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Light Element and Method of Manufacturing the Light Element

The invention relates to a light element containing at least two translucent panels between which a sheet-like textile is arranged, and a method of manufacturing said light element.

Such light elements with panels made of translucent plastic material are needed and used to a large scale for the illumination in or on roofs of, for example, manufacturing halls, factory buildings but also office buildings. Light elements, however, can be provided not only on roofs, but also, for example, on walls of a building or on self-supporting carriers.

It is various shapes of light elements that are known, for instance, a panel shape in which the panels substantially extend in one plane and form “light bands” as they are called. A further example is a dome shape, wherein the panels extend in a substantially curved shape and form “light domes” as they are called. The panels can also be provided at an angle with respect to each other and thus form a “saddle light band” as it is called. Translucent panels are customarily designed as sealed cavity elements, such as extruded web panels, e. g. double-web panels.

According to DIN 5034, indoor illumination, e. g. by means of light elements, is supposed to be glare-controlled. It is therefore known to use opalized plastic for the translucent panels, which, however, involves undesirable light loss. Since, in addition, DIN 4102, part 7, stipulates that it must be prevented that elements of skylight structures fall down in the event of fire, EP 1 332 261 B1 suggests the use of fabric-like material between two double-web panels combined in a sandwich-type construction.

In EP 1 332 261 B1 the fabric-like material is loosely put between the double-web panels so that it is independent of changes in length of the double-web panels, e. g. by thermal expansion. Thus, damage of the fabric-like material by tensile stress can be prevented. For this purpose, a rigid spacer is provided between the double-web panels. The inserted fabric-like material then has a small distance of, for example, 0.5 to 2 mm to the double-web panels and is freely movable between the sealed cavity thus formed between the upper and lower panels. If the panels of the light element expand as a result of heat exposure, the fabric-like material is not affected thereby, it is neither clamped at its edges nor at any other place of the panels, so that tensile stress does not occur in the fabric-like material.

In order to ensure constant translucency for the skylight construction, it is necessary to protect the sealed cavity against the entry of water in order to prevent impairment of the

optical properties of the light element by e. g. condensation or penetrating (back)water. What is provided in EP 1 332 261 B1 in this respect sealing the spacer in addition by means of a sealing agent applied from outside. In addition to the spacer, however, this requires an additional sealing agent and thus high expenditure and has furthermore proved to be error-prone in practice.

Thus, it is an object of the invention to provide a light element and a method of manufacturing a light element, which can be manufactured easily and can ensure tightness during the life cycle of the light element.

According to the invention, this problem is solved by the light element manufactured according to the invention and according to the features of claim 1 in that an elastic sealing tape is provided which is arranged along edges of the panels of the light element between the panels. In the light element of the invention, the distance of at least two panels of the light element is adjusted by the elastic sealing tape arranged between said panels. A sheet-like textile arranged between the respective panels is thinner than the distance resulting between the panels. The elasticity of the sealing tape is selected such that at least if the light element is horizontally arranged the weight force of the upper panels resulting therefrom merely causes a compression of the sealing tape, which results in a distance between the two panels which is greater than the thickness of the sheet-lie textile. This ensures that, independently of the position of the installation, unless additional forces which move the at least two panels towards each other occur due to supports or the like, the two panels which are arranged adjacent to the sheet-like textile are spaced apart from each other and thus enable free availability of the sheet-like textile arranged in-between. If the arrangement of at least two panels forming a light element is inserted into a support, for example a U-shaped section, it is ensured thereby that the panels are held in abutment at the sides of the U-shaped section. Thus, the distance resulting between the two panels for the assembled element is adjusted by the section in this case. This similarly applies to screw fittings, which also move the panels towards each other.

By means of the subject-matter of the invention as claimed in claim 1, it is possible by simple measures to achieve a light element wherein a sealed cavity for receiving the sheet-like textile without clamping is provided by the function of the sealing tape forming a distance, wherein the sealing tape is at the same time in a position to seal the cavity formed between the panels. In other words, an elastic sealing tape can be used as a sealing spacer, and in this way especially the separate use of spacers with addition sealing agents can be avoided. Due to the elasticity or elastic deformability of the sealing tape, it is possible to deform the latter in a defined manner in order to ensure a sealing function and to improve the solutions known

from the state-of-the-art, while the sealing tape can be adjusted to a defined thickness, as a result of which a defined height of the sealed cavity can be achieved.

The light element according to the invention has a simplified structure, reduced production effort and thus production expense and improves the manageability of the light element because an elastic spacer sealing as such is used. This and further advantages will be explained in more detail in the description.

It is an advantage if one side of the elastic sealing tape is adhesively connected to one of the panels at least in sections. The sealing tape thus can be placed on the body and is fixed with respect to said panel in a fixed relative position. This improves manageability. Furthermore, the sealing effect of the sealing tape can be improved by gluing. In the event of an elastic deformation of the sealing tape, the glue can work against a retraction of the sealing tape. The forces required for maintaining the elastic deformation of the sealing tape therefore can be reduced.

It is a further advantage if a double-sided adhesive elastic sealing tape is used, that is, two sides of the elastic tape are adhesively connected to both panels at least in sections. Further to the advantages described in the foregoing, double-sided adhesion makes it possible to seal the light element, for example at a front side, in a particularly effective and durable manner so that in the event of rain the entry of backwater can be prevented in a reliable manner. Moreover, double-sided adhesion improves the manageability of the light element until its final assembly. The panels are fixed relatively to each other by adhesion of the sealing tape, and a displacement of the panels with respect to each other, for example during transportation to the construction site and during assembly is prevented.

It is a further advantage if the complete elastic sealing tape, which is arranged between 2 adjacent panels of the light element comprises a plurality of sealing tape sections which are arranged between the panels, wherein joints occurring between the plurality of sealing tape sections are joined and, in particular glued. This makes it possible to assemble the sealing tape by piece goods or products available by the meter and thus to use off-the-shelf or standard products. This reduces costs while any desired shape of the sealing tape can be achieved at a minimum of variety of goods. It is possible, for instance, to provide straight sealing tape sections at an angle with respect to each other, so that, for example, a rectangular sealing tape can be achieved. By adhesion of the joints, that is, adjoining ends of the individual tapes, it is possible to ensure tightness of the adhesive tape.

It is a further advantage if, in addition to the elastic sealing tape, an adhesive tape is engaged around the edge of the at least two upper panels so that the sealing tape arranged between the panels remains compressed until the assembly time of the elements. By compression of

the sealing tape the sealing effect is enhanced. Furthermore, the inclination of the sheet-like textile with respect to the drapery can be decreased by the reduced height of the sealed cavity, which improves the manageability of the light element. By using an adhesive tape for generating the compression the expenditure can be reduced and edge protection of the light element can be achieved. At the same time a protective foil, such as an anti-hail protective foil, can be applied on one outer surface of the light element by means of the adhesive tape. By use of the adhesive tape, that is, a flexible means, for generating compression of the sealing tape, the sealing tape can be compressed to a final distance dimension by a further clamping device for assembly without the adhesive tape having to be removed before. As a result, a sufficient sealing effect is ensured at all times. If the sealing tape is compressed immediately after the manufacture of the light element by applying the adhesive tape, it is furthermore possible to handle the light element in any random position without the panels getting out of place. Thus, the adhesive tape also serves for transport protection and position stability.

In the following, the invention will be described and explained in more detail by means of the exemplified embodiments represented in the figures and further exemplified embodiments which are not represented.

Fig. 1a shows a cross-section of a light element of a first exemplified embodiment without additional compression by means of an adhesive tape.

Fig. 1b shows a cross-section of the light element of the first exemplified embodiment with previous compression.

Fig. 2 shows a perspective view of a light element in an intermediate step of the manufacture without upper body.

Fig. 3a shows a detailed view in plan view of the light element in an intermediate step of the manufacture without upper body with sealing joint.

Fig. 3b shows the detailed view with another sealing joint.

Fig. 3c shows the detailed view with a further sealing joint.

Fig. 4 shows a cross-section of a light element of a second exemplified embodiment with compression by assembly.

Fig. 5 shows a cross-section of a light element of a third exemplified embodiment with compression by assembly.

Fig. 6 shows a cross-section of a light element of a fourth exemplified embodiment with a plurality of sealed cavities.

Fig. 7 shows a cross-section of a light element of a fifth exemplified embodiment after assembly.

Fig. 8 shows a longitudinal section of a light element of a sixth exemplified embodiment after assembly.

Fig. 9 shows a cross-section of a light element of a seventh exemplified embodiment after assembly.

It is to be noticed that the following comments proceed on the assumption that the light element contains only 2 panels. The same is true in analogy in case that the light element contains more than 2 panels.

Figs. 1a and 1b show the first exemplified embodiment of the invention in a cross-section. The light element 10 according to the invention of said exemplified embodiment comprises double-web panels 1, 2 as examples of translucent panels 1, 2. The panels 1, 2 can be made, for example, of polycarbonate, PVC, PMMA, PET, glass or other materials. Special preference is given to polycarbonate because it has good mechanical properties such as high resistance and impact strength. Instead of double-web panels 1, 2, it is of course suitable bodies such as panels or domes of any shape that can be used; for instance, simple web panels, solid panels or multi-web panels, but also thermal glass. Moreover, the number of panels 1, 2 arranged next to or above each other is not limited, but rather depends on the envisaged purpose of use, shape of panels or the like and can be substantially random.

Between the two double-web panels 1, 2 of the example, it is a spaced elastic sealing tape 4 that forms a sealed cavity H. In said cavity H, a sheet-like textile 3 is located. Apart from serving as protection against pieces falling down in the event of fire, said sheet-like textile 3 serves, as is commonly known, to change light coming in from outside, from above in Fig. 1, e. g. to scatter, so that the light emitted from the lower side in Fig. 1 can be emitted glare-free or at least with restricted glare. Furthermore, incoming infrared radiation can be reduced.

For this purpose, a plurality of sheet-like textiles 3 is suitable. What has been found to be particularly suitable is fleeces and preferably fabrics which are made e. g. from fiberglass. In addition to good optical properties, they are also characterized by an advantageous thermal resistance, so that it can be ensured that the light element 10 is fireproof. Moreover, it has proved to be advantageous to reinforce the sheet-like textile 3, referred to also as fabric 3 in the following, mechanically, e. g. by means of metal fibres, in order to further increase

disruptive strength. If, for example, the light element 10 is penetrated and the upper panel 2 breaks locally, the fabric 3 can bear a comparatively higher load and/or distribute the latter to a greater effective area and thus decrease the surface load of the lower panel 1.

Besides the use of fiberglass, it is also recommendable, in particular from an economic point of view, to use or add various natural fibres, such as bleached hemp or linen fibres, because they are easily processed and have good insulating properties.

As mentioned before, the sheet-like textile 3 is inserted into the sealed cavity H. The height of the sealed cavity in a light element that has not yet been assembled is 50% to 100% greater than the thickness of the elastic sealing tape 4 to be described. This allows further compression of the elastic sealing tape 4 during the assembly of the light element on a building.

In order to achieve sealing by simultaneously maintaining the distance at low expenditure, which is the problem to be solved, the elastic sealing tape 4 is provided substantially as a solid mass, in contrast to sealing agents which are applied in a liquid or paste-like form. As will be described in more detail, this allows elastic deformation or compression of the sealing tape 4 and thus the construction of surface pressure having a sealing effect by impinging compressive force on the panels 1, 2 and by means of them on the sealing tape 4. The light element with a sealing tape 4 compressed accordingly by means of an adhesive tape 5 is shown in Fig. 1b. During manufacture, a force is generated which moves the two panels towards each other. Thus, the sealing tape is elastically deformed. In this state, the adhesive tape is applied such that it embraces the edges of both panels 1, 2. The mechanical strength of the adhesive tape prevents, after releasing the panels 1, 2, that the elastic sealing tap relaxes beyond a dimension predetermined by the adhesive tape.

As shown in Fig. 2 by way of example, the sealing tape 4 fully engages on the lower panel 1 along its edges R. In other words, the sealing tape 4 is gapless. For this purpose, it is possible to use a designed sealing tape 4 prefabricated in the desired shape, which reduces the expenditure in assembly. For this purpose, the shape required for generating the sealing tape 4 is, for example, punched out of a two-dimensional light element. This, however, causes higher costs of manufacture due to waste occurring as a result of cutting. Therefore, as an alternative, the sealing tape 4 can be composed of individual sealing tape elements (sealing tape sections), as illustrated in Figs. 3a-c. These figures are examples of joints of the sealing tape sections 4.1 and 42 of various geometrical shapes and shown schematically as broken lines. In this case, the joints are inserted in a gapless manner, preferably by gluing. Depending on the material used for the sealing tape 4 and/or the sealing tape sections 4.1, 4.2, however, welding of the joint ends can also be an advantage because this enables shorter

cycle times of processing and faster processability. Adhesion in turn is simple and can be carried out by few means and measures.

Attention is to be paid to the fact that the glued or welded joints have sufficient tensile strength in the sealing tape plane, that is, have sufficient strength in the event of transverse strain of the sealing tape 4 so that compression and thus deformation of the sealing tape 4 does not result in a removal or rupture of the joint. This can be achieved, for example, by the selection of a suitable glue, a high amount of glue or uniform welding. It is preferred to choose cold-tack strength at least as high as the tensile strength of the sealing tape material.

As mentioned before, the sealing tape 4 must be elastic so that it can be compressed in a defined manner and has a sealing effect. For this purpose, it is in particular (rubber) elastic materials that have proved to be of an advantage. What is preferably used is a foam material or cellular soft plastic. Attention is to be paid, however, to the fact that a porosity of the material is sufficiently small to prevent water from creeping along an interface between the double-web panel 1, 2 and the sealing tape 4 as well as waler from being sucked into the material. These requirements are met e. g. by an elastomer, such as a (synthetic) natural rubber, which is known per se.

In the horizontal light element 10 shown in Fig. 1a, the sealing tape 4 is subject to a weight force of the upper panel 2 (in the event of more than 2 panels by all panels arranged above). This load deforms the sealing tape 4 according to its elastic deformability; by the pressure force taking effect it is compressed in the direction of thickness and/or height, which results in an expansion in the transverse direction or in the plane. As described in the introduction, the sheet-like textile 3 shall have the possibility to deform independently of the panels 1, 2 (e. g. by thermal expansion), and shall have no frictional connection with the panels 1, 2. For this purpose, the sealing tape 4 must have such a small elasticity or such a small elastic deformability that it deforms by the load of the weight force of the upper panel 2 to such an extent that the distance of the panels 1, 2 ensured by the sealing tape 4 is greater than the thickness of the textile 3. At the same time, however, the sealing tape 4 must have such a high elastic deformability that it can be compressed to the desired thickness by using such a little force which can be applied by an adhesive tape 5 and/or a clamping device 20 and can be maintained without damaging the light element 10. Preferably, the thickness of the sealing tape 4 is almost identical with that of the sheet-like textile 3 at a compression of 50 ... 67 % of its initial thickness or height. If the sealing tape is compressed to approximately 50 ... 67 % of its thickness, tests have shown that the sealing effect of the sealing tape is optimal in many cases. Depending on the material of the sealing tape, however, other compression values are also appropriate.

The remarks made in the foregoing refer to an arrangement in which the sealing tape 4 is arranged only at the edges of 2 panels 1, 2 arranged in parallel to each other. It is, however, also further sealing tape sections that can be provided for a subdivision of the complete surface. The relevant embodiment, in which the webs are provided inside at the edge of the sealing tape 4 extending around the panels is conceivable. Such webs are to be provided in particular if screwing has to be provided for fixing the light element inside the surface.

In the following, a method is described by which the light element 10 can be manufactured.

First of all, as shown in Fig. 2, the elastic sealing tape 4 is placed with its bottom on the surface of the lower panel 1, which is directed upwards. Preferably, the sealing tape 4 can be glued to the panel in sections or fully, e. g. in the area in which backwater is to be expected in the event of an inclined assembly in a U-shaped rail or in which backwater is to be expected due to its particularly exposed position.

By this adhesion, the sealing effect can be further increased. It is also possible, however, to fix the sealing tape 4 on the lower panel 1, so that the latter maintains a certain position in which it does not get out of place anymore. It is to be observed that, if a panel 1, 2 made of polycarbonate is used, a glue which is compatible is to be used.

"Gluing" as claimed according to the invention is understood to be also any other suitable form of adhesive connection. In addition to the application of glue, the surface of the sealing tape 4 can also be thermically or chemically activated, e. g. melted or dissolved, in order to achieve an adhesive connection with a panel 1, 2. Pre-treatments of the panel 1, 2 and/or the sealing tape 4 are also conceivable, which increase the wettability, for example by means of plasma treatment or Corona treatment.

The sealing tape 4 of the light element 10 is preferably provided spaced apart on all sides from the edges R of the panels 1, 2, as shown in Fig. 1a, so that the sealing tape 4 deformable by compression does not protrude beyond the edge of the double-web panel 3 in its transverse expansion. Thus, damage of the sealing tape 4 when handling the light element 10 can be avoided. It is equally conceivable, however, to provide the sealing tape 4 flush with the edges R, so that the protrusion of the sealing tape 4 resulting from the compression can act as laterally sealing spacer in the assembly in a rail or frame. In this case, a lateral protective device is preferably provided for protection of the sealing tape 4; this can be formed, for instance, by the adhesive tape 5.

In a next step, the fabric 3 is inserted into a surface F on the lower double-web panel 1 restricted by the sealing tape 4, the surface F corresponding with the sealed cavity H of the finished light element 10. Preferably, the fabric 3 is dimensioned such that it has a distance of

0.5 to 2 mm from the sealing tape 4 at all sides, so that the fabric 3 is not clamped in the event of a transverse expansion of the sealing tape 4 by compression. If, however, a sealing tape 4 is used whose material has a small transverse expansion, the fabric 3 can also be provided flush with the sealing tape 4 for optimum coverage of the surface F. The optical properties of the textile 3 can be ensured uniformly along the complete surface F in both cases. The textile 3 is fixed in the known manner as in a light element whose panels 1, 2 are connected by means of rigid spacers.

In the next step, the upper panel 2 is placed on the sealing tape 4. In analogy with what has been said in the foregoing, it can be an advantage to provide adhesive connection at least in sections. Preferably, the upper panel 2 is arranged flush with the lower one. If, however, a saddle design is to be enabled, for instance, a parallel alignment of the lateral surfaces of the panels 1 is sufficient.

In a last method step of manufacturing the light element 10, the adhesive tape 5 is applied to the side portions of the panels 1, 2. It is fixed to the panels 1, 2 under pretension so that the sealing tape 4 is compressed to the second thickness. The adhesive tape 5 is schematically shown in Fig. 1b. By compression of the sealing tape 4 by a certain dimension or to the second thickness and the resulting surface pressure on the interfaces between the sealing tape 4 and the panels 1, 2, the sealing effect of the sealing tape 4 can be further increased. Sealing is improved above all in that a higher surface pressure is achieved between the sealing tape 4 and the panels 1, 2 by the sealing tape 4 being compressed more strongly.

In the exemplified embodiment, the adhesive tape 5 is first fixed at an outer surface of the upper panel 2, the light element 10 is pre-compressed to the desired dimension by means of pressing, manually or by tension at the adhesive tape 5 partly fixed and finally attached to the lower panel 1 in this condition. The adhesive tape 5 is preferably an aluminium adhesive tape 5 with sufficient tensile strength. If a press is used for applying the adhesive 5, which presses the two panels 1, 2 onto each other, the attachment of the adhesive tape 5 can of course also be carried out at the lower panel 1 first.

By increasing compression by means of the adhesive tape 5, preferably immediately after the manufacture of the light element, it can be ensured that the panels 1, 2 are secured against getting out of place also without using a glue between the sealing tape 4 and the panels 1, 2. As explained, the sealing function of the sealing tape 4 is increased by the compression. If glue is applied between the sealing tape 4 and the panels 1, 2, this protection by the adhesive tape 5 results in the fact that the adhesive layer can harden and/or develop adhesive force in an undisturbed manner and in a defined relative position of the panels 1, 2 with respect to each other.

In the course of the attachment of the adhesive tape 5, an anti-hail or transport protection foil can furthermore be applied at the outer surfaces of the panels 1, 2 and be fixed by means of the adhesive tape 5. This saves additional, separate means of attachment for applying such an optional protective foil.

Moreover, the adhesive tape 5 serves for protecting the light element 10 at its side portions against external influences during transport, handling and storage because the edges of the light element 10, which are particularly sensitive, are shielded e. g. against shock or sharp objects. Damage of the light element 10 thus can be prevented effectively.

The transportable light element 10 manufactured in this way can now be handled and stored in any random position. As is shown particularly clearly in Fig. 1b, the sealed cavity H, in which the fabric (textile) 3 is found, has been decreased by the compression in the height and/or normal axis. It is preferred that the sealing tape 4 is reduced to the second thickness by means of this compression, which almost conforms to that of the fabric 3, that is to say is only insignificantly greater. Thus, it can also be prevented effectively that the fabric 3 gets out of place by a change of position of the light element 10 because it does not have the possibility of forming folds or drapery due to the spatial restriction.

A third distance between the two panels 1, 2 to be set finally can be provided, which, however, is only achieved at the final assembly, during which further compressing of the elastic sealing tape 4 is triggered by the attachment at the building and which will be described in the following.

The light element 10 according to the invention, e. g. as simple light band, can be assembled in the known manner. In an exemplified embodiment, a clamping device 20 arranged on the building side is provided, as shown in Fig. 4.

This clamping device 20 provided on the building side and shown in a highly simplified manner consists e. g. of a rail 23 or frame which is arranged on a foundation 21, such as the roof of a building, and fixed thereon or thereto. In this example, the rail 23 comprises a bar 24 with threads. The light element 10 can be laid onto the rail 23 and fixed in the bar 24 by means of one or a plurality of screw(s) 22. For this purpose, screws can be screwed through the light element 10 at sealing tapes 4 positioned outside; it is also conceivable, however, to provide a sealing tape 4 positioned further inside and to screw the screws through this sealing tape 4, as is illustrated in Fig. 4. Light elements 10 with a plurality of sealed cavities H subdivided by sealing tapes 4 can make sense primarily if high distances are to be bridged and the subdivision is supposed to increase bending rigidity of the light band 10. In any case, it is an advantage to guide the screw 22 or any other fixing aid through the sealing tape 4

because this does not hamper the sealing of the sealed cavity(ies) H because the sealing tape 4 has a sealing effect also with respect to the screw 22.

In Fig. 4, the screw 22 is guided through one of the chambers of the web panel 1, 2 so that the screw can be screwed in more easily. It is also conceivable, however, to guide the screw 22 through the full material of the webs of the double-web panels 1, 2. Customarily, further known covering products are used which also ensure that the screw hole is sealed. For the third distance to be set to a defined dimension, the screw 22 is to be tightened at a torque limited accordingly. As an alternative, a spacer can be provided, so that the screw 22 can be screwed into the light element until abutment with the spacer at maximum.

Fig. 5 shows, by way of example, the use of a plurality of light elements 10 as claimed by the invention. In this example, they are provided spaced apart from each other and comprise the structure of the clamping device 20 as described in the foregoing. As can be seen in Fig. 5, the screws 22 here are guided through the sealing tape 4 positioned outside at the edge of the light element 10. Moreover, the space occurring between the light elements 10 is covered by a cover 25 which is connected to the panels 2 in a sealing manner, so that wetness cannot enter into the space.

In Fig. 7, an alternative manner of assembly of the light element 10 of the invention is shown. Here, the light elements 10 are applied directly to a foundation 21. In this example, the cover 25 extends along a longitudinal direction of the sealed cavities H. Here, preferably a plurality of, on average only one, screw(s) 22 arranged in a row, are used in order to achieve a clamping force by means of the cover 25. The clamping device 20 of this exemplified embodiment thus can manage with a smaller number of components. Assembly thus is simplified. Moreover, the light element 10, especially the sealing tape 4, is not penetrated. The sealing function of the sealing tape 4 thus can be ensured also in the event of narrow sealing tapes 4.

In Fig. 8, a light element 10 is compressed by means of the adhesive tape 5 and assembled in this state. In doing so, a clamping bracket 26 known per se can be used, which is fixed on the building side. A screw 22 can then be guided through an elongated hole of the clamping bracket 26 and connected e. g. with a cover 25 so that the light element 10 is protected at all sides. In the example shown, assembly is carried out on a side which extends transversely to the longitudinal direction of the sealed cavities H. In this exemplified embodiment, the screw 22 must absorb only a small transverse force at least during the assembly, because the adhesive tape 5 here serves as a clamping device. Assembly thus is simplified. In this exemplified embodiment, too, no penetration of the light element takes place. It is preferred

that the clamping bracket 26 has at least one drainage opening at its base point so that backwater can be avoided.

In Fig. 9, a light element 10 is shown which is substantially identical with the one in Fig. 8. Differing therefrom, however, a panel-fixing profile 27 is used for setting the second distance instead of an adhesive tape 5. It is also conceivable, however, to combine the adhesive tape 5 and the panel-fixing profile 27. It is preferred that the clamping bracket contains a further step which can be fixed together with the panel-fixing profile 27 to a foundation 21, such as a building. It is also preferred that the panel-fixing profile 27 is made of aluminium. It is to be observed that also in the exemplified embodiment of Figure 8 a robust panel-fixing profile can be provided, which is arranged according to the adhesive tape 5.

„On the building side" is understood within the framework of the invention to be that the clamping device 20 is fixed to the side of a building; said building cannot only be a house, factory hall, etc. within the narrower sense of the word, but on the contrary any structure which might be used for the installation of light elements 10, i.e. for example also support structures used as roofs of gas stations, frames for the holding windows, etc.

Although the exemplified embodiments described in the foregoing showed light elements 10 with only one chamber (one sealed cavity H), it is of course conceivable to provide longer or a plurality of panels 1, 2 and to subdivide the light element 10 into a plurality of sealed cavities 10, e. g. if greater light elements 10 are supposed to be provided. An example of the subdivision of a panel into a plurality of sealed cavities H has been illustrated schematically in Fig. 6. The subdivision into a plurality of sealed cavities increases the bending rigidity of the light element 10 and counteracts sag of the light element.

It is furthermore conceivable to provide a light element 10 of more than two panels 1, 2 arranged one above the other. This can have a favourable effect on the thermal properties of the light element 10 in that e. g. the insulation of the light element 10 generated in this way is higher. Even an asymmetric construction e. g. with two upper 2, 2 and one lower 1 panel or with a second sealed cavity H in the height axis with or without fabric 3 is conceivable. The light element 10 thus can be adapted to individual requirements. This modular concept increases the degree of freedom of the construction.

In an exemplified embodiment which has not been shown, the light element 10 is provided for inclined assembly. For this purpose, for example, the end of the light element 10 which is located farther below in a height axis is placed in a U-shaped rail which is arranged at the building in an oblique way and which can be connected to the frame of the roof in the described or any other known manner. In a further example, the clamping bracket 26 according to Fig. 8 can be used as lower abutment. Preferably, the sealed cavities H extend

perpendicular to the clamping bracket 26 according to Fig. 8. An attachment in a longitudinal direction of the sealed cavities H can preferably be carried out with a cover 25 according to Fig. 7. This is an easy method to form dome elements or light saddles. Water impinging on the light element 10, e. g. by rain or melting snow, can then enter the rail along the inclination of the light element 10 and back up there. Therefore, it is particularly advantageous at such exposed locations to glue the sealing tape 4 on both sides with the panels 1, 2 in order to further increase the sealing effect of the sealing tape 4. In addition, drainage spots can be provided in the rail. In this type of assembly, screwing by means of a screw can be dispensed with at least at the lower edge of the inclined light element 10. On the contrary, the light element is compressed to the third thickness, finally to be achieved, by insertion into the U-shaped opening of the rail. By the elastic retraction force of the sealing tape 4, clamping forces are exerted on the rail which ensure sufficient positional stabilization in the rail. It is also conceivable to provide the sides of the rail which get into clamping contact with the outer surfaces of the panels 1, 2 with sealing material which is also compressed by the clamping force of the light element and thus seals the rail towards outside, that is to say e. g. against rainwater.

The alignment of the panels with respect to clamping devices 20, covers 25, clamping brackets 26 or the like on the building side is not restricted to what has been described in the foregoing. On the contrary, the panels substantially can be aligned randomly. When it comes to a light saddle, for example, a combination of a cover 25 arranged in the longitudinal direction of the sealed cavity with a clamping bracket 26 holding the panels in a lower position and arranged transversely thereto is suitable. If, however, the panels are to be arranged horizontally, for example, substantially only as a light band, assembly only based on the cover 25 or on a clamping bracket 26 is also conceivable. The assembly elements then can be aligned in any way transversely or laterally to the sealed cavities.

Patentkrav

1. Lyselement (10) indeholdende
- mindst en første (1) og en anden (2) plade, som er lysgennemtrængelige,
- et fladeformet tekstil (3) og
- et elastisk tætningsbånd (4), hvor

det elastiske tætningsbånd (4) i det mindste er anbragt langs med kanter (R) af pladerne mellem pladerne (1, 2), og hvor
det elastiske tætningsbånd (4) er anbragt i afstand fra pladerne (1, 2) for at danne et tætnet hulrum (H), i hvilket det fladeformede tekstil (3) er anbragt, og hvor, ved et horisontalt anbragt lyselement (10) ved belastning af det elastiske tætningsbånd (4) kun med vægtkraften fra de(n) nedenunder og ovenover anbragte plade(r) (2), en første afstand mellem de(n) ovenover anbragte plade(r) (2), der indstiller sig ved hjælp af en elastisk deformering af det elastiske tætningsbånd (4), er større end en tykkelse af det fladeformede tekstil (3), med henblik på en klemmefri optagelse af det fladeformede tekstil (3).

2. Lyselement (10) ifølge krav 1,
hvor en side af det elastiske tætningsbånd (4) i det mindste afsnitsvis er forbundet klæbende med en af pladerne (1, 2).

3. Lyselement (10) ifølge krav 1 eller 2,
hvor to sider af det elastiske tætningsbånd (4) i det mindste afsnitsvis er forbundet klæbende med begge plader (1, 2).

4. Lyselement (10) ifølge et af de foregående krav,
hvor det elastiske tætningsbånd (4) omfatter flere tætningsbåndafsnit (4.1, 4.2, ...), som er anbragt mellem pladerne (1, 2) og mindst et samlingssted (S) af tætningsbåndafsnittene (4.1, 4.2) er samlet, især klæbet.

5. Lyselement (10) ifølge et af de foregående krav,
hvor det elastiske tætningsbånd (4) komprimeres ved hjælp af et klæbebånd (5), der griber ved pladerne (1, 2) omkring deres kant (R), for at frembringe en anden afstand mellem pladerne (1, 2), som er mindre end den første afstand,

men større end tykkelsen af det fladeformede tekstil (3).

6. Fremgangsmåde til fremstilling af et lyselement (10) ifølge et af de foregående krav, omfattende de følgende trin
- at påføre det elastiske tætningsbånd (4) på en første plade (1),
- at lægge det fladeformede tekstil (3) ind i en flade (F), der er indrammet af det elastiske tætningsbånd (4),
- at placere mindst en anden plade (2) på det elastiske tætningsbånd (4).

7. Fremgangsmåde ifølge krav 6,
endvidere omfattende fremgangsmådetrinnet
- at anbringe et klæbebånd (5), der griber om pladernes (1, 2) kanter (R), for ved hjælp af dette at komprimere det elastiske tætningsbånd (4) og frembringe en anden afstand mellem pladerne (1, 2), som er mindre end den første afstand, men større end tykkelsen af det fladeformede tekstil (3).

8. Fremgangsmåde ifølge et af kravene 6 til 7,
endvidere omfattende fremgangsmådetrinnet
- i det mindste afsnitsvis at forbinde en side af det elastiske tætningsbånd (4) klæbende med en plade (1, 2).

9. Fremgangsmåde ifølge et af kravene 6 til 8,
endvidere omfattende fremgangsmådetrinnet
- i det mindste afsnitsvis at forbinde to sider af det elastiske tætningsbånd (4) klæbende med begge plader (1, 2).

10. Fremgangsmåde ifølge et af kravene 6 til 9,
endvidere omfattende fremgangsmådetrinnet
- at frembringe en tredje afstand mellem pladerne (1, 2), der er mindre end den første afstand, men større end tykkelsen af det fladeformede tekstil (3), og foretrukket er mindre end den anden afstand, ved hjælp af en klemmeindretning (20) anbragt på bygningssiden, ved hjælp af hvilken det elastiske tætningsbånd (4) komprimeres, til installation af lyselementet (10).

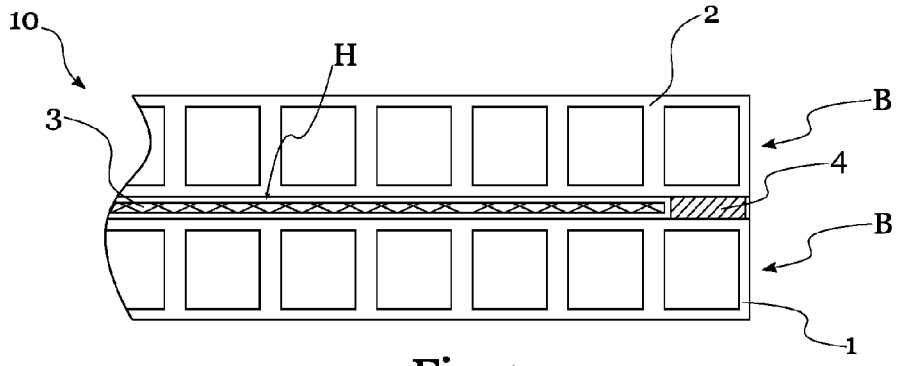

Fig. 1a

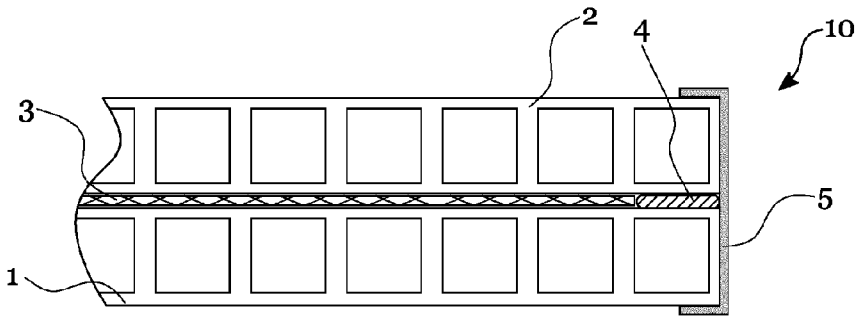

Fig. 1b

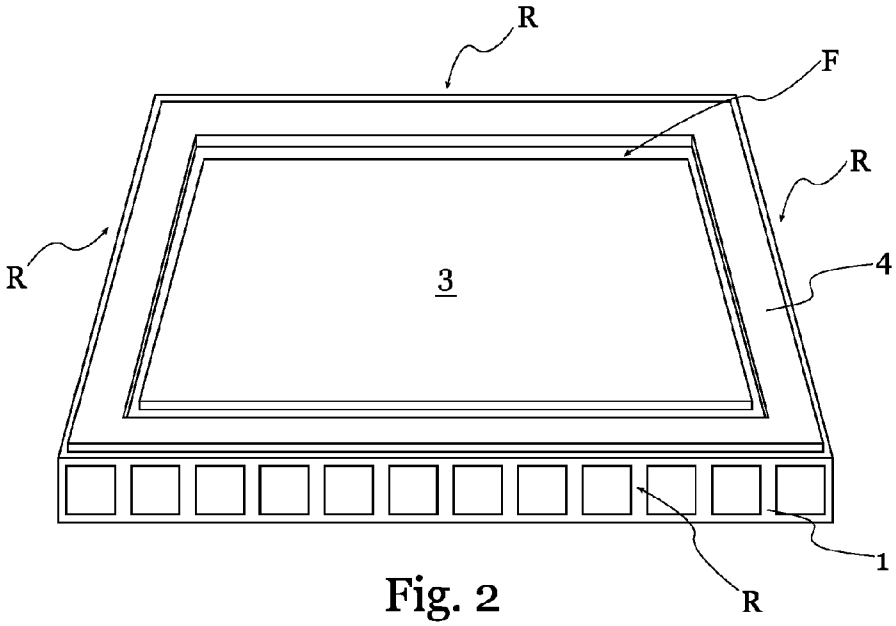

Fig. 2

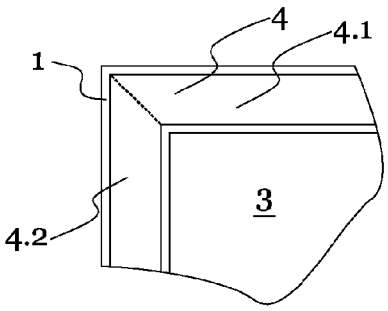

Fig. 3a

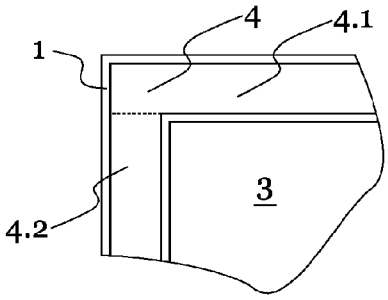

Fig. 3b

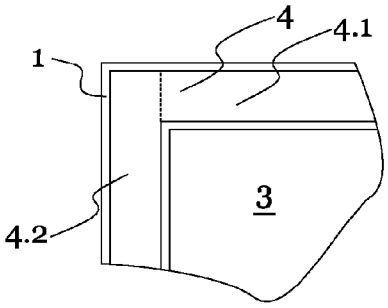

Fig. 3c

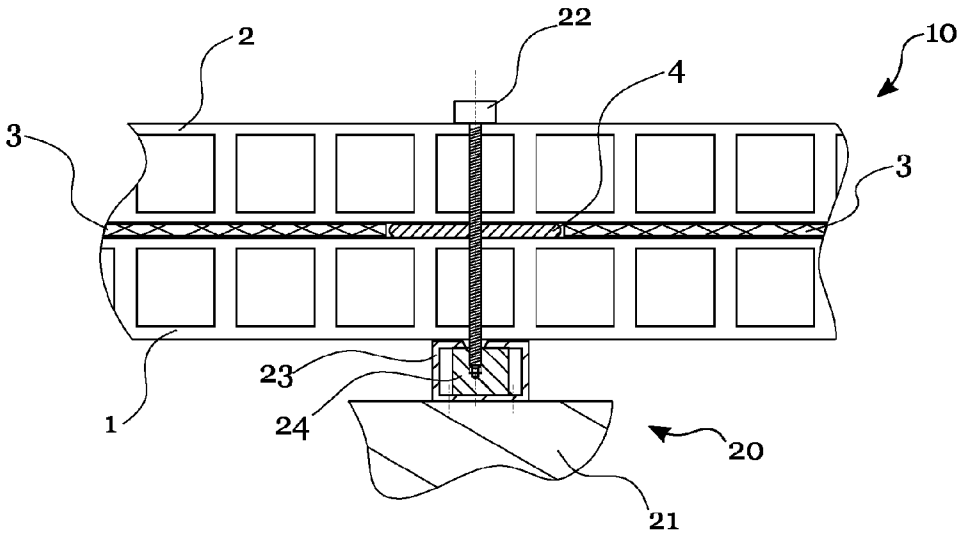

Fig. 4

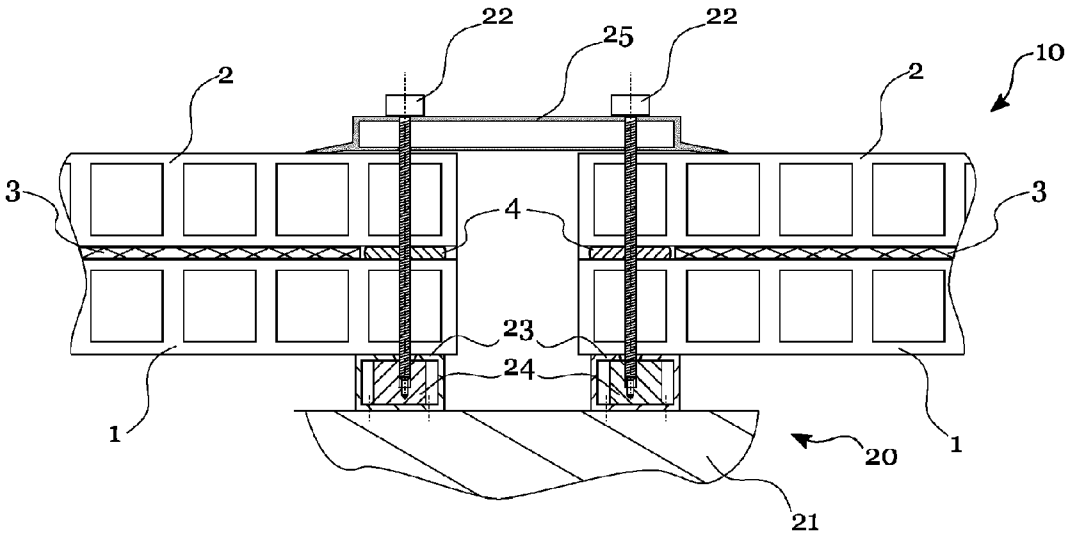

Fig. 5

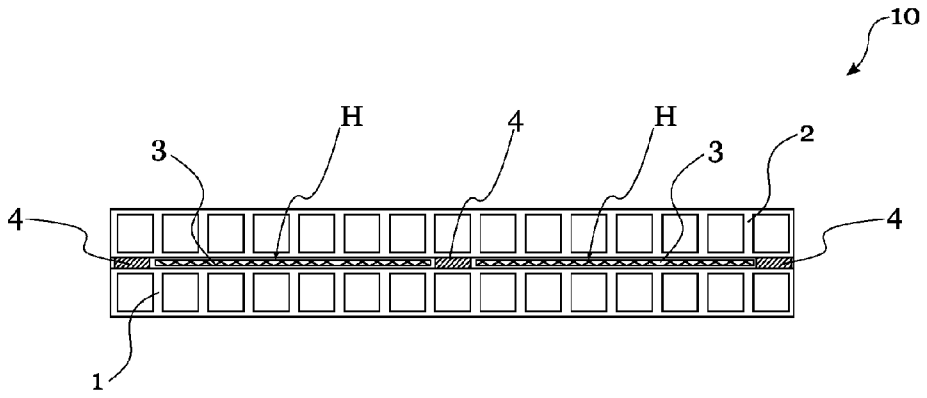

Fig. 6

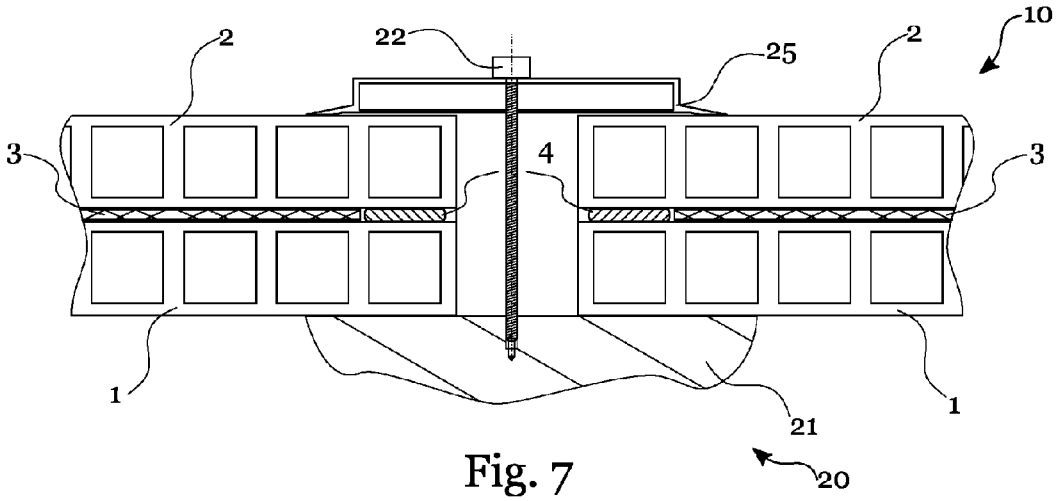

Fig. 7

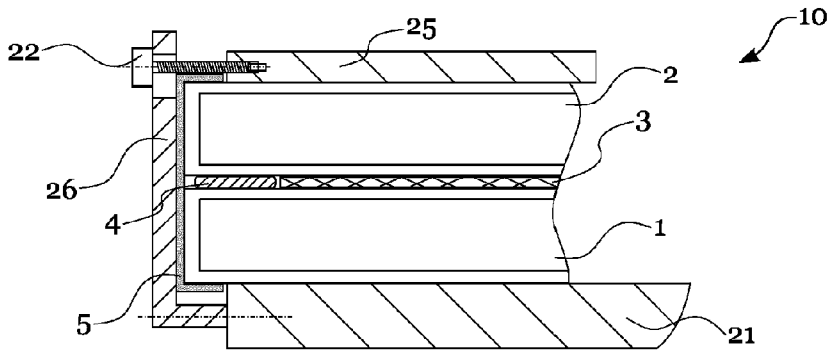

Fig. 8

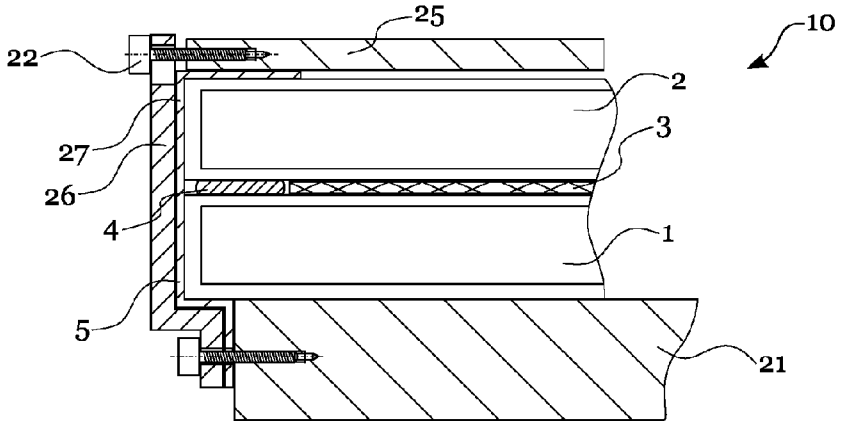

Fig. 9