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(54) **Eljárás falazótéglák előállítására, valamint az eljárással előállított falazótégla**

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

Method for making building blocks and building block obtained thereby

Description

[0001] The invention relates to a method for making building blocks according to Claim 1, and a building block according to Claim 31. The method for making building blocks, in particular perforated bricks, wherein each building block has a substantially cubic body that comprises several, at least two, voids which have a length and a width and which are separated from each other by webs, and which serve to receive, at least partially, an insulating material, wherein said building block is produced from a starting material under formation of said voids. The invention further relates to a building block, in particular perforated brick, which has a substantially cubic body that comprises several, at least two, voids which have a length and a width and which are separated from each other by webs, and which serve to receive, at least partially, an insulating material.

[0002] Building blocks, in particular perforated bricks, are formed from clay, mud or clayed masses with or without the addition of other materials as machine bricks and are burned at 800 to 1000°C. Such building blocks have a cubic body with a width which generally coincides with a wall thickness of a building wall which is to be produced from the building blocks. Therefore, such building blocks are produced in different widths. However, it is also conceivable that several building blocks are arranged with their narrow sides lying against one another in a building wall. For example, two such building blocks in the above arrangement form a building wall which has a wall thickness which corresponds substantially to twice the width of the building blocks. In the course of the rationalized construction of corresponding building walls, it has, however, become established to hold available building blocks with widths which correspond to the desired wall thicknesses of the building walls.

[0003] For example, such a building block is known from DE 31 00 642 A1. This concerns here a hollow brick with layers of insulating material, which are arranged parallel to two outer sides of the hollow brick, lying opposite one another, in spaces in the hollow brick and are distanced from one another by at least one region interspersed with empty voids. The regions interspersed with layers of insulating material are, moreover, distanced with respect to the outer sides of the hollow brick, parallel to them, by such regions which are interspersed with empty voids. This prior art document names, as insulating material, foamable insulating material, i.e. for example polyurethane or polystyrene, which is foamed into the spaces in the hollow brick provided for this. In addition, mineral wool is named as insulating material, without this prior art document disclosing how mineral wool is to be introduced into the spaces in the hollow brick. According to this prior art document, it is also possible to insert prefabricated insulating material plates, for example foam plates, into the spaces in the hollow brick.

[0004] A further building block is known from DE 35 32 590 A1, wherein this building block has a base body provided with air chambers. On at least one side of the base body, first webs are formed, which extend only over a portion of the height of the base body. A first shell is formed, parallel to the base body, onto these webs. Second webs are formed onto the first shell and/or onto the other side of the base body, onto which second webs a second shell is formed, likewise parallel to the base body, which likewise extend only over a portion of the height of the base body, and offset to the first webs. The space between the shells and/or the space between the base body and the shell is filled with insulation material, wherein foam, cork, granulated cork, coke fibre, wood wool, glass wool and rock wool are named as insulation material. In addition, synthetic fibres are possible, which can be injected, cast or inserted into the space between the shells and/or between the base body and the shell.

[0005] A further building block in the form of a honeycomb brick is known from DE 296 09 385 U1. This honeycomb brick has a circumferential wall, wherein at least two sides of the wall, lying opposite, have on the respective outer side of the honeycomb brick recesses or convexities, which engage into one another in the case of a lateral arrangement of several honeycomb bricks adjacent to one another. Furthermore, the honeycomb brick has webs arranged in the interior, which define vertically-running voids. In this honeycomb brick, provision is made that within the circumferential wall at least one interior, free of the vertical webs, is formed for the receiving of insulation material. This interior is constructed to be substantially larger compared to the voids. Glass wool, mineral wool, a foamed plastic or an insulating material of synthetic fibres, in particular of hollow fibres, is provided as insulating material.

[0006] Furthermore, from DE 200 12 221 U1 a building block constructed as a brick is previously known, which has two bearing sides, constructed on opposite outer sides of the brick, arranged horizontally in the position of use, two abutting sides, constructed on opposite outer sides, pointing in the abutting direction, arranged vertically in the position of use, preferably with butt joint indenting, two preferably free outer sides, constructed on opposite outer sides, arranged vertically in the position of use, wherein in the interior of the brick, in the position of use, vertically directed hollow chambers are formed, which reach through the brick by being constructed so as to be open on at least one bearing side, preferably on both bearing sides. Of these hollow chambers, several hollow chambers with a smaller hole cross section are formed, wherein at least one hollow chamber is constructed as a hollow chamber receiving insulating material, with a larger hole cross section. A compact insulating material body is provided as insulating material, which, with regard to its external dimensions, i.e. with regard to its axial length and its cross section, corresponds in an accurately fitting manner to the dimensions of the hollow chamber receiving it. In order to hold this insulating material body in the hollow chamber, the latter has a moulding in the form of a projecting strip-shaped nose, the moulding projecting into the hole cross section. This nose is pressed into the insulating material, so that the insulating material is securely clamped in the hollow chamber.

[0007] Finally, building blocks, namely perforated bricks, are known on the market, which have a cubic body which has a width corresponding to the wall thickness which is to be constructed of the building wall. In this cubic body, voids are provided which are filled with a perlite filling as insulating material.

[0008] The building blocks described above have various disadvantages. Thus, it is to be recognized that the introduction of insulating materials in the form of a fill, for example of perlite, vermiculite or foam glass has the disadvantage that the fill must be sintered or provided with a binder, in order to enable the fill to cure in the building block. When this fill is not introduced until after the production of the cubic body, a curing time of the fill is required, before the building block is ready for sale. If applicable, this curing time can be shortened by a supplementary firing process. Furthermore, the disadvantage exists that the voids in the different building blocks hold different quantities of insulating material, and so corresponding insulating materials must be held available in different configurations. This applies in particular in the case of those building blocks which are to be filled with preformed insulating material bodies. Generally, it is necessary to hold available corresponding insulating material bodies for each building block length and width. Furthermore, the previously known building blocks have, in part, the disadvantage that the introduced insulating material bodies are not arranged with a sufficient adhesion in the voids, and so the insulating material bodies must either be fastened with additional adhesive or protrusions in the voids. The use of adhesive leads here occasionally to the required fire-resistance grading not being able to be met, owing to the use of organic components. The configuration of additional protrusions as clamping elements leads to more complex moulds in the production of the building blocks and to the problem that these protrusions can be damaged or destroyed during mechanical manufacture, in particular in the case of mechanical insertion of the insulating material elements, with the result that success is highly doubtful. Furthermore, these building blocks have the disadvantage that despite the additional protrusions into the voids which receive insulating material, the insulating material falls out when the building blocks are cut in their longitudinal direction. Building blocks which are provided with fillings can have the tendency, on separating or cutting open, that the filling is not sufficiently fixed and trickles out. Therefore, special building blocks, designated as cut blocks, are offered. In addition, fillings have a thermal conductivity of a minimum of 0.043 W/mK.

[0009] Proceeding from this prior art document, the invention is based on the **object** of further developing a generic method for the production of building blocks such that an efficient manufacture of the building blocks in different lengths and widths is possible, wherein the building blocks have very good insulation characteristics, are able to be produced in sufficient variability with regard to their sound- and/or heat-insulation characteristics, wherein a secure anchoring of the insulating material is to be provided, without the fire protection characteristics substantially changing.

[0010] Furthermore, it is an **object** of the invention to provide a building block which is able to be produced in a simple and cost-effective manner as a mass-produced article with excellent heat- and/or sound-insulating characteristics, wherein a secure anchoring of the insulating material is to be provided, without the fire protection characteristics substantially changing.

[0011] The **solution** to this problem makes provision, in a method according to the invention, that moulded bodies of an insulating material are inserted into all voids, wherein said moulded bodies are made from a material which is compressible at least in the direction of surfaces arranged oppositely to each other, and have a volume larger than the volume of the voids and preferably have a width and/or a length greater than that of the voids, so that said moulded bodies are frictionally held in said voids, wherein said moulded bodies are made from mineral fibres bound by a binder, in particular from rock, glass or slag fibres, and have a fibre orientation parallel to the longitudinal axis of the voids, wherein said moulded bodies are made from mineral fibres bound by a binder, in particular from rock, glass or slag fibres, and have a fibre orientation parallel to the longitudinal axis of the voids.

[0012] According to the invention, provision is therefore made that moulded bodies of an insulating material are inserted into the voids of the building blocks such that the moulded bodies are securely connected with the body of the building block and also still remain in the voids when the void is open on one side, and the moulded body lies only against three surfaces of the void. An additional fastening of the moulded bodies is not necessary, although in some cases this additional fastening, for example by a thermally activatable adhesive, can be expedient and advantageous. The voids can be constructed identically with regard to their width, independently of the length and width of the building blocks, such that these voids can basically also be equipped with identically wide insulating material elements, for example strip-, bar- or plate-shaped insulating material elements of organic or inorganic fibres, alternatively organic or inorganic expanded or foam materials. The provision of insulating material elements of different widths is no longer necessary here, so that the filling of the building blocks is substantially more efficient and more cost-effective. With regard to the solution of the above-mentioned problem, in a building block according to the invention provision is made that the insulating material is constructed as a moulded body and is able to be inserted frictionally into all voids, wherein the moulded bodies are inserted frictionally into the voids, wherein the moulded bodies are made from a material which is compressible at least in the direction of surfaces arranged oppositely to each other and wherein the moulded bodies have a volume larger than the volume of the voids, and preferably have a width and/or length greater than that of the voids, that the moulded bodies are made from mineral fibres bound by a binder, in particular from rock, glass or slag fibres.

[0013] Through the frictional connection between the insulating material, produced as a moulded body, and the body of the building block, the insulating material is arranged substantially undetachably in the void, so that even cutting of the building block does not imperatively lead to the insulating material falling out from the building block.

[0014] Further features and advantages of the method according to the invention or of the building block according to the invention will emerge from the subclaims or from the following description of advantageous embodiments of the method according to the invention or of the building block according to the invention.

[0015] The building block is preferably produced from inorganic starting materials. For example, such building blocks can be produced from a hydraulically curing starting material, in particular from cement, lime, gravel, split, sand, natural and/or expanded light aggregates, with or without the addition of other materials, such as for example brick-dust, ashes or similar materials, or from a thermosetting starting material, in particular from clay, mud or clayed masses, with or without the addition of other materials, such as nonplastic materials and/or opening materials, for example polystyrene, sawdust, paper fibre material or the like.

[0016] The production of the building blocks can take place both continuously in the course of an extrusion process or discontinuously, in which the building blocks are produced individually in a mould, in that a plurality of moulds are filled with the starting material and the starting material cures in the moulds. As already mentioned above, the starting material can cure hydraulically or after a drying process can be delivered to a kiln, in which the building blocks are fired.

[0017] A development of the method according to the invention makes provision that the voids are configured with different lengths, wherein the greater length represents an integral multiple of the smaller. The voids can therefore be equipped with moulded bodies of insulating material, wherein the moulded bodies basically have a consistent material thickness and lengths coordinated to the voids. Preferably, the building block has two voids of different lengths, wherein the shorter voids have a length which coincides with half the length of the longer voids. The moulded bodies of insulating material can therefore be held available in a width which corresponds to the length of the longer void, wherein for the equipping of the shorter voids, the insulating material for the formation of the moulded bodies is halved in its width and subsequently inserted into the voids with the shorter length.

[0018] According to a further feature of the method according to the invention, the voids are arranged extending at right angles to the longitudinal axis of the body, so that the voids run in the direction of the longitudinal axis of the building wall which is constructed from the building blocks and enable an optimum heat and/or sound insulation of a building wall produced therefrom.

[0019] Preferably, the voids are configured with a length that is greater than the width of the voids. Furthermore, provision is made that the voids are configured with a rectangular cross section, so that the moulded bodies of insulating material, for example of mineral fibres bound by a binder, which are necessary for filling the voids, can be held available in web and/or plate form, wherein the individual moulded bodies are separated from these mineral fibre webs or mineral fibre plates by a cut at right angles to the large surfaces of the mineral fibre webs or mineral fibre plates.

[0020] Moulded bodies of an insulating material, substantially coinciding with the cross-sectional shape of the voids, are inserted into the voids.

[0021] The moulded body is constructed so as to be compressible at least in the direction of surfaces arranged oppositely to each other and is inserted preferably in a compressed state into the void. The compressing of the moulded body before the insertion of the moulded body into the void has the advantage that the moulded body is not damaged by the increased friction, possibly occurring during insertion, on the inner wall surfaces of the void. Therefore, the possibility exists of using, for example, moulded bodies of mineral fibres with a relatively low bulk density.

[0022] According to a further feature of the method according to the invention, the moulded body is inserted frictionally in the void, wherein the moulded body is preferably configured with a length and/or width that is greater than that of the void. In addition, provision can be made that the moulded body is adhered to at least one inner wall surface of the void. As already stated, moulded bodies of mineral fibres, bound by a binder, in particular of rock or glass fibres are used, but also natural fibres, in particular plant and/or animal fibres, such as flax, hemp, sheep's wool and the like.

[0023] It has proved to be advantageous here to configure the moulded bodies with a fibre orientation parallel to the longitudinal axis of the voids, so that the moulded bodies have a high compressibility in the direction of the surface normals of the large surfaces of the moulded body and accordingly can be inserted in compressed form into the voids.

[0024] In order to increase the adhesion of the moulded bodies in the voids, provision is made according to a further feature of the method according to the invention that the inner wall surfaces of the voids are configured with a high surface roughness. Alternatively or additionally, provision can be made that the inner wall surfaces of the voids are configured with point-shaped and/or linear protrusions, which preferably have a maximum height of 1 mm. The linear protrusions are preferably configured in a discontinuous manner.

[0025] Provision is made according to a further feature of the invention that the voids are arranged in rows. Preferably, in each row there are arranged two voids having a different length. This serves in particular to maintain the stability of the building block, so that the building block has not only outer wall surfaces, but also webs in the region between adjacent voids of a row.

[0026] Preferably, two voids are arranged in each row, one void having a length which is twice as large as the length of the second void. The voids accordingly have a length ratio of one third to two thirds. According to a further feature of the method according to the invention, provision is made that the voids with different lengths are alternatingly arranged in adjacent rows, so that a web arranged between the two voids is arranged offset in a longitudinal direction of the building block to a web between two voids of an adjacent row. This configuration serves to increase the stability of the building block.

[0027] According to the invention, all voids are filled with insulating material. Here, the possibility exists to fill the voids with different insulating materials, so that the building block produced according to the method according to the invention can be adjusted to the respective requirements in the building wall. Thus, for example, different requirements exist for the building blocks with regard to the sound and/or heat insulation, in so far as they are installed in the external wall region or in the internal wall region of a building. Whereas in the external wall region, primarily the heat insulation is of great importance, the internal walls in a building are primarily to have sound-insulating characteristics, although heat-insulating characteristics are also aimed for there.

[0028] High sound-insulating characteristics are achieved in that at least one void, preferably all the voids in one row, is/are filled with a material, in particular with a grainy material, having a bulk density of ≥ 1500 kg/m³, in particular ≥ 2000 kg/m³. A building block produced in such a manner is then preferably used in the external wall region such that a high sound insulation result is achieved.

[0029] In the method according to the invention, provision is made furthermore in an advantageous manner that the moulded bodies are separated from an almost endless strip-shaped insulating material. Here, provision can be made that the moulded bodies are separated from the almost endless strip-shaped insulating material after insertion thereof into the voids. Alternatively, the possibility exists that the moulded bodies are separated from the almost endless strip-shaped insulating material prior to insertion thereof into the voids. In both cases, the moulded bodies can terminate in a surface-flush manner with the cubic body of the building block, so that a post-processing of the building block is not necessary. When the building block has several voids arranged in rows, endless strip-shaped insulating materials, arranged adjacent to one another, can of course be inserted and separated according to the length of the voids. The moulded bodies are produced as strips, plates or bars from a mineral fibre web divided by one or more cuts in a longitudinal direction. Here, the mineral fibre web is guided above a production line for such building blocks parallel to the conveying direction of the building blocks and is cut in a longitudinal direction according to the number of required strips, plates or bars, whereupon the strips, plates or bars configured as moulded bodies are compressed and are delivered in compressed state to the voids. In the voids, the moulded bodies relax, so that they are frictionally held in the voids owing to their greater width and/or length with respect to the dimensions of the voids.

[0030] According to a further feature of the invention, provision is made that the mineral fibre web is cut corresponding to the width of the voids into differently wide strips, plates or bars, from which the moulded bodies are separated.

[0031] It has proved to be advantageous that the cubic body is fabricated from a mantle block material or a brick fragment having a bulk density of ≤ 1.70 kg/dm³. In order to achieve a high heat insulation performance, provision is made, finally, in a method according to the invention, that the building block is fabricated with a web-void-ratio in the wall thickness direction of 1 : 2.2 to 2.5, and/or in the wall longitudinal direction of 1 : 2.0 to 2.3. Such a building block has a perforations proportion of between 56 and almost 64%, so that also a correspondingly large amount of insulating material can be introduced into the building block. According to the invention, it is therefore possible to produce the building block with a thermal conductivity of ≤ 0.09 W/mK.

[0032] The advantages, described above, of the method according to the invention, are also provided in the building block according to the invention. The building block according to the invention is distinguished in that the insulating material is configured in the form of moulded bodies and is frictionally inserted into the voids, wherein the moulded body preferably has a width and/or length which is greater than that of the void. Therefore, the moulded body is inserted securely into the voids, so that it does not fall out from the building block even in the rough working conditions which prevail on building sites, and in particular remains in the voids even when the building block for example is trimmed such that the void is open on one side, so that the moulded body only lies against three remaining inner wall surfaces of the void. Hereby, it is ensured that a building wall produced from the building blocks according to the invention has high heat and/or sound insulation.

[0033] Preferably, the voids have different lengths and an identical width, so that a defined volume is provided. Through the identical width of the voids, the moulded bodies which are to be inserted, for example of insulating material plates with a constant material thickness, can be worked and subsequently inserted into the voids. The moulded bodies then merely have to be adapted to the different lengths of the voids. It has proved to be advantageous that the voids have different lengths, wherein the greater length is an integral multiple of the smaller, so that for example voids with half or double lengths compared with standard voids can be formed.

[0034] The voids preferably extend at right angles to the longitudinal axis of the body, wherein the voids have a length which is greater than the width of the voids.

[0035] Such a building block can be produced in a simple manner when the voids have a rectangular cross section, so that the moulded bodies are also configured so as to be rectangular in cross section. This configuration of the moulded bodies is advantageous in particular in the case of plate-shaped starting material of insulating material, because the insulating material, which is delivered for example in web or plate form, merely has to be divided into strips by a cut in a longitudinal direction or transversely hereto, which already have a material thickness coordinated to the width of the voids, so that by means of the cut which is to be carried out the length of the moulded body of insulating material can be adjusted. According to a further feature of the building block according to the invention, provision is made that the moulded bodies are configured so as to be compressible at least in the direction of surfaces arranged oppositely to each other. Through the compressibility of the moulded body, these can be inserted in a simple manner in compressed form into the voids, in which the moulded bodies subsequently expand and are held securely in the voids by friction fit.

[0036] Nevertheless, provision can additionally be made that the moulded bodies are adhered to at least one inner wall surface of the voids. For example, the moulded body can have an adhesive layer in the region of an outer surface, which adhesive layer, after the insertion of the moulded body in the voids, is able to be activated for example by heat.

[0037] The moulded bodies are made from mineral fibres, bound by a binder, in particular from rock or glass fibres, because these insulating materials have an excellent heat- and/or sound-insulation behaviour, and furthermore are compressible in a simple manner as a function of their bulk density. Finally, these insulating materials are able to be worked, in particular cut, readily.

[0038] According to a further feature of the invention, provision is made that the moulded bodies of mineral fibres bound by a binder have a fibre orientation parallel to the longitudinal axis of the voids, so that the moulded body is configured so as to be compressible in the direction of the surface normals of the large surfaces.

[0039] In order to increase the adhesion of the moulded bodies in the voids, provision is made according to a further feature of the invention that the inner wall surfaces of the voids have a high surface roughness. Alternatively or additionally, provision can be made that the inner wall surfaces of the voids have point-shaped and/or linear protrusions, which preferably have a maximum height of 1 mm and in the case of linear protrusions can be configured in a discontinuous manner, so that they do not impede the insertion of the moulded bodies into the voids. The production of the surface roughness can be ensured additionally or alternatively by the surface structure of a tow core during the extrusion of a clayed building block blank or by a correspondingly configured mould.

[0040] According to a further feature of the building block according to the invention, the voids are arranged in rows wherein, according to a further development, in each row two voids are arranged, which have a different length. Preferably, in each row there are arranged two voids, one void having a length which is twice as large as the length of the second void. A development of this configuration makes provision that the voids with different lengths are alternatingly arranged in adjacent rows. The configurations described above lead to a high stability of a building block according to the invention.

[0041] According to a further feature of the invention, all the voids of the building block can be filled with insulating material. Here, the possibility exists to fill the voids with different insulating materials, in order to adjust the building block according to the invention to different requirements of the building walls situated inside or outside the building.

[0042] A high sound-insulating performance is achieved in that at least one void, preferably all the voids, of a row of the building block is/are filled with a material, in particular with a grainy material, having a bulk density of $\geq$ 1500 kg/m^3, in particular $\geq$ 2000 kg/m^3.

[0043] The building block according to the invention preferably consists of a mantle block material or of a brick fragment having a bulk density of $\leq$ 1.70 kg/dm^3, which preferably has a thermal conductivity of $\leq$ 0.40 W/mK and a web-void-ratio in the wall thickness direction of 1 : 2.2 to 2.5 and/or in the wall longitudinal direction of 1 : 2.0 to 2.3. Altogether, a building block according to the invention, filled with insulating material moulded bodies, with a total Lambda$_{10}$ value $\leq$ 0.09 W/mK is produced. The bulk density of the insulating material of mineral fibres, provided according to the invention, lies in particular between 13 kg/m^3 and 120 kg/m^3 and has a Lambda$_{10}$ value of $\leq$ 0.034 W/mK.

[0044] Further features and advantages of the invention will emerge from the following description of the associated drawing, in which preferred embodiments of a building block according to the invention are illustrated. In the drawing: there are shown:

Figure 1 shows a building block produced as a highly perforated brick for a wall thickness of 24 cm, in a top view;

Figure 2 shows a building block according to Figure 1 for a wall thickness of 30 cm, in a top view;

Figure 3 shows a building block according to Figure 1 for a wall thickness of 36.5 cm, in a top view;

Figure 4 shows a building block according to Figure 1 for a wall thickness of 40 cm, in a top view, and

Figure 5 shows a building block according to Figure 1 for a wall thickness of 49 cm, in a top view.

[0045] A building block 1 illustrated in Figure 1 has a substantially cubic body 2, which has two outer wall surfaces 3 and two outer wall surfaces 4, 5 running at right angles thereto. The outer wall surfaces 3 are constructed so as to be flat, whereas the outer wall surface 4 has a nose-shaped protrusion 6 and the outer wall surface 5 has a recess 7 constructed in a corresponding manner to the nose-shaped protrusion 6. The building block illustrated in Figure 1 has substantially a square base area.

[0046] In the building block 1, voids 8 having a length a and a width b are arranged running parallel to the outer wall surfaces 3. Furthermore, the building block 1 has voids 9 with a length c and the width b. The length c corresponds to half the length a.

[0047] The voids 8 and 9 are arranged in rows 10 and are separated from one another by a web 11 with a web width d. The rows 10 are separated from one another by webs 12, wherein the webs 12 have a web width e.

[0048] In addition, the building block 1 has, in the region of the outer wall surfaces 3, outer walls 13 with a thickness f and, in the region of the outer wall surfaces 4, 5, outer walls 14 with a thickness g.

[0049] The embodiment of a building block 1 illustrated in Figure 1 is a schematic diagram and the corresponding dimensions a to g are indicated below with respect to Figures 2 to 5.

[0050] The voids 8, 9 are filled with moulded bodies 15 of mineral fibres bound by a binder, wherein the mineral fibres have a fibre orientation parallel to the longitudinal axis of the voids 8, 9. The moulded bodies 15 are constructed so as to be compressible and are inserted in compressed state into the voids 8, 9. In the relaxed state, the moulded bodies 15 have a greater material thickness compared to the width d of the voids 8, 9, so that the moulded bodies 15 are frictionally held in the voids 8, 9. Furthermore, the moulded bodies 15 correspond, with regard to their outer contour, to the voids 8, 9 of the building block 1, which are constructed so as to be rectangular in cross section.

[0051] Although in Figure 1 and also in the following Figures 2 to 5 only some of the voids 8, 9 are filled with moulded bodies 15, it is self-evident that in a building block 1 all the voids 8, 9 or else only some of the voids 8, 9 can be filled with moulded bodies 15, wherein of course also different moulded bodies 15, i.e. for example those moulded bodies 15 with a high sound-insulating performance and those moulded bodies 15 with a high heat-insulating performance are used.

[0052] The voids 8, 9 illustrated in Figures 1 to 5 have consistently widths b of 40 mm. The voids 8 have a length a of preferably 150 mm, whereas the voids 9 have a length c of preferably 75 mm. Resulting herefrom in a building block 1 according to Figure 2 with a width B of 30 cm, which coincides with a wall thickness of a building wall constructed herefrom, is a quantity of five rows 10 of voids 8 and 9 with respectively a width b of 40 mm and a web width e of 16.666 mm.

[0053] The webs 11 have a web width d of 7.334 mm. The thickness g of the outer wall 14 is 7.33 mm in the region of the two protrusions 6 and 8 illustrated in Figure 2 in the region of the outer wall 14 on both sides of the protrusions 6. The thickness f of the outer walls 13 is 16.666 mm and therefore coincides with the web width e.

[0054] In Figure 3 a further embodiment of a building block 1 is illustrated, which is provided for the production of a building wall, with a building wall thickness of 38 cm and therefore has a width B of 38 cm.

[0055] In contrast to the embodiment according to Figure 2, the embodiment according to Figure 3 differs in that, instead of five rows 10 with voids 8, 9 in the embodiment according to Figure 2, now six rows 10 with voids 8, 9 and moulded bodies 15 inserted therein are provided. Resulting from this also is a dimensioning of the web widths e of the webs 12, deviating from the embodiment according to Figure 2, which dimensioning in the embodiment according to Figure 3 has a web width e of 20 mm. In the same manner, also the thickness f of the outer wall 13 of the building block 1 is now 20 mm, deviating from Figure 2. The further dimensions a to d and g coincide with the embodiment according to Figure 2.

[0056] In the dimensions a to g and L indicated above, the building block 1 according to Figure 3 has a proportion of voids 8, 9 of 56.9%, whereas the proportion of voids 8, 9 in the building block according to Figure 2 is 60.1%. Therefore the proportion of moulded bodies 15, which are inserted as insulating material into the voids 8, 9, therefore also lies in the same order of magnitude.

[0057] In Figure 4 a further embodiment of a building block 1 is illustrated, which differs from the building blocks 1 according to Figures 2 and 3 in that the building block 1 according to Figure 4 has a width B of 40 cm and accordingly is provided for a building wall with a wall thickness of 40 cm. With the exception of the thickness f and the web width e, the dimensions of the building block 1 according to Figure 4 coincide with the dimensions of the building blocks 1 according to Figures 2 and 3. Differing, the building block 1 according to Figure 4 has a web width e of 15 mm and a thickness f of likewise 15 mm. Furthermore, it is to be recognized that the building block 1 according to Figure 4, unlike the building block according to Figure 3, has three protrusions 6 and accordingly also three recesses 7 on the outer wall surface 4 lying opposite.

[0058] The moulded bodies 15 are inserted into the voids 8, 9, which voids 8, 9 are provided in seven parallel rows 10. The building block 1 according to Figure 4 has a proportion of voids 8, 9 of 63.1%.

[0059] Finally, Figure 5 shows a further building block 1 with eight rows 10 of voids 8, 9 running in a parallel manner, wherein the building block 1 has two protrusions 6 in the region of an outer wall surface 4 and two recesses 7 in the region of the outer wall surface 5 lying opposite. The building block 1 according to Figure 5 has a proportion of voids 8, 9 of 58.9% and is constructed with a width B of 49 cm, so that it is provided for a building wall with a wall thickness of 49 cm.

[0060] Compared to the building blocks 1 described above, the building block 1 according to Figure 5 also has coinciding dimensions for the lengths a and c and the width b of the voids 8, 9. Furthermore, the thickness g of the outer wall 14 is also constructed in a coinciding manner with the previously described exemplary embodiments of the building block 1. Only the web width e, with a measurement of 18.888 mm, deviates from this. This dimension is also provided for the thickness f of the outer wall 13.

[0061] The building blocks 1 described above and illustrated in Figures 1 to 5 can be produced in an advantageous manner by a method in which the building blocks 1 in a first step are extruded from a starting material, for example clay, mud or clayed masses, with or without the addition of other materials, such as nonplastic materials and/or opening materials, for example polystyrene, sawdust, paper fibres or the like, from a mouthpiece and are subsequently dried and fired.

[0062] Subsequently, in all the building blocks 1 illustrated above with different width B it is possible without difficulty to fill the voids 8, 9 with coinciding moulded bodies 15, because the voids 8 in all the building blocks 1 of Figures 1 to 5 are likewise constructed in a coinciding manner, as the voids 9 of these building blocks 1. For this, it is possible to separate corresponding moulded bodies 15 as strip-shaped insulating material elements from a mineral fibre web, to introduce them into the voids 8, 9 and to cut them off from the insulating material strips in a surface-flush manner, before the insulating material strip is subsequently introduced into the next void 8, 9 with coinciding dimensioning.

Eljárás falazótéglák előállítására, valamint az eljárással előállított falazótégla

Szabadalmi igénypontok

1. Eljárás falazótéglák, főként soklyukú téglák előállítására, egy lényegében kocka alakú testtel, amely testnek legalább két, egy hosszúsággal (a, c) és egy szélességgel (b) rendelkező, egymástól gerincek (11, 12) által elválasztott, legalább részben egy szigetelőanyag befogadására szolgáló üregе (8, 9) van, ahol a lényegében kocka alakú testet egy kiindulási anyagból állítjuk elő az üregek (8, 9) kialakítása mellett, ahol valamennyi üregbe (8, 9) szigetelőanyagból álló alaktesteket (15) helyezünk,

azzal jellemezve,

hogy az alaktesteket (15) egy legalább az egymással szemközt elrendezett felületek irányában összenyomható anyagból alakítjuk ki az üregek (8, 9) térfogatához képest nagyobb térfogattal, előnyösen az üregekhez képest nagyobb szélességgel és/vagy hosszúsággal, úgyhogy az alaktestek (15) súrlódás által vannak az üregekben (8, 9) megtartva, emellett az alaktesteket (15) kötőanyagokkal összekötött ásványi szálasanyagokból, főként kőzet-, üveg- vagy salakszálakból alakítjuk ki, ahol a szálak irányultsága párhuzamos az üregek (8, 9) hossztengelyével.

2. Az 1. igénypont szerinti eljárás, *azzal jellemezve*, hogy a falazótéglát (1) szervetlen kiindulási anyagokból állítjuk elő.

3. Az 1. igénypont szerinti eljárás, *azzal jellemezve*, hogy a falazótéglákat (1) extrudálással vagy egyenként, formában állítjuk elő.

4. Az 1. igénypont szerinti eljárás, *azzal jellemezve*, hogy a falazótéglákat (1) egy hidraulikusan kikeményedő kiindulási anyagból, főként cementből, mészből, kavicsból, zúzottkőből, homokból, természetes és/vagy duzzasztott könnyű adalékanyagokból más anyagok, mint például téglapor, hamuk és hasonló anyagok hozzáadásával vagy anélkül, vagy egy hőhatásra keményedő kiindulási anyagból, főként agyagból, vályogból vagy agyagos masszákból más anyagok, mint soványító és/vagy kiégető anyagok, például polisztirol, fűrészpor, papír rostanyag vagy hasonlók hozzáadásával vagy anélkül állítjuk elő.

5. Az 1. igénypont szerinti eljárás, *azzal jellemezve*, hogy az alaktest (15) keresztmetszeti alakját az üregek (8, 9) keresztmetszeti alakjával lényegében megegyezően alakítjuk ki.

6. Az 1. igénypont szerinti eljárás, *azzal jellemezve*, hogy az üregeket (8, 9) különböző hosszúságokkal (a, c) képezzük ki, ahol az egyik hosszúságok (a) a másik hosszúságok (c) egész számú többszörösei.

7. Az 1. igénypont szerinti eljárás, *azzal jellemezve*, hogy az üregeket (8, 9) a test (2) hossztengelyével párhuzamosan kiterjedően rendezzük el.

8. Az 1. igénypont szerinti eljárás, *azzal jellemezve*, hogy az üregeket (8, 9) olyan hosszúsággal képezzük ki, amely nagyobb, mint az üregek (8, 9) szélessége.

9. Az 1. igénypont szerinti eljárás, *azzal jellemezve*, hogy az üregeket (8, 9) derékszögű négyszög alakú keresztmetszettel képezzük ki.

10. Az 1. vagy 9. igénypont szerinti eljárás, ***azzal jellemezve***, hogy az alaktesteket (15) összenyomva helyezzük be az üregekbe (8, 9).

11. Az 1. igénypont szerinti eljárás, ***azzal jellemezve***, hogy az alaktesteket (15) járulékosan összeragasztjuk az üregek (8, 9) legalább egy belső falfelületével.

12. Az 1. vagy 9. igénypont szerinti eljárás, ***azzal jellemezve***, hogy az alaktesteket (15) lap-, rúd- vagy szalagszerűen képezzük ki.

13. Az 1. igénypont szerinti eljárás, ***azzal jellemezve***, hogy az üregek (8, 9) belső falfelületeit nagy felületi érdességgel alakítjuk ki.

14. A 13. igénypont szerinti eljárás, ***azzal jellemezve***, hogy az üregek (8, 9) belső falfelületeinek felületi érdességét megfelelő felérdesítő felülettel rendelkező húzómagokkal alakítjuk ki.

15. Az 1. igénypont szerinti eljárás, ***azzal jellemezve***, hogy az üregek (8, 9) belső falfelületeit pont- és/vagy vonalszerű kiemelkedésekkel alakítjuk ki, amelyek előnyösen 1 mm maximális magassággal rendelkeznek.

16. A 15. igénypont szerinti eljárás, ***azzal jellemezve***, hogy a vonalszerű kiemelkedéseket megszakításokkal képezzük.

17. Az 1. igénypont szerinti eljárás, ***azzal jellemezve***, hogy az üregeket (8, 9) sorokban (10) rendezzük el.

18. A 17. igénypont szerinti eljárás, ***azzal jellemezve***, hogy mindegyik sorban (10) két üreget (8, 9) rendezünk el, amelyek különböző hosszúsággal (a, c) rendelkeznek.

19. A 18. igénypont szerinti eljárás, ***azzal jellemezve***, hogy mindegyik sorban (10) két üreget (8, 9) rendezünk el, ahol az egyik üreg (8) hosszúsága kétszer akkora, mint a másik üreg (9) hosszúsága.

20. A 17. vagy 18. igénypont szerinti eljárás, ***azzal jellemezve***, hogy a különböző hosszúságú üregeket (8, 9) a szomszédos sorokban (10) váltakozó módon rendezzük el.

21. Az 1. igénypont szerinti eljárás, ***azzal jellemezve***, hogy valamennyi üreget (8, 9) szigetelőanyaggal töltjük meg.

22. A 17. igénypont szerinti eljárás, ***azzal jellemezve***, hogy egy adott sor (10) minden üregét (8, 9) egy $\geq 1500\ kg/m^3$, főként $\geq 2000\ kg/m^3$ nyers sűrűségű, főként szemcsés anyaggal töltjük meg.

23. Az 1. vagy 9. igénypont szerinti eljárás, ***azzal jellemezve***, hogy az alaktesteket (15) egy megközelítőleg végtelen szalagszerű szigetelőanyagról választjuk le.

24. A 23. igénypont szerinti eljárás, ***azzal jellemezve***, hogy az alaktesteket (15) az üregekbe (8, 9) való behelyezés után választjuk le a megközelítőleg végtelen szalagszerű szigetelőanyagról.

25. A 23. igénypont szerinti eljárás, ***azzal jellemezve***, hogy az alaktesteket (15) az üregekbe (8, 9) való behelyezés előtt választjuk le a megközelítőleg végtelen szalagszerű szigetelőanyagról.

26. Az 1. vagy 9. igénypont szerinti eljárás, *azzal jellemezve*, hogy az alaktesteket (15) szalagokként, lapokként vagy rudakként választjuk le egy ásványi szálasanyag-elemről, főként annak hosszirányában.

27. A 26. igénypont szerinti eljárás, *azzal jellemezve*, hogy az ásványi szálasanyag-pályát az üregek (8, 9) szélességének (b) megfelelően különböző szélességű szalagokra, lapokra vagy rudakra választjuk le, amelyekről az egyes alaktesteket (15) leválasztjuk.

28. Az 1. igénypont szerinti eljárás, *azzal jellemezve*, hogy a testet (2) $\leq$ 1,70 kg/dm^3 nyers sűrűségű burkolótégla-anyagból, illetve cserépből állítjuk elő.

29. Az 1. igénypont szerinti eljárás, *azzal jellemezve*, hogy a falazótéglát (1) $\leq$ 0,09 W/mK hővezető képességű anyagokból állítjuk elő.

30. Az 1. igénypont szerinti eljárás, *azzal jellemezve*, hogy a falazótéglát (1) a falvastagság irányában 1:2,2-2,5 gerinc-üreg aránnyal és/vagy a fal hosszirányában 1:2,0-2,3 gerinc-üreg aránnyal állítjuk elő.

31. Falazótégla, főként soklyukú tégla, egy lényegében kocka alakú testtel, amely testnek legalább két, egy hosszúsággal (a, c) és egy szélességgel (b) rendelkező, egymástól gerincek (11, 12) által elválasztott, legalább részben egy szigetelőanyag befogadására szolgáló ürege (8, 9) van, ahol a szigetelőanyag valamennyi üregbe (8, 9) behelyezhető alaktestként (15) van kialakítva,

azzal jellemezve,

hogy az alaktestek (15) súrlódó módon vannak az üregekbe (8, 9) behelyezve, ahol az alaktestek (15) egy legalább az egymással szemközt elrendezett felületek irányában összenyomható anyagból vannak kialakítva, és ahol az alaktestek (15) az üregekhez (8, 9) képest nagyobb térfogattal, előnyösen az üregekhez (8, 9) képest nagyobb szélességgel és/vagy hosszúsággal rendelkeznek, és hogy az alaktestek (15) kötőanyagokkal összekötött ásványi szálasanyagokból, főként kőzet-, üveg- vagy salakszálakból vannak kialakítva, ahol a szálak irányultsága párhuzamos az üregek (8, 9) hossztengelyével.

32. A 31. igénypont szerinti falazótégla, *azzal jellemezve*, hogy az üregek (8, 9) különböző hosszúságokkal (a, c) és azonos szélességgel (b) rendelkeznek és előnyösen egy meghatározott térfogatuk van.

33. A 31. igénypont szerinti falazótégla, *azzal jellemezve*, hogy az üregek (8, 9) különböző hosszúságokkal (a, c) rendelkeznek, ahol az egyik hosszúság (a) a másik hosszúság (c) egész számú többszöröse.

34. A 31. igénypont szerinti falazótégla, *azzal jellemezve*, hogy az üregek (8, 9) a test (2) hossztengelyével párhuzamosan kiterjedően vannak elrendezve.

35. A 31. igénypont szerinti falazótégla, *azzal jellemezve*, hogy az üregek (8, 9) olyan hosszúsággal (a, c) rendelkeznek, amely nagyobb, mint az üregek (8, 9) szélessége (b).

36. A 31. igénypont szerinti falazótégla, *azzal jellemezve*, hogy az üregek (8, 9) derékszögű négyszög alakú keresztmetszettel rendelkeznek.

37. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy az üregekbe (8, 9) az üregek (8, 9) keresztmetszeti alakjával lényegében megegyező, szigetelőanyagokból levő alaktestek (15) vannak behelyezve.

38. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy az alaktestek (15) járulékosan össze vannak ragasztva az üregek (8, 9) legalább egy belső falfelületével.

39. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy az alaktestek (15) lap-, rúd- vagy szalagszerűen vannak kiképezve.

40. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy az üregek (8, 9) belső falfelületei nagy felületi érdességgel rendelkeznek.

41. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy az üregek (8, 9) belső falfelületei pont- és/vagy vonalszerű kiemelkedésekkel vannak kialakítva, amelyek előnyösen 1 mm maximális magassággal rendelkeznek.

42. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy az üregek (8, 9) sorokban (10) vannak elrendezve.

43. A 42. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy mindegyik sorban (10) két üreg (8, 9) van elrendezve, amelyek különböző hosszúsággal (a, c) rendelkeznek.

44. A 42. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy mindegyik sorban (10) két üreg (8, 9) van elrendezve, ahol az egyik üreg (8) olyan hosszúsággal (a) rendelkezik, amely kétszer akkora, mint a másik üreg (9) hosszúsága (c).

45. A 42. vagy 43. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy a különböző hosszúságú üregek (8, 9) a szomszédos sorokban (10) váltakozó módon vannak elrendezve.

46. A 42. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy egy adott sor (10) minden ürege (8, 9) egy $\geq$1500 kg/m^3, főként $\geq$2000 kg/m^3 nyers sűrűségű, főként szemcsés anyaggal van megtöltve.

47. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy a test (2) $\leq$1,70 kg/dm^3 nyers sűrűségű burkolótégla-anyagból, illetve cserépből áll.

48. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy a hővezető képessége $\leq$ 0,09 W/mK.

49. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy gerinc-üreg aránya a falvastagság irányában 1:2,2-2,5 és/vagy a fal hosszirányában 1:2,0-2,3.

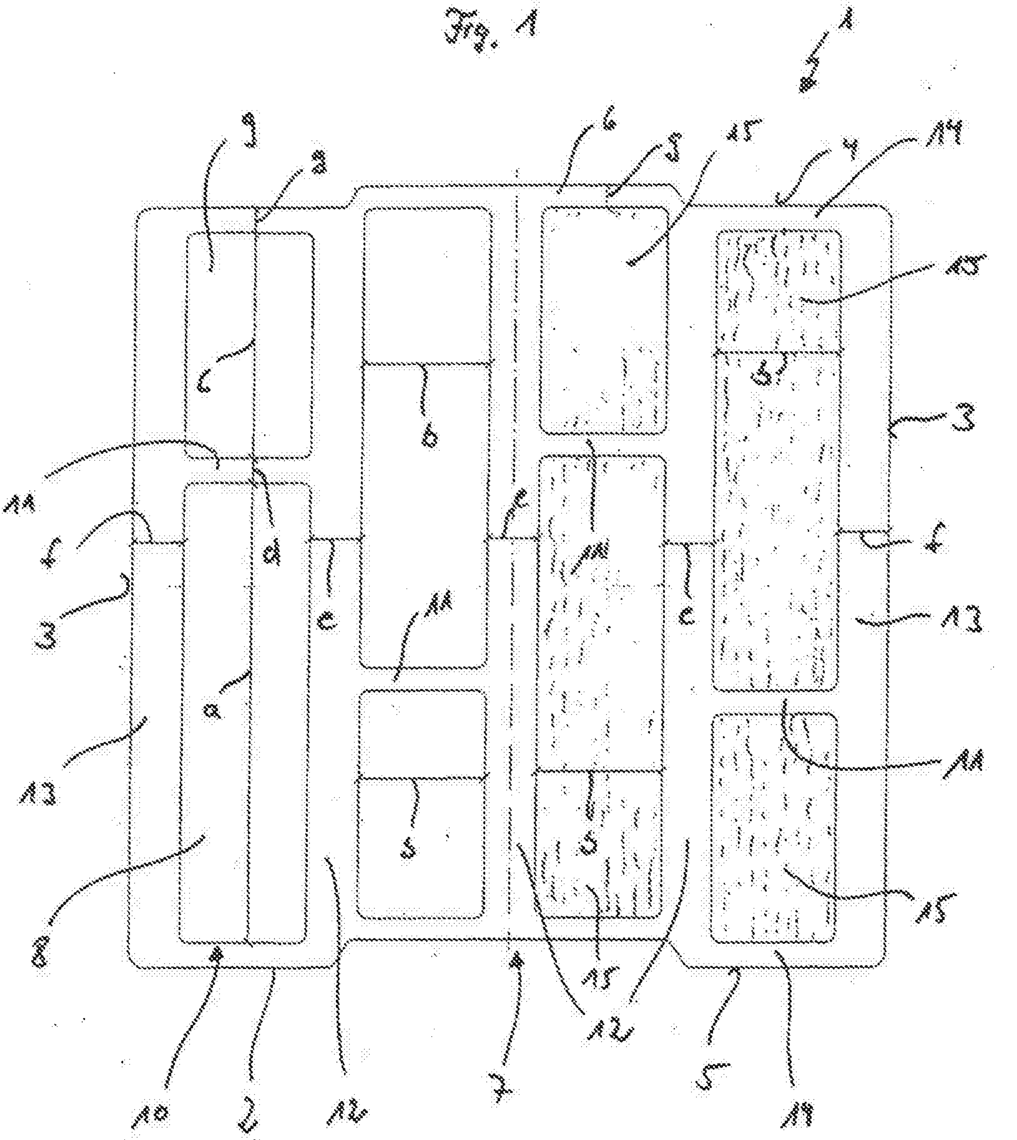
50. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy a falazótégla kiindulási anyagának hővezető képessége $\leq$0,35 W/mK.

51. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy szervetlen kiindulási anyagai vannak.

52. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy hidraulikusan kikeményedő kiindulási anyaga van, főként cement, mész, kavics, zúzottkő, homok, természetes és/vagy duzzasztott könnyű adalékanyagok, más anyagok, mint például téglapor, hamu vagy hasonló anyagok hozzáadásával vagy anélkül.

53. A 31. igénypont szerinti falazótégla, ***azzal jellemezve***, hogy hőhatásra keményedő kiindulási anyaga van, főként agyag, vályog vagy agyagos masszák, más anyagok, mint soványító és/vagy kiégető anyagok, például polisztirol, fűrészpor, papír rostanyag vagy hasonlók hozzáadásával vagy anélkül.

Fig. 1



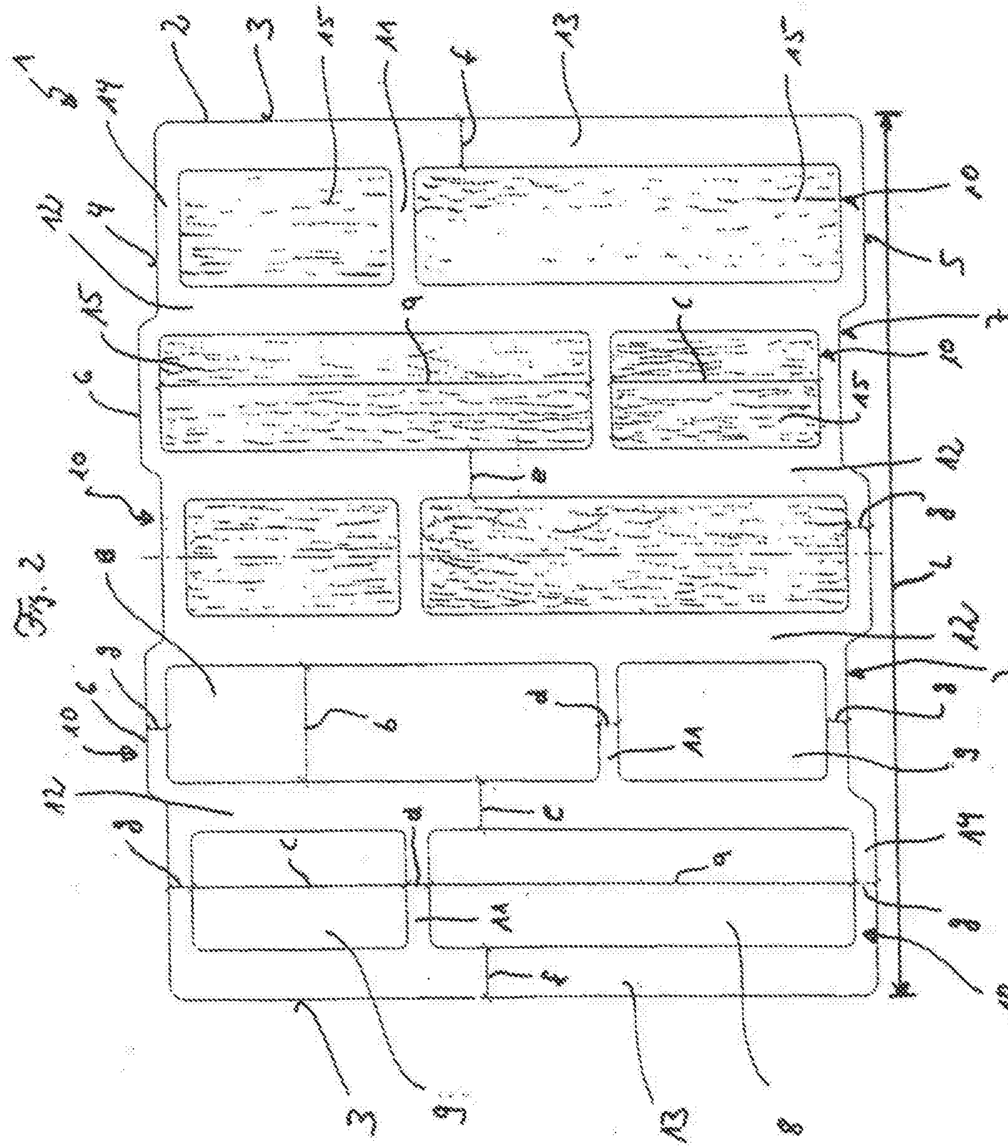


Fig. 2

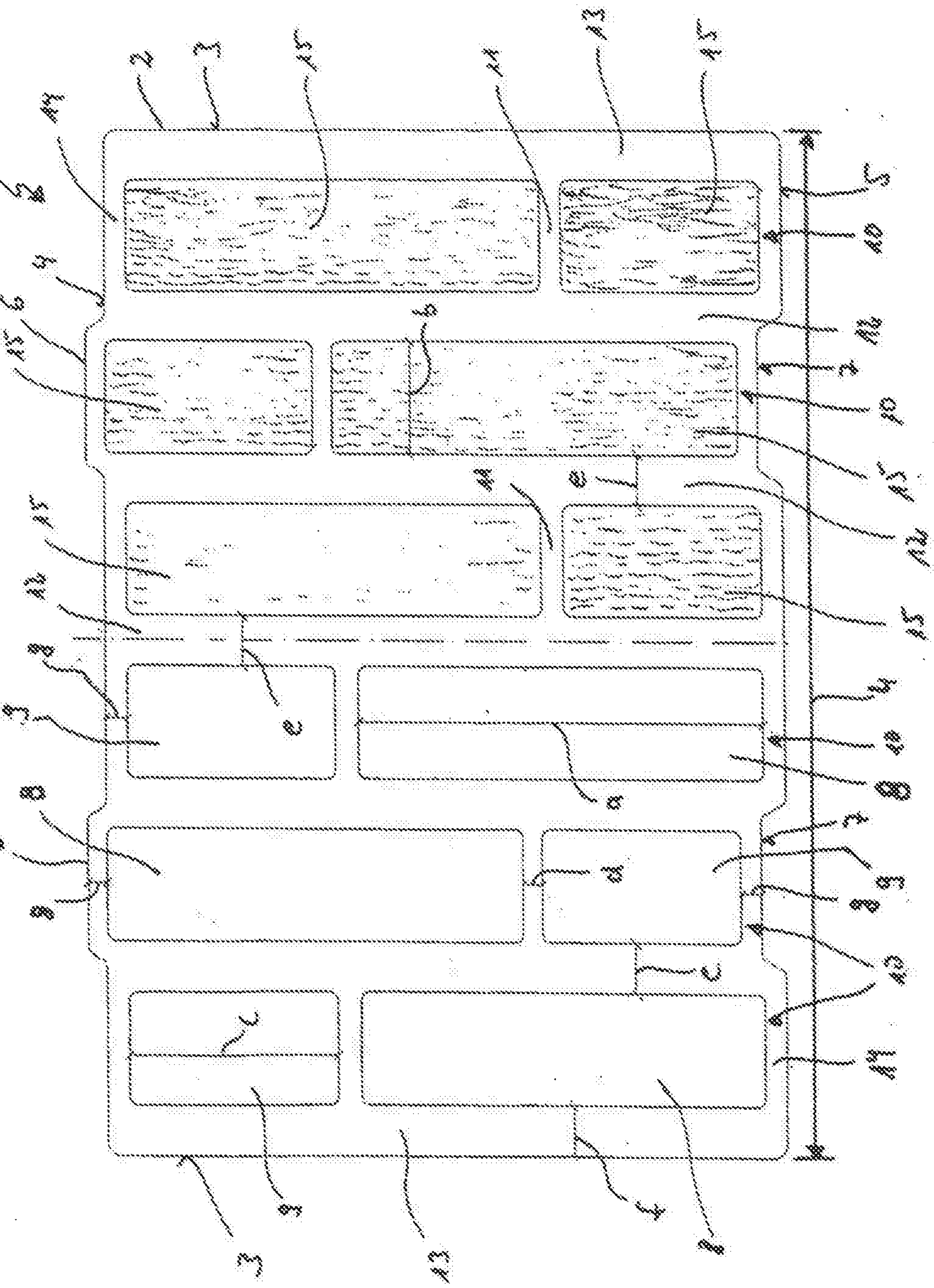


Fig. 3

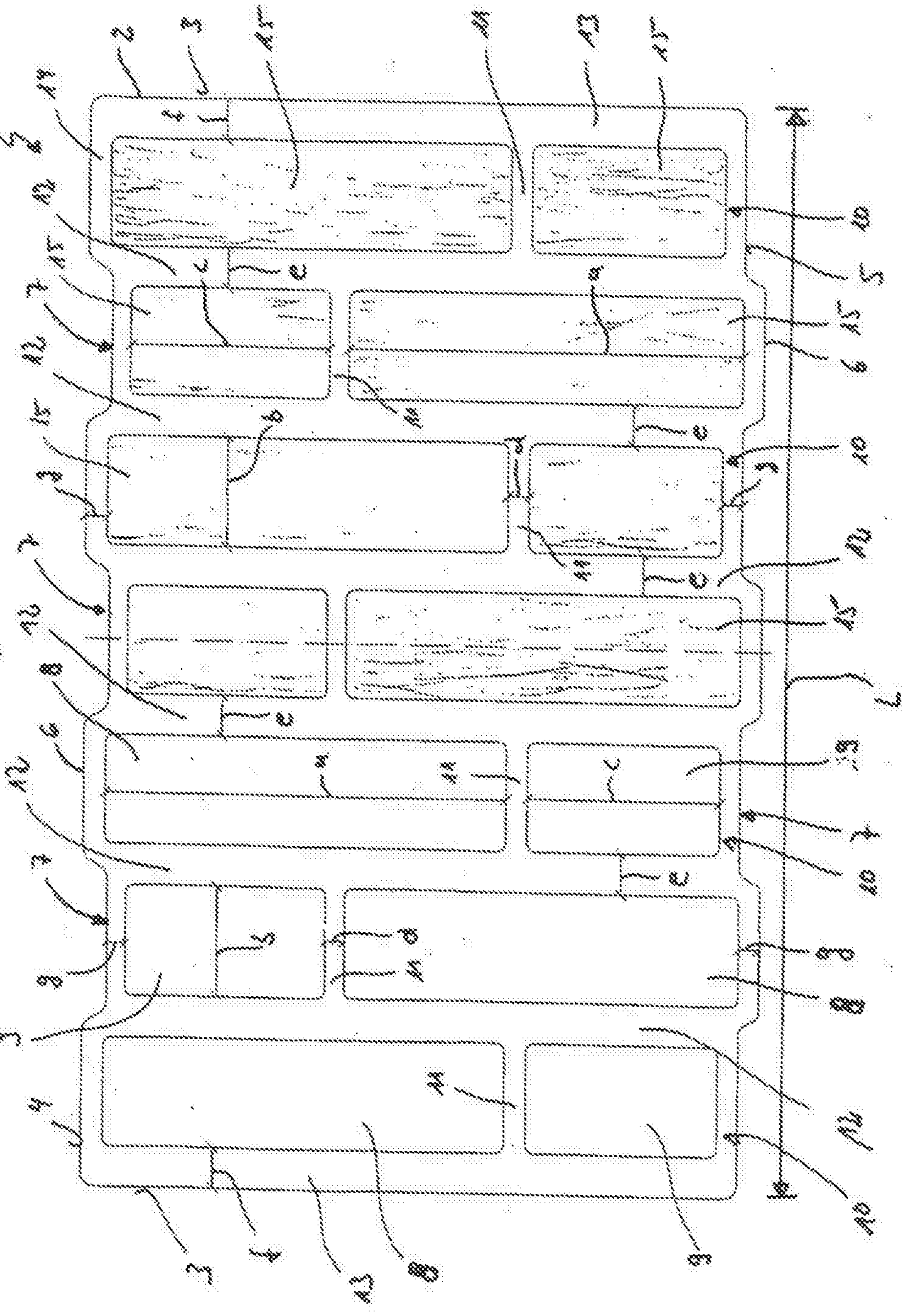


Fig. 4

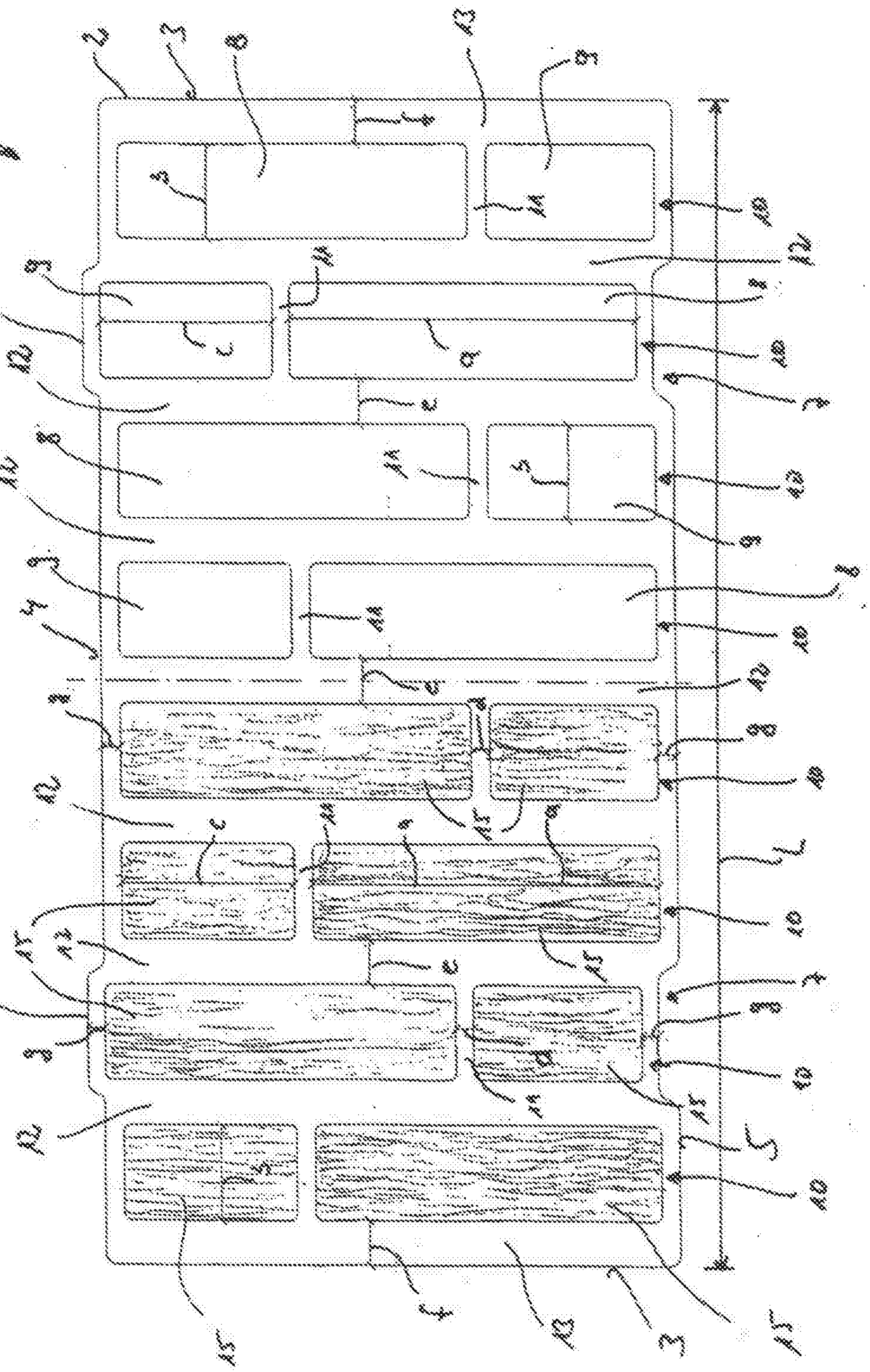


Fig. 5