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COMPONENT WITH AT LEAST ONE LIGHT SOURCE

The present invention pertains to a component with at least one light source.

The prior art includes a plurality of components with integrated light sources, which can be subsequently installed, for example, in a wall, a ceiling or a floor. A component of this type is described, for example, in GB2242455A.

In order to accommodate the component consisting, for example, of a metal frame in the wall, the ceiling or the floor, a corresponding recess has to be provided therein beforehand such that the installation of this light source is relatively elaborate.

The present invention therefore is based on the objective of making available a component with at least one light source, which ensures a simplified installation of the light source.

The above-defined objective is attained with a component according to claim 1.

In the context of the present invention, the term wood based material refers to all materials that are based on the natural product wood, but in which the wood is chopped into wood chips and processed by admixing other additives and binders. These accordingly are inter alia particleboards, fiberboards such as MDF or HDF boards and OSB boards, as well as of refined products thereof such as lightweight boards, composite honeycomb boards and

boards with plastic or melamine resin coatings. However, the term wood based material does not include solid wood products such as boards and planks or veneers.

Due to the utilization of a wood based material, the component according to the invention does not have to be elaborately installed into an existing wall, an existing ceiling or an existing floor because it already forms at least part of said wall, ceiling or floor in the first place.

It is therefore conceivable that the component according to the invention forms a sidewall or a shelf of a cabinet such that it is no longer necessary to subsequently and elaborately install a light source. In other words, the component according to the invention and the light source arranged in its interior form an installation unit that is already preassembled at the factory and can be used as a wall, ceiling or floor element, for example, in pieces of furniture or also in the construction of houses.

Preferred embodiments of the component according to the invention form the objects of the dependent claims and are described in greater detail below.

A special embodiment concerns the combination of particularly light or acoustically treated board products, for example lightweight boards or acoustic panels, with light sources.

The light sources used may basically consist of any light sources known from the prior art. However, it is particularly advantageous to use light sources that have

a small structural height and/or emit light that can be easily focused and/or have a low heat development and/or have a high light efficiency. These requirements are fulfilled to a high degree, for example, by LED light sources. Another advantage of the LED technology can be seen in that their color temperature can be influenced by means of corresponding controls. This makes it possible to easily influence the required light conditions as needed.

The components according to the invention can be used as wall elements, ceiling elements or floor elements. The integration into pieces of furniture (shelves, integration into cabinet walls for interior lighting) or into constructive components is also conceivable. It is particularly advantageous that the preferably supporting component can thereby also fulfill a lighting function.

A particular advantage of the component can be seen in the option of utilizing wood based materials for the board-like component. Wood based materials typically have only a low thermal stability and therefore complicate the installation of halogen light sources into pieces of furniture. The wood based materials used particularly also consist of multilayer boards, preferably three-layer boards.

According to the invention, the light sources are used in combination with lightweight boards. Lightweight boards are composed of cover layers consisting of conventional wood based materials and a central layer, which has a much lower density than the cover layers and consists, e.g., of cardboard honeycombs or a foamed central layer

(e.g. polyurethane foam, styrene foam, biofoams, lightweight board of lignocellulose material). Another option, which is not part of the invention, would be a lightweight board consisting of an integral board, the density of which is much lower in the center and increases toward the outside of the board. A lightweight board particularly has a density that lies below 450 kg/m^3, preferably below 350 kg/m^3.

Regardless of whether or not the component consists of a lightweight board, it is advantageous if the density of the wood based material of the component, particularly of the cover layer, increases outward in accordance with an embodiment of the invention in order to thereby ensure a high stability of the openings, through which the light is emitted outward from the component. This is particularly important in instances, in which the opening does not have inner surfaces that exclusively extend perpendicular to the respective plane of the component or the cover layer, but rather inner surfaces, for example, with a stepped and/or sloped profile. In a stepped and/or sloped profile, the wood based material only has a relatively low strength in the region of the narrowest cross section of the opening such that cracks or fractures in the region of the edge of the opening must be prevented at this location. The density in the zones near the surface therefore should amount, for example, to at least 750 kg/m^3, particularly at least 780 kg/m^3, preferably at least 800 kg/m^3.

The above-described openings may consist of bores or of slots. It would therefore be conceivable, for example, to realize sections with a plurality of symmetrically

arranged openings, particularly with several adjacently arranged rows of openings. Sections with several adjacently arranged slots would also be conceivable. Combinations of slot-shaped and circular openings may also be provided. When using LEDs, in particular, an optimal illumination is achieved with a square arrangement of several light sources such as, for example, five rows of five openings for a section with 25 LEDs. It would naturally also be conceivable to provide only individual rows of openings and LEDs. However, several sections of openings and LEDs may also be provided on the component, preferably in a symmetric arrangement.

As mentioned above, the openings may have different cross sections and be realized, in particular, circularly in the form of bores or in a slot-shaped fashion. Furthermore, a symmetric or asymmetric light emission can be achieved by suitably arranging the light-emitting element relative to the opening. In other words, the light-emitting element does not necessarily have to be arranged coaxial to the opening, but may also be offset relative thereto.

An LED combines the focusing ability with a small structural size in a particularly advantageous fashion. The light beam can therefore be focused in such a way that it is respectively emitted through an opening with a respective diameter or cross section between less than one and several millimeters (e.g., 0.05-10, particularly 1-8 mm, preferably 3-6 mm).

Since the light source is in accordance with an embodiment of the component according to the invention set back from the outer surface of the component, particularly the cover layer, relatively far in comparison with the opening cross section, this light source hardly is directly visible to an observer. In this way, the actual light source can be prevented from bothering the observer with direct light. A very homogenous and apparently diffuse lighting effect can therefore be achieved. The lighting effect is also influenced by the opening diameter at the point of the narrowest cross section or on the outer side of the component, respectively. For example, if the light-emitting element is arranged relatively close to the respective opening for construction-related reasons, the opening cross section has to be chosen as small as possible in order to prevent the light source from bothering the observer with direct light. Consequently, the clearance between the light-emitting element and the opening also has to be taken into account in realizing a certain lighting effect.

According to another embodiment of the component according to the invention, the clearance between the light-emitting element of the light source, particularly the LED, and the cover layer provided with the light emission openings amounts to more than 10 %, particularly more than 20 %, preferably more than 50 %, of the thickness of the component. As mentioned above, the cross section of the openings can be chosen very small. For example, a light-emitting element in the form of an LED with a reflector and a lens may be realized in such a way that the light beams emitted from the light-emitting

element once again converge in a focal point before they are ultimately emitted into the room in a very widely scattered fashion. It therefore suffices to provide only a very small opening cross section if the light-emitting element is arranged such that the focal point lies exactly in the region of the light emission opening in the component. In this way, largely glare-free lighting can be achieved with simple means.

Different options for respectively focusing or directing the light beam are available. On the one hand, this light beam may have a symmetric shape such that a surface extending perpendicular to the light beam is uniformly illuminated. On the other hand, asymmetric focusing can likewise be realized such that a deflection of the emitted light can be achieved. If the light source is used as a ceiling light, for example, this makes it possible to respectively generate higher luminous intensities on the surfaces to be illuminated or to deflect the light emitted from a peripherally installed ceiling light toward the center of the room or vice versa.

An LED light source requires electrical devices for controlling the luminous intensity and for supplying the LED with power. For example, these electrical devices may be installed centrally and supply different components that in turn feature several LED light sources. However, the integration of the electrical devices proved advantageous with respect to the application and installation. In this way, several components can be wired and connected to one another like conventional "lighting units."

In order to construct ceiling systems, it is preferred to use individual ceiling elements that can be installed into prepared mountings. Light sources are either subsequently installed or integrated into individual ceiling elements. However, lighting systems installed in this way are usually bothersome for the observer due to the extensive direct view of the light source. Even the use of reflectors only makes it possible to insufficiently resolve this bothersome effect. Consequently, reflections and an uneven illumination occur. However, this bothersome effect can be prevented by using the components according to the invention with light sources in a few of the ceiling elements.

The acoustic treatment of rooms and pieces of furniture can be very easily realized with boards made of wood based materials. According to the prior art, the cover layers are perforated for this purpose such that sound can penetrate into the interior of the board. Sound-reflecting and sound-absorbing elements in the interior of the board cause an acoustic absorption and prevent the penetrating sound from being emitted.

The perforation may feature bores with a diameter of one or several millimeters (for example 1-2 mm). However, products with a hole diameter of less than 1 millimeter are also conceivable. Experts also refer to such boards as acoustic boards or acoustic panels.

A special embodiment of the present invention concerns the combination of acoustic and illumination properties of a board, in which perforations of the acoustic board

are also used for the transmission of light beams. For this purpose, certain bores of the acoustic board are provided with light-emitting elements or light-emitting elements are arranged behind the openings in a grid that depends on the required luminous intensity. The choice of a suitable light-emitting element (e.g. LED) makes it possible to realize the required opening radius almost identical to the diameter of the perforation. In this way, optical drawbacks caused by bothersome uneven bore diameters can be prevented.

Other preferred embodiments with respect to the realization of the wood based material are described below.

As already indicated above, the wood based material is preferably realized in such a way that it has a very high homogeneity and density in the region of the zones near the surface. This makes it possible to produce precise recesses. When particleboards are used as wood based material, the required homogeneity can be achieved in that at least 50 %, particularly at least 75 %, preferably at least 95 %, of the particles in the zones near the surface have a maximum diameter of 0.5 mm.

According to another embodiment, the precision in the production of the openings can be additionally improved if the wood based material is provided with a coating containing synthetic resin. This coating has a much higher density than the wood based material and can be very precisely processed with tools of correspondingly high quality. The coatings used preferably consist of impregnants, which are compressed directly with the wood

based material board, or of laminates, which are bonded to the wood based material in a separate production step. The coating may have a thickness of at least 0.05 mm, particularly at least 0.15 mm, preferably at least 0.25 mm. The coating used particularly consists of conventional urea resins, melamine resins and phenolic resins, as well as mixtures thereof.

The light transmission region may be blackened in order to prevent bothersome reflections at this location. It may be advantageous to utilize a mass-colored wood based material for this purpose in order to prevent a separate production step. Numerous options in this respect are known from the prior art. For example, a dye, which in this case may also consist of graphite in order to achieve a blackening effect, can be admixed to the chips or fibers in addition to the binder.

In order to permanently avoid potential problems arising from the heat generated by each light source, it is preferred that the wood based material has an increased thermal stability - although these types of problems hardly occur to a noteworthy degree with the preferably used LEDs. Measures for achieving such an increased thermal stability are sufficiently known from the prior art. In lightweight boards, for example, such an increased thermal stability can be achieved by utilizing temperature-resistant central layer materials such as, for example, special cardboard honeycombs and by selecting a temperature-resistant adhesive for the bond between the central layer and the cover layers. It is therefore preferred to use wood based materials or lightweight boards with a thermal stability of at least

75 °C, particularly at least 100 °C, preferably at least 115 °C.

Example 1:

Integration of an LED into a lightweight honeycomb board.

Light sources in the form of several light-emitting elements are integrated into a lightweight board with an overall thickness of 19 mm, which consists of cover layers (particleboard with a thickness of 4 mm) on both sides and a cardboard honeycomb core. The honeycomb board is covered on all sides and has a decorative design on its surface and edges. In addition, this honeycomb board features on its rear side locking devices that allow its installation in the form of a ceiling lighting element, which is integrated into a paneled ceiling consisting of individual panel elements.

The element has a square shape and features 16 integrated light-emitting elements that are arranged in four rows of four elements. The lighting elements are preassembled on a carrier plate that also carries all electrical devices required for the operation of the light source.

The preassembled carrier plate features devices for being fastened in the honeycomb board.

The honeycomb board is prepared with bores that serve for the emission of the light beam and with millings for receiving the carrier plate. The carrier plate can now be inserted into the thusly prepared honeycomb board in a simple installation step and used as an element of a

paneled ceiling, which simultaneously fulfills a lighting function.

Example 2:

Integration of an LED into an acoustic board

An acoustic board features perforations that are arranged in a grid on at least one of its outer sides. Light-emitting elements of the type described in example 1 are integrated into the acoustic board in such a way that the light emission openings of the 16 light-emitting elements arranged in a grid correspond to perforations of the acoustic board. The light source is therefore integrated into the board in such a way that it is almost imperceptible.

The component according to the invention can be realized and enhanced in many different ways. In this respect, we refer on the one hand to the claims following claim 1 and on the other hand to the description of an exemplary embodiment with reference to the attached drawing. In the drawing:

Figures 1a)-d) show a sectional view of exemplary embodiments of a component according to the present invention, and

Figure 2 shows a top view of the component illustrated in Figures 1a)-d).

Figure 1 and Figure 2 show a component 1, in this case a lightweight board 2, with a first cover layer 1a, a

second cover layer 1b and a lightweight, honeycomb-shaped central layer 1c with integrated light source 4. The light source 4 is connected to the cover layer 1a by means of a carrier 7. The light source 4 features several LEDs 5 that emit light outward through assigned circular openings 6 in the cover layer 1b. The lightweight board features crossbars 3 for reinforcement purposes.

The exemplary embodiments illustrated in Figures 1a)-d) differ with respect to the design of the openings 6, particularly the profile of the inner surfaces 6a of the openings 6. In the exemplary embodiment according to Figure 1a), the inner surfaces 6a of the openings 6 are realized straight and extend perpendicular to the respective plane of the lightweight board 2 and the lower cover layer 1b.

However, it is also conceivable to provide the inner surfaces 6a with a stepped profile as is the case in Fig. 1b). In this case, the upper part of the inner surface 6a is set back relative to the lower part. Such a design of an opening 6 can be achieved, for example, by initially producing a blind hole with a relatively large diameter on the side of the lower cover layer 1b facing the LED 5 and subsequently producing a continuous bore with a smaller diameter in this blind hole. However, the described opening 6 can also be produced in a particularly advantageous fashion with a correspondingly shaped step drill. A stepped profile of the inner surfaces 6a has the advantage that relatively small opening cross sections can be realized, particularly in connection with focusing the emitted light beams in a focal point.

The smallest possible opening cross sections can also be achieved with a sloped profile of the inner surfaces 6a as illustrated, for example, in the exemplary embodiment according to Figure 1c). A sloped profile refers to a profile that is angled relative to the respective longitudinal plane of the lightweight board 2 and the lower cover layer 1b. Such a profile can be produced, for example, with a conical milling tool.

Figure 1d) shows a combination of a stepped and a sloped profile of the inner surfaces 6a of the openings 6. In this case, the upper part of the inner surface 6a is set back relative to the lower part and produced, for example, by initially providing a blind bore with a relatively large diameter in the lower cover layer 1b. The lower part of the inner surface 6a then protrudes in the direction of the center of the opening 6 in a plane that respectively extends parallel to the longitudinal plane of the lightweight board 2 and the cover layer 1b and is followed by a sloped section, in which the inner surface 6a is angled relative to the respective longitudinal plane of the lightweight board 2 and the cover layer 1b. In the present example, the sloped section can be produced, for example, with a conical milling tool. However, this opening 6 can alternatively also be produced with a correspondingly shaped step drill.

Figure 2 ultimately shows a top view of the component 1 in the form of a lightweight board 2 with a section formed by four respective rows of LEDs 5 and openings 6, which are arranged adjacent to one another and offset

relative to one another. It would naturally also be conceivable to arrange several such sections in one and the same component 1.

SZABADALMI IGÉNYPONTOK

ALKATRÉSZ LEGALÁBB EGY FÉNYFORRÁSSAL

1. Alkatrész (1) legalább egy fényforrással (4), ahol az alkatrész (1) egy anyaga egy fa alapanyagot tartalmaz, és a fényforrás (4) az alkatrész (1) belsejében van helyezve, azzal jellemezve, hogy az alkatrész (1) egy könnyűszerkezetes panel (2) két fa alapanyagból készült fedőlappal (1a, 1b) és egy középső résszel (1c) amelynek vastagsága kisebb, mint a fedőlapoké (1a, 1b), ahol a fedőlapok (1b) egyikén egy vagy több nyílás (6) van kialakítva.

2. Az 1. igénypont szerinti alkatrész (1), azzal jellemezve, hogy az alkatrész legalább egy forgácslapot, farostlemezt és/vagy OSB-lapot tartalmaz.

3. Az előző igénypontok egyike szerinti alkatrész (1), azzal jellemezve, hogy a nyílások (6) belső felülete (6a) be van feketítve.

4. Az előző igénypontok egyike szerinti alkatrész (1), azzal jellemezve, hogy a nyílások (6) belső felületének (6a) egy lépcsős vagy ferde lefutású.

5. Az előző igénypontok egyike szerinti alkatrész (1), azzal jellemezve, hogy a nyílások (6) furatokból és/vagy hornyokból vannak kialakítva.

6. Az előző igénypontok egyike szerinti alkatrész (1), azzal jellemezve, hogy a fényforrás (4) legalább egy fénykibocsájtó elemet, különösképp legalább egy LED-et (5) tartalmaz, ahol minden fénykibocsájtó elem, különösképp minden LED (5) előnyösen a nyílások (6) egyikéhez van hozzárendelve, és ahol a nyílás (6) előnyösen egytengelyűen van elrendezve a fénykibocsájtó elemmel, különösképp a LED-del (5).

7. A 6. igénypont szerinti alkatrész (1), azzal jellemezve, hogy a nyílás (6) átmérője 0,5-10, különösképpen 1-8 mm, előnyösen 3-6 mm.

8. A 6. vagy a 7. igénypont szerinti alkatrész (1), azzal jellemezve, hogy a fénykibocsájtó elem, különösképp LED (5) és a fedőlap (1b) közötti távolság több mint 10%-a, különösképp több mint 20%-a előnyösen több mint 50%-a az alkatrész (1) vastagságának, ahol különösen előnyösen a fénykibocsájtó elem különösképp a LED (5) a fedőlappal (1b) érintkezik.

9. Az előző igénypontok egyike szerinti alkatrész (1), azzal jellemezve, hogy az alkatrész (1) egy akusztikai panel.

10. Az előző igénypontok egyike szerinti alkatrész (1), azzal jellemezve, hogy az alkatrész (1), különösképpen a fedőlap (1b) fa alapanyagának a sűrűsége belülről kifelé növekszik, különösképp legalább 750 kg/m^3 előnyösen legalább 780 kg/m^3 különösen előnyösen legalább 800 kg/m^3 értékig.

11. Az előző igénypontok egyike szerinti alkatrész (1), azzal jellemezve, hogy az alkatrész (1), különösképpen a fedőlap (1b) fa alapanyaga legalább a keresztmetszetének külső 30%-ában különösképp 20%-ában előnyösen 10%-ában, a fa alapanyag teljes szilárdsága miatt, a részecskék összességéhez képest legalább 50% különösképp legalább 75% előnyösen legalább 95% maximum 0,5 mm átmérőjű részecskét tartalmaz.

12 Az előző igénypontok egyike szerinti alkatrész (1), azzal jellemezve, hogy az alkatrész (1), különösképpen a fedőlap (1b) fa alapanyaga egy műgyanta tartalmú bevonattal van ellátva, amely különösképp impregnálással, előnyösen közvetlen a fa alapanyagba van felvive, vagy egy bevonó anyagként van kialakítva, amely előnyösen egy különálló munkafolyamat során a fa alapanyaghoz van ragasztva.

13. A 12. igénypont szerinti alkatrész (1), azzal jellemezve, hogy a bevonat vastagsága legalább 0,05 mm különösképp legalább 0,15 mm, előnyösen legalább 0,25 mm.

14. Az előző igénypontok egyike szerinti alkatrész (1), azzal jellemezve, hogy az alkatrész (1) különösképpen a fedőlap (1b), fa alapanyagának részecskéi egy színezőanyaggal, különösképp grafittal vannak beszínezve.

15. Az előző igénypontok egyike szerinti alkatrész (1), azzal jellemezve, hogy az alkatrész (1) különösképpen a fedőlap (1b) és/vagy a könnyűszerkezetes panel (2), különösképpen a középső rész (1c) legalább 75°C-ig különösképp legalább 100°C-ig előnyösen 115°C-ig hőálló.

A meghatalmazott:

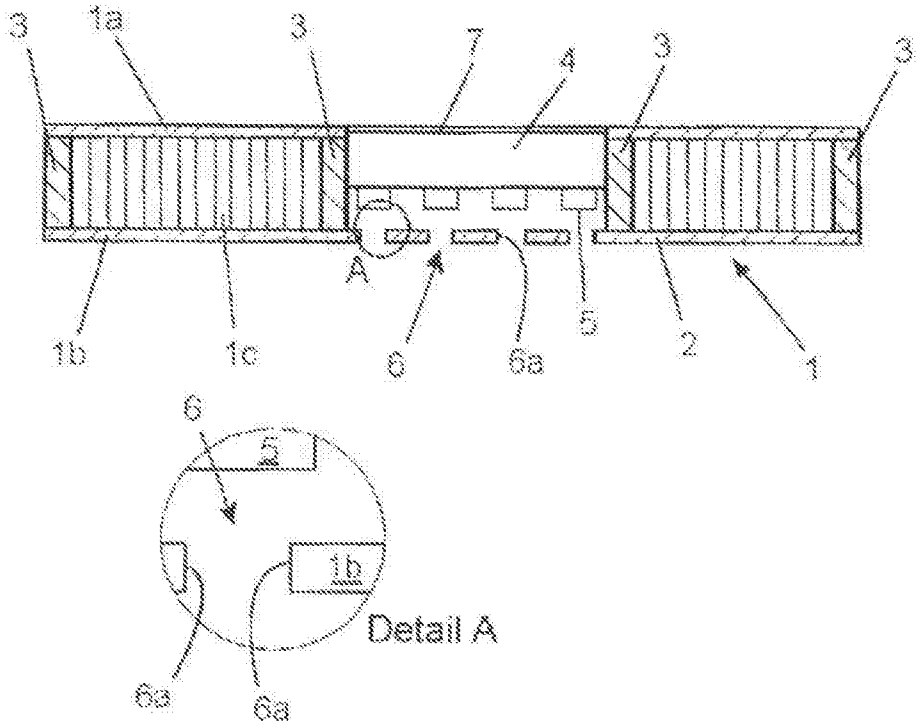

Fig. 1a)

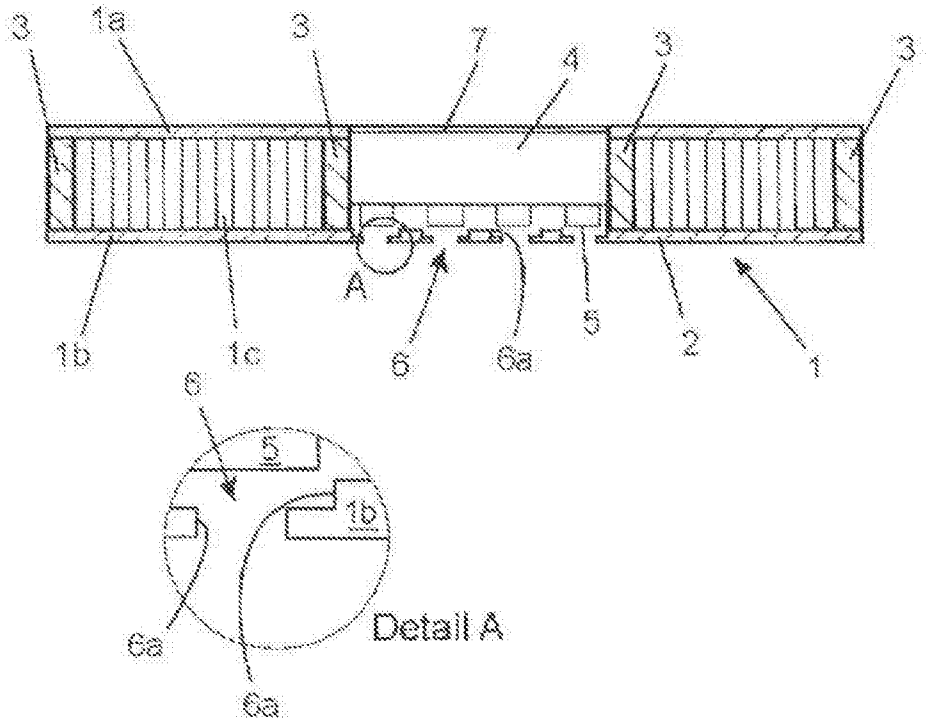

Fig. 1b)

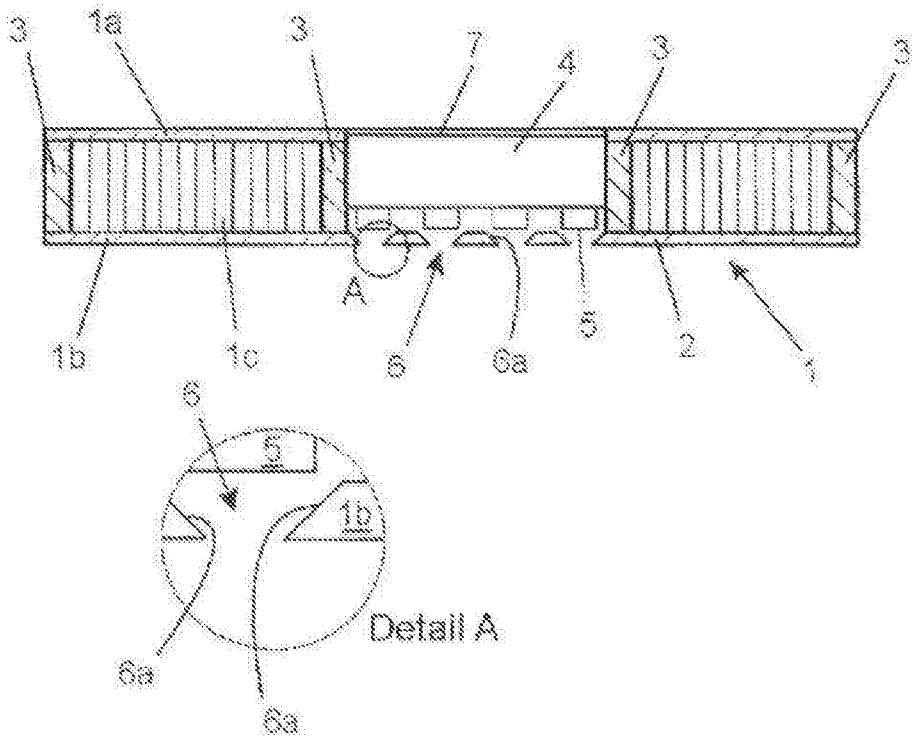

Fig. 1c)

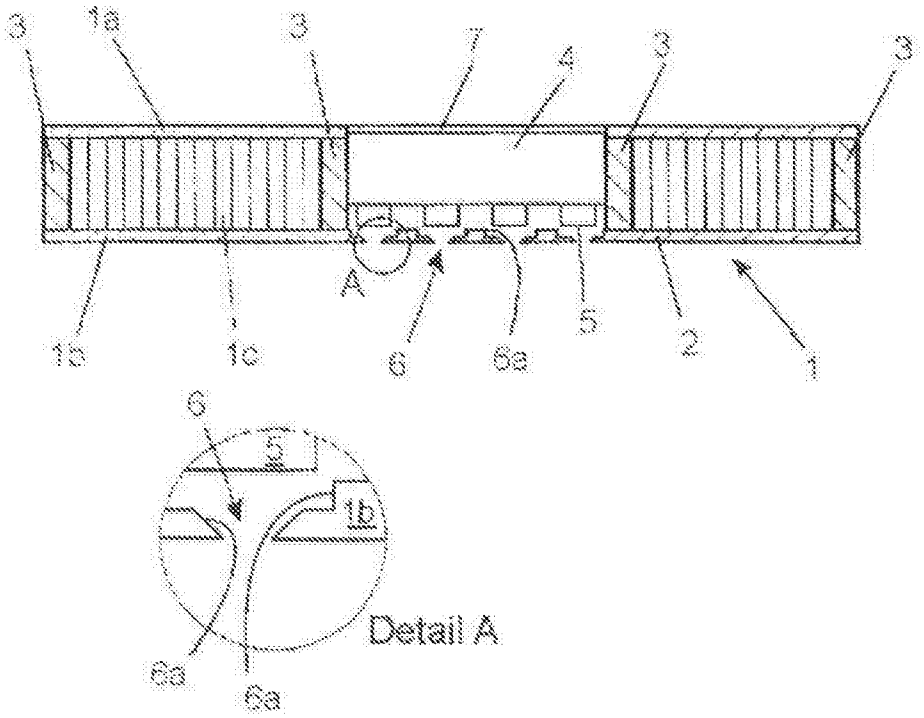

Fig. 1d)

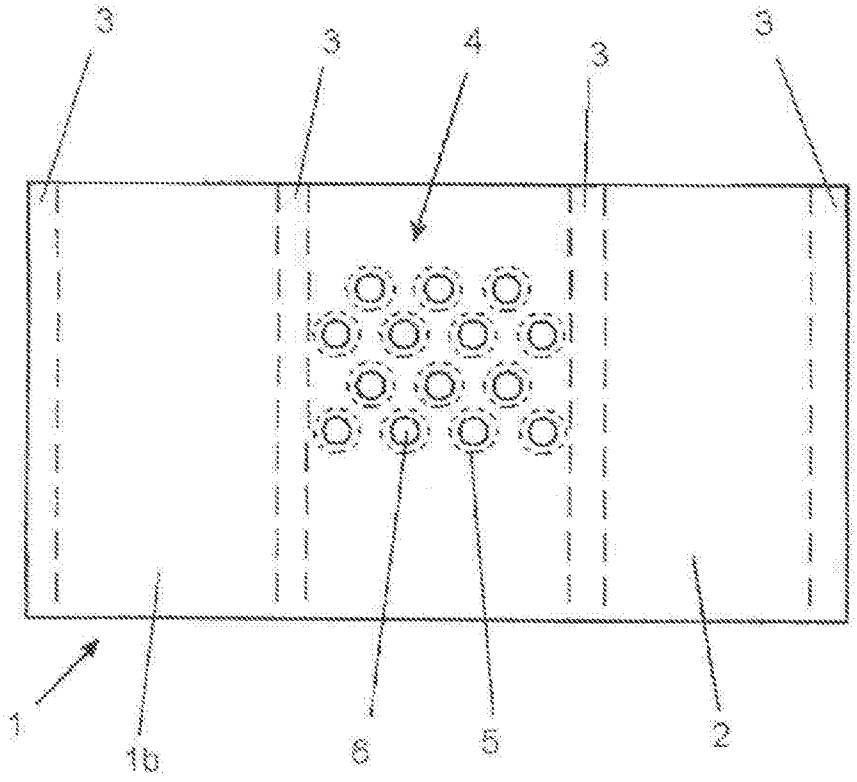

Fig. 2