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## (54) A WALL COVERING ELEMENT

(57) A wall covering element (10) for contacting at least one wall (1) or at least one structural element is provided. The wall covering element comprises a rigid, foamed body (100) provided from polystyrene (PS), polyurethane (PUR) and/or polyurea (PU), the element comprising

• at least a first contact side (101) adapted to contact at least one wall or at least one structural element; and
• at least one front side (102) opposite the first contact side;

wherein at least one front side is provided with an acrylic coating (150).

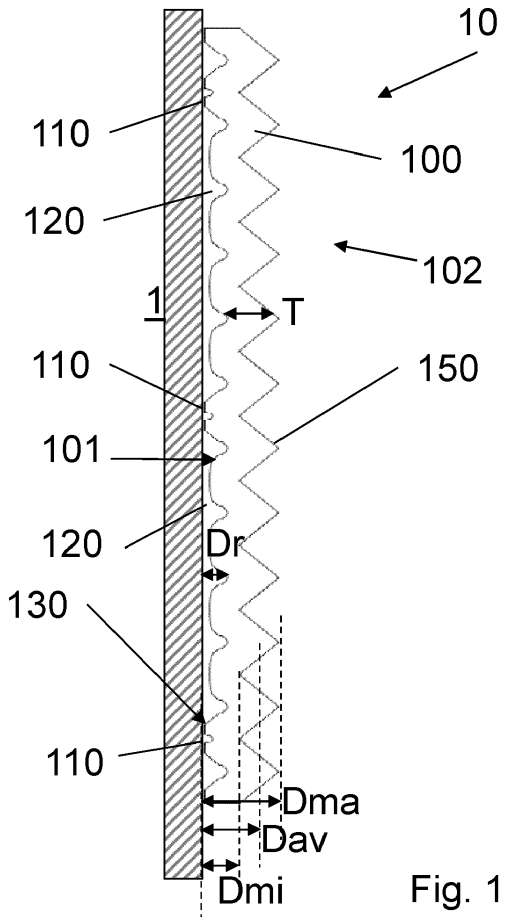


Fig. 1

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## Description

### Field of the Invention

**[0001]** The present invention generally relates to wall covering elements and methods to provide such wall covering elements.

### Background of the Invention

**[0002]** Wall covering elements are known in the art. They are typically used as cornices or cove moldings, moldings in general, wall panels, skirtings, baseboards and alike. The wall covering elements are provided from a foamed, rigid body and may have a front or face side which is provided with a decorative pattern or structure.

**[0003]** A disadvantage of such wall covering element, is the vulnerability for impact forces which may be applied on it. As an example, a baseboard may be subjected to impact due to e.g. a table side or a chair back hitting the front side of the baseboard. Wall covering element are also vulnerable for scratches applied to the front or face side.

### Summary of the Invention

**[0004]** It is therefore an object of the present invention to increase the scratch and/or impact resistance of wall covering elements while being used to cover a well and/or a structural element.

**[0005]** According to a first aspect of the invention, a wall covering element for contacting at least one wall or at least one structural element, said wall covering element comprising a rigid, foamed body provided from polystyrene (PS), polyurethane (PUR) and/or polyurea (PU), the element comprising

- at least a first contact side adapted to contact at least one wall or at least one structural element; and
- at least one front side opposite the first contact side;
- wherein at least one front side is provided with an acrylic coating .

**[0006]** The wall may be a vertical wall, an inclined wall or a horizontal wall, i.e. a floor or ceiling. A wall covering element may be an element, usually a decorative element, which is adapted to cover at least a part of a wall, e.g. an upright wall or a ceiling. The wall covering element may be adapted to cover parts of two walls, like a cornice or cove molding. The wall covering may also be adapted to cover parts of two walls in vertical direction, e.g. in the corner made by two vertical walls. The wall covering element may be a molding, a wall panel, a skirting, a baseboard and alike. A wall covering element may be an element, usually a decorative element, which is adapted to contact at least one structural element, like wood partitioning structures, metal stud partitioning support beams, sandwich panels, metal or steel walls and/or structures, and alike, sides of a bar and/or a counter, a cooking island, sides of furniture, or to contact partition walls, e.g. partition walls in larger spaces such as meeting rooms,and many more.

**[0007]** Hence the first contact side is also referred to as the backside. It is the side with which the element contacts, and optionally connects, to the wall, walls, structural element and/or structural elements.

**[0008]** The wall covering element is adapted to contact, and usually also to connect to a wall or any other structural element. The connection is usually made by cementing or gluing the backside or backsides of the wall covering element to the wall or the structural element. The backside or backsides are contacting sides.

**[0009]** The wall covering may comprise a second contact side, adapted to contact a second wall, floor or structural element. E.g. the wall covering element being a cornice or cove molding, the wall covering element having one contact side to contact the upright wall, and the second contact side to contact the ceiling.

**[0010]** The front side is the side of the element which typically remains visible for the user when the element is contacting and optionally connecting to the wall, walls, structural element and/or structural elements. The front side may be opposite to the first and any further, e.g. a second, contact side.

**[0011]** Rigid in the context of this invention means that the foamed body has a compression strength of equal or more than 1N/mm$^2$, measured according to ISO 844:2021.

**[0012]** A foamed body is a body comprising at least solid material, in which void spaces are present, void spaces being spaces comprising only air (like ambient air), a gas or a mixture of one or more gasses, optionally mixed with air. Hence a body of a given material is a foamed body when the specific mass of the volume of the body is less than the specific mass of the same volume, being provided completely by said material only.

**[0013]** The outer surface of the rigid, foamed body may be a non-foamed layer, i.e. a layer or zone in the direction towards the core of the body, in which no void spaces are provided. Hence the density of the rigid, foamed body may vary through the thickness of the body.

**[0014]** Preferably the acrylic coating is provided as water based acrylic coating. The provision of such coating improves the scratch resistance of the wall covering elements second surface. In the context of this invention, scratch resistance is measured according to ISO 4586-2:2018. A scratch resistance in the range of 5N to 10N may be obtained.

**[0015]** The wall covering element has a border delimiting the outer perimeter of the wall covering element.

**[0016]** According to some embodiments, the first contact side may comprise one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones, the recessed zones are delimited by at least one boundary between the recessed zone and one or more contact zones, for

each point of the boundary of each contact zone, either the maximum span over the recessed zone is less than or equal to the half of the width (W) of the wall covering element or the minimum of the spans (S) over the recessed zone is less than or equal to the half of the width (W) of the wall covering element.

**[0017]** Hence according to some embodiments, the first contact side may comprise one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones, the recessed zones are delimited by at least one boundary between the recessed zone and one or more contact zones, for each point of the boundary of each contact zone, both the maximum span over the recessed zone is less than or equal to the half of the width (W) of the wall covering element and the minimum of the spans (S) over the recessed zone is less than or equal to the half of the width (W) of the wall covering element.

**[0018]** The minimum of the spans of a point over the recessed zone is the smallest of the linear distances, i.e. spans, measurable between this point and another point of a boundary delimiting said recessed zone, which linear distances are measured along a line which bridges the recessed zone. The maximum span of a point over the recessed zone is the largest of the linear distances measurable between this point and another point of a boundary delimiting the recessed zone, which linear distances are measured along a line which bridges the recessed zone.

**[0019]** The first contact side may comprise one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones, the recessed zones are delimited by at least one boundary between the recessed zone and one or more contact zones, for each point of the boundary of each contact zone, the minimum of the spans (S) over the recessed zone is less than or equal to the half of the width (W) of the wall covering element.

**[0020]** For each point of the boundary of each contact zone, the minimum of the spans over the recessed zone may be less than or equal to 250mm.

**[0021]** Hence for each point of the boundary of each contact zone, for each possible secant though said point and sectioning a boundary in at least one, but sectioning said boundary in a limited number of points, there is at least one secant for which the distance between said point and the other section point, being the chord or span, is less than or equal to the half of the width (W) of the wall covering element.

**[0022]** The first contact side may comprise one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones, the recessed zones are delimited by at least one boundary between the recessed zone and one or more contact zones, for each point of the boundary of each contact zone, the maximum span over the recessed zone is less than or equal to the half of the width (W) of the wall covering element. For each point of the boundary of each contact zone, the maximum span over the recessed zone may be less than or equal to 250mm.

**[0023]** According to a second aspect, a wall covering element for contacting at least one wall or at least one structural element is provided. The wall covering element comprising a rigid, foamed body provided from polystyrene (PS), polyurethane (PUR) and/or polyurea (PU), the element comprising at least a first contact side adapted to contact at least one wall or at least one structural; and at least one front side opposite the first contact side. The first contact side comprises one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones. The recessed zones are delimited by at least one boundary between the recessed zone and one or more contact zones, for each point of the boundary of each contact zone, the minimum of the spans over the recessed zone is less than or equal to the half of the width of the wall covering element.

**[0024]** The provision of the recessed zones having dimensions in the mentioned ranges, have the recessed zone may function as elastic deformation zones. Impacts exercised on the front side of the wall covering element, may provide temporarily and elastic deformation from the rigid foamed body, bending inwards into the recessed zone, without permanent deformation. The provision of such recessed zones improves the impact resistance of the wall covering element. In the context of this invention, impact resistance is measured according to EN477. An impact resistance in the range of 2 to 4 Joule may be obtained.

**[0025]** Wall covering elements according to the first aspect of the invention may be combined with the features of a wall covering element according to the second aspect of the invention and vice versa. Hence, following features set out hereinafter may be provided to a wall covering elements according to the first and/or the second aspect of the invention.

**[0026]** The contact zones of the first contact side may all be coplanar.

**[0027]** Or in other words, in case the first contact side comprising more than one contact zones for contacting at least one wall or at least one structural element, the firs side comprising one or more recessed zones, the contact zones being delimited by at least one boundary between the contact zone and one or more recessed zones, for each contact zone, each point of the boundary of this contact zone has at least one point of a boundary of another contact zone to whom the distance is less than or equal to half the width of the wall covering element. Preferably, for each contact zone, each point of the boundary of this contact zone has at least one point of a boundary of another contact zone to whom the distance is less than half the width of the wall covering element and is less than or equal to 250mm.

**[0028]** The width of the wall covering element is the minimum distance between two point of the border of the wall covering element, along a line through the centre of gravity of the element and intersecting the border of the

element at said two points.

**[0029]** The border of the wall covering element is the circumference of the perpendicular projection of the wall covering elements on a plane parallel to the wall or structural element the first contact side of the wall covering element is to be adapted to contact to.

**[0030]** Optionally, the wall covering element may comprise a second contact side. This second contact side comprises one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones, the recessed zones are delimited by at least one boundary between the recessed zone and one or more contact zones, for each point of the boundary of each contact zone, the minimum of the spans over the recessed zone is less than or equal to the half of the width of the wall covering element. For each point of the boundary of each contact zone, the minimum of the spans over the recessed zone may be less than or equal to 250mm. In this case, the border of the wall covering element is the circumference of the perpendicular projection of the wall covering elements on a plane parallel to the wall or structural element the second contact side of the wall covering element is to be adapted to contact to. The width of the wall covering element here is the minimum distance between two point of the border of the wall covering element, along a line through the centre of gravity of the element and intersecting the border of the element at said two points.

**[0031]** For circular wall covering elements having only one, i.e. the first contact side, the width is the diameter of the wall covering element. For rectangular shapes having only one, i.e. the first contact side, the width is the length of the smallest side of the rectangle.

**[0032]** In case of rectangular wall covering element, the rectangular border has a width, being the short side of the rectangular border, in the range of 5 to 150 cm, such as 7.5 to 120 cm for baseboards or skirting, or in the range of 75 to 125 cm, like about 100cm, for wall panels.

**[0033]** The long side of the rectangular border may be in the range of 100 to 300 cm, such as 100 to 275 cm, e.g. 260 or 275 cm.

**[0034]** For at least one point of the boundary of each contact zone, the minimum of the spans (S) over the recessed zone is at least 1 cm, preferably the minimum of the spans (S) over the recessed zone being at least 2 cm.

**[0035]** At least one contact zone may be a contact zone being present adjacent the border of the wall covering element, possibly even providing the border of the wall covering element.

**[0036]** At least one, and possibly more than one contact zone may be ribs. In particularly when the wall covering element has a polygonal shape, the ribs may be provided substantially parallel to one side of the polygonal shape, e.g. in case of rectangular, diamond or parallelogram shapes. For rectangular shapes, the ribs may be provided substantially parallel to the long side or short side of the rectangle, most preferred parallel to the long side.

**[0037]** At least one, and possibly more than one contact zone may be provided as islands in a recessed zone, like circular, polygonal, rectangular, square, or any other shaped island. The islands may be aligned in one or more lines being substantially parallel to each other. In particularly when the wall covering element has a polygonal shape, the lines may be provided substantially parallel to one side of the polygonal shape, e.g. in case of rectangular, diamond or parallelogram shapes. For rectangular shapes, the lines may be provided substantially parallel to the long side or short side of the rectangle, most preferred parallel to the long side. The islands may be distributed in the recessed zone according to a matrix distribution, or according to a checkerboard distribution.

**[0038]** The contact zone or zones may have a width (Wc) in the range of 5 to 25mm, e.g. in the range of 5 to 20 mm, like in the range of 8 to 18 mm, e.g. in the range of 8 to 16 mm. This width is advantageous to support properly the rills of e.g. glue used to contact and connect the wall covering element to the wall, floor or structural element.

**[0039]** The width of the contact zone is the minimum distance between two point of the border of the contact zone, along a line through the centre of gravity of the contact zone and intersecting the border of the contact zone at said two points.

**[0040]** Possibly the wall covering element may have an inner border, i.e. a border encompassed fully by the rigid, foamed body. As an example, the wall covering element may be donut- or ring-shaped. At least one contact zone may be a contact zone being present this inner border of the wall covering element, possibly even providing the inner border of the wall covering element.

**[0041]** The first contact side may comprise one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones, the maximum depth (Dr) of the one or more recessed zones is at maximum 14cm.

**[0042]** The first contact side may comprise one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones, the maximum depth (Dr) of the one or more recessed zones is at maximum half the width of the wall covering element.

**[0043]** The first contact side may comprise one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones, the maximum depth (Dr) of the one or more recessed zones is at maximum half of the maximum depth (Dma) of the wall covering element.

**[0044]** The maximum depth of a recessed zone is the maximum distance between the inner surface of the first contact side and the plane defined by the wall or structural element, when the wall covering element is in use. In case of a plurality (i.e. more than one) of recessed zones, the maximum depth of the recessed zones is the highest of the plurality of maximum depths, each maximum depth

being measured for one of the plurality of the recessed zones. Possibly, in case of a plurality of recessed zones, the maximum depths of each of the plurality of the recessed zones are equal. Alternatively, in case of a plurality of recessed zones, the maximum depths of each of the plurality of the recessed zones differ one from the other.

**[0045]** The maximum depth (Dma) of the wall covering element is the maximum distance between the front side opposite the first contact side and the plane defined by the wall or structural element, when the wall covering element is in use.

**[0046]** The maximum depth of the wall covering element may preferably be less than equal to 15 cm, such as less than or equal to 10 cm, e.g. in the range of 5 to 15 cm, e.g. range of 5 to 10 cm. Optionally the maximum depth of the wall covering element may be less than equal to 5 cm as well.

**[0047]** The minimum depth (Dmi) of the wall covering element is the minimum distance between the front side opposite the first contact side and the plane defined by the wall or structural element the wall covering element, when the wall covering element is in use.

**[0048]** The minimum depth of the wall covering element may preferably be less than equal to 15 cm, such as less than or equal to 10 cm, e.g. in the range of 5 to 15 cm, e.g. range of 5 to 10 cm.

**[0049]** The average depth (Dav) of the wall covering element is the average distance between the front side opposite the first contact side and the plane defined by the wall or structural element the wall covering element, when the wall covering element is in use, averaged over all points of the front side opposite the first contact side.

**[0050]** The average depth of the wall covering element may preferably be less than equal to 15 cm, such as less than or equal to 10 cm, e.g. in the range of 5 to 15 cm, e.g. range of 5 to 10 cm.

**[0051]** When the wall covering element has a front side opposite the first contact side being planar and parallel to the wall or structural element, when the wall covering element is in use, the maximum, minimum and average depth of the wall covering element are equal. This is not the case when the wall covering element has a front side opposite the first contact side, having e.g. a profiled surface or an uneven surface.

**[0052]** Preferably the maximum depth of the one or more recessed zones is at maximum half of the average depth of the wall covering element.

**[0053]** Possibly, the maximum depth of the one or more recessed zones is at maximum half of the minimum depth of the wall covering element.

**[0054]** According to some embodiments, the first contact side comprising one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones, the maximum depth of the one or more recessed zones may be at maximum 10 cm. For each of the one or more recessed zones, the maximum depth of the wall covering element may preferably be less than equal to 15 cm, such as less than or equal to 10 cm, e.g. in the range of 5 to 15 cm, e.g. range of 5 to 10 cm. Optionally the maximum depth of the wall covering element may be less than equal to 5 cm as well

**[0055]** According to some embodiments, the minimum thickness of the foamed rigid body of the wall covering elements along the one or more recessed zones may be at minimum 5mm, possibly at least 7mm.

**[0056]** In every point of the at least one front side, the thickness (T) of the wall covering elements foamed rigid body, also referred to as wall thickness, is the distance from the tangent plane of the at least one front side in said point to the at least a first contact side. This distance is measured according to the line perpendicular to this tangent plane in said point.

**[0057]** According to some embodiments, the first contact side comprising one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones, the maximum depth of the one or more recessed zones may be at maximum 10 cm, the minimum thickness of the wall covering elements foamed rigid body along the one or more recessed zones being at minimum 5mm, possibly at least 7mm.

**[0058]** The provision of the recessed zones having dimensions in the mentioned ranges, have the recessed zone may function as elastic deformation zones. Impacts exercised on the front side of the wall covering element, may provide temporarily and elastic deformation from the rigid foamed body, bending inwards into the recessed zone, without permanent deformation. The provision of such recessed zones improves the impact resistance of the wall covering element. In the context of this invention, impact resistance is measured according to EN477. An impact resistance in the range of 2 to 4 Joule may be obtained.

**[0059]** According to some embodiments, the wall covering element further comprises a second and possibly even further contact sides adapted to contact at least one wall or at least one structural. The at least one front side may be opposite these second and optionally further contact sides, or the wall covering element may comprise further front sides being opposite these second and/or optionally further contact sides. The second and possibly even further contact sides may be provided with an acrylic coating, being similar or identical the acrylic coating provided to the at least one front side.

**[0060]** The acrylic coating at the at least one front side may have a thickness of equal or more than 0.1mm.

**[0061]** This thickness is preferably equal or more than 0.15mm, such as equal or more than 0.2mm. This thickness is preferably equal or less than 0.65mm, such as equal or less than 0.55mm, e.g. equal or more than 0.45 mm.

**[0062]** The acrylic coating may comprise one or more acrylate components, said one or more acrylate components together providing 25 to 60 %w of the dry weight of the acrylic coating.

**[0063]** The acrylic coating may comprise 10 to 40 %w

fire retardening agents, this %w being based upon the dry weight of the acrylic coating.

**[0064]** Possible fire retardening agents may be, but are not limited to, gypsum (CaSO4.2H2O), xonotlite, tobermorite, phosphazene, and alike and any combinations thereof.

**[0065]** The acrylic coating may comprise 15 to 65 %w passive fillers, like CaCO3, MgCO3, Ti02, and alike and combinations thereof. The acrylic coating may comprise 10 to 35%w active fillers, like CaSO4.1/2H2O (or plaster). All the %w are percentages based upon the dry weight of the acrylic coating. The acrylic coating may comprise other components like colorants and/or pigments, stabilisers like UV-stabilizers, RAL colour pigmentation, matting agents and alike and any combination thereof.

**[0066]** Such acrylic coatings further improve the scratch resistance of the coating, and hence of the wall covering element.

**[0067]** The rigid, foamed body may have a density in the range of 80 to 300kg/$m^3$.

**[0068]** Preferably the rigid, foamed body may have a density in the range of 100 to 250 kg/$m^3$, more preferably in the range of 120 to 220 kg/$m^3$.

**[0069]** The rigid, foamed body may preferably be a closed cell foam.

**[0070]** According to some embodiments, the rigid foam body may comprise a closed cell foam. A closed cell foam is a foam in which more than 80% of the cells are closed. With this % is meant the number of cells being closed over the total number of cells, expressed as a percentage.

**[0071]** According to some embodiments, the rigid foam body may comprise an open cell foam. An open cell foam is a foam in which more than 40% of the cells are open. With this % is meant the number of cells being open over the total number of calls, expressed as a percentage.

**[0072]** According to some embodiments, the rigid foam body may comprise a foam with open and closed cells, or mixed cell foam. A mixed cell foam is a foam in which less than 80% of the cells are closed and less than 40% are open. With this % is meant the number of cells being open, respectively closed, over the total number of cells, expressed as a percentage.

**[0073]** The rigid foamed body may be blown by a chemical blowing agent, providing the gas during foaming due to a chemical reaction between components forming the polymeric matrix. Usually CO2 is provided by the chemical reaction. The rigid foamed body may be blown by a physical blowing agent, such as N2, CO2 and/or pentane, which may be injected or stirred into the polymeric matrix while providing the rigid foamed body.

**[0074]** The rigid foamed body may have a compression strength of equal or more than 1 N/$mm^2$.

**[0075]** This a compression strength is measured according to ISO 844:2021.

**[0076]** The rigid foamed body may comprise foamed polystyrene. The rigid foamed body may be provided from foamed polystyrene. This polystyrene (or PS) is typically foamed with physical blowing agents in a thermoplastic production process. The acrylic coating may be in direct contact with the rigid foamed body. Chemically blown polystyrene may as well be used.

**[0077]** The rigid foamed volume may comprise foamed polyurethane and/or polyurea. The rigid foamed volume may be provided from foamed polyurethane, from foamed polyurea, or a combination of foamed polyurethane and foamed polyurea. Between the water-based acrylic coating and the rigid foamed volume, a precursor may be provided.

**[0078]** The precursor may e.g. be a precursors may be silanes, aminosilanes, acrylates, methacrylates, and alike and combinations thereof. The precursor may e.g. be a precursor chosen from the group consisting of silanes, aminosilanes, acrylates, methacrylates, and combinations thereof. The precursor may be applied in layer thicknesses of preferably less than 10 $\mu$m.

**[0079]** The at least first contact side may also be provided with an acrylic coating. The acrylic coating at the first contact side has a thickness, composition and properties similar or identical to coating provided on the at least one front side.

**[0080]** In general, the provision of a rigid foamed body and an acrylic coating on the front side, most preferably combined with the provision of recessed zones and contact zones as set out in the context of this invention, has a beneficial effect. The coating causes the wall covering element to be better scratch resistant. Impact forces can be resisted better, as an impact force acting on the front side, may result in a temporarily deformation of the rigid foamed body inwards the recessed zones, while the coating remains intact. Though the underlaying rigid foamed body may show some damage due to the impact force, the outer front surface may remain intact, as the coating may hide the underlaying defect.

**[0081]** According to a third aspect of the present invention, a method to provide a wall covering element is provided. The methos comprises the steps of

- providing a rigid, foamed body from polystyrene (PS), polyurethane (PUR) and/or polyurea (PU), the body having at least a first flank adapted to provide a first contact side of the wall covering element, this first contact side adapted to contact a wall, and at least a second flank opposite the first flank side;
- providing a water based acrylate coating layer the at least second flank;
- drying and curing said water based acrylate coating layer thereby providing an acrylate coating on the second flank.

**[0082]** The water based acrylate coating layer is dried and cured. During this step, water is evaporated from the coating layer, causing the coating layer to dry. During or after this drying, the chemical components of the acrylate coating layer react and form a stable acrylate coating on the second flank.

**[0083]** The wall covering element is a wall covering element according to the first aspect of the invention.

**[0084]** The provision of a rigid foamed body may comprise

- providing a foamable composition;
- extruding the foamable composition through a die, thereby providing a foamed volume;
- solidifying the foamed volume, thereby providing the rigid, foamed body.

**[0085]** The rigid, foamed body provided by extrusion are also referred to as 2D and 2.5D bodies and volumes.

**[0086]** The provision of a rigid foamed body may comprise

- providing a foamable composition;
- injecting the foamable composition in a mould;
- allowing the foamable composition to foam and at least partially solidify in the mould; and
- demoulding the foamed foamable composition, thereby providing the rigid, foamed body.

**[0087]** The provision of a rigid foamed body may further comprise machining the surface of the rigid, foamed body at the first flank and/or at the second flank.

**[0088]** Machining the second flank may be done to provide a profile or relief in this flank. This flank will provide the side of the wall covering element which remains visible during use of the wall covering element, this side is covered by means of the water based acrylate coating layer.

**[0089]** Machining the first flank, eventually providing the first contact side of the wall covering element, may be done to provide recessed zones and contact zones along the first contact side of the wall covering element.

**[0090]** In general, the rigid, foamed body may be machined to remove e.g. burrs or irregularities on the outer surface of the rigid, foamed body.

**[0091]** Providing a water based acrylate coating layer may comprise spraying the water based acrylate coating layer on at least the second flank.

**[0092]** Providing a water based acrylate coating layer comprises curtain coating the water based acrylate coating layer on at least the second flank. This curtain coating is preferably applied to 2D and 2.5D bodies.

**[0093]** The water based acrylate coating layer may be provided with a wet film thickness between 300$\mu$m and 500$\mu$m. This wet film thickness or WFT is the thickness of the water based acrylate coating layer after being applied on a surface.

**[0094]** The acrylic coating may comprise, next to water, one or more acrylate components. The water based acrylate coating layer may further comprise fire retardening agents like gypsum (CaSO4.2H2O), xonotlite, tobermorite, phosphazene and alike and any combinations thereof, and/or passive fillers, like CaCO3, MgCO3, Ti02, and alike and combinations thereof and/or active fillers, like CaSO4.1/2H2O (or plaster). The water based acrylate coating layer may further comprise other components like colorants and/or pigments, stabilisers like UV-stabilizers, RAL colour pigmentation, matting agents and alike and any combination thereof.

**[0095]** The rigid, foamed body may be provided from polyurethane (PUR), polyurea (PU) and/or polystyrene (PS)

**[0096]** Rigid, foamed body is provided from polyurethane (PUR) and/or polyurea (PU) are preferably applied by injection moulding of the polyurethane (PUR) and/or polyurea (PU), or its precursors, in a mould. Rigid, foamed body is provided from polystyrene (PS) are preferably applied by extrusion of the polystyrene (PS), or its precursors, through a die.

**[0097]** The rigid, foamed body may be provided from polyurethane (PUR) and/or polyurea (PU), the method further comprising the provision of a precursor layer prior to providing a water based acrylate coating layer.

**[0098]** The precursor may e.g. be a precursors may be silanes, aminosilanes, acrylates, methacrylates, and alike and combinations thereof. The precursor may e.g. be a precursor chosen from the group consisting of silanes, aminosilanes, acrylates, methacrylates, and combinations thereof. The precursor may be applied in layer thicknesses of preferably less than 10 $\mu$m.

**[0099]** According to some embodiments, also the other flanks, like the first contact side, may be provided with an acrylic coating in the same or a similar way and with the same or a similar composition as the acrylic coating provided on the second flank.

**[0100]** Wall covering elements according to the second aspect of the invention may be provided by injection moulding or extrusion of foamable composition, to provide the foamed rigid body. The first contact side comprising one or more contact zones for contacting at least one wall or at least one structural element, and one or more recessed zones may be obtained by this injection moulding or extrusion or may be provided by machining the corresponding flank of the foamed rigid body.

**[0101]** A wall covering element according to the first and/or second aspect of the invention, or wall covering elements provided by a method according to the third aspect of the invention, may be used to cover one or more parts of one or more walls, like a cornice or cove molding. A wall covering element according to the first and/or second aspect of the invention, or wall covering elements provided by a method according to the third aspect of the invention, may be used as a molding, a wall panel, a skirting, a baseboard and alike.

**[0102]** It is understood that the features of the first and second aspect of the invention may be combined. It is understood that the features of the first and/or second aspect of the invention may be combined with the features of the third aspect of the invention.

**[0103]** In relation to the present invention, when reference is made to ranges, the ranges are inclusive, except explicitly stated differently.

## Brief Description of the Drawings

**[0104]**

Fig. 1 schematically shows a cross section of a wall covering element according to the invention.

Fig. 2 schematically shows a back view of the wall covering element of figure 1.

Fig. 3 schematically shows a cross section of a further wall covering element according to the invention.

Fig. 4 and fig. 5 schematically show a back view of alternative wall covering elements according to the invention.

**[0105]** The same reference signs in different figures refer to the same or a similar feature.

## Detailed Description of Embodiment(s)

**[0106]** A wall covering element 10 according to the present invention is shown in figures 1 and 2. Figure 1 shows a cross section of the wall covering element 10 according to the plane AA', while figure 2 shows the backside of the wall covering element 10. This wall covering element 10 is to be applied to contact e.g. a vertical wall 1 and may function as a baseboard.

**[0107]** The wall covering element 10 has a rigid foamed body 100 provided from foamed polyurethane. The wall covering element 10 has a first contact side 101 adapted to contact the wall 1. The first contact side 101 comprises some, in this case 3, contact zones 110 for contacting the wall, being parallel ribs, parallel to a direction of the length of the wall covering element 1. At the two outer ends of the wall covering element, two additional contact zones 111 are present. Between the contact zones 110 and 111, there are two recessed zones 120 which are delimited by a boundary 130 between the recessed zone and one or more contact zones.

**[0108]** On the other side, being the front side 102, an acrylic coating 150 is provided. This coating has a thickness of about 0.25 mm. The front side is profiled, in this case comprising a saw-like cross section. For each point of the boundary 130 of each of the contact zones, the minimum of the spans S over the recessed zone 120 is less than or equal to the half of the width W of the wall covering element 10. The width W is e.g. about 250 mm. The length of the wall covering element 10 is e.g. about 2000 mm. The span S, which is for most points of the boundary 130 of each of the contact zones the width of the recessed zone 120, is about 120mm. The width Wc of the contact zones 110 hence is about 12mm.

**[0109]** The maximum depth Dr of the recessed zones is about half of the maximum depth Dma of the wall covering element 10, being 10mm. Taking into account the profiled surface of the front side 102, minimum depth (Dmi) of the wall covering element is about 8mm, and the average depth (Dav) of the wall covering element is about 12mm. The wall thickness T is on average 8mm.

**[0110]** The rigid foamed body 100 is provided by foaming a polyurethane forming reaction mixture in a mould. As a mere example, such reaction mixture may be a polyol-diisocyanate mixture. A closed cell foam with density of about 200 kg/m$^3$ is provided. After foaming and demoulding, the front side 102 is first provided with a precursor, being applied in a layer thickness of about 10$\mu$m. A spray gun may be used to apply this precursor. After the precursor has cured and dried, an acrylic coating 150 is applied. The applied coating comprises a water based acrylic base resin, 40w% dolomite, 1w% TiO2 pigment, 2w% matting agent, a thixothropy modifier, and is applied in an amount of 350$\mu$m wet film thickness by means of a spray gun. After drying and curing, the acrylic coating has a thickness of about 200$\mu$m.

**[0111]** The scratch resistance of the wall covering element 10 is 7 N (according to ISO 4586-2:2018) , while the impact resistance is 3 J (according to EN477)..

**[0112]** As a mere alternative, a similar wall covering element may be provided by extruding a PUR or PU curing mixture through a die. The direction of extrusion is perpendicular to the width W. After foaming, the same way is used to apply the precursor and the acrylic coating. This wall covering element may be free of the contact zones 111.

**[0113]** Still as another alternative, a cuboid rigid PUR or PU foamed block may be mould casted or extruded. The recessed zones may be milled out, after which the same way is used to apply the precursor and the acrylic coating.

**[0114]** A cross section of an alternative wall covering element 11 is shown in figure 3. The same reference signs refer to the same dimension or feature as for the wall covering element 10 in figures 1 and 2. This molding is provided from the extruded PS and is coated with an acrylate coating as is applicable for wall covering element 10. In this wall covering element 11, the contact zones 110 are again three longitudinal ribs. The recessed zones 120 have a different maximum depth Dr, still for each recessed zone, the maximum depth Dr is at maximum half of the maximum depth (Dma) of the wall covering element 11. Taking into account the profiled surface of the front side 102, minimum depth (Dmi) of the wall covering element is about 8mm, and the average depth (Dav) of the wall covering element is about 30mm. The wall thickness T is on average 8mm. The width W of the wall covering element 11 is e.g. about 120 mm. The span S, which is for most points of the boundary 130 of each of the contact zones the width of the recessed zone 120, is about 40mm. The width Wc of the contact zones 110 hence is about 10mm.

**[0115]** A view of the backside of an alternative wall covering element 12 is shown in figure 4. The same reference signs refer to the same dimension or feature as

for the wall covering element 10 and 11 in figures 1, 2 and 3. This decorative element, used to contact e.g. a ceiling, is provided from the same PUR or PU rigid foam, and is coated with the same precursor and acrylate coating as is applicable for wall covering elements 10 and 11. The wall covering element is provided by moulding the foamable PUR or PU curing mixture in a mould and providing a precursor and coating the front side of the wall covering element by spray coating.

**[0116]** In this wall covering element 12, the contact zones 110 are ribs providing the border of the wall covering element 12. Four dots 112 also function as additional contact zone. Due to the positioning of the dots 112, for each point of the boundary 130 of each contact zone 110 and 112, the minimum of the spans S over the recessed zone 120 is less than or equal to the half of the width (W) of the wall covering element.

**[0117]** The recessed zone 120 has about a uniform maximum depth Dr being 7mm and is less than half of the maximum depth (Dma) of the wall covering element 12, in this particular case 15mm. The wall thickness T is on average 8mm. The width W of the wall covering element 12 is e.g. about 600 mm. The width Wc of the contact zones 110, which equals the diameter of the dots 112, is about 15mm.

**[0118]** A view of the backside of still an alternative wall covering element 13 is shown in figure 5. The same reference signs refer to the same dimension or feature as for the wall covering element 10, 11 and 12 in figures 1, 2, 3 and 4. This decorative element, used to contact e.g. a ceiling, is provided from the same PUR or PU rigid foam, and is coated with the same precursor and acrylate coating as is applicable for wall covering elements 1, 11 and 12. The wall covering element is provided by moulding the foamable PUR or PU curing mixture in a mould and providing a precursor and coating the front side of the wall covering element by spray coating.

**[0119]** In this wall covering element 13, the contact zones 110 is one circular rib providing the border of the wall covering element 12. One inner rib 113 also function as additional contact zone. Due to the positioning of the inner rib 113 and its diameter, for each point of the boundary 130 of each contact zone 113, the maximum span X over the recessed zone 121 being the inner side of the circular rib 113, is less than or equal to the half of the width (W) of the wall covering element. Also due to the positioning of the inner rib 113 and its diameter, for each point of the boundary 130 of contact zone 110, the minimum of the spans S over the recessed zone 120, being the ring shapes recess zone, is less than or equal to the half of the width (W) of the wall covering element.

**[0120]** The recessed zone 120 has about a uniform maximum depth Dr being 7mm and is less than half of the maximum depth (Dma) of the wall covering element 13, in this particular case 15mm. The wall thickness T is on average 8mm. The width W of the wall covering element 13 is the diameter of the wall covering element, e.g. about 500 mm. The width Wc of the contact zones 110 and 113, is about 15mm.

**[0121]** Although the present invention has been illustrated by reference to specific embodiments, it will be apparent to those skilled in the art that the invention is not limited to the details of the foregoing illustrative embodiments, and that the present invention may be embodied with various changes and modifications without departing from the scope thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein. In other words, it is contemplated to cover any and all modifications, variations or equivalents that fall within the scope of the basic underlying principles and whose essential attributes are claimed in this patent application. It will furthermore be understood by the reader of this patent application that the words "comprising" or "comprise" do not exclude other elements or steps, that the words "a" or "an" do not exclude a plurality, and that a single element may fulfil the functions of several means recited in the claims. Any reference signs in the claims shall not be construed as limiting the respective claims concerned. The terms "first", "second", third", "a", "b", "c", and the like, when used in the description or in the claims are introduced to distinguish between similar elements or steps and are not necessarily describing a sequential or chronological order. Similarly, the terms "top", "bottom", "over", "under", and the like are introduced for descriptive purposes and not necessarily to denote relative positions. It is to be understood that the terms so used are interchangeable under appropriate circumstances and embodiments of the invention are capable of operating according to the present invention in other sequences, or in orientations different from the one(s) described or illustrated above.

## Claims

1. A wall covering element (10) for contacting at least one wall (1) or at least one structural element, said wall covering element comprising a rigid, foamed body (100) provided from polystyrene (PS), polyurethane (PUR) and/or polyurea (PU), the element comprising

    - at least a first contact side (101) adapted to contact at least one wall or at least one structural element; and
    - at least one front side (102) opposite the first contact side;

    wherein at least one front side is provided with an acrylic coating (150).

2. A wall covering element according to claim 1, wherein the first contact side (101) comprises one or more contact zones (110) for contacting at least one wall or at least one structural element, and one or more recessed zones (120), the recessed zones are delimited by at least one boundary (130) between the recessed zone and one or more contact zones, for each point of the boundary of each contact zone, either the maximum span over the recessed zone is less than or equal to the half of the width (W) of the wall covering element or the minimum of the spans (S) over the recessed zone is less than or equal to the half of the width (W) of the wall covering element.

3. A wall covering element according to any one of the claims 1 to 2, wherein for each point of the boundary of each contact zone, the maximum span over the recessed zone is less than or equal to the half of the width (W) of the wall covering element.

4. A wall covering element according to any one of the claims 1 to 3, wherein for each point of the boundary of each contact zone, the minimum of the spans (S) over the recessed zone is less than or equal to the half of the width (W) of the wall covering element.

5. A wall covering element according to any one of the claims 2 to 4, wherein for each point of the boundary of each contact zone, the minimum of the spans over the recessed zone is less than or equal to 250mm.

6. A wall covering element according to any one of the claims 2 to 5, wherein for each point of the boundary of each contact zone, the maximum span over the recessed zone may be less than or equal to 250mm.

7. A wall covering element according to any one of the claims 1 to 6, wherein the first contact side (101) comprises one or more contact zones (110) for contacting at least one wall or at least one structural element, and one or more recessed zones (120), the maximum depth (Dr) of the one or more recessed zones is at maximum half the width of the wall covering element.

8. A wall covering element according to any one of the claims 1 to 7, wherein the first contact side (101) comprises one or more contact zones (110) for contacting at least one wall or at least one structural element, and one or more recessed zones (120), the maximum depth (Dr) of the one or more recessed zones is at maximum half of the maximum depth (Dma) of the wall covering element.

9. A wall covering element according to any one of the previous claims, wherein the acrylic coating at the at least one front side has a thickness of equal or more than 0.1mm.

10. A wall covering element according to any one of the previous claims, wherein the acrylic coating comprises one or more acrylate components, said one or more acrylate components together providing 25%w to 60 %w of the dry weight of the acrylic coating.

11. A wall covering element according to any one of the previous claims, wherein the acrylic coating comprises 10%w to 40 %w fire retardening agents, this %w being based upon the dry weight of the acrylic coating.

12. A wall covering element according to any one of the previous claims, wherein the rigid, foamed body has a density in the range of 80 to 300kg/$m^3$

13. A wall covering element according to any one of the previous claims, wherein the rigid, foamed body is a closed cell foam.

14. A wall covering element according to any one of the previous claims, wherein the rigid foamed body has a compression strength of equal or more than 1 N/$mm^2$

15. A wall covering element according to any one of the previous claims, wherein the rigid foamed body comprises foamed polystyrene

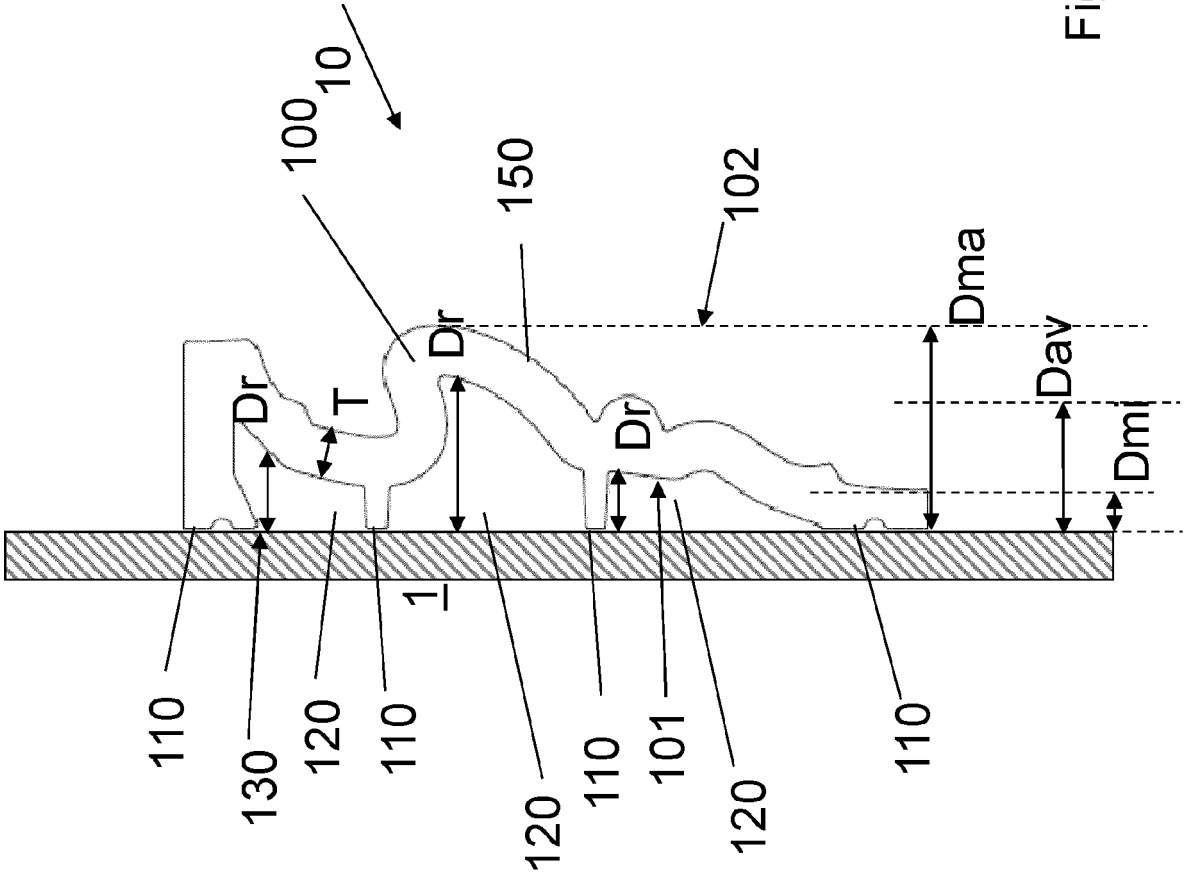
16. A wall covering element according to claim 15, wherein the acrylic coating is in direct contact with the rigid foamed body.

17. A wall covering element according to any one of the previous claims, wherein the rigid foamed volume comprises foamed polyurethane and/or polyurea.

18. A wall covering element according to claim 17, wherein between the water-based acrylic coating and the rigid foamed volume, a precursor is provided.

19. A wall covering element according to any one of the previous claims, wherein the at least first contact side is provided with an acrylic coating.

Fig. 3


10
100
150
102
Dma
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Dr
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130
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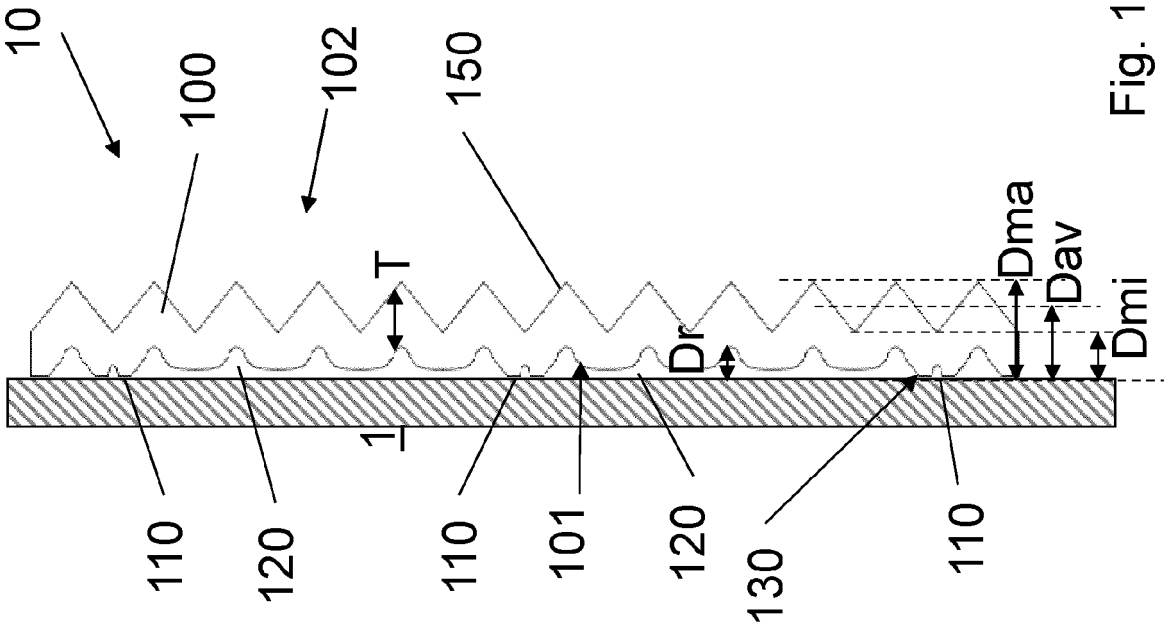
Fig. 1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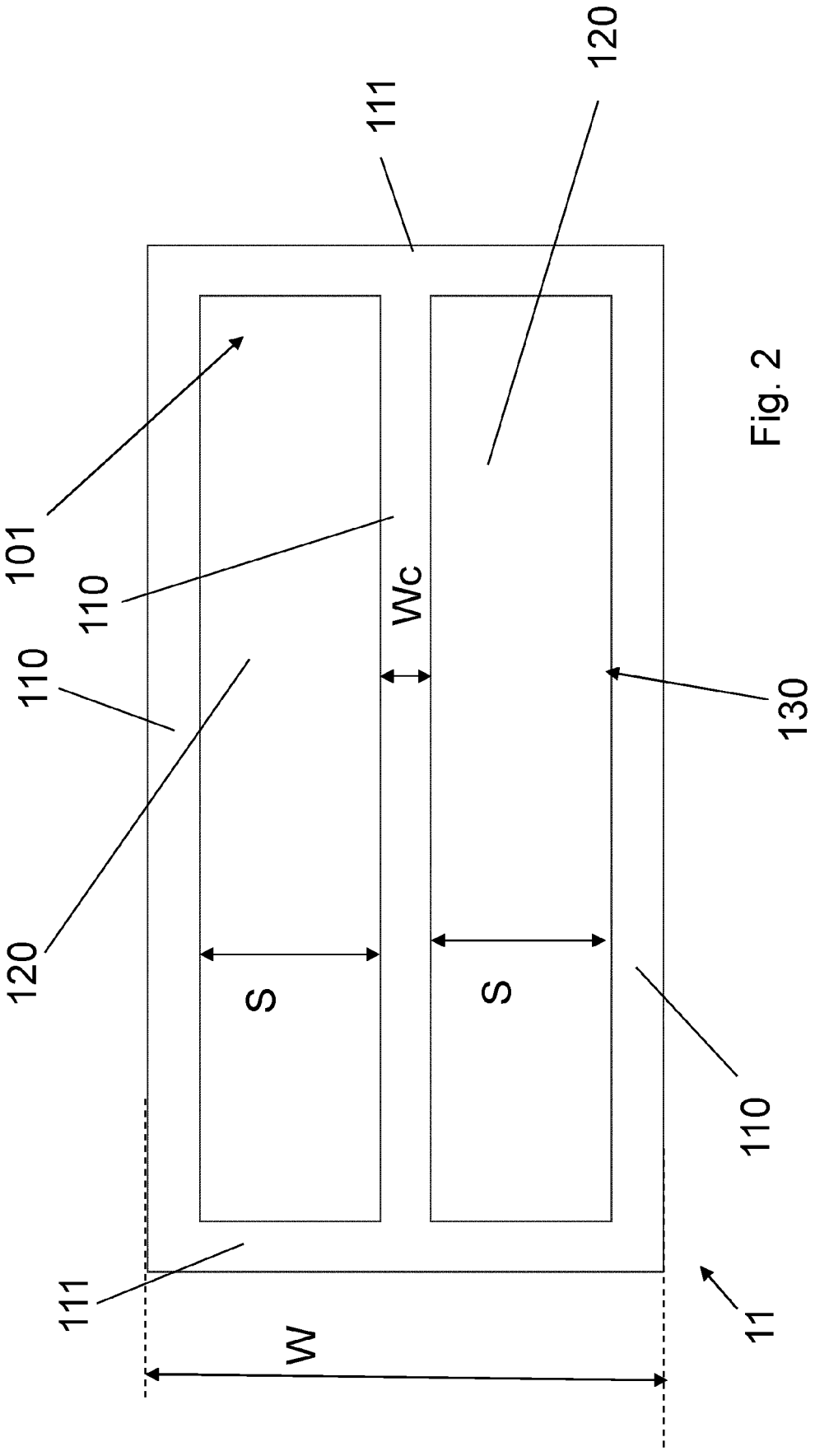
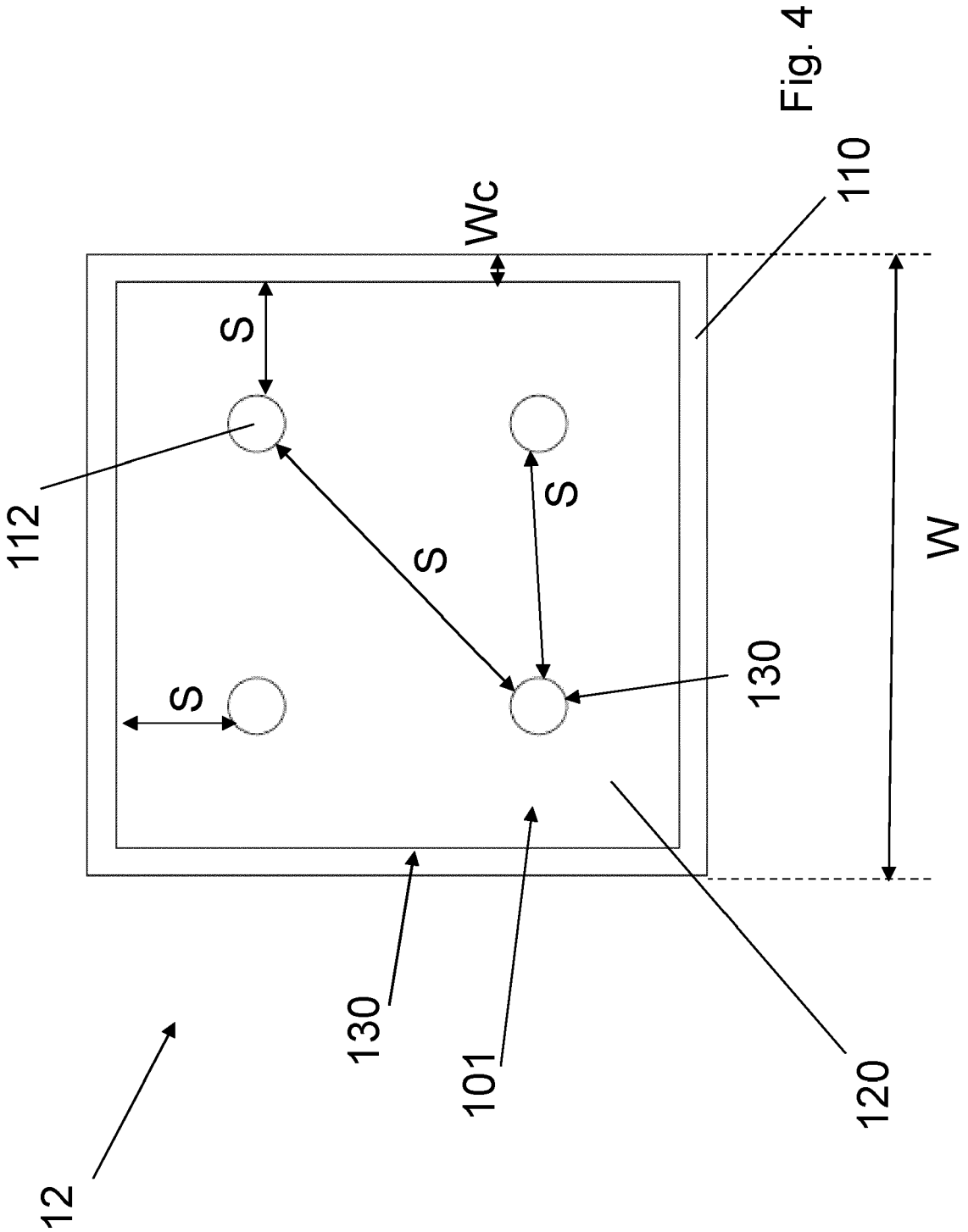



Fig. 2

Fig. 4



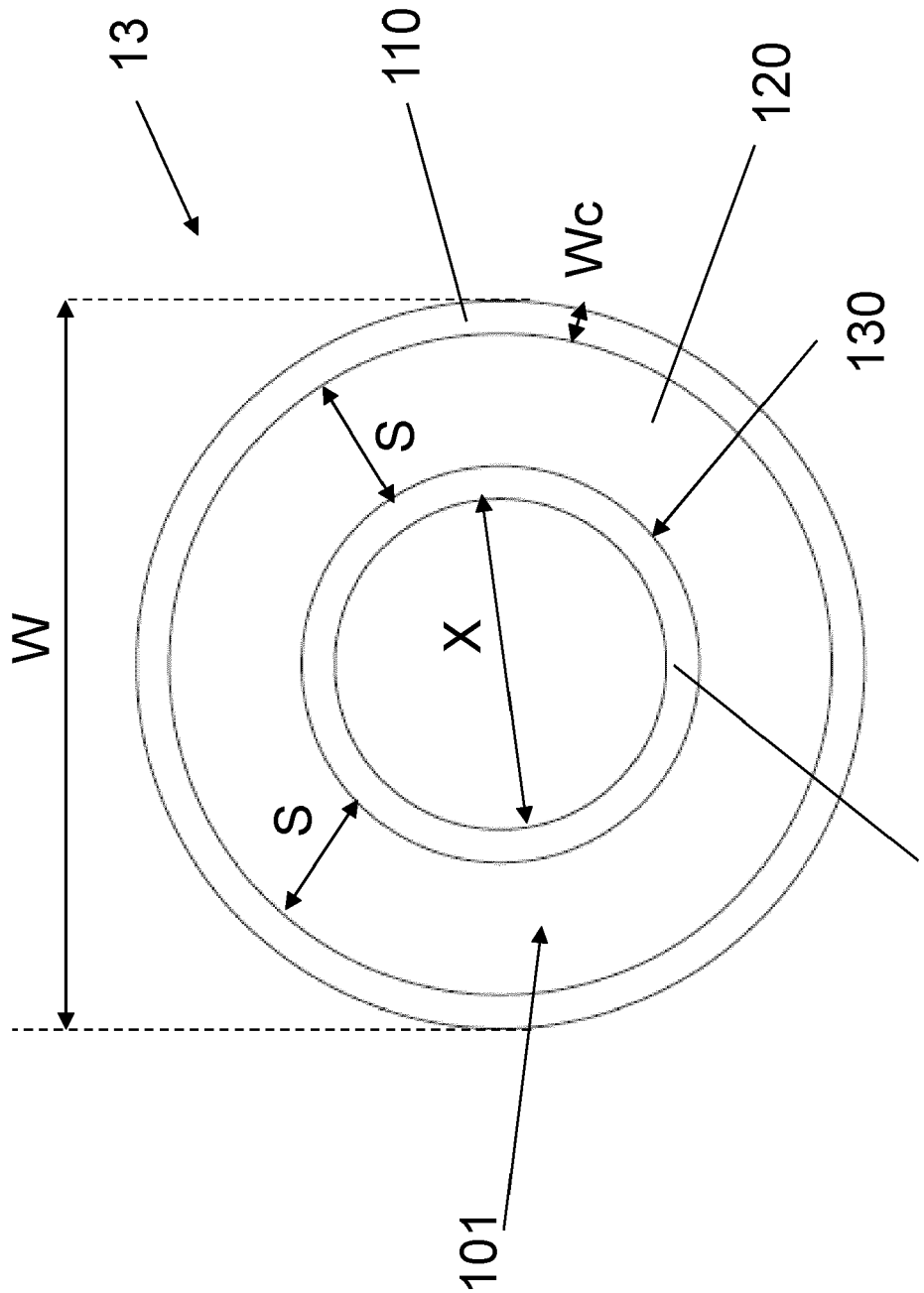



Fig. 5

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# EUROPEAN SEARCH REPORT

Application Number
EP 22 18 5595

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| Y | * paragraphs [0045], [0082], [0083], [0100], [0111], [0128], [0198]; figure 5 * | 3,6 | |
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| | * figure 1 * | | |
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E04F

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 5 December 2022 | Fournier, Thomas |

CATEGORY OF CITED DOCUMENTS

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