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(54) **Wall element**

Wandelement

Élément de paroi

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**WO-A1-93/04240 WO-A1-2011/025373
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Description

[0001] The invention relates to a wall element comprising two outer layers extending at least substantially parallel to each other and an intermediate layer connected thereto, which wall element can be moved between a folded position, in which the outer layers face each other, and an unfolded position, in which the outer layers are spaced from each other, said intermediate layer comprising first parts which are connected to a respective outer layer and second parts which extend between said first parts.

[0002] An element is known from Australian patent specification No. AU 511833, for example, which describes an insulation panel comprising two outer layers and intermediate strips connected thereto, which outer layers are movable between a first position, in which the outer layers are closely juxtaposed, and a second position, in which they are spaced from each other. A drawback of the known element is that it does not have sufficient constructional stiffness for being used as a sturdy wall element. An additional drawback is the fact that the wall part can unintentionally collapse from the second position to the first position. DE 23 53 927 discloses a wall element according to the preamble of claim 1.

[0003] It is an object of the invention to overcome the drawbacks of the prior art. It is in particular an object of the invention to provide a wall element which has a very high flexural and tensile strength and which can be folded or unfolded in a simple and/or efficient manner without the possibility of this taking place unintentionally.

[0004] In order to achieve that object, a wall element of the kind described in the introduction is according to the invention characterised in that the intermediate layer has a rectangular cross-section in the unfolded position, wherein the first parts extend parallel to the outer layers in the folded and unfolded positions, wherein the second parts extend perpendicularly to the first parts in the unfolded position, wherein the second parts extend parallel to the first parts in the folded position, and wherein each second part is pivotally connected to at least one of the first parts, wherein the intermediate layer (3) is formed from one blank, wherein each second part (97) is pivotally connected to both first parts (6), wherein each second part (7) is pivotally connected to one of the first parts (6) along two spaced fold lines (21, 22; 23, 25), and wherein each second part (7) is pivotally connected to the other first part (6) along one fold line (23, 26). As a result, use can be made in a simple and/or efficient manner of a standard element, for example for forming a wall, for each desired thickness of the wall, wherein the maximum thickness is the sum of the length of the second parts and the thicknesses of the first parts and of the outer layers. In folded position, the wall element takes up less space, so that the wall elements can be efficiently stored and/or transported. This saves costs and reduces the burden on the environment. In unfolded position, the wall element can preferably be fixed in position by providing an

insert between the first and the second parts, in particular an insert in the form of a piece of insulation material, such as rock wool. In another preferred embodiment, a first part and/or a second part comprise(s) a lip that can be bent outward, which lip functions to fix the wall element in the unfolded position. As a result, separate fixation means are not required, so that such means need not be brought along separately, which leads to a further reduction of the transport and storage costs. By fixing the wall element in a position between the folded and the unfolded position or in said folded or said unfolded position, unintentional folding of the construction element, for example as a result of a force being exerted thereon, is not possible. This is important, for example, if several wall elements are used for forming a wall, which wall elements are interconnected, since the connecting of wall elements can only take place if said wall elements are in the same position.

[0005] Preferably, the outer layers are staggered relative to the first parts of the wall element, so that the outer layers project relative to the first parts of the wall element at one short end thereof so as to form a mounting opening, and so that the first parts project relative to the outer layers at the other short end of the wall element so as to form a mounting projection. To connect adjacent wall elements together, the mounting projection of one element is inserted into the mounting opening of the other wall element.

[0006] It is noted that the wall element cannot be used exclusively to form a wall, as the wall element is also suitable for use as a ceiling element and/or as an insulation element.

[0007] In a preferred embodiment of a wall element according to the invention at least one of the second parts is provided with a fold line for forming a wing that can be folded inward, which wing functions to fix the wall element in the unfolded position.

[0008] In another preferred embodiment of a wall element in accordance with the invention at least one of said first parts comprises two spaced parts.

[0009] In another preferred embodiment of a wall element according to the invention, the outer layers are made of a material selected from the group consisting of wood, gypsum, metal and plastic. Preferably, the intermediate layer is made of a cellulosic material, such as paper/cardboard.

[0010] The invention will now be explained in more detail with reference to figures illustrated in a drawing, in which:

- Figure 1 is a perspective view of two interconnected wall elements;
- Figures 2 a 3 are perspective views of a wall element of figure 4 in an unfolded position and a folded position, respectively;
- Figures 4 and 5 are side views of the wall element of figures 2 and 3 in an unfolded position and a folded position, respectively;

- Figures 6, 7 and 8 are perspective views of a separate outer layer (figure 6) and a separate intermediate layer (figures 7 and 8), respectively, of the wall element of figures 2 and 3;
- Figures 9 and 10 correspond to figures 4 and 5, in this case, however, relating to a wall element according to the invention;
- Figures 11 and 12 relate to a wall element according to a preferred variant, showing a side view of the wall element in an unfolded position (figure 11) thereof and a top plan view of a blank of a separate intermediate layer used therewith, respectively;
- Figures 13 and 14 correspond to figures 11 and 12, in this case relating to another preferred variant, however;
- Figures 15 and 16 correspond to figures 13 and 14, in this case relating to yet another preferred variant.

[0011] As indicated, figure 1 is a perspective view of two interconnected, identical wall elements 1. Each wall element 1 is made up of two parallel outer layers 2 of gypsum and an intermediate layer 3 comprising several layers of corrugated cardboard, which is glued together with said outer layers. The outer layers 2 are staggered relative to the intermediate layer 3 of the wall element 1. As a result, the outer layers 2 project relative to the intermediate layer 3 at one short end of the wall element 1 so as to form a mounting opening 4, whilst the intermediate layer 3 projects relative to the outer layers 2 at the other short end of the wall element 1 so as to form a mounting projection 5. With respect to figure 1, the mounting projection 5 of one wall element 1 is inserted into the mounting opening 4 of the other wall element 1 for connecting adjacent wall elements 1 together.

[0012] The wall element 1 can be moved between a folded position, in which the outer layers 2 are close to each other (figure 3), and an unfolded position, in which the outer layers 2 are spaced from each other (figure 2). Referring to figures 2 and 3, the intermediate layer 3 comprises first parts 6, which are glued to a respective outer layer 2, and second parts 7, which extend between the first parts 6. As drawn, the first parts 6 extend parallel to the outer layers 2 in the folded position (figure 5) and in the unfolded position (figure 4). The second parts 7 extend perpendicular to the first parts 6 in the unfolded position (figure 4), however, and parallel to the first parts 6 in the folded position (figure 5). Each of the second parts 7 is pivotally connected to at least one of the first parts 6.

[0013] Further referring to figures 4 and 5, the intermediate layer 3 comprises two panels 8, 9, each formed from one blank. In the unfolded position (figure 4), each panel 8, 9 has a U-shaped cross-section, with the first parts 6 forming the bases of the U-shaped cross-sections and the second parts 7 forming the legs of the U-shaped cross-sections. Second parts 7 facing each other of the panels 8, 9 are connected.

[0014] Figure 6 relates to a separate outer layer 2 of gypsum. Figure 7 relates to a non-folded panel 8, 9 of a

few layers of corrugated cardboard, each consisting of a flat sub-layer 10 and a corrugated sub-layer 11, which are glued together. As shown in figure 7, one second part 7' of each panel 8, 9 is pivotally connected to the first part 6 thereof along two spaced fold lines 12, 13 in the panel 8, 9. By contrast, the other second part 7'' of each panel 8, 9 is pivotally connected to the first part 6 thereof along one fold line 14 in the panel 8, 9.

[0015] Figures 8, 9 and 10 relate to the preferred variant according to the invention, in which the intermediate layer 3 is made of one blank. In the unfolded position (figure 9) second parts 7', 7'' facing each other of the blank are connected on one side of the wall element 1. The inward-facing second part 7' thereof is pivotally connected to the first part 6' along two spaced fold lines 15, 16 in the blank. The outward-facing second part 7'' thereof is pivotally connected to the other first part 6'' along one fold line 17 in the blank. The second part 7''' of the blank on the other side of the wall element (1) is pivotally connected to the first parts 6', 6'' along one fold line 18 (part 6') and two fold lines 19, 20 (part 6'') in the blank (figure 8).

[0016] Figures 11 and 12 relate to a preferred variant of the wall element 1, in which corresponding parts are indicated by the same numerals. The wall element 1 comprises outer layers 2 and an intermediate layer 3, which outer layers 2 are staggered relative to the intermediate layer 3 in this variant as well. The intermediate layer 3 comprises one blank with first parts 6 and second parts 7, whose functions correspond to those of preceding preferred variants. Also in this case the blank is provided with two pairs of spaced fold lines (21, 22; 24, 25) and two single fold lines (23, 26), wherein said pairs of fold lines (21, 22; 24, 25) are located diagonally opposite each other and said single fold lines (23, 26) are likewise located diagonally opposite each other. As a result, the first parts 6 and the second parts 7 can optimally pivot relative to each other, without the presence of overlapping parts in the unfolded position of the wall element 1, as is the case in figures 4 and 9. The upper first part 6 of the blank is to that end provided with a cut, as shown. Said cut thus not play a part (any more) once the outer layers 2 are mounted. At least one of the second parts 7 comprises a lip 27 which can be bent outward and which functions to fix the wall element 2 in the unfolded position thereof. An insert in the form of rock wool may be provided before or after transport.

[0017] Figures 13 and 14 relate to another preferred variant and correspond to figures 11 and 12, with corresponding parts being indicated by the same numerals. The fourth preferred variant shown therein is identical to the third preferred variant shown in figures 11 and 12, with this difference that this variant does not comprise a lip 27 that can be bent outward from at least one of the second parts 27. Instead, a fold line 28 is provided in at least one of the second parts 7, so that a wing 29 that can be folded inward is formed in the second part 7 in question for fixing the wall element 2 in the unfolded po-

sition. It is noted that the fold line 28 need not necessarily be positioned in the centre of the second part 7 in question.

[0018] Figures 15 and 16 relate to yet another preferred variant and correspond to figures 13 and 14, with corresponding parts being indicated by the same numerals. The fifth preferred variant shown therein is identical to the fourth preferred variant shown in figures 13 and 14, with this difference that the cut in the upper first part 6 is much larger. The upper first part 6 is in this case actually formed by spaced parts 6', 6" thereof.

Claims

1. A wall element (1) comprising two outer layers (2) extending at least substantially parallel to each other and an intermediate layer (3) connected thereto, which wall element (1) can be moved between a folded position, in which the outer layers (2) face each other, and an unfolded position, in which the outer layers (2) are spaced from each other, said intermediate layer (3) comprising first parts (6) which are connected to a respective outer layer (2) and second parts (7) which extend between said first parts, **characterised in that** the intermediate layer (3) has a rectangular cross-section in the unfolded position, wherein the first parts (6) extend parallel to the outer layers (2) in the folded and unfolded positions, wherein the second parts (7) extend perpendicularly to the first parts (6) in the unfolded position, wherein the second parts (7) extend parallel to the first parts (6) in the folded position, and wherein each second part (7) is pivotally connected to at least one of the first parts (6), wherein the intermediate layer (3) is formed from one blank, wherein each second part (7) is pivotally connected to both first parts (6), wherein each second part (7) is pivotally connected to one of the first parts (6) along two spaced fold lines (21, 22; 23, 25), and wherein each second part (7) is pivotally connected to the other first part (6) along one fold line (23, 26).
2. A wall element (1) according to claim 1, wherein at least one of the second parts (7) comprises a lip (27) that can be bent outward, which lip functions to fix the wall element (1) in the unfolded position.
3. A wall element (1) according to claim 1 or 2, wherein at least one of the second parts (7) is provided with a fold line (28) for forming a wing (29) that can be folded inward, which wing functions to fix the wall element (1) in the unfolded position.
4. A wall element (1) according to claim 1, 2 or 3, wherein at least one of said first parts (6) comprises two spaced parts (6', 6").

5. A wall element (1) according to any one of the preceding claims 1 - 4, wherein the outer layers (2) are made of a material selected from the group consisting of wood, gypsum, metal and plastic.

6. A wall element (1) according to any one of the preceding claims 1 - 5, wherein the intermediate layer (3) is made of a cellulosic material, such as paper/cardboard.

Patentansprüche

1. Wandelement (1) mit zwei Außenschichten (2), die sich zumindest im Wesentlichen parallel zueinander erstrecken, und einer Zwischenschicht (3), die mit ihnen verbunden ist, wobei das Wandelement (1) zwischen einer eingeklappten Position, in der die Außenschichten (2) aufeinander zu gerichtet sind, und einer aufgeklappten Position bewegbar ist, in der die Außenschichten (2) voneinander beabstandet sind, wobei die Zwischenschicht (3) erste Teile (6) aufweist, die mit einer jeweiligen Außenschicht (2) verbunden sind, und zweite Teile (7), die sich zwischen den ersten Teilen erstrecken, **dadurch gekennzeichnet, dass** die Zwischenschicht (3) in der aufgeklappten Position einen rechteckigen Querschnitt aufweist, wobei sich die ersten Teile (6) parallel zu den Außenschichten (2) in der eingeklappten und der aufgeklappten Position erstrecken, wobei sich die zweiten Teile (7) rechtwinklig zu den ersten Teilen (6) in der aufgeklappten Position erstrecken, wobei sich die zweiten Teile (7) in der eingeklappten Position parallel zu den ersten Teilen (6) erstrecken und wobei jeder zweite Teil (7) schwenkbar mit mindestens einem der ersten Teile (6) verbunden ist, wobei die Zwischenschicht (3) aus einem Rohling gefertigt ist, wobei jeder zweite Teil (7) schwenkbar mit beiden ersten Teilen (6) verbunden ist, wobei jeder zweite Teil (7) schwenkbar mit einem der ersten Teile (6) entlang zweier beabstandeter Klapplinien (21, 22; 23, 25) verbunden ist und wobei jeder zweite Teil (7) schwenkbar mit dem anderen ersten Teil (6) entlang einer Klapplinie (23, 26) verbunden ist.
2. Wandelement (1) nach Anspruch 1, wobei mindestens einer der zweiten Teile (7) eine Lippe (27) aufweist, die nach außen gebogen werden kann, wobei die Lippe zur Befestigung des Wandelements (1) in der aufgeklappten Position dient.
3. Wandelement (1) nach Anspruch 1 oder 2, wobei mindestens eins der zweiten Teile (7) mit einer Klapplinie (28) versehen ist, um einen Flügel (29) zu bilden, der nach innen geklappt werden kann, wobei der Flügel zur Befestigung des Wandelements (1) in der aufgeklappten Position dient.

4. Wandelement (auf 1) nach Anspruch 1, 2 oder 3, wobei mindestens eins der ersten Teile (6) zwei beabstandete Teile (6', 6'') aufweist.
5. Wandelement (1) nach einem der vorstehenden Ansprüche 1-4, wobei die Außenschichten (2) aus einem Material gefertigt sind, das aus der Gruppe ausgewählt ist, die aus Holz, Gipskarton, Metall und Kunststoff besteht.
6. Wandelement (1) nach einem der vorstehenden Ansprüche 1-5, wobei die Zwischenschicht (3) aus einem Zellulosematerial wie Papier/Karton gefertigt ist.

Revendications

1. Élément de paroi (1) comprenant deux couches externes (2) s'étendant au moins sensiblement parallèlement l'une à l'autre et une couche intermédiaire (3) reliée à ces dernières, lequel élément de paroi (1) peut être déplacé entre une position pliée, dans laquelle les couches externes (2) sont l'une face à l'autre, et une position dépliée, dans laquelle les couches externes (2) sont espacées l'une de l'autre, ladite couche intermédiaire (3) comprenant des premières parties (6) qui sont reliées à une couche externe (2) respective et des secondes parties (7) qui s'étendent entre lesdites premières parties, **caractérisé en ce que** la couche intermédiaire (3) présente une section transversale rectangulaire dans la position dépliée, dans lequel les premières parties (6) s'étendent parallèlement aux couches externes (2) dans les positions pliée et dépliée, dans lequel les secondes parties (7) s'étendent perpendiculairement aux premières parties (6) dans la position dépliée, dans lequel les secondes parties (7) s'étendent parallèlement aux premières parties (6) dans la position pliée, et dans lequel chaque seconde partie (7) est reliée de manière à pouvoir pivoter à au moins l'une des premières parties (6), dans lequel la couche intermédiaire (3) est formée à partir d'un flanc, dans lequel chaque seconde partie (7) est reliée de manière à pouvoir pivoter aux deux premières parties (6), dans lequel chaque seconde partie (7) est reliée de manière à pouvoir pivoter à l'une des premières parties (6) le long de deux lignes de pliage espacées (21, 22 ; 23, 25), et dans lequel chaque seconde partie (7) est reliée de manière à pouvoir pivoter à l'autre première partie (6) le long d'une ligne de pliage (23, 26).
2. Élément de paroi (1) selon la revendication 1, dans lequel au moins l'une des secondes parties (7) comprend une lèvre (27) qui peut être repliée vers l'extérieur, chaque lèvre servant à fixer l'élément de paroi (1) dans la position dépliée.

3. Élément de paroi (1) selon la revendication 1 ou 2, dans lequel au moins l'une des secondes parties (7) comporte une ligne de pliage (28) afin de former un rabat (29) qui peut être plié vers l'intérieur, lequel rabat sert à maintenir l'élément de paroi (1) dans la position dépliée.
4. Élément de paroi (1) selon la revendication 1, 2 ou 3, dans lequel au moins l'une desdites premières parties (6) comprend deux parties espacées (6', 6'').
5. Élément de paroi (1) selon l'une quelconque des revendications 1 à 4 précédentes, dans lequel les couches externes (2) sont réalisées en un matériau sélectionné à partir du groupe constitué par du bois, du gypse, du métal et une matière plastique.
6. Élément de paroi (1) selon l'une quelconque des revendications 1 à 5 précédentes, dans lequel la couche intermédiaire (3) est réalisée en un matériau cellulosique, tel que du papier/carton.

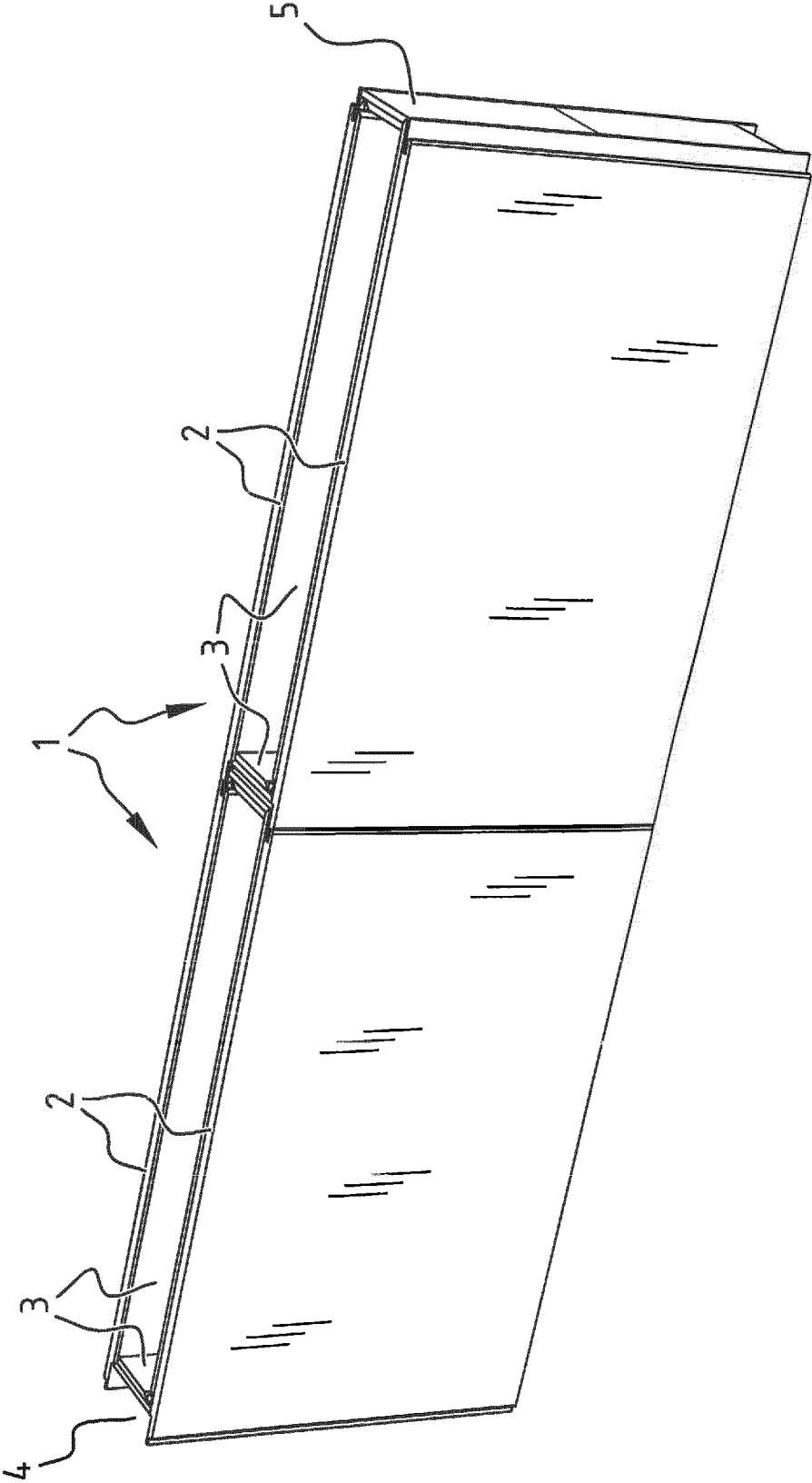
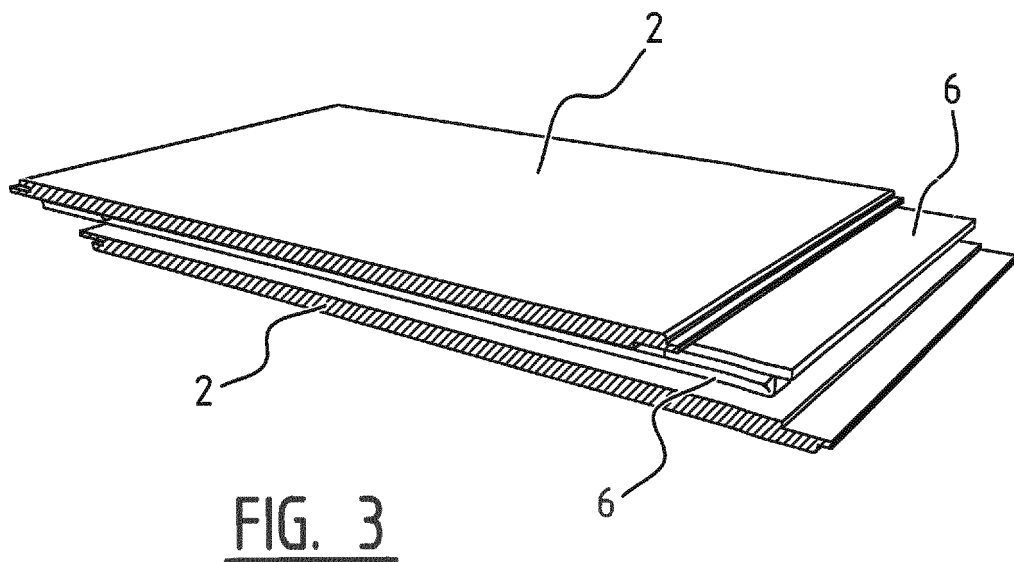
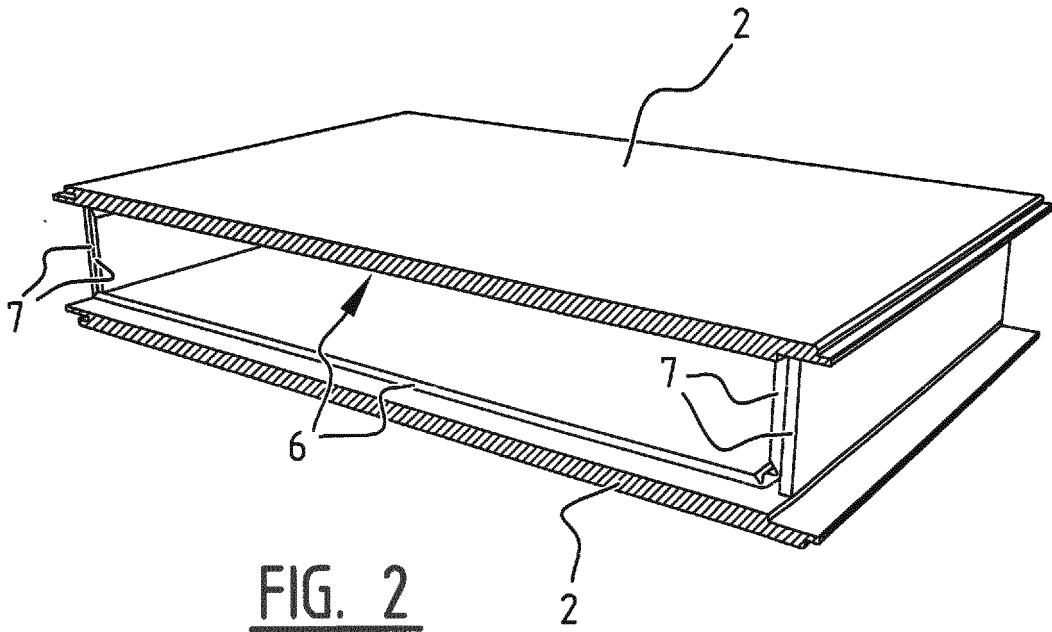
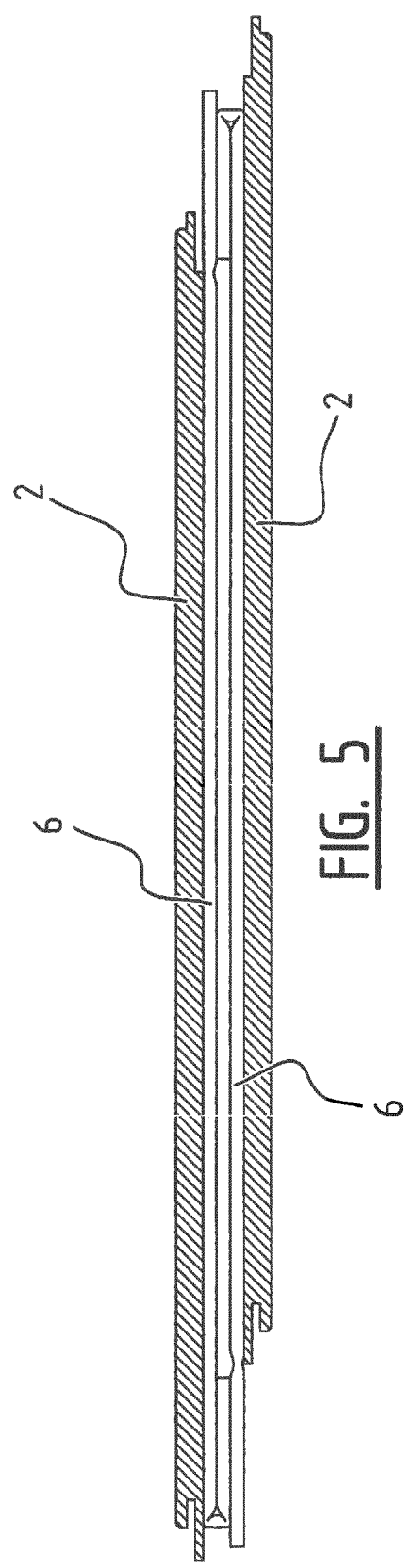
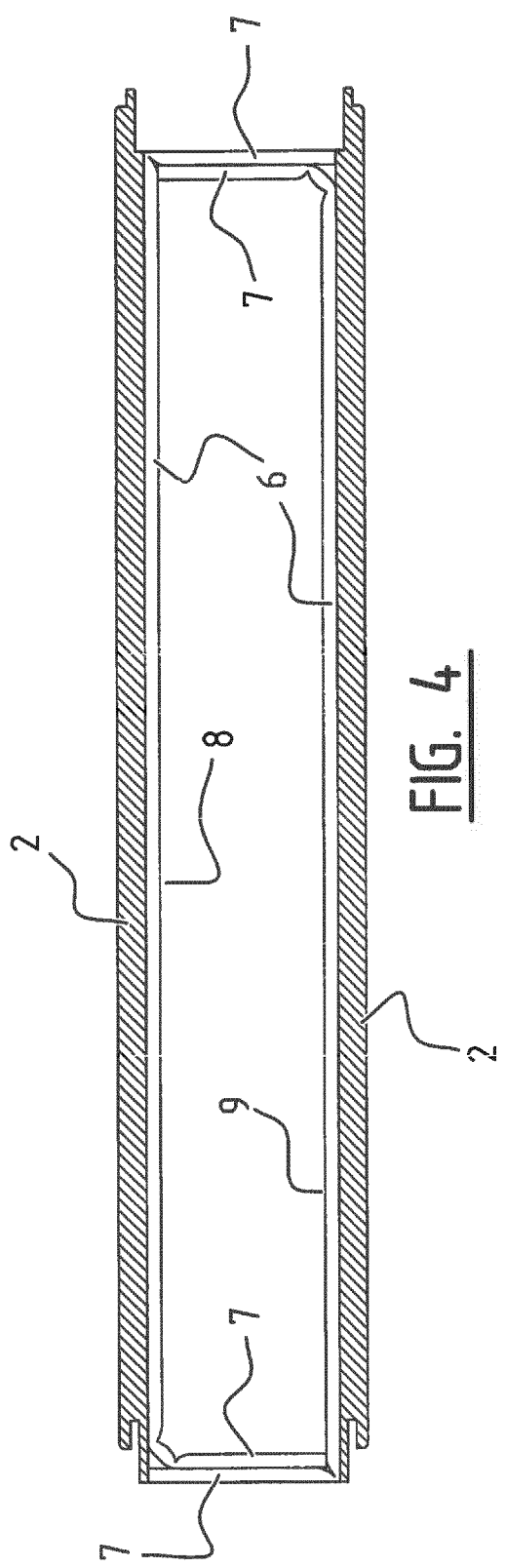


FIG. 1





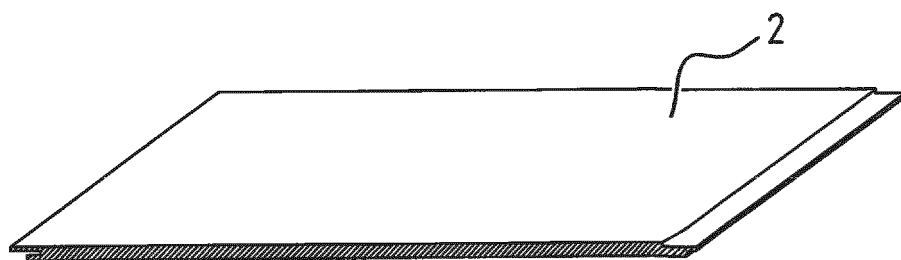


FIG. 6

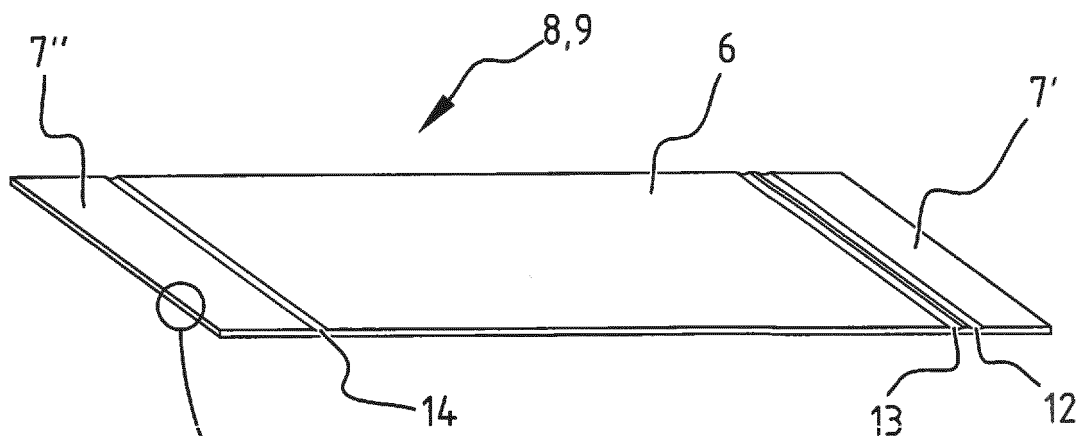


FIG. 7

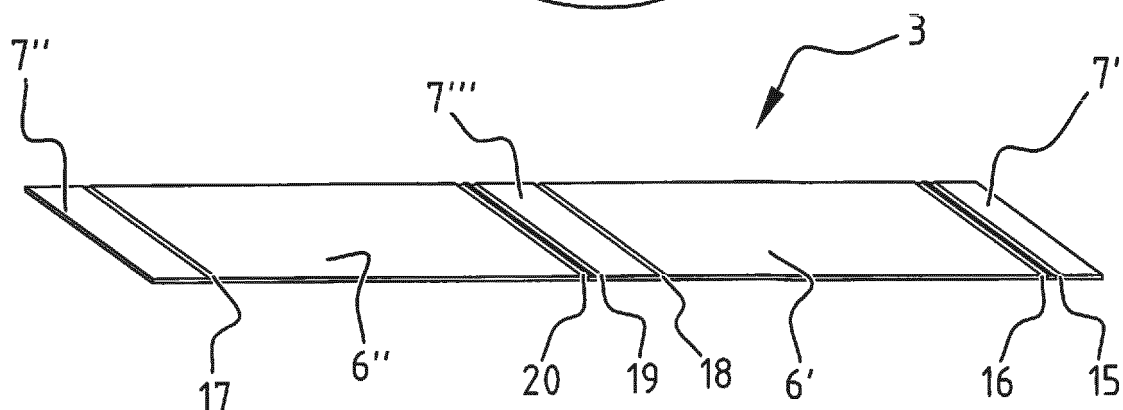


FIG. 8

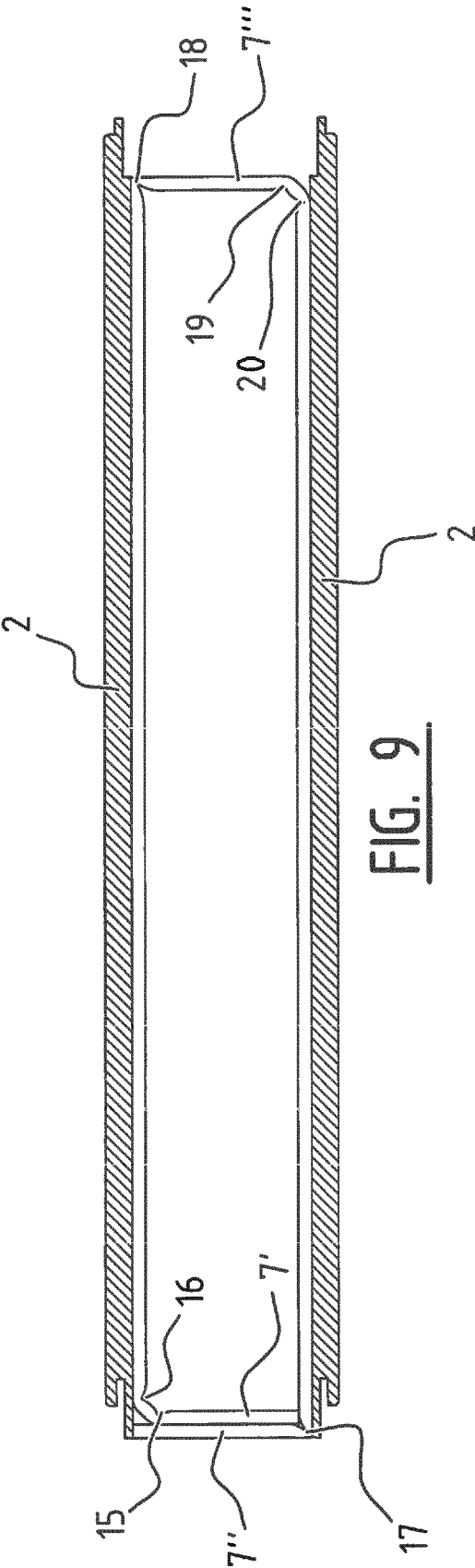


FIG. 9

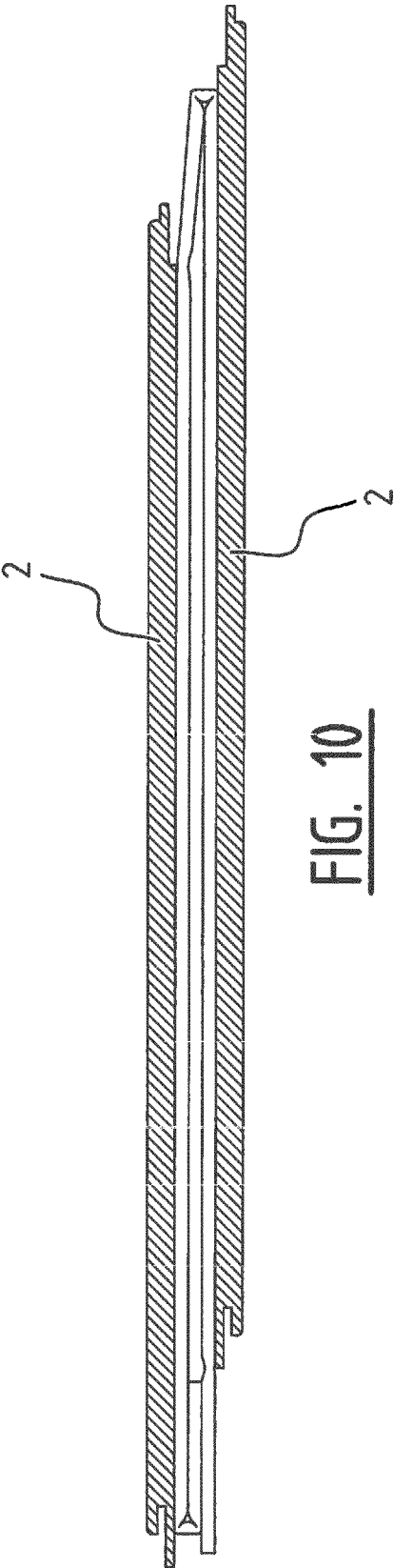


FIG. 10

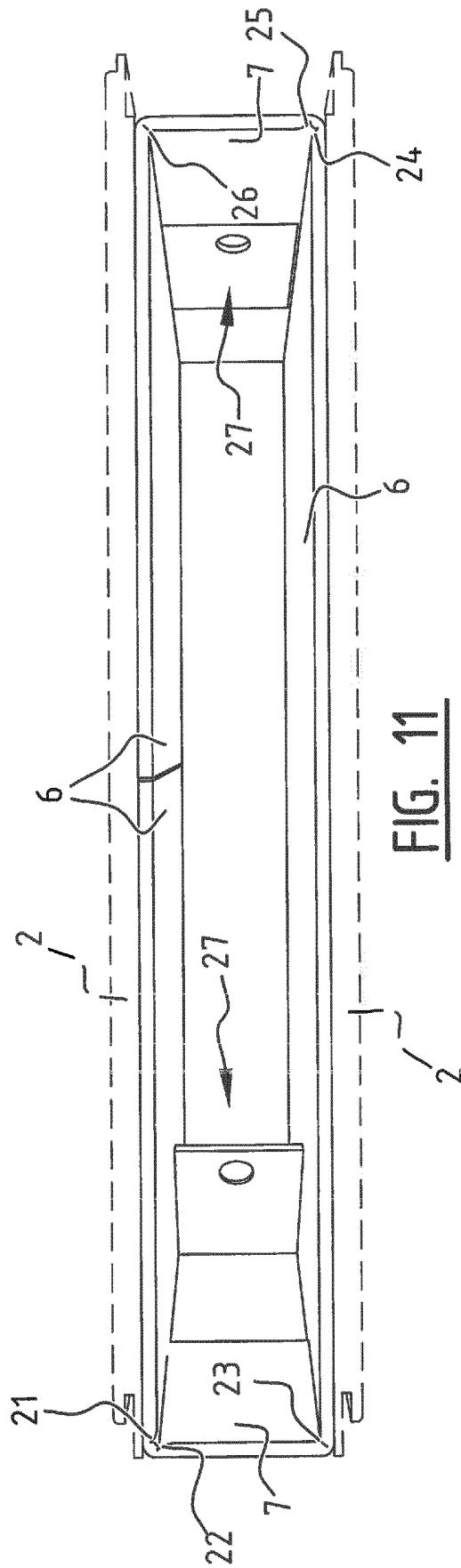


FIG. 11

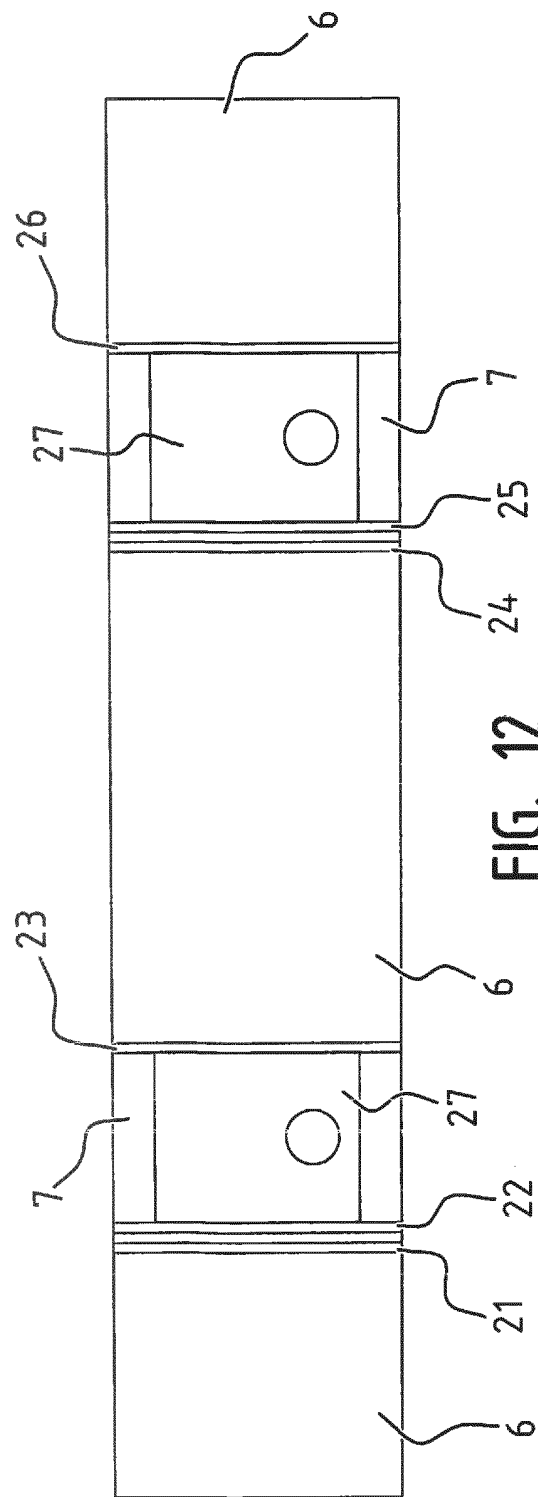
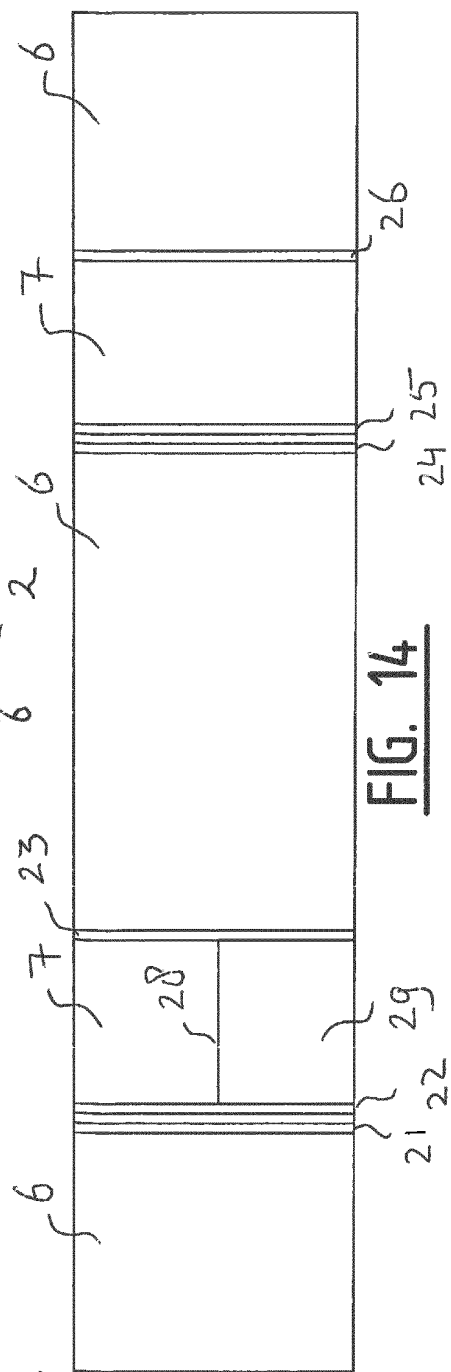
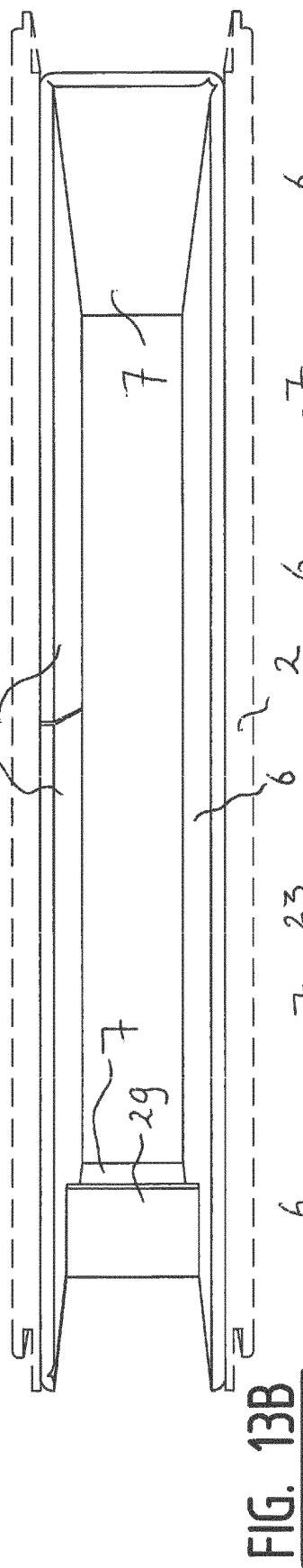
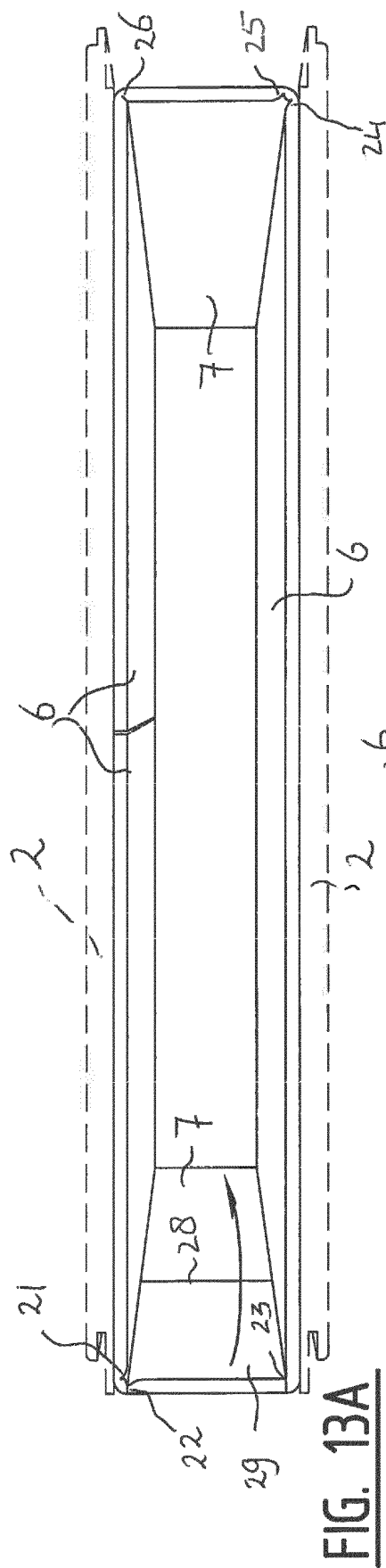
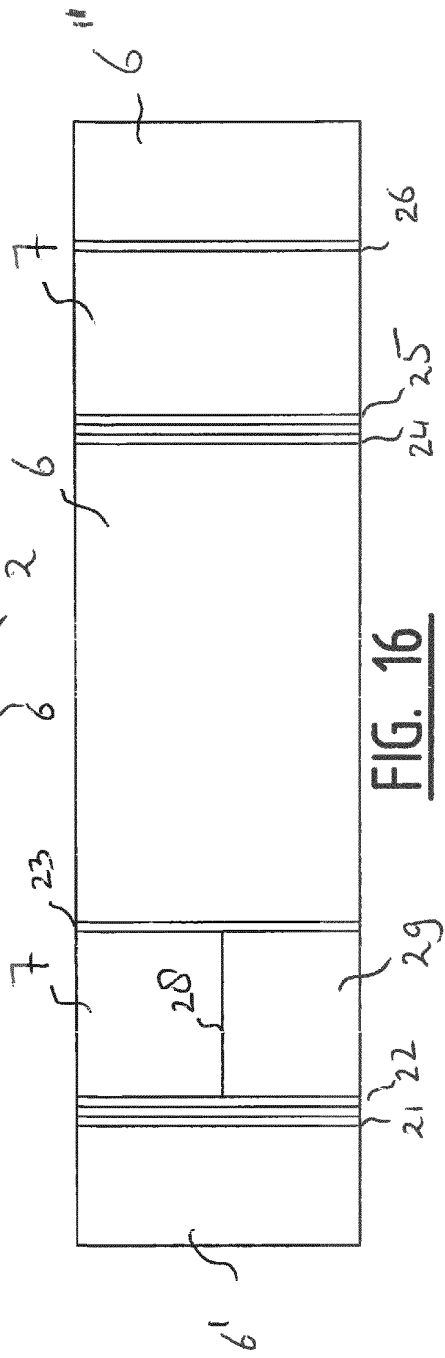
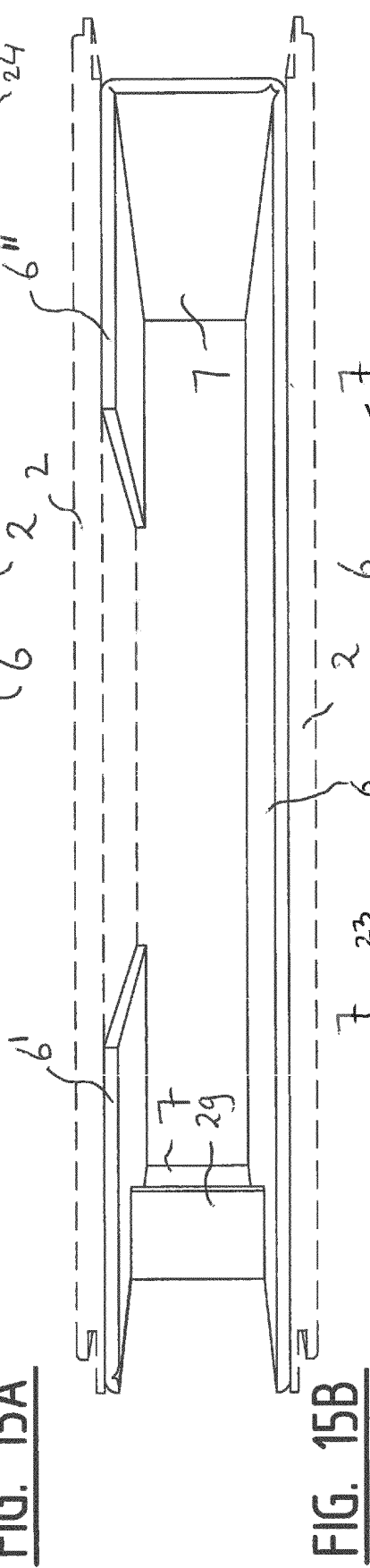
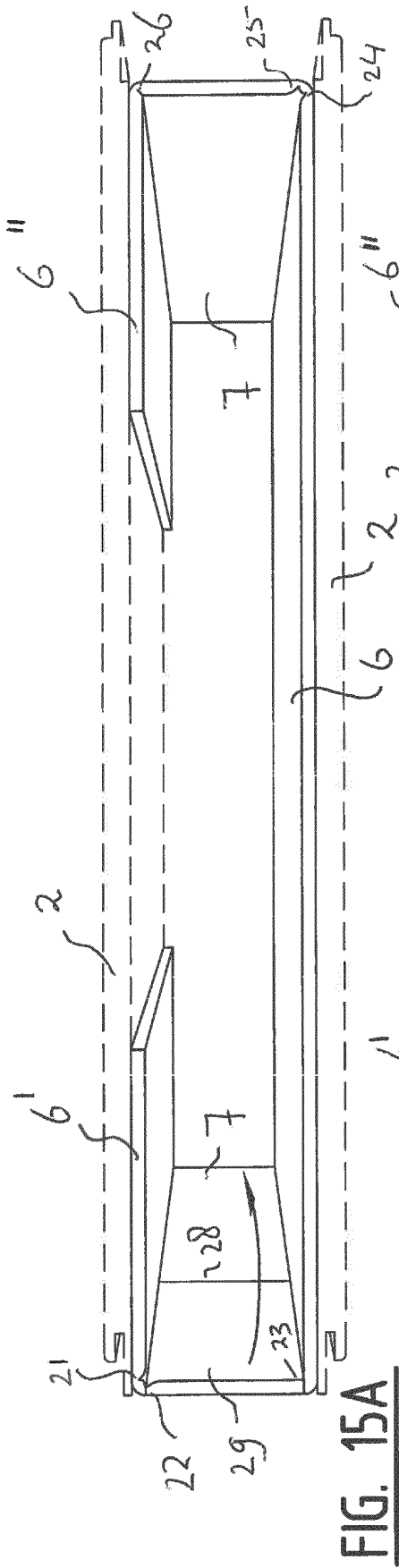


FIG. 12





REFERENCES CITED IN THE DESCRIPTION

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