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(54) **SYSTEM FOR BUILDINGS, IN PARTICULAR INDUSTRIAL BUILDING FACADES, AND INSULATION ELEMENT FOR THE SYSTEM**

BAUSYSTEM, INSBESONDERE INDUSTRIELLE GEBÄUDEFASSADEN UND ISOLIERUNGSELEMENT FÜR DAS SYSTEM

SYSTÈME DE BÂTIMENTS, EN PARTICULIER FACADES DE BÂTIMENT INDUSTRIEL, ET ÉLÉMENT D'ISOLATION POUR LE SYSTÈME

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**EP-B1- 1 402 128 US-A- 5 524 400**

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## Description

**[0001]** The invention relates to a system according to the preamble of claim 1.

**[0002]** In particular industrial buildings are often made from steel panels, in particular trapeze plates, wherein cassette shaped wall elements are arranged in an interior of the steel panels for insulation purposes wherein corresponding insulation elements are clamped into the wall elements so that in particular outer walls of the industrial buildings are provided with heat or sound insulation. For the insulation materials arranged in the cassettes mineral wool is typically used, in particular glass wool or rock wool. The invention relates to an improvement for producing respective facades that are particularly suitable for industrial buildings.

**[0003]** Thus, systems according to the preamble of claim 1 are already known from EP 0 896 106 A2 (DE 698 05 710 T2) in which cassettes with horizontally protruding webs and with angled support flanges at the web ends are used which form engagement elements so that the insulation elements can be accordingly fixated in the cassettes. Thus, according to this known solution the insulation elements that are arranged in the cassettes with an oversize are respectively provided with a slot at least at one edge side wherein the slot can either be provided by a corresponding cut without removing material or by a groove in which the engagement element engages after inserting the insulation element that is typically provided as an insulation plate, so that the insulation element is supported in the cassette. The interconnection with the steel panels, in particular the trapeze plates as it is typically used for industrial buildings is provided by respective spacer elements, in particular bolts, the invention relates to an improvement over this prior art for the purpose of increasing a compatibility of the insulation plates with different cassettes.

**[0004]** The cassettes and also the insulation elements inserted therein, in particular the insulation plates which can be provided with an external fairing for example in the form of a glass fleece are typical mass products which have to be stored at the manufacturer after production and which are then delivered according to customer requirements. Since the slots respectively have to be configured with reference to clear width of the cassettes, this is a distance of the support flanges from the actual cassette wall in view of the desired excess thickness, there is the necessity of respectively stocking insulation plates with different thickness and dimensions.

**[0005]** Wall assemblies of a building structure are described in US 5,524,400 where the panels are provided with grooves which extend circumferentially around the panels whereas two distanced grooves are provided at each lateral end face of the panel element which serve for engagement with U-shaped support members to form the wall assemblies comprising a plurality of panels arranged adjacent to each other. Finally, U-shaped slots are provided at end faces of plate-like insulation elements so that specific elastical tongues are formed which serve as additional sealing elements (EP 0 125 397 A1).

**[0006]** Thus, it is an object of the invention to increase compatibility of such systems while maintaining a simple configuration of the insulation elements to be used, in particular the insulation plates, in particular in view of the fact that systems of this type have to be provided with different cassette sizes and insulation plate thicknesses.

**[0007]** This object is achieved according to the invention for a system according to the features of claim 1.

**[0008]** Advantageous embodiment of the system can be derived from the dependent claims.

**[0009]** According to the invention a much more universal use of insulation plates and associated cassettes is achieved in that two or plural slots are provided instead of only one slot, advantageously in a form of an incision or a groove at an edge side of an insulation element in particular two slots at an edge side are preferred for this purpose advantageously a distance of the slots is modular, this means distances are identical, this means when a most proximal slot has a distance L2 from one of the two main surfaces then a distance of the other slot advantageously to the same main distance is two times the distance L2. Particularly advantageously the distance is configured with a module dimension of 40 mm, wherein a practical band width of the distance is, this means a distance of the most proximal slot to the main plane and the distance between the slots is in a range between 20 and 60 mm, advantageously 25- 55 mm. These are practicable and thus advantageous ranges, wherein however all individual values are included that are between these ranges.

**[0010]** Since the cassettes are typically provided in increments for particular clear distances between support flange and cassette wall and also a definition of the desired oversize is typically provided in two steps, in particular with an oversize of approximately 40 mm or 80mm insulation elements that are customized in this way can be used for different cassettes this means for different cassette depths with an overhang of for example 40 mm or 80mm. This yields substantial advantages for a manufacturer of such insulation elements and systems since this in particular significantly reduces costs for stocking and thus also producing such system specific insulation elements which is advantageous in the field of mineral wool insulation since there is a high level of cost pressure in this field.

**[0011]** In an embodiment of the invention it is advantageous to use insulation elements made from mineral wool which are compressible which has advantages for storing, transporting and introducing the insulation elements into the cassettes. Advantageously the insulation elements are configured as insulation plates which also facilitates handling. Advantageously the slots can be formed optionally by incisions without material removal and/or by grooves. In case of the grooves it is advantageous to provide the groove width smaller than or equal to a thickness of the engagement element, this means of the support flanges which form the engagement element.

[0012] With respect to the insulation element it is advantageous when the slots have a distance of 40 mm from each other, wherein it is advantageous that a distance of the slot that is most proximal to the main surface is also 40 mm so that the same insulation plate can be used for an oversize of 40 mm or 80mm depending on the cassette. This dimension of 40 mm has proven particularly advantageous wherein advantageously also values in a range of 20 - 60mm, in particular 25 - 55 mm are suitable.

[0013] For fixating the insulation elements within the cassette it is advantageous to choose the groove depth and/or the slot depth in a range of 10 - 80 mm, advantageously 10 - 70 mm, in particular 50 - 70 mm. For the groove a width between 1 and 10 mm, in particular 1 - 5 mm has proven useful.

[0014] Plural slots are practical, however, two respective slots at one edge are advantageous, wherein also opposite edge sides or all edge sides can be provided with slots as required in order to facilitate assembly with respective slots. The slots can be configured by incisions without material removal or by a knife cut or as grooves or mixed.

[0015] Subsequently, advantageous embodiments of the invention are illustrated which relate in particular to insulation elements and systems for producing building façades, in particular for industrial buildings in a purely schematic representation based on drawing figures, wherein:

FIG. 1 illustrates a partial cross section of an industrial building façade made from steel in a sheet metal configuration with insulating plates; and

FIG. 2 illustrates an embodiment that differs slightly from the embodiment of FIG. 1, also in a partial sectional view;

FIG. 3 illustrates a partial view for connecting cassettes illustrated in FIGs. 1 and 2 with an outer wall of trapeze plates forming an industrial building;

FIG. 4 illustrates a schematic sectional view of a portion of an insulation element for an application in a corresponding system; and

FIG. 5 illustrates an alternative embodiment to the embodiment of FIG. 4.

[0016] FIG. 1 illustrates an exemplary partial cross section of a wall of an industrial building façade with cassette shaped wall elements 2 that are arranged on top of each other and which are made in particular from steel plates which advantageously extend between non illustrated vertically arranged support columns and as will be described in more detail with reference to FIG. 3 which can be connected to attached to an outer wall of an industrial building which is made from trapeze plates in this embodiment.

[0017] Each cassette type wall element 2 subsequently designated as cassette 2 includes a cassette wall 6 and webs 8 which are arranged at an upper and a lower end of the cassette wall 6 and which are in particular integrally configured with the cassette wall 6 and which are typically protruding at a right angle and which can be reinforced with beads 10 as illustrated in FIG. 1.

[0018] At least at one end, here in at an upper end of the cassette wall 6 according to FIG. 1 the web 8 is angled at its protruding end with reference to the cassette in inward direction and according to the installed condition according to FIG. 1 in downward direction, thus advantageously by 90°. The support flange is designated as 12. At the opposite end, thus at the lower end according to FIG. 1 the cassette web 8 includes a support flange 14 which extends outward with respect to the cassette and thus downward in the illustration according to FIG. 1 wherein the support flange is also angled advantageously by 90° with respect to the cassette web 8. This identical angular orientation of the two support flanges 12, 14 of each cassette 2 facilitates that the support flanges 12, 14 reach over each other when the cassettes are placed on top of each other as evident from FIG. 1.

[0019] In order to provide a better differentiation the reference numerals of the upper cassette with respect to the center cassette 2 are provided with the suffix a and of the lower cassette with respect to the center cassette 2 the reference numerals are provided with the suffix b for the same components. Due to the configuration of the support flanges the lower support flange 14a of the upper cassette 2a reaches over the support flange 12 of the center cassette 2 and the horizontally extending webs 8 or 8a are arranged on top of each other. It holds for the lower webs that the support flange 14 of the centrally arranged cassette 2 reaches over the support flange 12b of the lower cassette 2b. As will be described infra in more detail in this embodiment with support flanges oriented in an identical direction. The support flanges 12, 14 reaching over each other form an engagement element 16 respectively in combination for an engagement that will be described infra in more detail into an insulation element 18 that is inserted into the cassette and supported therein.

[0020] Like the cassette webs 8 also the cassette wall 6 can be stiffened with beads as required as can be derived from FIG. 1.

[0021] The insulation element 18 which is provided herein in an exemplary manner in the form of an insulation plate made from mineral wool has a greater thickness than the clear width L1 that is formed by the engagement element 16 relative to the cassette wall 6. Thus, the insulation element 18 protrudes in installed condition in outward direction beyond the cassette webs 8, here towards the right in the illustration according to FIG. 1 and directly contacts the sheet outer shell 4 which is provided herein in particular in the form of a trapeze plate. The cassettes 2 are attached at the outer

shell 4 with fasteners in particular bolts which is not illustrated in FIG. 1.

[0022] Façade configurations for industrial buildings as illustrated in FIG. 1 are known in the art for example from DE 698 05 710 T2 already recited supra which relates to the general configuration of the cassettes and the interaction with the insulation element.

5 [0023] In this reference the plate shaped insulation element or insulation plate 18 is provided with a slot at one of its edge sides herein the upper edge side in FIG. 1 which connects the two main surfaces of the insulation plate 18, wherein the slot is introduced into the insulation plate with respect to the clear width L1 so that the engagement element 16 formed by the support flanges 12, 14b or 12b, 14 arranged on top of each other engages this slot so that it attaches or fixates the insulation element or the insulation plate 18 in the cassette 2.

10 [0024] In the embodiment according to FIG. 2 only the support flanges are configured differently since in this embodiment for example only the cassette web 8 at an upper end of each cassette 2 is provided with a downward angled support flange 12, but not the lower cassette web.

15 [0025] This is evident from FIG. 2 for the lower end of the center cassette 2 since the lower support web 8 is not provided with an angled flange therein. In order to intensify the fixation of the insulation plate certainly also the support flanges 2 can be oriented inward which is not illustrated in the drawing so that the cross section of the cassette would have a U-shape.

20 [0026] FIG. 3 illustrates a conventional attachment bolt that is known for example from DE 698 05 710 T2 and through which in particular the compression of the portion protruding outward beyond the cassette of the insulation plate configured with excess thickness adjusts itself as a function of a distance between the support flange 14 and the trapeze plate 4 that is defined by the bolt.

[0027] More stringent requirements with respect to the insulation effect which come with increasing an insulation thickness have shown that it is useful and practical applications to use two different bolt types for this known system so that the portion of the bolt 28 between the head 30 and the support flange 14 is configured with 40 mm and alternatively with 80 mm so that a respective bolt can be used as a function of the overlap.

25 [0028] Since the configuration and the function of the bolt is already described in the document that is incorporated by reference no separate description is required, rather FIG. 8 illustrated therein and the corresponding description are referred to. Instead of bolts certainly also other attachment and spacer elements can be used according to the disclosure of this document that is incorporated by reference.

30 [0029] The invention develops this subject matter further in a direction towards a more universal use ability which has significant advantages for a manufacturer of such insulation elements in view of the fact that these are typical mass products in particular with respect to storage and stocking of the insulation plate.

35 [0030] Accordingly as evident from FIG. 4 at least one of the edge sides 20 of the insulation element 18 is provided with not only one slot 22 but with plural offset slots herein advantageously with two offset slots 22 and 24. In the embodiment according to FIG. 4, the slots 22 and 24 are configured with knife incisions into the material of the insulation plate or insulation element 18 thus without removing material so that a claw shaped or knife shaped engagement is provided when the engagement element engages the insulation plate 18.

40 [0031] In the embodiment according to FIG. 5 the slots 22, 25 are configured as grooves after material removal wherein a groove width essentially corresponds to a thickness of the engagement element 16, particularly advantageously to slightly less than the thickness of the engagement element so that an appropriate engagement of the engagement element in these grooves can be provided performing a fixation of the insulation element 18 in the cassette 2.

[0032] In particular cases, in particular for high raw densities of the insulation elements 18 it can be advantageous for assembly reasons to also provide grooves with a width which is slightly wider than the thickness of the engagement elements 16. The fixation of the insulation elements is provided in these cases by applying the outer shell 4 of the system which is matched with respect to thickness and distance.

45 [0033] The incision 24 that is arranged on an outside with respect to the cassette has a distance L2 with respect to an outer main surface in installed condition of the insulation plate according wherein a distance between the 2 slots 22 and 24 is L3. Advantageously the distances L2 and L3 are identical and are advantageously for example 40 mm. In practical applications these distances can be in a range of 20 - 60 mm in particular 25 - 55 mm. Certainly all intermediary distances are included since eventually an interaction between the clear width between the engagement element 16 and the cassette wall 6 is relevant as well as an oversize of the insulation plate, thus in how far the insulation plate protrudes outward beyond the engagement elements or shall protrude outward beyond the engagement elements.

50 [0034] Thus, namely there is a variability in the dimensions of the cassette, in particular of the cassette webs and of the support flanges integrally formed at an end of the cassette webs which is described in an exemplary manner with reference to the subsequent table.

55

	Cassette clear width L1 in mm	Insulation Thickness in mm for overhang	
		40 mm	80 mm
5	90	130	170
	100	140	180
	120	160	200
	130	170	210
10	140	180	220
	145	185	225
	160	200	240
	180	220	260
15	200	240	280

[0035] Thus the left column provides the clear width L1 between the ends of the horizontal cassette webs 8 and the cassette wall 6 which differ accordingly as a function of the size of the cassette, in particular as a function of the desired insulation thickness, thus between 90 mm and 200 mm. The two right columns with the headline insulation thickness at overhang respectively specify insulation plates with different insulation thicknesses which facilitate achieving overhangs of 40 or 80 mm. This would mean for the prior art that respective insulation plates with different thicknesses will be used for cassettes in order to accommodate the desired overhang, herein 40 mm or 80 mm. According to the invention, however, at least two adjacent slots are provided in the respective edge side 20, optionally also in the opposite edge side of the insulation plate 18 which are adjusted to a respective distance from one another and to the outer surface of the insulation plate.

[0036] With reference to the table values cited supra for the thickness of the insulation plates and the desired overhangs the slot 22 would be moved inward by 80 mm with reference to the outer main surface 26 and the slot 24 would be moved inward by 40 mm. This yields a substantial advantage for mass production of cassettes and insulation plates since the same insulation plate can be used for different cassette sizes. For example an insulation plate with a thickness of 180 mm can be used for a cassette with a clear width of 100 mm in case an overhang of 80 mm is desired but it can also be used for a cassette with 140 mm clear width in case an overhang of 40 mm is required. For the cassette in the left column with a clear width of 130 mm for example an insulation plate with a thickness of 170 mm can be used for a desired overhang of 40mm but as well for a cassette with a clear width of 90 mm in case an overhang of 80mm is desired. This yields increased compatibility for using the insulation elements which can thus be used in the same configuration, this means respective slot spacing of the plural slots for different cassettes. Multiple insulation thicknesses are represented in initialized prints. The invention is certainly not limited to two slots by the same token three, four or plural slots can be used, wherein for practical reasons advantageously not more than four slots, however, advantageously two slots are used.

## 40 Claims

1. A system for buildings, in particular industrial building facades, with cassette shaped wall elements (2) having an insulation element (18) inserted therein, wherein each wall element includes a cassette wall (6) with two webs (8) that are provided at an end side of the cassette wall (6) and which

45 respectively advantageously protrude at a right angle from the cassette wall (6), wherein at least one of the two cassette webs (8) that are angled from the cassette wall (6) includes an angled support flange (12; 14) which forms an engagement element (16) for the insulation element (18) inserted in the cassette (2), the insulation element (18) having two main surfaces and four circumferential edge sides, wherein a thickness (D) of the insulation element is greater than a clear width between the engagement element (16) and the cassette wall (6), and wherein the engagement element (16) engages a slot of an engagement receiver in one of the edge sides of the insulation element (18),

50 **characterized in that**  
the edge side (20) of the insulation element (18) which is engaged by the engagement element (16) is provided with at least two slots (22, 24) which form the engagement receiver, which slots are arranged at a distance from each other and with a different distance from one of two main surfaces (26) of the insulation element (18).

2. The system according to claim 1,

**characterized in that**

the insulation element (18) is made from mineral wool, in particular rock wool or glass wool.

3. The system according to claim 1 or 2,

**characterized in that**

the insulation element (18) is configured as an insulation plate.

4. The system according to one of the claims 1 - 3,

**characterized in that**

the slots (22, 24) are formed in the insulation plate by incisions without material removal and/or by grooves, whose groove width advantageously corresponds to a thickness of the engagement element (16).

5. The system according to one of the preceding claims,

**characterized in that**

a first distance (L2) which is the distance (L2) of the slot (24) from the main surface (26) which is arranged most proximal to a slot (24) is identical to a second distance (L3) which is the distance (L3) between the slot (24) and the adjacent slot (22).

6. The system according to claim 5,

**characterized in that**

the first distance (L2) and the second distance (L3) between the two slots at the same edge side (20) is 40 mm.

7. The system according to any one of the preceding claims,

**characterized in that**

the edge side (20) includes up to four slots.

8. The system according to any one of the preceding claims 4 to 7,

**characterized in that**

the groove width is in particular in a range of 1 mm to 10 mm, in particular in a range of 1 mm to 5 mm and/or wherein the groove and/or slot depth is 10 mm to 80 mm, in particular 10 mm - 70 mm.

9. The system according to any one of the preceding claims,

**characterized in that**

respective slots (22, 24) are provided at opposite edge sides (20) of the insulation element (18).

10. The system according to any one of the preceding claims,

**characterized in that**

the insulation element (18) is a compressible insulation plate.

**Patentansprüche**

1. System für Gebäude, insbesondere Industriegebäudefassaden, mit kassettenförmigen Wandelementen (2), in die

ein Dämmelement (18) eingesetzt ist, wobei jedes Wandelement eine Kassettenwand (6) mit zwei Stegen (8) aufweist, die an einer Endseite der Kassettenwand (6) vorgesehen sind und die jeweils vorteilhaft in einem rechten Winkel von der Kassettenwand (6) abstehen, wobei mindestens einer der beiden Kassettenstege (8), die von der Kassettenwand (6) abgewinkelt sind, einen gewinkelten Halteflansch (12; 14) umfasst, der ein Eingriffselement (16) für das in die Kasette (2) eingesetzte Dämmelement (18) bildet, wobei das Dämmelement (18) zwei Hauptflächen und vier umlaufende Randseiten aufweist, wobei eine Dicke (D) des Dämmelements größer ist als eine lichte Weite zwischen dem Eingriffselement (16) und der Kassettenwand (6) und wobei das Eingriffselement (16) in einen Schlitz einer Eingriffsaufnahme in einer der Randseiten des Dämmelements (18) eingreift,

**dadurch gekennzeichnet, dass**

die Randseite (20) des Dämmelements (18), in die das Eingriffselement (16) eingreift, mit mindestens zwei Schlitz (22, 24) versehen ist, welche die Eingriffsaufnahme bilden, wobei die Schlitz in einer Distanz voneinander und mit einer unterschiedlichen Distanz von einer von zwei Hauptflächen (26) des Dämmelements (18) angeordnet sind.

2. System nach Anspruch 1,

**dadurch gekennzeichnet, dass**

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das Dämmelement (18) aus Mineralwolle, insbesondere Steinwolle oder Glaswolle, hergestellt ist.

3. System nach Anspruch 1 oder 2,  
**dadurch gekennzeichnet, dass**

das Dämmelement (18) als eine Dämmplatte ausgebildet ist.

4. System nach einem der Ansprüche 1-3,  
**dadurch gekennzeichnet, dass**

die Schlitze (22, 24) in der Dämmplatte durch Einschnitte ohne Materialabtrag und/oder durch Nuten, deren Nutbreite vorteilhaft einer Dicke des Eingriffselements (16) entspricht, ausgebildet sind.

5. System nach einem der vorangehenden Ansprüche,  
**dadurch gekennzeichnet, dass**

eine erste Distanz (L2), welche die Distanz (L2) des Schlitzes (24) von der Hauptfläche (26) ist, die einem Schlitz (24) am nächsten angeordnet ist, identisch mit einer zweiten Distanz (L3) ist, welche die Distanz (L3) zwischen dem Schlitz (24) und dem benachbarten Schlitz (22) ist.

6. System nach Anspruch 5,  
**dadurch gekennzeichnet, dass**

die erste Distanz (L2) und die zweite Distanz (L3) zwischen den beiden Schlitzten auf derselben Randseite (20) 40 mm beträgt.

7. System nach einem der vorangehenden Ansprüche,  
**dadurch gekennzeichnet, dass**

die Randseite (20) bis zu vier Schlitzte umfasst.

8. System nach einem der vorangehenden Ansprüche 4 bis 7,  
**dadurch gekennzeichnet, dass**

die Nutbreite insbesondere in einem Bereich von 1 mm bis 10 mm, insbesondere in einem Bereich von 1 mm bis 5 mm, liegt, und/oder wobei die Nut- und/oder Schlitztiefe 10 mm bis 80 mm, insbesondere 10 mm - 70 mm, beträgt.

9. System nach einem der vorangehenden Ansprüche,  
**dadurch gekennzeichnet, dass**

jeweilige Schlitze (22, 24) an gegenüberliegenden Randseiten (20) des Dämmelements (18) ausgebildet sind.

10. System nach einem der vorangehenden Ansprüche,  
**dadurch gekennzeichnet, dass**

das Dämmelement (18) eine komprimierbare Dämmplatte ist.

### Revendications

1. Système pour bâtiments, en particulier pour façades de bâtiments industriels, comprenant des éléments de paroi (2) en forme de cassette dans lesquels est inséré un élément d'isolation (18), chaque élément de paroi incluant une paroi de cassette (6) avec deux ailes (8) qui sont prévues à un côté extrémité de la paroi de cassette (6) et font respectivement avantageusement saillie à angle droit de la paroi de cassette (6), au moins une des deux ailes de cassette (8) inclinées par rapport à la paroi de cassette (6) incluant une bride de support inclinée (12 ; 14) qui forme un élément d'engagement (16) pour l'élément d'isolation (18) inséré dans la cassette (2), l'élément d'isolation (18) ayant deux surfaces principales et quatre côtés de bord périphériques, une épaisseur (D) de l'élément d'isolation étant supérieure à une largeur libre entre l'élément d'engagement (16) et la paroi de cassette (6), et l'élément d'engagement (16) s'engageant dans une fente d'un récepteur d'engagement dans l'un des côtés de bord de l'élément d'isolation (18),  
**caractérisé en ce que**  
le côté de bord (20) de l'élément d'isolation (18) dans lequel s'engage l'élément d'engagement (16) est pourvu d'au moins deux fentes (22, 24) qui forment le récepteur d'engagement, lesquelles fentes sont disposées à une certaine distance l'une de l'autre et à une distance différente de l'une des deux surfaces principales (26) de l'élément d'isolation (18).

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2. Système selon la revendication 1,  
**caractérisé en ce que**  
l'élément d'isolation (18) est réalisé en laine minérale, en particulier en laine de roche ou en laine de verre.
- 5 3. Système selon la revendication 1 ou 2,  
**caractérisé en ce que**  
l'élément d'isolation (18) est configuré comme une plaque d'isolation.
- 10 4. Système selon l'une des revendications 1 à 3,  
**caractérisé en ce que**  
les fentes (22, 24) sont formées dans la plaque d'isolation par des incisions sans enlèvement de matière et/ou par des rainures dont la largeur de rainure correspond avantageusement à une épaisseur de l'élément d'engagement (16).
- 15 5. Système selon l'une des revendications précédentes,  
**caractérisé en ce que**  
une première distance (L2) qui est la distance (L2) de la fente (24) par rapport à la surface principale (26) qui est disposée le plus près d'une fente (24) est identique à une seconde distance (L3) qui est la distance (L3) entre la fente (24) et la fente adjacente (22).
- 20 6. Système selon la revendication 5,  
**caractérisé en ce que**  
la première distance (L2) et la seconde distance (L3) entre les deux fentes du même côté de bord (20) est de 40 mm
- 25 7. Système selon l'une quelconque des revendications précédentes,  
**caractérisé en ce que**  
le côté de bord (20) inclut jusqu'à quatre fentes.
- 30 8. Système selon l'une quelconque des revendications précédentes 4 à 7,  
**caractérisé en ce que**  
la largeur de la rainure est en particulier comprise dans une plage de 1 mm à 10 mm, en particulier dans une plage de 1 mm à 5 mm et/ou dans lequel la profondeur de la rainure et/ou de la fente est comprise entre 10 mm et 80 mm, en particulier entre 10 mm et 70 mm
- 35 9. Système selon l'une quelconque des revendications précédentes,  
**caractérisé en ce que**  
des fentes respectives (22, 24) sont prévues sur des côtés de bord opposés (20) de l'élément d'isolation (18).
- 40 10. Système selon l'une quelconque des revendications précédentes,  
**caractérisé en ce que**  
l'élément d'isolation (18) est une plaque d'isolation compressible.
- 45
- 50
- 55



Fig. 1

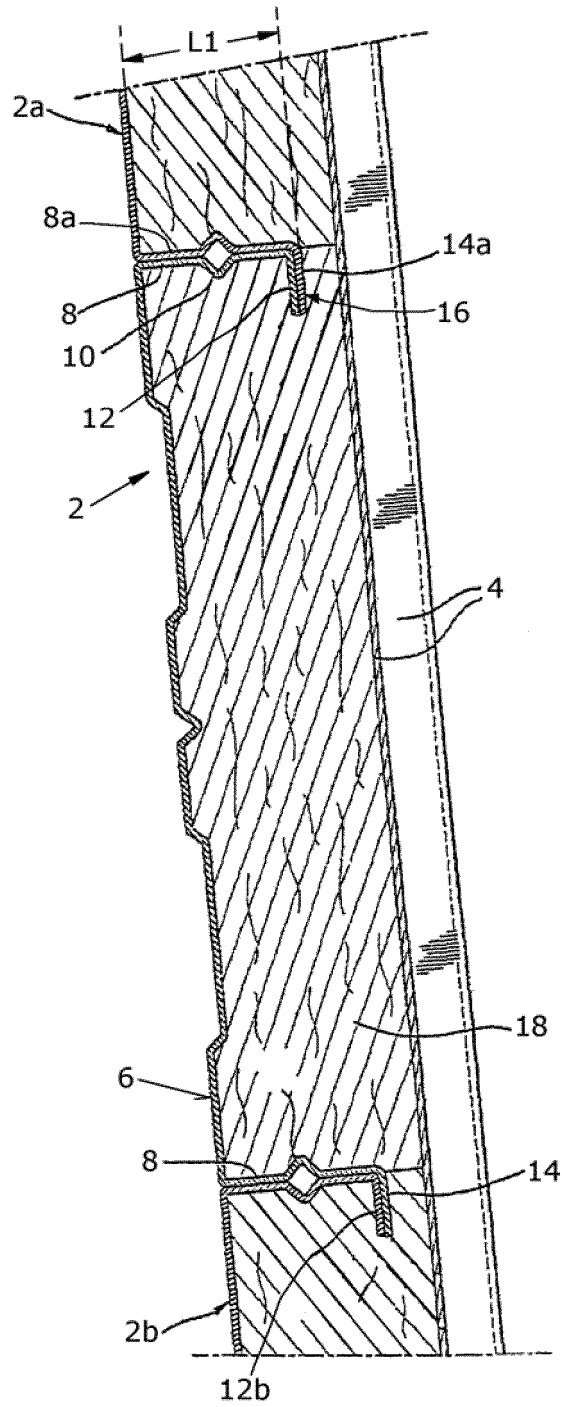


Fig. 2

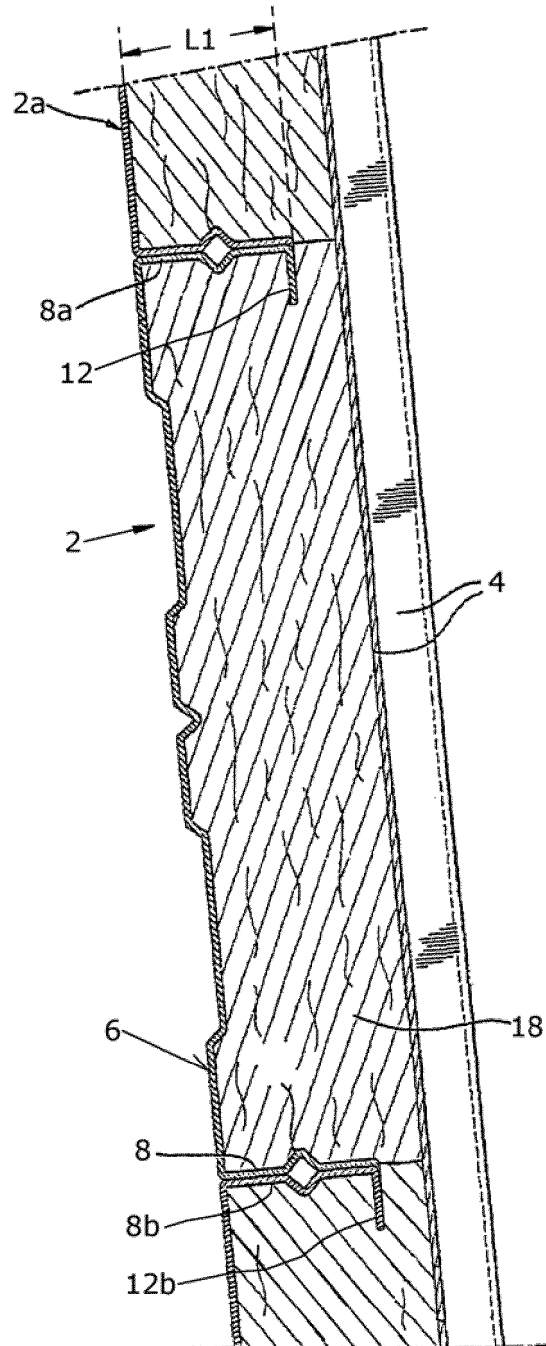


Fig. 3

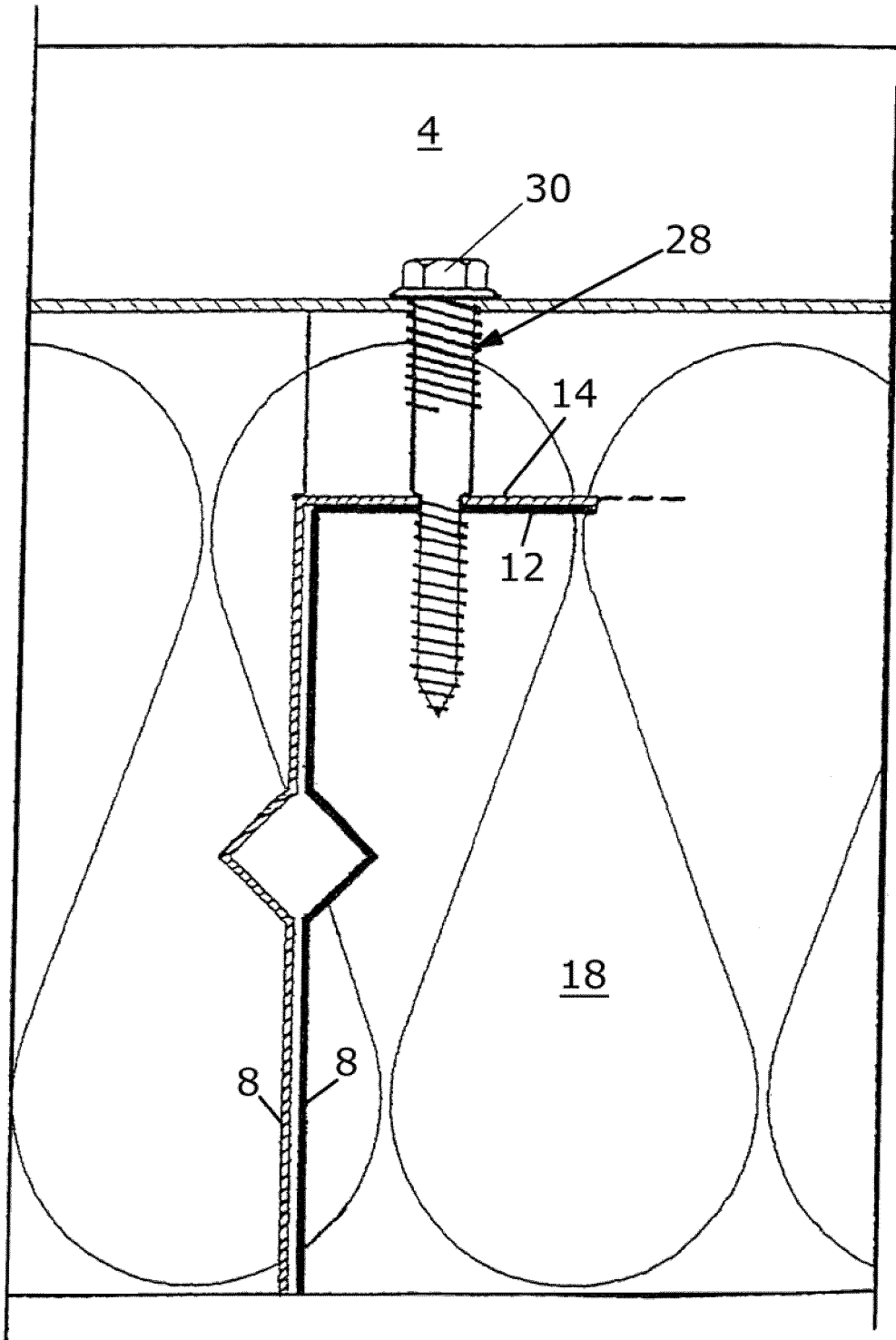


Fig. 4

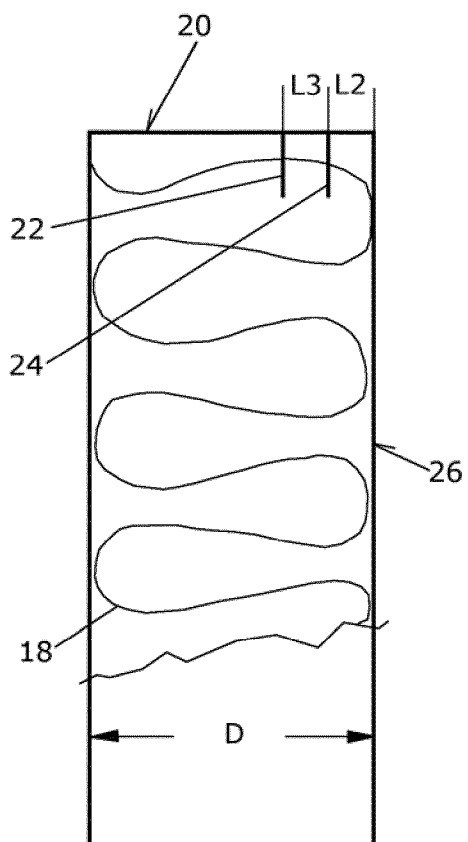
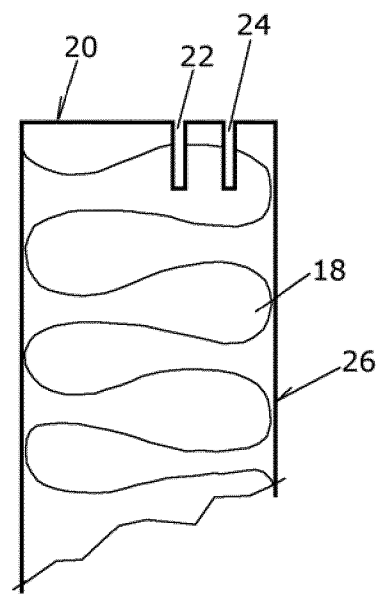


Fig. 5



**REFERENCES CITED IN THE DESCRIPTION**

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