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(54) **AN INSULATION ELEMENT FOR FITTING BETWEEN ELONGATED MEMBERS IN A
FRAMEWORK OF A BUILDING STRUCTURE**

ZWISCHEN LÄNGLICHEN GLIEDERN EINES GEBÄUDERAHMENS EINBAUBARES
DÄMMELEMENTES

ÉLÉMENT D'ISOLATION INSÉRABLE ENTRE DES ÉLÉMENTS ALLONGÉS D'UNE STRUCTURE
DE BÂTIMENT

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- **CHRISTENSEN, Kenn**
DK-4622 Havdrup (DK)
- **ROSENBERG, Gorm**
DK-4295 Stenlille (DK)
- **KALLWEIT, Gerhard**
46236 Bottrop (DE)

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(74) Representative: **Høiberg A/S**
St. Kongensgade 59 A
1264 Copenhagen K (DK)

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(73) Proprietor: **Rockwool International A/S**
2640 Hedehusene (DK)

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(72) Inventors:
• **JEPSEN, Flemming**
DK-9610 Nørager (DK)

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Description

[0001] The present invention relates to an insulation element for fitting between elongated members in a framework of a building structure, such as between rafters, beams or the like, said insulation element being a fibrous insulation element, preferably a mineral wool batt, and said insulation element having substantially parallel first and second sides and substantially parallel third and fourth sides, exhibiting a first side portion and a substantially parallel opposing second side portion, wherein at least said first side portion is provided as a trim portion which is provided with a cutting marking substantially parallel with the first side thereby defining an elongated trim section along the first side, said trim section having a predetermined width.

[0002] An insulation element of such kind is known from WO98/42930.

[0003] Building structures typically comprise a framework with a number of elongated members, such as rafters, joists etc., defining a number of cavities with the elongated members of the framework as cavity walls. In particular a roof structure comprises a number of rafters with a certain distance apart. It is typically required that a roof or a floor structure must be insulated and therefore insulation panels are fitted in these cavities. In order to meet the thermal insulation requirements fibrous insulation material is often used. Such fibrous insulation materials, such as glass wool, stone wool or other fibrous material panels, may be provided in rectangular building elements or as a roll.

[0004] The distance between the elongated members of the framework in a building structure, such as rafters, joists, beams or the like, may vary from one structure to another or even within the same building structure. In roof structures the distance may vary from e.g. 550-950 mm. Although the insulation material is somewhat flexible there are limitations as to how compressible the insulation elements can be subjected to before the compressed element may bend out of the cavity if the insulation element is too compressed when fitted between the rafters and beams. Therefore, insulation elements of the initially mentioned kind must be manufactured in many different sizes in order to ensure a correct fit.

[0005] An advantage with this kind of fibrous insulation slab product is that it can be cut into an appropriate size and is easy install and easy for the inexperienced builder, such as the DIY builder, to understand and makes it easy to fit a suitable insulation to a building structure, such as a roof a wall or a floor structure.

[0006] In order to fit the insulation slabs, they must be cut into size. This results in a high amount of waste material which is inconvenient for many reasons, such as costs and environmental concerns. For the building material retailers, in particular do-it-yourself (DIY) stores, this insulation product requires an unacceptable amount of storage space as fibrous insulation slabs of many different sizes must be offered for sale. For instance in order

to be able to supply customers with insulation slabs for rafter distances in the range of 550-950 mm, eight different sizes must be kept on store. This storage must be repeated for each thickness of insulation that the store intends to sell. This is considered too space consuming for most retailers and therefore the availability of such insulation slab products is rather limited in most retail stores (DIY stores) that are selling building materials and accessories.

[0007] On this background, an object of the present invention is to provide an insulation element that allows for a broader range of use making it more attractive to building material retailers as well as their customers.

[0008] This object is achieved by an insulation element of the initially mentioned kind wherein at least said second side portion is provided as a flexible zone extending along the second side and comprising a flexible section of the insulation element which is substantially less rigid and thus compressible and which has a predetermined width, and wherein the flexible zone is provided by softening the respective side by compressing the edge region during manufacture and thereby reducing the fibre bonding in the flexible section.

[0009] The insulation element according to the invention may be made of any insulating material. Often a fibrous insulation material is preferred. Especially mineral wool, such as stone wool or glass wool is preferred.

[0010] An insulation element according to the invention is suitable for fitting within a wide range in the distance between elongated members in a building framework. The advantage of an insulation element according to the invention is this combination of a trim portion and a soft flexible portion on the opposite side of the trim portion. This makes the fitting of the insulation element easier and contributes to achieving a good insulation result, so that the insulation is not too compressed or is too loosely fitted. An insulation element according to the invention is cost effective in production, whereby a low-priced fibrous insulation element for a wide range of use in building structures may be achieved.

[0011] The at least one flexible zone is provided by softening the respective side by compressing the edge during manufacture and thereby reducing the fibre bonding in the flexible section. Hereby, the fibre bondings are broken making the fibrous insulation element for flexible without reducing the density and without significantly influencing the thermal insulation properties.

[0012] The flexible zone along the section side is made less rigid during the manufacture, e.g. by pressing rollers into the zone and moving them along the edge. This has the advantage that this zone is compressible and may be compressed in order to fit between the rafters and beams of the building structure, e.g. two rafters or the like. If the compression of the second side is not sufficient for obtaining a good fitting of the insulation element, i.e. if the distance between the cavity walls is smaller, the trim portion on the side opposite the flexible portion of the rectangular insulation slab may be cut off whereby

the width of the insulation element is reduced. By having dimensioned the flexible portion and the trim portion suitably, the need for trimming the insulation element by cutting off the trim section becomes easily visible. When the insulation element is placed with the flexible zone abutting a first rafter, it becomes apparent that trimming is needed if the trim zone extends beyond the second rafter, i.e. the transition between the trim zone and the rest of the insulation element is positioned above the rafter. This transition may be marked with a cutting line marking the trim portion and making it easy for the builder to cut away the trim portion and fit the insulation slab. With the pre-cut cutting line, the trim portion will have a regular shape when cut away which makes it suitable for reuse e.g. to fit into small cavities the building structure.

[0013] By this wide range in use, the advantage of an insulation element according to the invention, the need for different formats is significantly reduced in order to cover the varying framework distances involved in building insulation. To reduce this need even further the third side of the insulation element may be provided with a trim portion extending along the third side and the fourth side of the rectangular insulation element may be provided with a flexible zone comprising a flexible section extending along the fourth side. Hereby, the insulation element is provided with flex/trim capability in both orientations. This means that the range of use is doubled for one format.

[0014] This is in particular the case in a preferred embodiment, wherein the trim section width is substantially equal to the flexible section width and wherein the first and second sides are provided with a length substantially equal to the sum of the width of the flexible zone, the width of the trim zone and the length of the third and fourth sides.

[0015] The at least one trim portion is provided by a cutting line parallel to the trim side, i.e. the first - respectively third - side. In a first embodiment, this cutting line may be a visual line marker. In a second embodiment, said cutting line is a pre-cut slit having a depth less than the thickness of the panel, preferably at least 50 mm and wherein said slit being substantially parallel to the trim side, i.e. the first - respectively third - side. By having provided a pre-cut, the cutting action is made easier as the pre-cut acts as a guide rail for the cutting tool. Moreover, the amount of fibrous dust produced by the cutting is reduced.

[0016] In one embodiment of the invention, the insulation element is a mineral fibre batt. However it is realised that the present invention also relates to other types of fibrous insulation materials. In a preferred embodiment, the insulation element is provided with a density of 25-45 kg/m², preferably 28-35 kg/m². Preferably, the insulation element is provided with a thickness between 100 and 400 mm, more preferably approx. 140 mm, 160 mm, 180 mm or 200 mm.

[0017] In an embodiment, the insulation element is provided with a first top layer having a first density and a

second layer having a second density, said first density preferably being larger than the second density. Hereby, particular bending and rigidity characteristics may be achieved by a dual density an insulation element according to the invention.

[0018] Preferably, the insulation element according to the invention has a substantially rectangular shape, but it is realised that other forms could be provided without departing from the invention.

[0019] The invention is described in the following with reference to the accompanying drawings, in which:

- Fig. 1 is a schematic top view of an insulation element according to a first embodiment of the invention;
- Fig. 2 is a schematic top view of an insulation element according to a second embodiment of the invention;
- Fig. 3 is a perspective view of the insulation element in fig. 2;
- Figs. 4 and 5 are schematic views illustrating the use of an insulation element according to the invention;
- Fig. 6 shows an example of a series variation of distances between building structure members for receiving insulation elements; and
- Figs. 7 and 8 show examples of insulation elements according to some preferred embodiments of the invention fit to the series of distances shown in fig. 6.

[0020] Figure 1 shows a first embodiment of an insulation element 1 is having a rectangular shape with first and second sides having a length l and third and fourth sides with a width d . The opposing first and second sides are provided with a trim portion 3 and a flexible portion 4, respectively. The trim portion 3 is separated from the rest of the insulation element 1 by a cutting line 7. The width of the trim portion is d_t and the width of the flexible portion is d_f . In figure 1 the most basic embodiment of an insulation element according to the invention is shown.

[0021] With reference to figure 2 and 3, a second embodiment is shown, where a second trim portion 5 is also provided along the third side and a flexible portion 6 is also provided along the fourth side. The cutting lines 7, 8 may be printed lines on the top surface of the insulation panel 1 or - as shown in fig. 3 - pre-cuts 7, 8 partially separating the trim portions 3, 5 from the rest of insulation panel 1. These pre-cuts have a depth, which is less than the thickness t of the insulation panel 1, varies depending on the thickness t of the insulation slab, but is preferably at least 50 mm and more preferably 50 mm less than the thickness t . Often the depth of the pre-cut will be in the range from one third to two thirds of the total thickness t . The thickness t may be within the range of 100 - 400 mm. Preferably, the insulation elements 1 are manufactured in standard sizes and thicknesses, e.g. with a thick-

ness of 140 mm, 160 mm, 180 mm or 200 mm.

[0022] Referring to figures 4 and 5, it becomes readily apparent how easy an insulation element 1 according to the invention is to understand for an inexperienced worker, e.g. a DIY person. The insulation slab 1 is to be fitted between two rafters or similar elongated framework members 2 in a building structure with a mutual distance D between them. This may be rafters in a roof structure, a wall structure or a floor structure where thermal and/or acoustic insulation is required. The insulation slab 1 is placed with the flex zone 4 abutting one or the rafters 2 so that the flexible zone is not compressed but merely positioned abutting the first rafter 2. The width d (see fig. 1 or 3) of the insulation slab 1 is larger than the distance D between the rafters 2.

[0023] If the insulation panel width d is such that the cutting line 7 is placed above the rafter 2 as it is the case in fig. 4, the trim portion 3 is to be cut off and the worker can easily cut along the cutting line 7 with the rafter 2 serving as a backing board for the cutting action in the insulation slab 1. The resulting insulation element 1 may then be fitted by compressing the flexible portion without providing too much compression causing the insulation element to buckle or bend out of the cavity between the two rafters.

[0024] If the distance D is not so much smaller than the width d of the insulation element 1, as it is the case in fig. 5, the insulation element 1 may be fitted in the same manner without having to trim the width first.

[0025] This means that there is no measuring with measuring sticks or tapes needed, but simply if the rafter is under the cutting line when the insulation panel 1 is positioned, then cutting is needed to fit the insulation element, but if the cutting line is free of the rafter, no cutting should be performed before fitting the insulation element between the rafters. Thus by the invention it is ensured that a small oversize in width is maintained also if trimming is needed, and that consequently a satisfactory amount of compression of the insulation element is done so that the spring effect of the insulation material expands the insulation panel between the rafters and keeps it in place.

[0026] The distances D between the elongated members 2 in the frameworks is determining which insulation element width is to be used. In fig. 6 are shown eight typical distance ranges that must be covered in order to provide an insulation element product range that covers the insulation needs for small building projects, such as DIY projects, comprehensively. As it can be seen in the figure, there are eight distance ranges D₁ to D₈ which together are covering a range in the rafter distance D from 550 mm to 950 mm in incremental steps of 50 mm.

[0027] Whereas previously this would require eight different formats of insulation slabs, it is realised by the invention that by sizing the insulation slabs according to the invention correctly, this required amount of formats can be reduced to only two formats, as shown in the figures 7 and 8.

[0028] In relation to the range in the distances D between the framework members in a building structure shown in fig. 6, the insulation element shown in fig. 7 is provided with trim portions 3, 5 along its first and third sides and flexible portions 4, 6 along its second and fourth sides. This "small" format insulation element according to the invention is provided with the following dimensions: The widths d_f and d_t are both approx. 50 mm and the insulation element width d is 660 mm and the length l is 760 mm, i.e. $l = d + d_f + d_t$. The dimensions ensure that a certain compression will always take place when fitting the insulation panel.

[0029] As illustrated in the lower part of fig. 7, this format is adapted to fit four different distances D₁ - D₄ covering the lower part of the range. If the distance D between the rafters is between 550 - 650 mm, i.e. D₁ or D₂, the insulation element is fitted with its longitudinal orientation parallel to the rafters. If the rafter distance is within the D₁ range, the trim portion 3 along the first side is cut off and thereby reducing the width to 610 mm and then compressing in particular the flexible zone for fitting the insulation between the rafters. If the distance is within the D₂ range, the trim portion should not be cut off, as the insulation element fits between the rafters with its longitudinal orientation substantially parallel to the rafters.

[0030] If the distance between the rafters is within the range of D₃ or D₄, i.e. between 650-750 mm, the advantage with an insulation element according to the preferred embodiment of the invention as shown in fig. 2 and fig. 3 becomes apparent. In this situation, the insulation element 1 is oriented with its longitudinal orientation substantially perpendicular to the rafters and the second trim portion 5 may be cut off if the distance is within the D₃ range.

[0031] In figure 8, a second "large" format is shown which similarly covers the rafter distance range of 750-950 mm, i.e. D₅ to D₈. This "large" format insulation panel is provided with a length l of 960 mm and a width d of 860 mm. Again this insulation element may be oriented with its longitudinal orientation parallel to the rafters or perpendicular to the rafters depending on the distance D. The trim portions and the flexible portions are provided with the widths d_f and d_t of approx. 50 mm.

[0032] This system in use is easy to illustrate and to instruct a user of how to trim and install. Information about rafter distances could advantageously be printed on the top of insulation element so that the user can easily find instructions on the product during the insulation fitting operation.

[0033] A technical advantage of the dimensions of the two formats may be found in the production of the fibrous insulation panels. The fibrous insulation panels are produced by cutting up a fibrous material web of e.g. stone wool. This web is often produced with a width of 2000 mm and by providing the "small" format with a width of 660 mm, three adjacent lines of insulation panels may be cut from this material web leaving a minimum amount

of fibrous waste material. The "large" format may be produced in two adjacent lines each with a width of 960 mm, which is the length of the longitudinal direction of the "large" format panel. This also minimises the amount of waste material.

[0034] It should be emphasised that the dimensions of the insulation element and the distances between the framework structures are explanatory and could be varied within the scope of the invention which is defined in the accompanying claims. Other embodiment of a fibrous insulation panel than the ones described above may be provided without departing from the scope of the claims.

Claims

1. An insulation element (1) for fitting between elongated members (2) in a framework of a building structure, such as between rafters, beams or the like, said insulation element (1) being a fibrous insulation element, preferably a mineral wool batt, and said insulation element (1) having substantially parallel first and second sides and substantially parallel third and fourth sides, exhibiting a first side portion and a substantially parallel opposing second side portion, wherein at least said first side portion is provided as a trim portion (3) which is provided with a cutting marking (7, 8) substantially parallel with the first side thereby defining an elongated trim section (3, 5) along the first side, said trim section (3, 5) having a predetermined width (d_t),

characterised in that

at least said second side portion is provided as a flexible zone (4) extending along the second side and comprising a flexible section (4, 6) of the insulation element (1) which is substantially less rigid and thus compressible and which has a predetermined width (d_f), and wherein the flexible zone (4, 6) is provided by softening the respective side by compressing the edge region during manufacture and thereby reducing the fibre bonding in the flexible section.

2. An insulation element according to claim 1, wherein the third side is provided with a trim portion (5) extending along the third side and the fourth side is provided with a flexible zone (6) comprising a flexible section extending along the fourth side.
3. An insulation element according to claim 1 or 2, wherein the at least one trim portion (3, 5) is provided by a cutting line (7, 8) parallel to the trim side, i.e. the first - respectively third - side.
4. An insulation element according to claim 3, wherein said cutting line (7, 8) is a visual line marker.
5. An insulation element according to claim 4, wherein said cutting line (7, 8) is a pre-cut slit having a depth

less than the thickness of the panel, preferably at least 50 mm and wherein said slit being substantially parallel to the trim side, i.e. the first - respectively third - side.

6. An insulation element according to any of the preceding claims, wherein the trim section width (d_t) is substantially equal to the flexible section width (d_f).
7. An insulation element according to any of the preceding claims, wherein the first and second sides are provided with a length (l) substantially equal to the sum of the width of the flexible zone (d_f), the width of the trim zone (d_t) and the length of the third and fourth sides (d).
8. An insulation element according to any of the preceding claims, wherein the insulation element (1) is provided with a density of 25-45 kg/m², preferably 28-35 kg/m².
9. An insulation element according to any of the preceding claims, wherein the insulation element (1) is provided with a first top layer having a first density and a second layer having a second density, said first density preferably being larger than the second density.
10. An insulation element according to any of the preceding claims, wherein the insulation element is provided with a thickness (t) between 100 and 400 mm.

Patentansprüche

1. Dämmelement (1) zum Einbau zwischen länglichen Gliedern (2) in einem Gebäuderahmen, wie etwa zwischen Sparren, Balken oder dergleichen, wobei das Dämmelement (1) ein Faserdämmstoffelement, vorzugsweise eine Mineralwollmatte ist, und das Dämmelement (1) im Wesentlichen parallele erste und zweite Seiten und im Wesentlichen parallele dritte und vierte Seiten hat, die einen ersten Seitenabschnitt und einen im Wesentlichen parallelen gegenüberliegenden zweiten Seitenabschnitt aufweisen, wobei mindestens der erste Seitenabschnitt als ein Abtrennabschnitt (3) vorgesehen ist, der mit einer Abtrennmarkierung (7, 8) versehen ist, die im Wesentlichen parallel zur ersten Seite ist, so dass ein länglicher Abtrennabschnitt (3, 5) entlang der ersten Seite gebildet wird, wobei der Abtrennabschnitt (3, 5) eine vorbestimmte Breite (d_t) hat, **dadurch gekennzeichnet, dass** mindestens der zweite Seitenabschnitt als eine flexible Zone (4) vorgesehen ist, die sich entlang der zweiten Seite erstreckt und einen flexiblen Abschnitt (4, 6) des Dämmelements (1) umfasst, der im Wesentlichen weniger starr und daher komprimierbar

ist, und der eine vorbestimmte Breite (d_f) hat, und wobei die flexible Zone (4, 6) mittels Weichmachen der entsprechenden Seite durch Komprimieren des Randbereichs während der Herstellung gebildet wird, sodass die Faserbindung in dem flexiblen Abschnitt reduziert ist.

2. Dämmelement nach Anspruch 1, wobei die dritte Seite mit einem Abtrennabschnitt (5) versehen ist, der sich entlang der dritten Seite erstreckt, und die vierte Seite mit einer flexiblen Zone (6) versehen ist, die einen flexiblen Abschnitt aufweist, der sich entlang der vierten Seite erstreckt.
3. Dämmelement nach Anspruch 1 oder 2, wobei der mindestens eine Abtrennabschnitt (3, 5) durch eine Trennlinie (7, 8) parallel zur Abtrennseite, d.h. zur ersten bzw. zur dritten Seite, gebildet wird.
4. Dämmelement nach Anspruch 3, wobei die Trennlinie (7, 8) eine sichtbare Markierungslinie ist.
5. Dämmelement nach Anspruch 4, wobei die Trennlinie (7, 8) ein vorgestanzter Schlitz mit einer Tiefe von weniger als die Dicke der Platte, vorzugsweise mindestens 50 mm ist, und wobei der Schlitz im Wesentlichen parallel zur Abtrennseite, d.h. zur ersten bzw. zur dritten Seite, ist.
6. Dämmelement nach einem der vorhergehenden Ansprüche, wobei die Breite des Abtrennabschnitts (d_f) im Wesentlichen gleich der Breite des flexiblen Abschnitts (d_f) ist.
7. Dämmelement nach einem der vorhergehenden Ansprüche, wobei die erste und zweite Seite eine Länge (l) im Wesentlichen gleich der Summe der Breite der flexiblen Zone (d_f), der Breite der Abtrennzone (d_f) und der Länge der dritten und vierten Seite (d) haben.
8. Dämmelement nach einem der vorhergehenden Ansprüche, wobei das Dämmelement (1) eine Dichte von 25-45 kg/m², vorzugsweise 28-35 kg/m² hat.
9. Dämmelement nach einem der vorhergehenden Ansprüche, wobei das Dämmelement (1) eine erste obere Schicht mit einer ersten Dichte und eine zweite Schicht mit einer zweiten Dichte aufweist, wobei die erste Dichte vorzugsweise größer als die zweite Dichte ist.
10. Dämmelement nach einem der vorhergehenden Ansprüche, wobei das Dämmelement eine Dicke (t) von zwischen 100 und 400 mm hat.

Revendications

1. Élément d'isolation (1) pour l'insertion entre des éléments allongés (2) dans un cadre d'une structure de bâtiment, tels qu'entre des chevrons, poutres ou similaires, ledit élément d'isolation (1) étant un élément d'isolation fibreux, de préférence un morceau de laine minérale et ledit élément d'isolation (1) présentant des premier et second côtés sensiblement parallèles et des troisième et quatrième côtés sensiblement parallèles, présentant une première partie latérale et une seconde partie latérale opposée sensiblement parallèle, dans lequel au moins ladite première partie latérale est prévue comme partie de bord (3) qui est dotée d'un marquage de coupe (7, 8) sensiblement parallèle au premier côté, définissant par là-même une section de bord allongée (3, 5) le long du premier côté, ladite section de bord (3, 5) présentant une largeur (d_f) prédéterminée, **caractérisé en ce que** au moins ladite seconde partie latérale est prévue comme une zone flexible (4) s'étendant le long du second côté et comprenant une section flexible (4, 6) de l'élément d'isolation (1) qui est sensiblement moins rigide et ainsi compressible et qui a une largeur prédéterminée (d_1) et dans lequel la zone flexible (4, 6) est prévue en amollissant le côté respectif en compressant la région d'arête pendant la fabrication et réduisant par là-même le collage des fibres dans la section flexible.
2. Élément d'isolation selon la revendication 1, dans lequel le troisième côté est doté d'une partie de bord (5) s'étendant le long du troisième côté et le quatrième côté est doté d'une zone flexible (6) comprenant une section flexible s'étendant le long du quatrième côté.
3. Élément d'isolation (1) selon la revendication 1 ou 2, dans lequel l'au moins une partie de bord (3, 5) est prévue par une ligne de coupe (7, 8) parallèle au côté de bord, c'est-à-dire au premier, respectivement troisième, côté.
4. Élément d'isolation selon la revendication 3, dans lequel ladite ligne de coupe (7, 8) est un marqueur de ligne visuel.
5. Élément d'isolation selon la revendication 4, dans lequel ladite ligne de coupe (7, 8) est une fente prédécoupée présentant une profondeur inférieure à l'épaisseur du panneau, de préférence d'au moins 50 mm et dans lequel ladite fente est sensiblement parallèle au côté de bord, c'est-à-dire au premier, respectivement troisième, côté.
6. Élément d'isolation selon l'une quelconque des revendications précédentes, dans lequel la largeur de

section de bord (d_1) est sensiblement égale à la largeur de section flexible (d_1).

7. Élément d'isolation selon l'une quelconque des revendications précédentes, dans lequel les premier et second côtés sont dotés d'une longueur (1) sensiblement égale à la somme de la largeur de la zone flexible (d_1), la largeur de la zone de bord (d_t) et la longueur des troisième et quatrième côtés (d). 5
8. Élément d'isolation selon l'une quelconque des revendications précédentes, dans lequel l'élément d'isolation (1) est doté d'une densité de 25 à 45 kg/m², de préférence de 28 à 35 kg/m². 10
9. Élément d'isolation selon l'une quelconque des revendications précédentes, dans lequel l'élément d'isolation (1) est doté d'une première couche supérieure présentant une première densité et d'une seconde couche présentant une seconde densité, ladite première densité étant de préférence supérieure à la seconde densité. 15
10. Élément d'isolation selon l'une quelconque des revendications précédentes, dans lequel l'élément d'isolation est doté d'une épaisseur (f) entre 100 et 400 mm. 20

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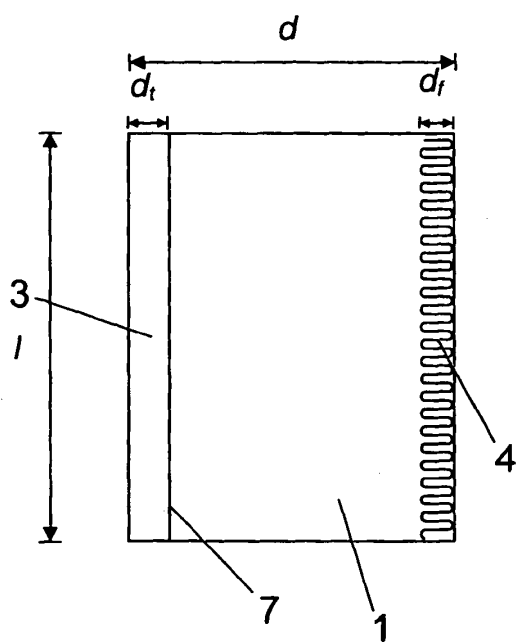


Fig. 1

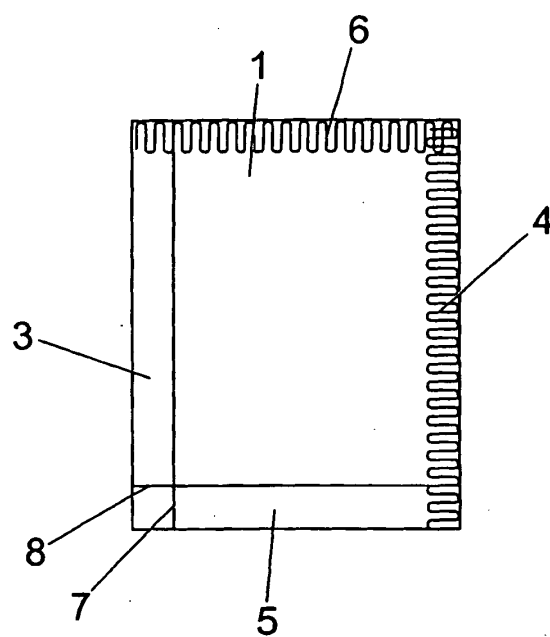


Fig. 2

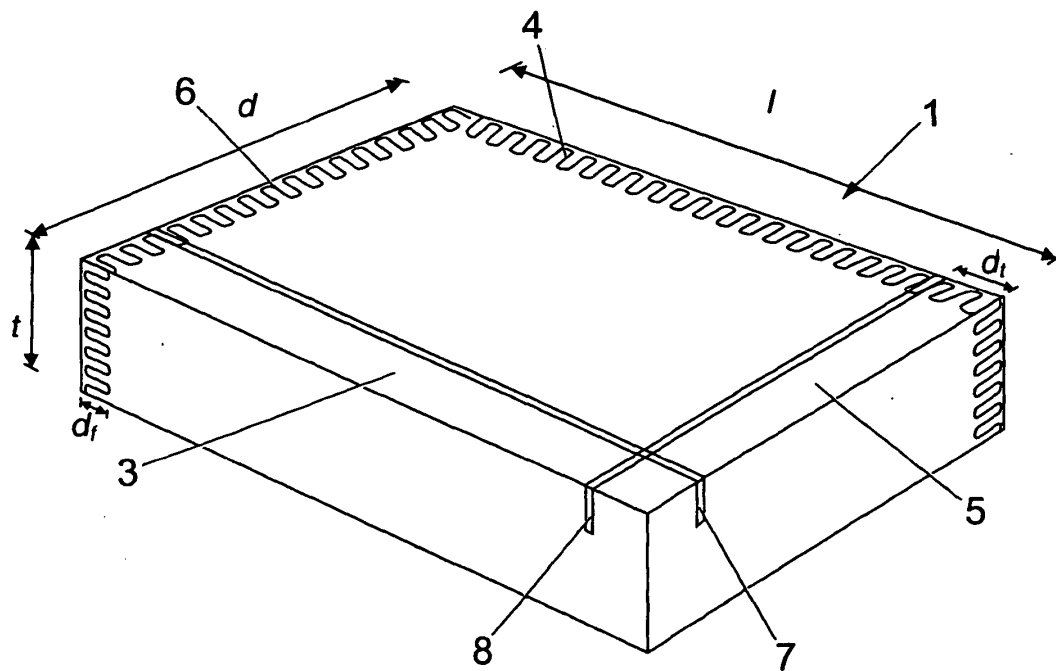


Fig. 3

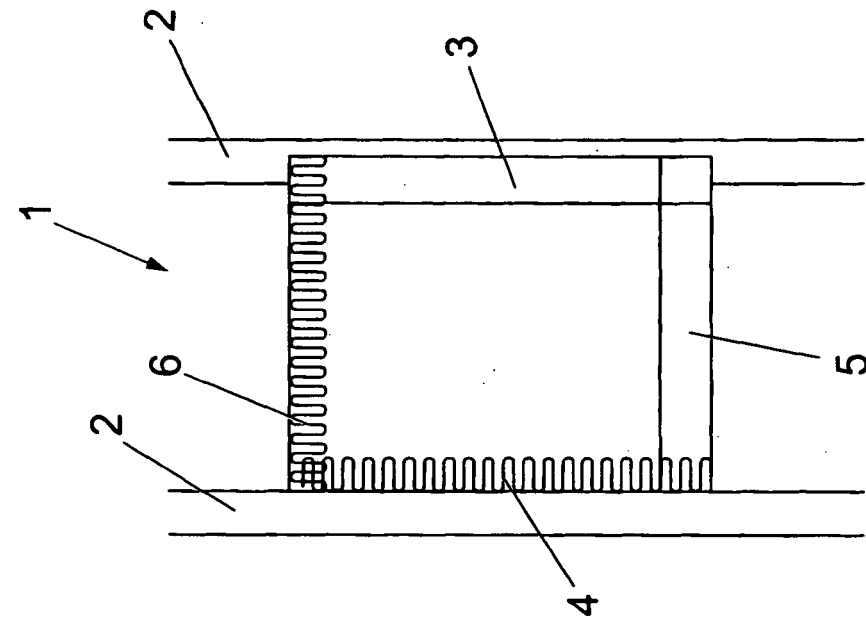


Fig. 5

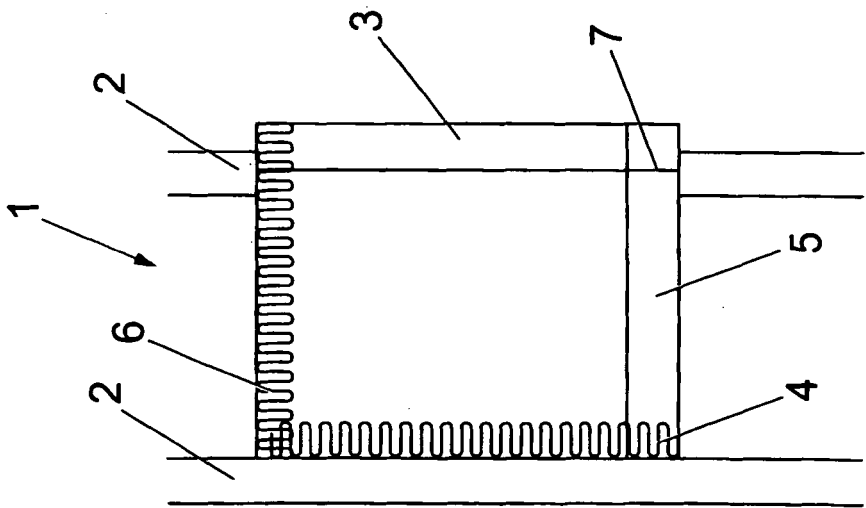


Fig. 4

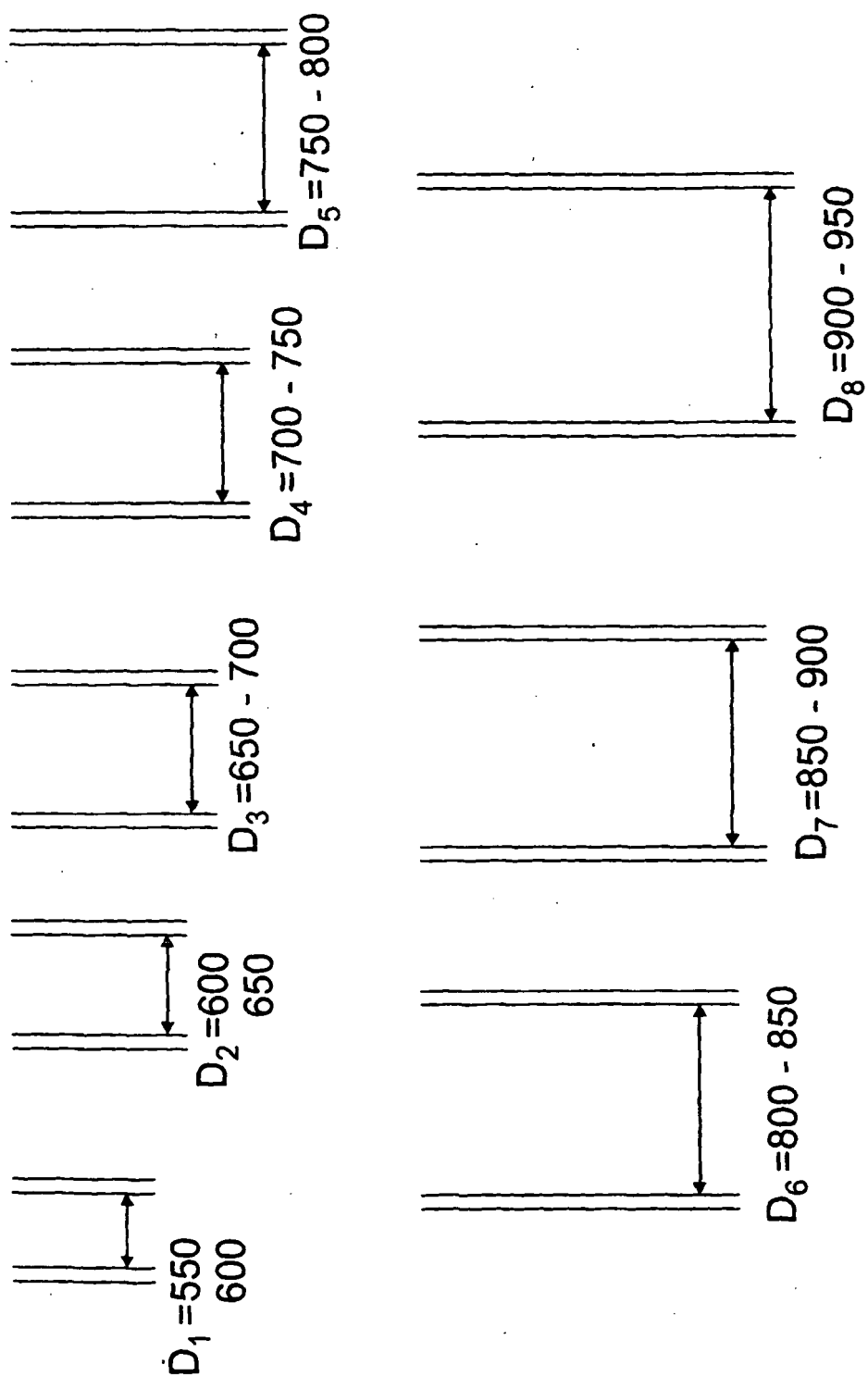


Fig. 6

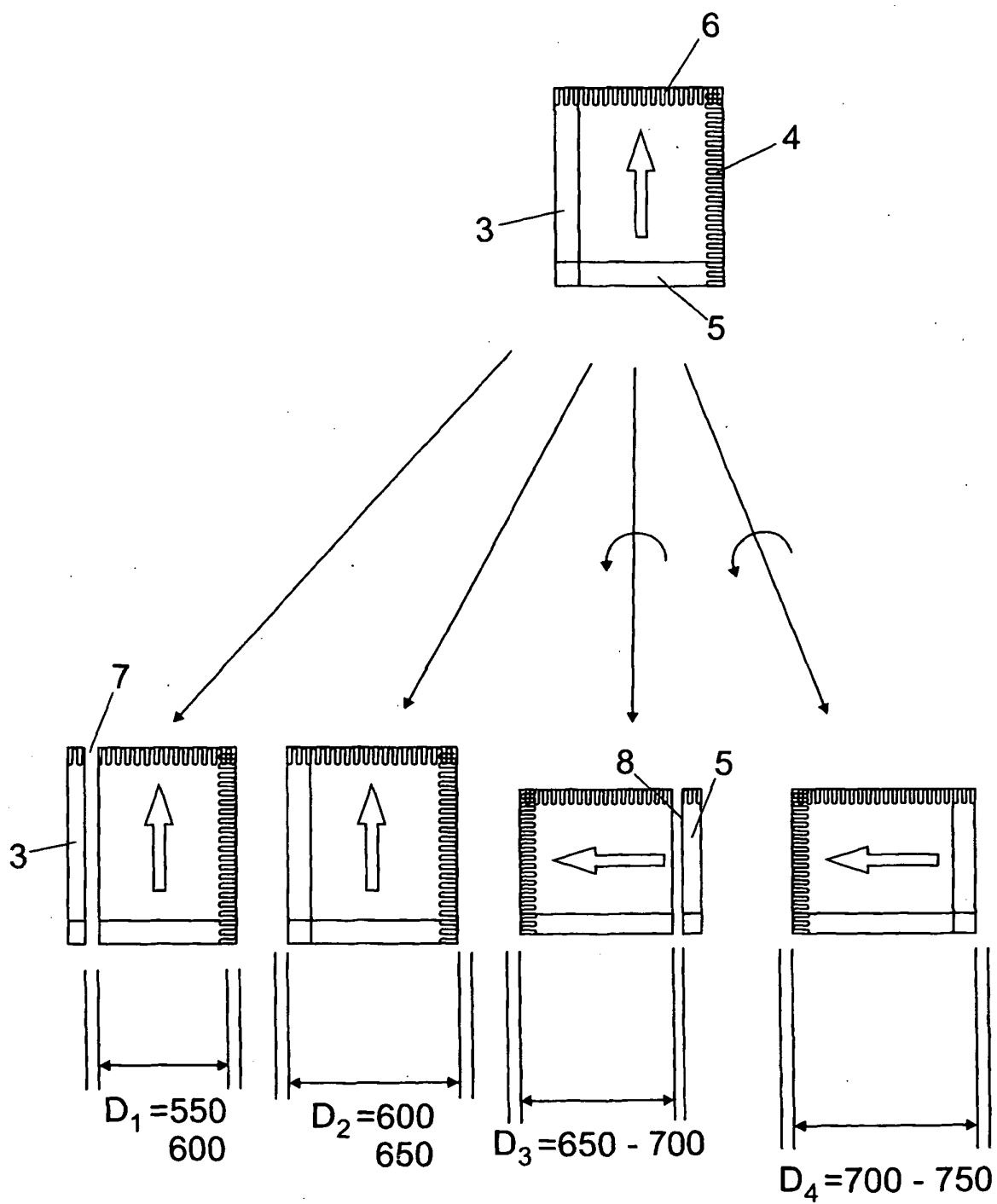


Fig. 7

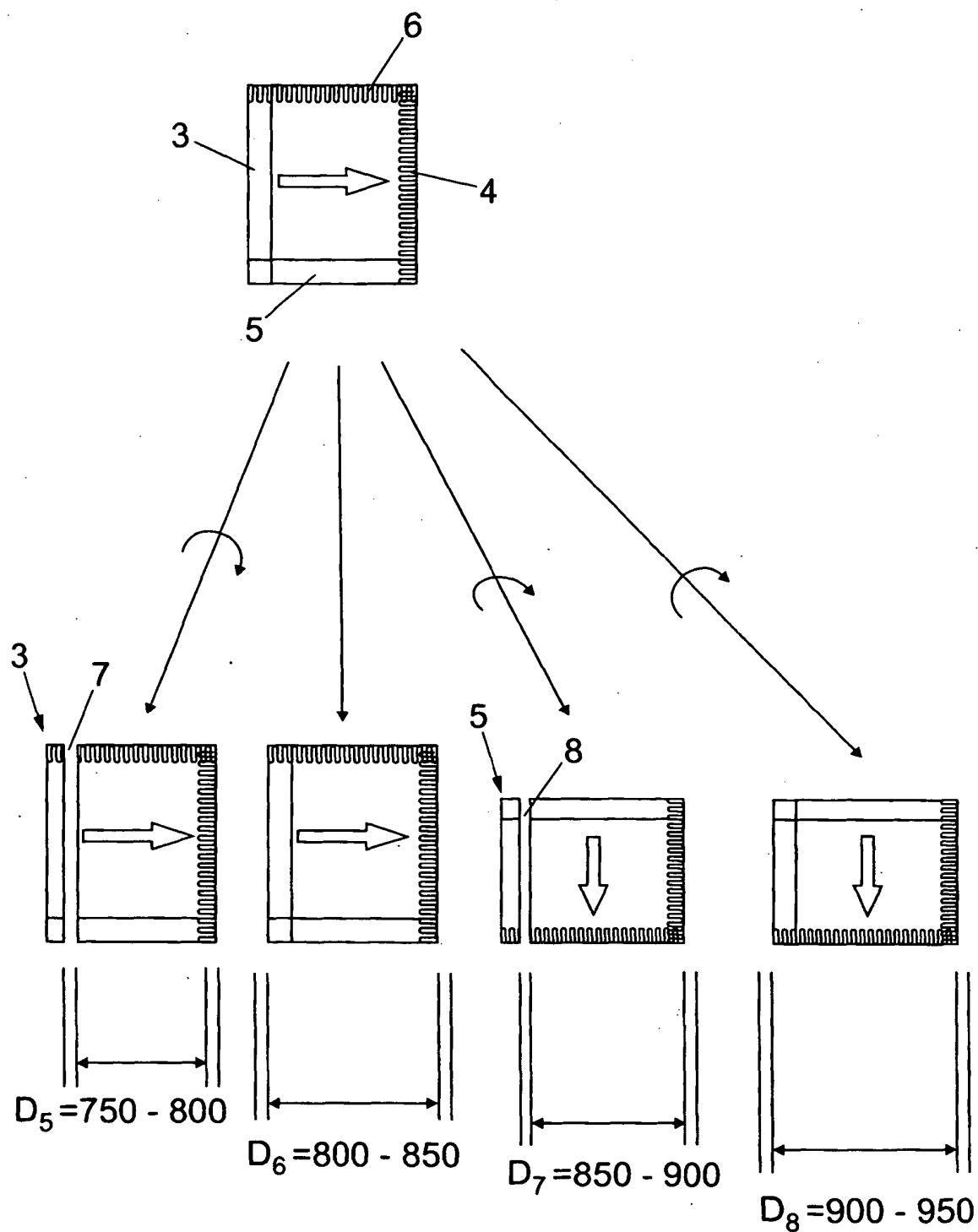


Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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