clay (202) off carrier surface (201) and once again make space for a fresh chunk of clay.

Claims

1. Method for shaping malleable material, comprising of:

   - depositing a chunk of malleable material on a carrier surface, wherein the carrier surface extends parallel to a first direction;

   characterized by:

   - compressing the chunk of malleable material in a second direction after it has been deposited, wherein
   - the second direction lies perpendicularly of the first direction;
   - the compressing of the chunk of malleable material comprises of pushing in the second direction against the chunk of malleable material with a first surface of a mould;
   - a second surface of the mould lying opposite the carrier surface is moved together with the first surface in the second direction during the compression; and
   - pressing creases, which are formed by the compression in a surface of the chunk of malleable material facing toward the second surface, against the second surface by means of the compression.

2. Method as claimed in claim 1, wherein the distance between the second surface and the carrier surface is greater than the maximum thickness which the chunk of malleable material has before the compression.

3. Method as claimed in claim 1 or 2, wherein the compression comprises of displacing the chunk of malleable material in the second direction relative to the carrier surface.

4. Method as claimed in claim 1, 2 or 3, wherein the first surface and the second surface are mutually adjacent surfaces of an object with fixed relative position and relative orientation, and the distance between the second surface and the carrier surface is held constant during the compression.

5. Method as claimed in claim 1, 2 or 3, wherein the first surface and the second surface are mutually adjacent surfaces of an object and are displaceable separately of each other parallel to the carrier surface.

6. Method as claimed in claim 1, 2, 3 or 5, comprising of deforming the chunk of malleable material with compression such that the chunk of malleable material pushes against the carrier surface and the second surface with sufficient force produced by the compression to increase the distance between the second surface and the carrier surface.

7. Method as claimed in any of the foregoing claims, wherein a further material is enclosed in interstices between the creases relative to each other and the second surface, wherein the further material comprises sprinklable particles or a liquid.

8. Method as claimed in claim 7, wherein the further material comprises a quantity of sprinklable particles, and comprising of arranging the quantity of sprinklable particles as a layer of sprinklable particles on the chunk of malleable material before the chunk of malleable material is compressed, such that the layer of sprinklable particles is located between the second surface and the chunk of malleable material during compression of the chunk of malleable material.

9. Method as claimed in claim 8, wherein arranging of the layer of sprinklable particles comprises of sprinkling the layer of sprinklable particles over the chunk of malleable material after the chunk of malleable material has been deposited on the carrier surface and before the chunk of malleable material is compressed.

10. Method as claimed in any of the foregoing claims, wherein the chunk of malleable material is located during the compression at least partially in a space between the carrier surface, the second surface and the first surface, comprising of

- moving in the second direction, together with the first surface, a third surface which at least partially bounds the space; and
- pressing creases by compression against the third surface in a third direction, which creases are formed by the compression in a surface of the chunk of malleable material facing toward the third surface, wherein the third direction lies perpendicularly of the first direction and the second direction.

11. Method as claimed in any of the foregoing claims, wherein the chunk of malleable material is located during the compression at least partially in a space between the carrier surface, the second surface and the first surface; comprising of

- pressing a surface of the chunk of malleable material facing toward a third surface by compression against the third surface in a third direction, wherein the third direction lies perpendicularly of the first direction and the second direction;
- pressing a surface of the chunk of malleable material facing toward a fourth surface by compression against the fourth surface in a fourth direction, wherein the third surface and the fourth surface are located opposite each other and the fourth direction is opposite to the third direction.

12. Method as claimed in claim 10, comprising of

- pressing the chunk of malleable material by compression against a fifth surface in the first direction.

13. Method as claimed in claim 10 or 11, comprising of

- severing a piece from the chunk of malleable material with a cut perpendicularly of the first direction.

14. Method as claimed in claims 11 and 3, wherein a part of the chunk of malleable material comes to protrude over an edge of the carrier surface during the displacement relative to the carrier surface and the part is severed from the chunk of material, wherein the cut runs along the edge.

15. Method as claimed in any of the foregoing claims, wherein the chunk of malleable material comprises clay or loam and the method is used to form building material such as a brick strip.

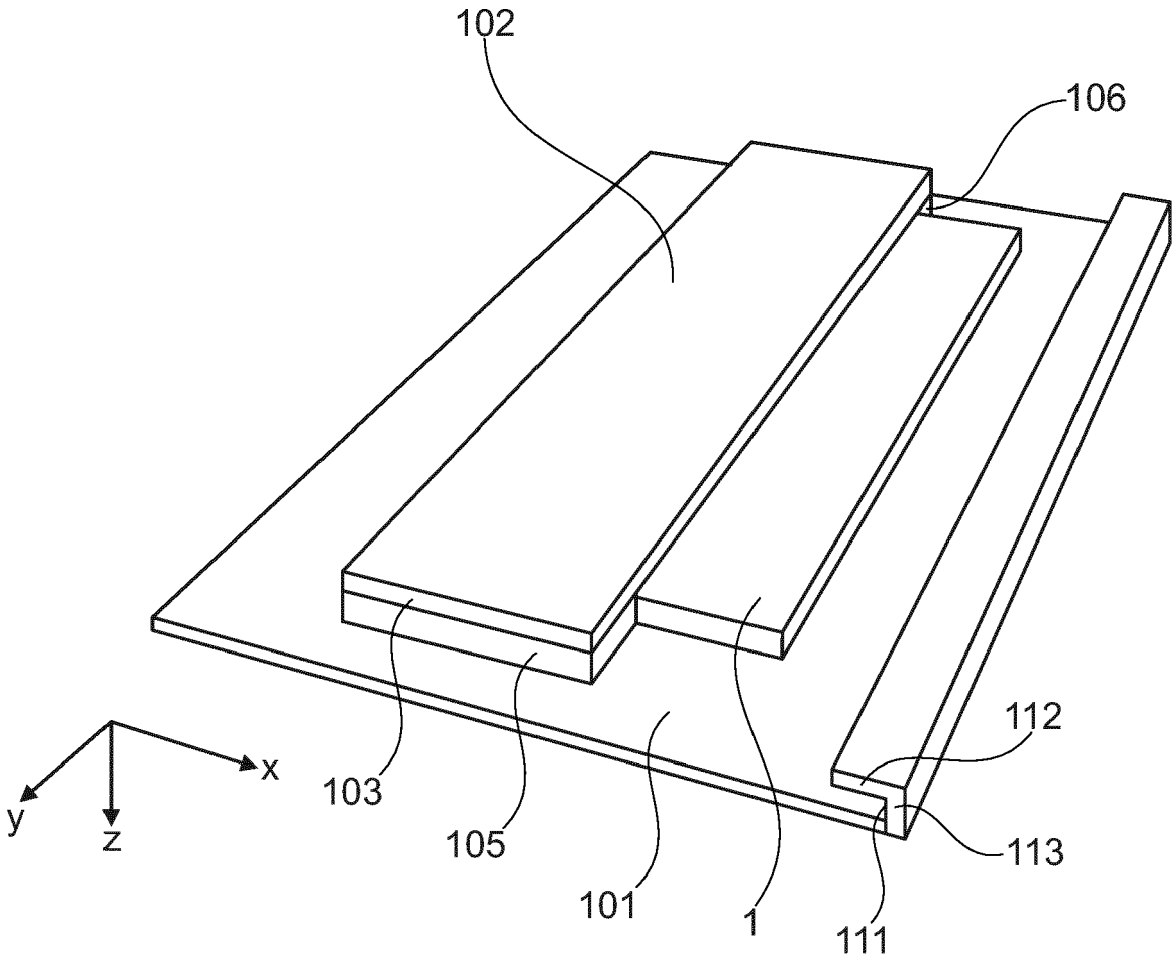

Fig. 1

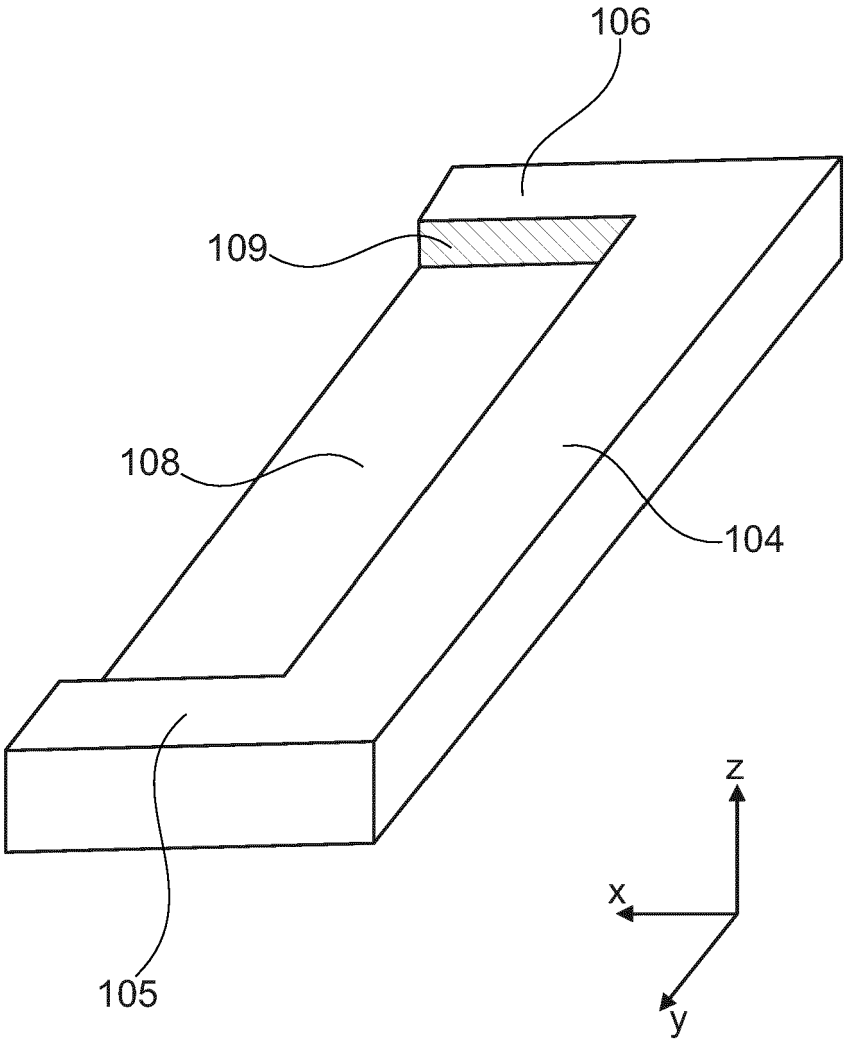

Fig. 2

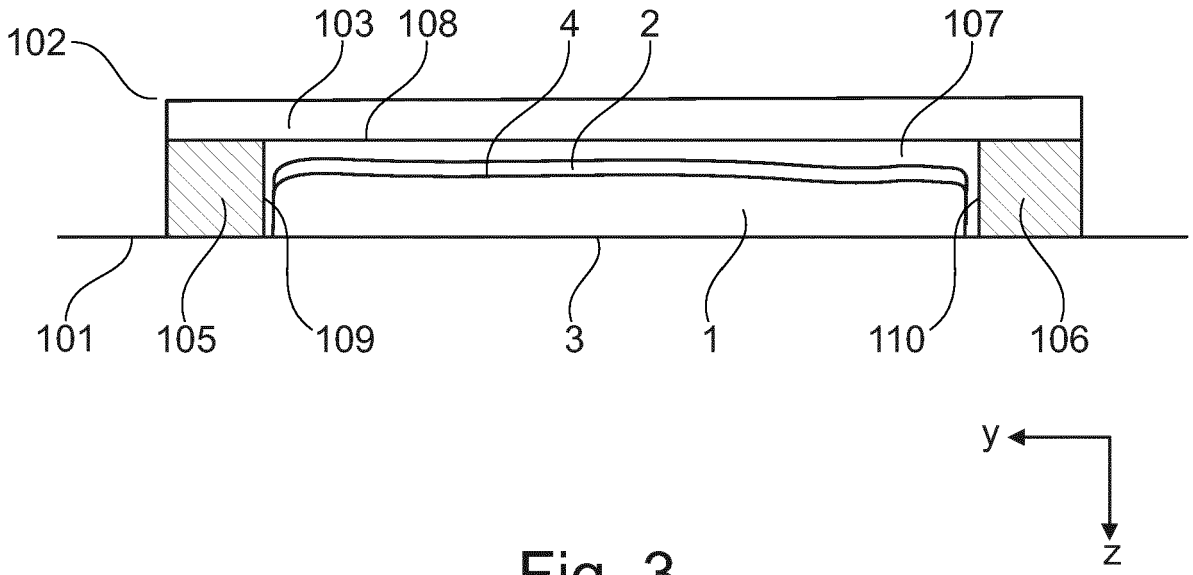

Fig. 3

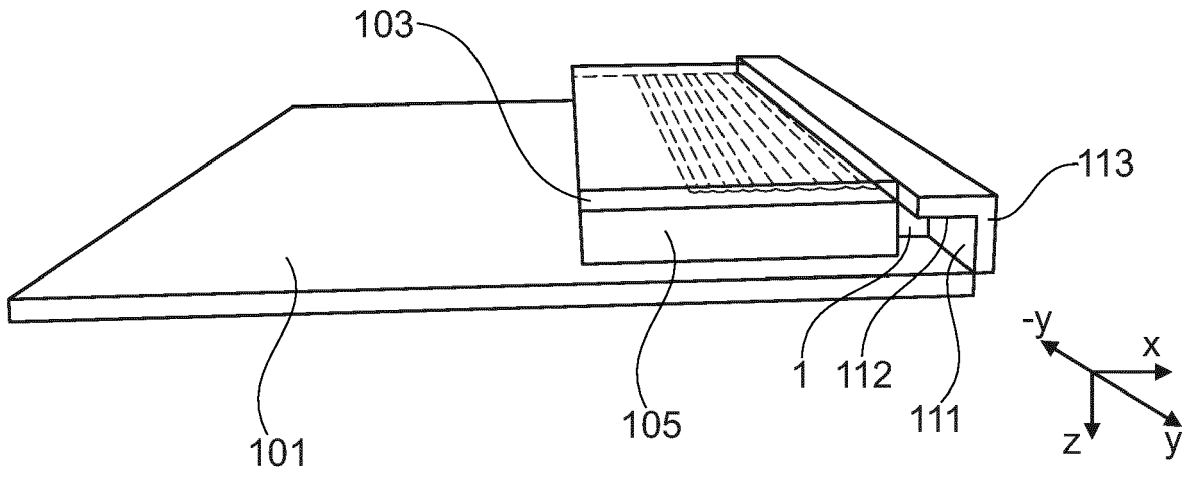

Fig. 4

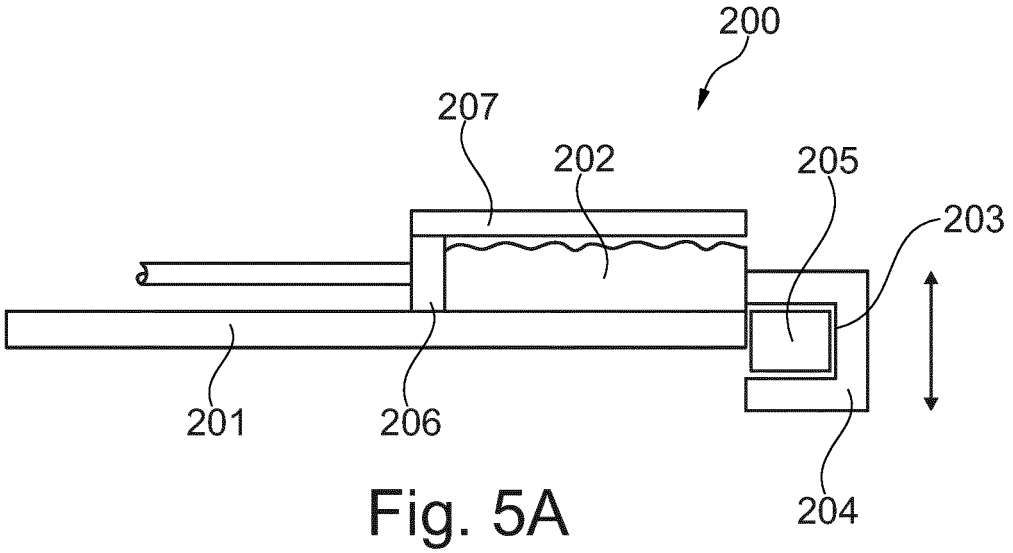

Fig. 5A

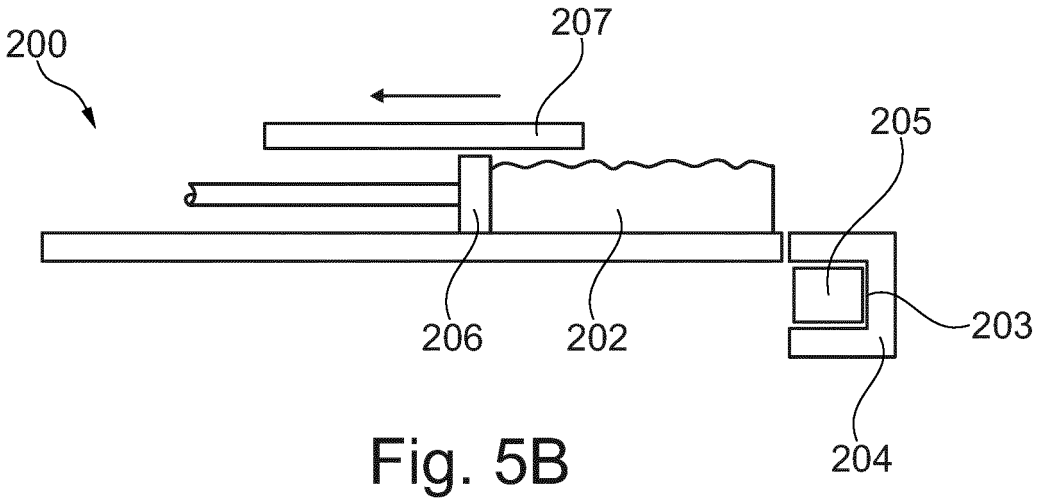

Fig. 5B

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EUROPEAN SEARCH REPORT

Application Number
EP 16 15 1656

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	JP S57 126614 A (MATSUSHITA ELECTRIC WORKS LTD) 6 August 1982 (1982-08-06) * figures 1,2 * -----	1,10-12	INV. B28B11/00 B28B11/10
A	NL 7 309 933 A (HERMANN HOLZSCHECK) 22 January 1974 (1974-01-22) * page 5, line 20 - page 6, line 25; figures 4-7 * -----	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	7 June 2016	Orij, Jack

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07-06-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP S57126614 A	06-08-1982	JP S6030246 B2	15-07-1985
		JP S57126614 A	06-08-1982
NL 7309933 A	22-01-1974	DE 2235159 B1	03-01-1974
		NL 7309933 A	22-01-1974

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