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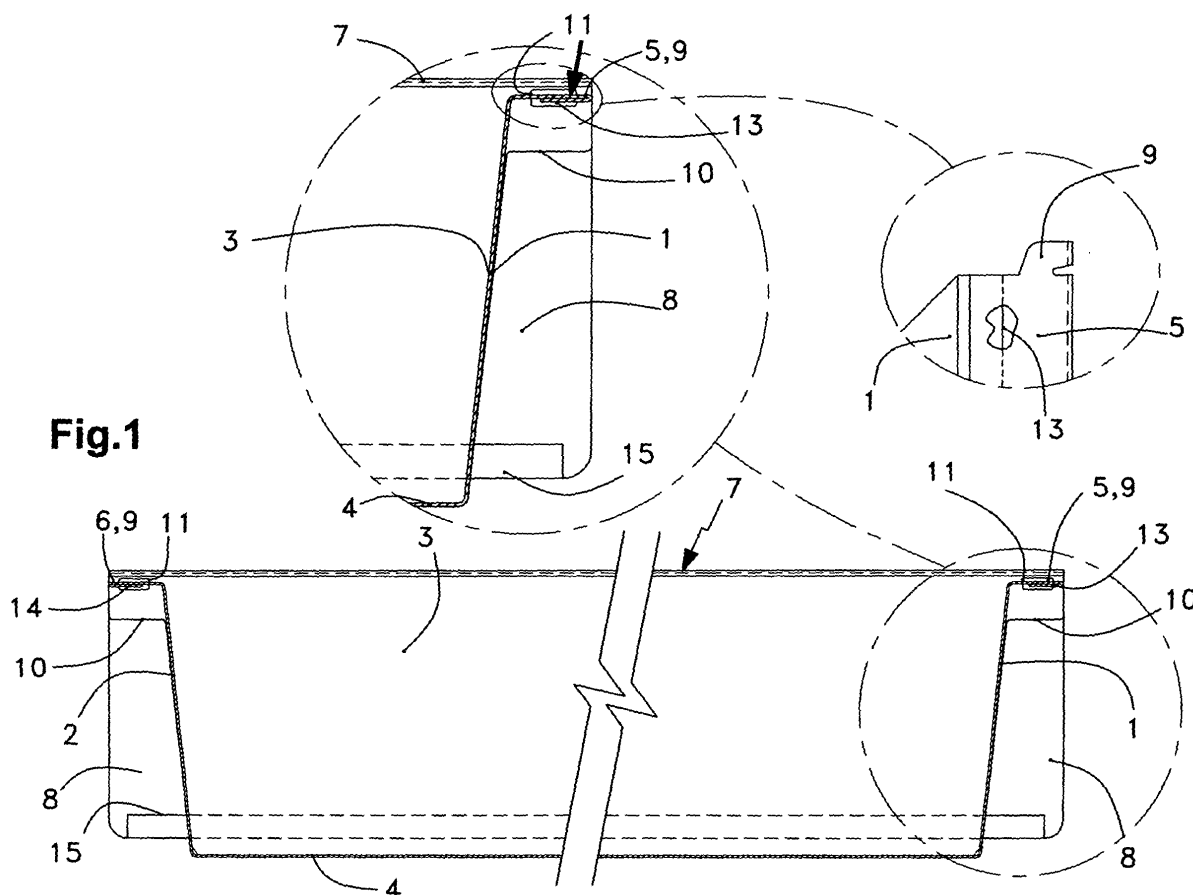
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(54) **Metallic storage box**

(57) This invention relates to a storage box made of sheet metal wherein the definitive configuration of the container is delimited around the sides by a front panel (1), a back panel (2) and two sides (3); the entire upper

edges of the front and back panels are folded outwards horizontally, and the upper edges of the sides are also folded outwards to form a channel with an inverted "U" shape which forms a skirt (8) on its outer side.

Fig.1



Description

FIELD OF THE INVENTION

[0001] This invention concerns a storage box made of sheet metal in which the definitive configuration of the container is delimited around the sides by a front panel, a back panel and two sides; the entire upper edges of the front and back panels are folded outwards horizontally, and the upper edges of the sides are also folded outwards to form a channel with an inverted "U" shape which forms a skirt on its outer side.

PRIOR ART

[0002] In this field, among other techniques, there are two known methods for forming one-piece metallic boxes.

[0003] One of these consists in forming them from a single piece by means of some method for metallic deformation in which a flat starting sheet is pressed between a mould and a die. This method of manufacture implies that the mould and die must be manufactured first. Apart from the high cost that this implies, there is an additional problem in that a different mould and die set has to be manufactured for each different model of box, and this is only economically viable when large quantities of boxes are to be produced.

[0004] The other technique consists in folding a flat sheet that has been stamped out to the appropriate shape.

[0005] When using this technique, one constructional method is known in which said panels that form the shape of the box have to be folded so that they can then be welded together. One problem with this method is the difficulty of the welding operation itself, the time involved and the equipment required to weld the joints; in addition, the welds have then to be processed, if the product is to have the appearance of quality that a high-priced product such as these metal boxes deserves. Another important problem is that plastic or painted finishes (intended to diversify the range of boxes offered in order to satisfy different tastes and requirements) can only be applied after the box has been formed into its final shape, since otherwise, the heat of the welding operation would damage any finish of this type that had been applied previously.

[0006] Another known type of folded-metal construction, without welds, involves designs in which the front and back panels are attached to the sides by engaging hooks into slots. The known designs constructed in this way are based on butt joints between the edges of the sides and the front and back panels, and do not succeed in hiding the hooks from view, giving a poor appearance to a product that, as we have mentioned, is considered to be high-quality. In addition, the corners of the finished box are not visually closed, i.e., it is possible to see light through them, which also spoils the product's image as

a quality product.

DETAILED DESCRIPTION OF THE INVENTION AND ITS ADVANTAGES

[0007] Given the above state of things, the invention that concerns us proposes a solution in which the metallic box is formed by folding a part with a shape suitable for assembly, tending towards an inverted truncated pyramid in shape, in which the front and back panels have co-planar extensions on both sides that form hooks facing towards the outside of the box, and that when inserted from inside the box towards the outside, operated by engaging into corresponding slots cut into the upper edges of the sides in wings that form co-planar extensions on both edges of the sides of the box and that extend downwards from said folds; as regards the final shape of the box, the width of the front and back panels is adjusted according to the separation between the side panels, and the position of each hook with respect to its slot is such that the inside of the hook is pressed against the external vertical edge of the slot, coinciding with an assembly position in which the entire lengths of the edges of the front and back panels fit perfectly against the inner faces of the sides, while at the same time, the external faces of the front and back panels are aligned with the edges of the sides. The width of the slot in the hooks is made greater than the thickness of the wings of the sides, and the horizontal dimension of the slots in the sides is made comfortably greater than that of the hooks in the direction of longitudinal insertion into them from the inside to the outside of the box.

[0008] The constructional method described here allows a strong, reliable joint to be achieved that will not come apart accidentally, using simple folding operations and assembly operations, and allows complete visual closure of the box, as corresponds to the image of quality that this type of product should offer.

[0009] These advantageous properties are the result of a design that takes advantage of the positive functions of the shape itself. In effect, the proposed design uses certain elements, and positions of these, that are in consonance with the properties of the material employed and the essential shape of the final product, and that, these elements being in themselves peculiar, lead to improved operability of the product.

[0010] This concept will be better understood if we previously explain the functionality achieved by the constructional method proposed. The cut-out piece of sheet metal is folded into a form that tends towards the inverted truncated pyramidal shape of the finished box, and then the following attachment operations are performed: the sides of the box are pushed apart and the front and back panels are pushed between them towards the interior of the box until the hooks are aligned with the corresponding slots in the side panels, at which point, the hooks penetrate the slots and slide along them until they hit the outermost front vertical edge of the slots, the assembly operation

being complete at this point, the box having exactly the shape it should.

[0011] This operation has been carried out by using the elastic properties of the sheet metal, which also ensure the stability of the assembled box, since the elastic forces maintain the hooks pressed against the outermost vertical edge of the slots, which ensures that accidental detachment will not occur. This is an example of what is meant by a design that takes advantage of the positive function of the shape itself.

[0012] Another example of this principle is that the elasticity of the side panels, together with the particular design which places the front and back panels between the side panels, causes the latter to press against the edges of the front and back panels, producing a perfect fit along their entire length, which results in a complete visual closure that does not allow light to be seen through the corners of the box, offering a favourable impression of the quality that is expected in products of this type.

[0013] On the other hand, the positions of the slots, close to the lower face of the folds of the side panels, means that the hooks are not visible from outside the box during normal use, which also favours the impression of quality of the product. This is also favoured by the fact that according to this invention, the flanges of the front and back panels and the skirts of the side panels have their long edges finished by flaps folded against the hidden face of said flanges and skirts; this detail also favours the appearance of high quality and at the same time constitutes a safety element, reducing the risk of accidental cuts during handling.

[0014] Another aspect of the invention consists in the incorporation of at least one element to provide rigidity and reduce noise, of a suitable thickness, attached to the lower face of the bottom panel of the box; according to a preferential method of construction, this rigid noise-reducing element is a sheet of cavernous constitution formed by a multiplicity of cavities separated by thin vertical walls. This element performs three functions; on the one hand, it limits the extent to which one box can fit into another (in their final form), preventing them from becoming jammed together, and simultaneously offering the possibility of stacking a large number of boxes in a minimal space, which greatly aids their storage, handling and transport, leading to significant cost savings; a second function is to provide extra rigidity, allowing thinner sheet metal to be used, with significant cost savings, and achieving this with a hollow element that is very light and strong and uses little material; and finally, it prevents what is known as the "drum" effect, which is normally found in large boxes that, like those under discussion, are made of sheet metal, and which are extremely noisy to use, causing an annoyance that should be avoided.

[0015] Another feature of the invention is that the wings on the side panels have a height that is slightly less than the thickness of the element that provides rigidity and reduces noise, offering the possibility of limiting the penetration of one box into another if said element is not

attached.

DRAWINGS AND REFERENCES

[0016] To better understand the nature of this invention, we have included drawings that represent a method of industrial construction that is simply an illustrative example that is not exclusive.

Figure 1 shows a box constructed according to this invention that corresponds to the longitudinal cross-section through I-I indicated in the top view of figure 2, and that shows the state when the front panel (1) and the back panel (2) have been engaged with the side panels (3). Figure 1 includes an expanded detail drawing of the part around the front panel (1), from which another, more expanded drawing is extracted showing a top view of a hook (9).

Figure 2 shows a top view of a box constructed according to this invention, in the assembled state.

Figure 3 shows the left side view of the box shown in figure 1, in its assembled position.

Figure 4 is an expanded view of detail IV indicated on figure 3.

Figure 5 is an expanded view of the cross-section through V-V indicated in figure 4.

Figure 6 shows the unfolded shape of the sheet metal for the box shown in figures 1 and 2, before folding.

Figures 7 to 13 illustrate the assembly procedure for the box shown in figure 1. Figure 7 shows the initial position, before the box is assembled. Figure 8 is a partial top view, corresponding to figure 7, and which is shown in its entirety in figure 2 after assembly.

Figure 9 is similar to figure 8, but shows the side panel (3) pressed outwards. Figures 10 and 11 are equivalent to figures 7 and 8, but showing the front panel (2) and the back panel (3) pressed inwards. Figures 12 and 13 are equivalent to figures 10 and 11, but show the final assembled position of the box. Figure 14 is an expanded view of detail XIV-XIV indicated in figure 12.

Figure 15 is equivalent to figure 12, but incorporates the element (12) that provides rigidity and reduces noise.

Figure 16 is the top view corresponding to figure 15. Figure 17 illustrates how the boxes constructed as shown in figure 15 can be stacked.

Figure 18 shows the cross-section through XVIII-XVIII indicated in figure 17.

[0017] The following parts references are used in these figures:

- 1.- Front panel
- 2.- Back panel
- 3.- Side panels
- 4.- Bottom panel
- 5.- Front panel (1) flange

- 6.- Back panel (2) flange
- 7.- Side panel (3) folds
- 8.- Side panel (3) skirts
- 9.- Hooks in the front panel (1) and back panel (2)
- 9a.- Upwards bend at the side
- 10.- Side panel (3) wings
- 11.- Slots in wings (10)
- 12.- Rigid, noise reducing element on bottom panel (4)
- 13.- Flap on the flange (5) of the front panel (1)
- 14.- Flap on the flange (6) of the back panel (2)
- 15.- Flap on the skirt (8) of the side panels (3)
- 16.- Cavities in the rigid noise reducing element (12)
- 17.- Walls in the rigid noise reducing element (12)

DESCRIPTION OF A PREFERRED EMBODIMENT

[0018] In relation to the drawings and references as numbered above, the attached drawings illustrate a preferred constructional method for the object of this invention that is intended particularly to produce a box of sheet metal in which the definitive configuration of the box is delimited around the sides by a front panel (1), a back panel (2) and two side panels (3); the entire upper edges of the front panel (1) and back panel (2) are folded outwards horizontally to form flanges (5 and 6), and the upper edges of the sides (3) are also folded outwards (7) to form a channel with an inverted "U" shape which forms a skirt (8) on its outer side.

[0019] As shown in figure 1, the solution that is the object of this invention consists in the formation of the box by folding a shaped metal sheet into an inverted truncated pyramidal form, in which the front panel (1) and the back panel (2) have co-planar extensions at both ends that form hooks (9) pointing outwards and that, by insertion from inside to outside the box, operate jointly with corresponding slots cut into the upper edges of the side panels (3) in wings (10) that are co-planar extensions at both ends of the side panels (3) of the box and that extend downwards from said folds (7); with respect to the final configuration of the box, the width of the front panel (1) and the back panel (2) is made to fit into the separation between the side panels (3) and the position of each hook (9) with respect to its corresponding slot (11) is such that the bottom of the hook (9) presses against the outermost vertical edge of the slot (11) coinciding with an assembly position in which the entire length of the edges of the front panel (1) and the back panel (2) fit perfectly against the inner face of the side panels (3), while at the same time, the outer faces of the front panel (1) and the back panel (2) are level with the edges of said side panels (3); the apertures in the hooks are wider than the thickness of the wings (10), and the horizontal dimension of the slots (11) is comfortably greater than that of the hooks (9) in the direction of longitudinal insertion into them from the inside to the outside of the box. Figures 1 to 6 illustrate sufficiently the details of this construction, and figures 7 to 13 illustrate sufficiently the functionality

by which the box is assembled into its final form.

[0020] In this constructional method, the concept, location and operation of the characteristic elements take advantage of the positive function of the form of the box, to produce benefits that are implicit in the form itself, this being no coincidence since a different design concept involving the same elements would not produce the same benefits, even though the same material were to be used, which can be clearly seen in the manoeuvre required to obtain the final form of the box, as explained below.

[0021] The initial position is that shown in figures 7 and 8, before the box is assembled as in figures 1 and 2, at a point when we have a form that is close to the final form and suitable for the assembly operations, this form having previously been obtained by folding the appropriate flat cut-out shape as shown in figure 6. The first stage of the manoeuvre is illustrated in figure 9, and consists in separating the side panels (3) using their natural elasticity; in the second stage, the front panel (1) and the back panel (2) are simultaneously inserted between the side panels (3) until the hooks (9) are aligned with their slots (11), as shown in figures 10 and 11; at this point, simply releasing the side panels (3) allows their inherent elasticity to engage the hooks (9) in the slots (11), after which the elasticity of the front panel (1) and the back panel (2) moves the hooks along the slots until the hooks press against the outermost vertical edge of the slots (11), maintaining a continuous pressure there that prevents accidental disengagement; figures 12 and 13 shown this final position in which the proposed design takes advantage of the elastic properties of the material to guarantee the operative form of the box.

[0022] On the other hand, as can be appreciated in figure 14, the proposed construction provides complete visual closure of the corners of the box, since the front panel (1) and the back panel (2) are trapped between the side panels (3), which are permanently pressed against them because of the elasticity of the material.

[0023] Although it may seem obvious, it must be pointed out that the proposed constructional method offers great versatility and can be adapted to boxes of different dimensions, simply by modifying the dimensions of the flat cut-out sheet shown in figure 6.

[0024] Since no welding is required, this constructional process allows the initial sheet-metal material to include plastic or painted surface finishes to enhance the final appearance of the box.

[0025] As a safety measure against accidental cuts, while simultaneously increasing the rigidity, the flanges (5 and 6) of the front panel (1), the back panel (2) and the skirts (8) have their long sides finished by flaps (13, 14 and 15) folded back onto the hidden faces of the flanges (5 and 6) and the skirts (8). This can be seen most clearly in figures 4 and 14.

[0026] Another significant objective of the invention (see figure 15) is that the box incorporates at least one rigid noise-reducing element (12), of suitable thickness, attached to the lower face of the bottom panel (4) of the

box. One of its functions is illustrated in figures 17 and 18, where it acts to limit on the penetration of one box into another, allowing the boxes to be stacked to occupy minimum space without the boxes jamming inside each other; another (dual) function consists in preventing the "drum effect " mentioned previously while increasing the rigidity of the bottom panel of the box, producing the advantageous secondary effect of allowing the box to be constructed of thinner metal sheet and so leading to considerable cost savings. According to one preferred constructional design, the rigid noise-reducing element (12) is a material with multiple internal cavities (16) separated by thin vertical walls (17).

[0027] In cases in which the rigid noise-reducing element (12) is not included, one feature of the invention is that the side-panel wings (10) are slightly lower in height than the rigid noise-reducing element (12), as a result of which, when this element is present, the side-panel wings (10) do not interfere with the limit on penetration when stacking the boxes (figure 17).

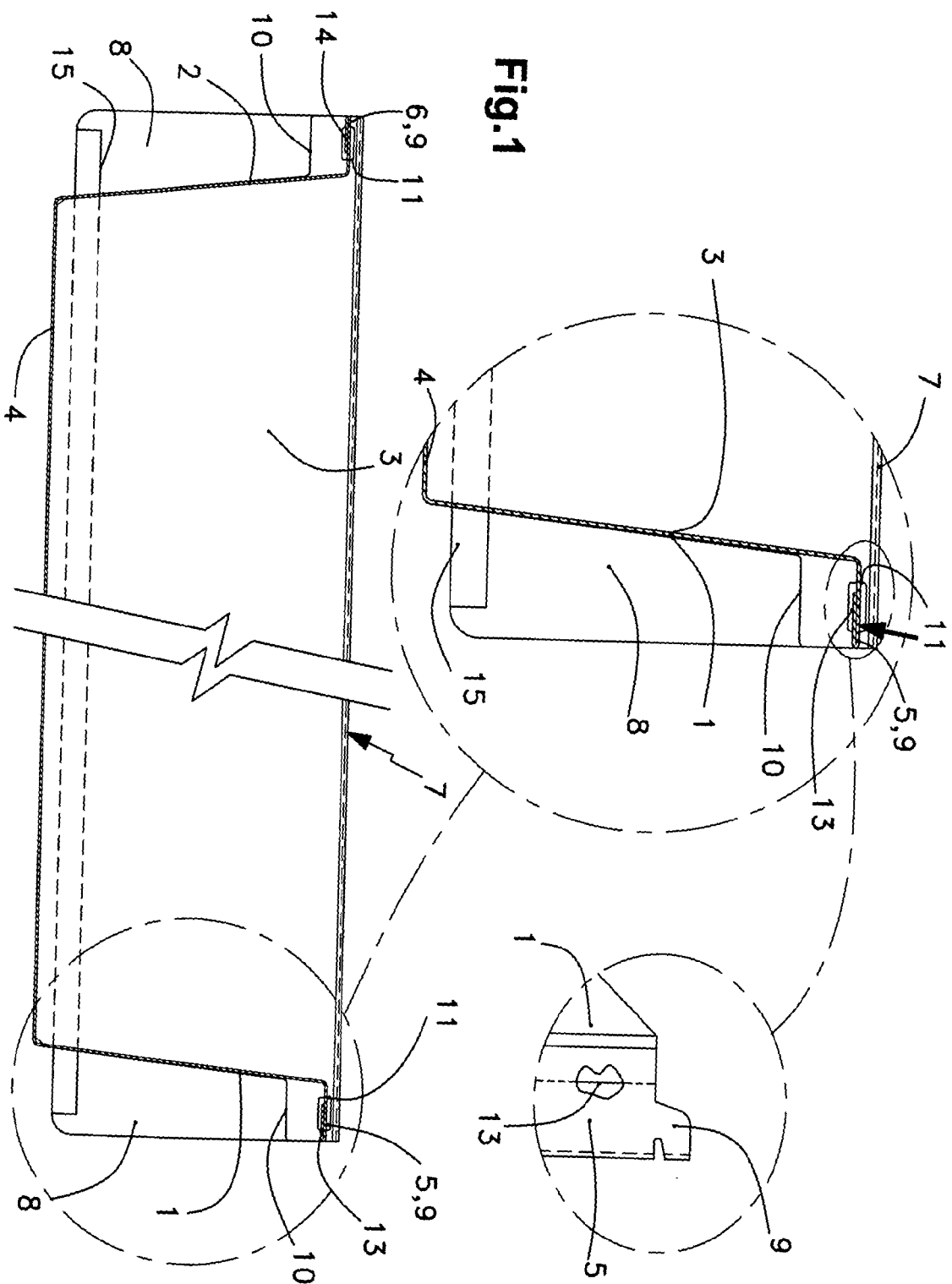
[0028] As can be seen in figure 4 and the expanded details of this figure, the intention is that the hooks (9) are bent slightly upwards (9a), to ensure that they remain engaged in their respective slots (11).

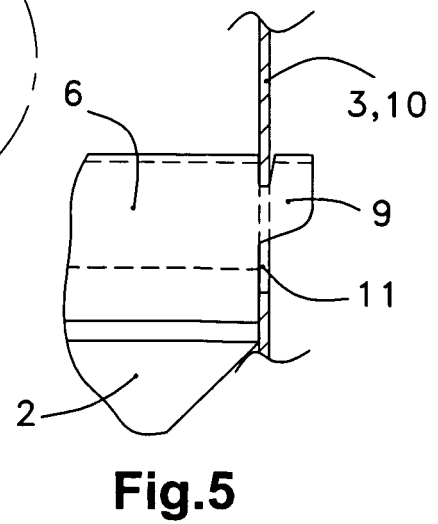
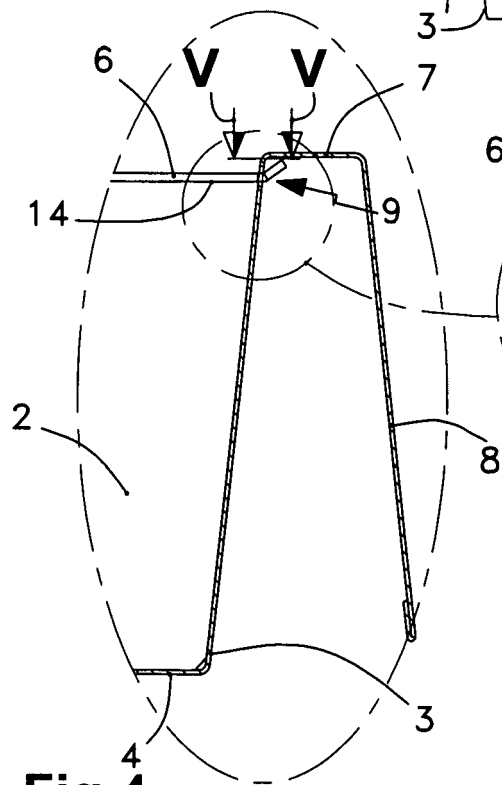
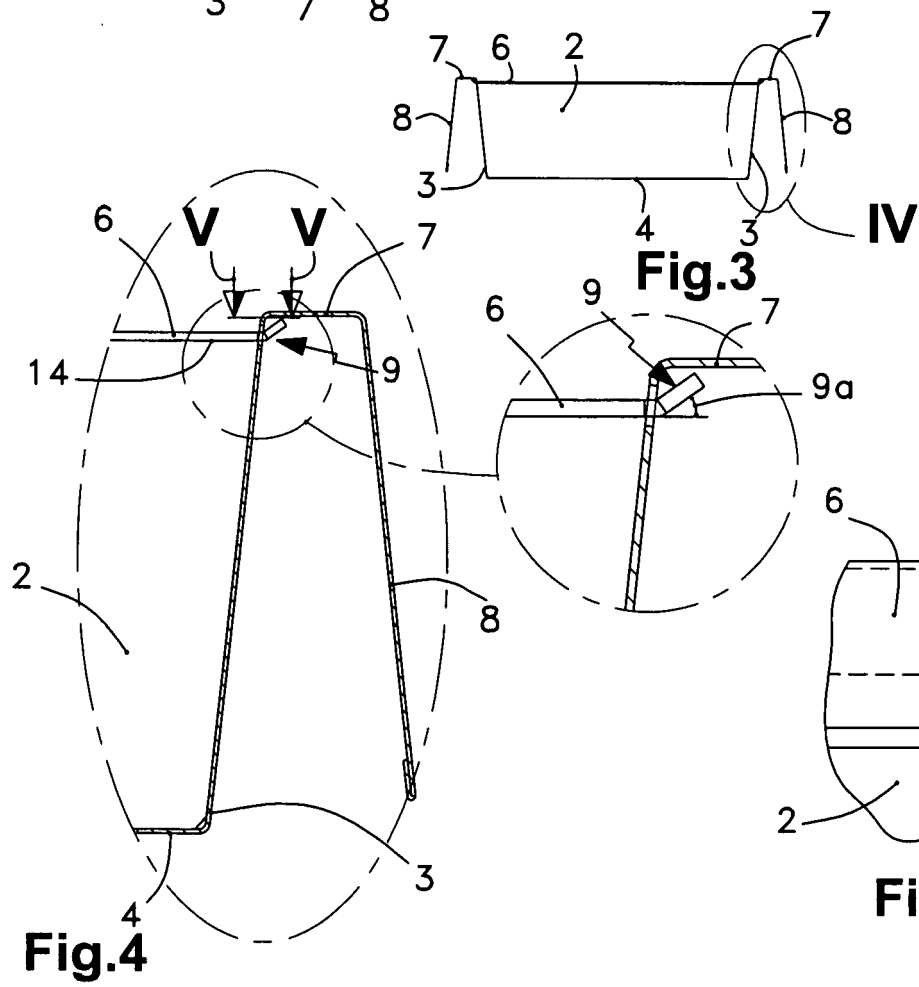
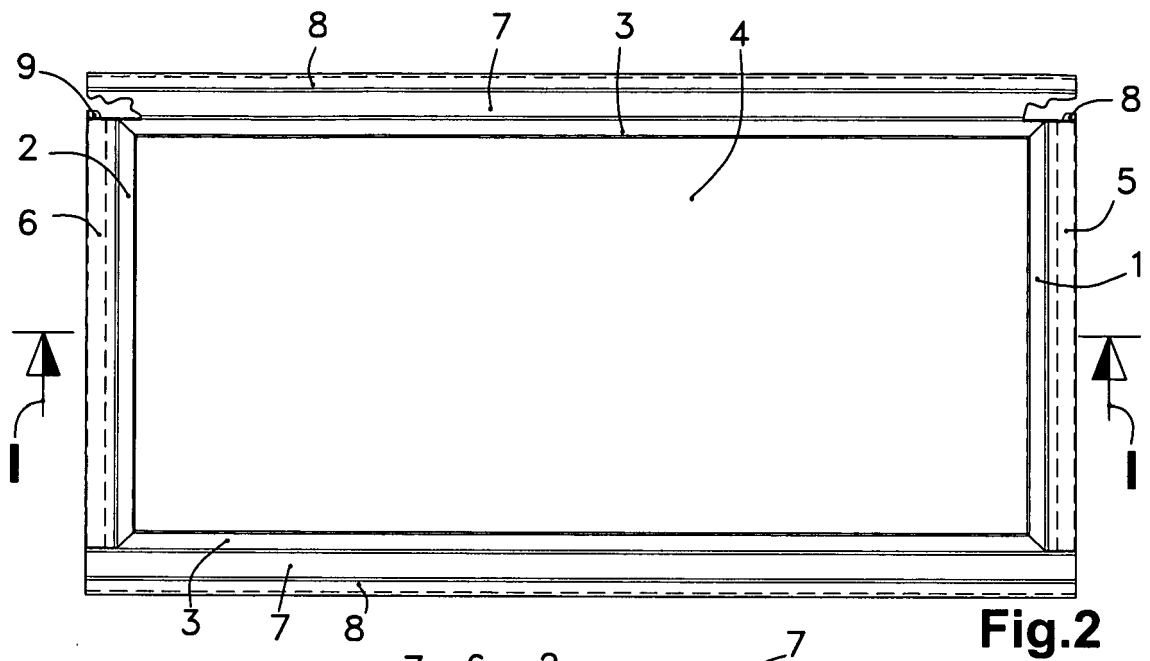
Claims

1. A storage box, and especially, a metallic box, in which the definitive configuration of the box is delimited around the sides by a front panel (1), a back panel (2) and two side panels (3); the entire upper edges of the front panel (1) and back panel (2) are folded outwards horizontally to form flanges (5 and 6), and the upper edges of the sides (3) are also folded outwards (7) to form a channel with an inverted "U" shape which forms a skirt (8) and a flap (15) on its outer side, a characteristic of the box being that it is formed by folding a cut-out shape suitable for assembly by this method and that tends to form an inverted truncated pyramid shape in which the front panel (1) and the back panel (2) have co-planar extensions on each end that form hooks (9) facing outwards with respect to the box and that, by insertion from inside the box towards the exterior, engage with corresponding slots cut near to the upper edges of the side panels (3) in the corresponding wings (10) that form co-planar extensions at both ends of the side panels (3) of the box, extending downwards from said folds (7); with respect to the final configuration of the box, the width of the front panel (1) and the back panel (2) is adjusted according to the separation between the side panels (3) and the position of the hooks (9) with respect to the slots (11) is such that the inside of the hook (9) is pressed against the outermost vertical edge of the slot (11), coinciding with an assembly position in which the entire lengths of the edges of the front panel (1) and the back panel

(2) fit perfectly against the inner faces of the sides (3), while at the same time, the outer faces of the front panel (1) and the back panel (2) are level with the edges of said side panels (3); the apertures in the hooks are wider than the thickness of the wings (10), and the horizontal dimension of the slots (11) is comfortably greater than that of the hooks (9) in the direction of longitudinal insertion into them from the inside to the outside of the box.

2. The storage box according to claim 1, **characterized in that** the flanges (5, 6) of the front panel (1) and the back panel (2) and of the skirts (8) have their long edges finished by a flap (13, 14, 15) folded back against the hidden faces of said flanges (5,6) and skirts (8).
3. The storage box according to claim 1, **characterized in that** the box incorporates at least one rigid noise-reducing element (12) of suitable thickness attached to the lower face of the bottom panel (4) of the box.
4. The storage box according to claim 1, **characterized in that** the rigid noise-reducing element (12) is a sheet with a cavernous form consisting of multiple cavities (16) separated by thin vertical walls (17).
5. The storage box according to claim 1, **characterized in that** the side-panel wings (10) are slightly lower in height than the thickness of the aforesaid rigid noise-reducing element (12).
6. The storage box according to claim 1, **characterized in that** the hooks (9) are bent upwards (9a) to guarantee their permanence in their respective slots (11).





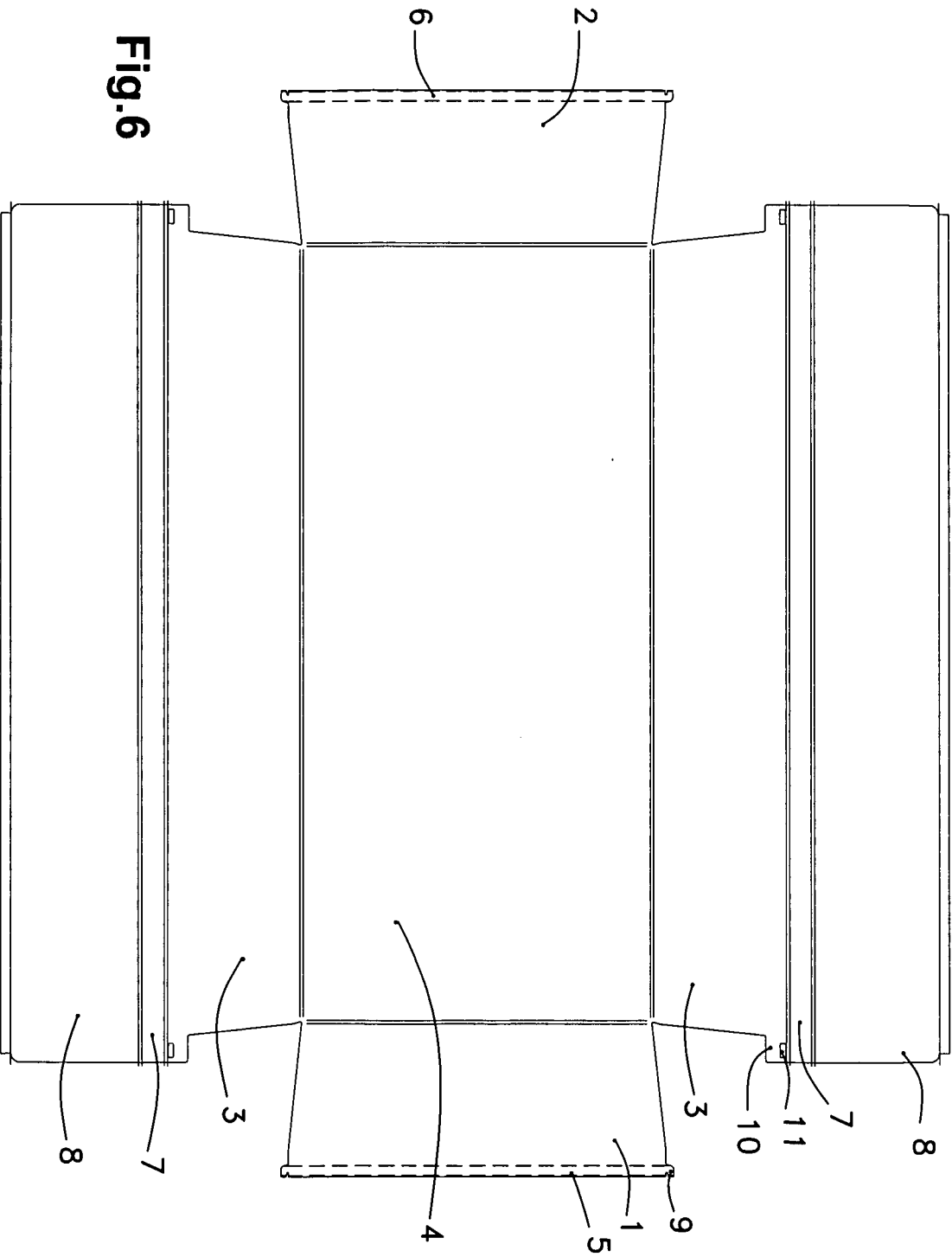
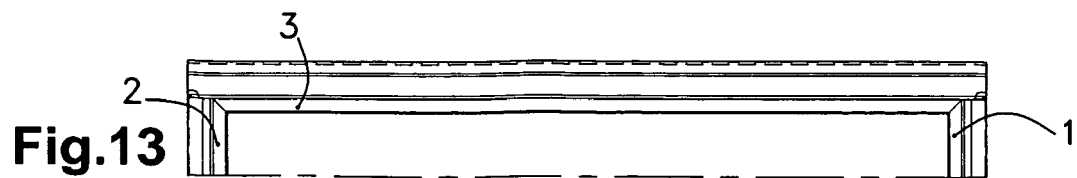
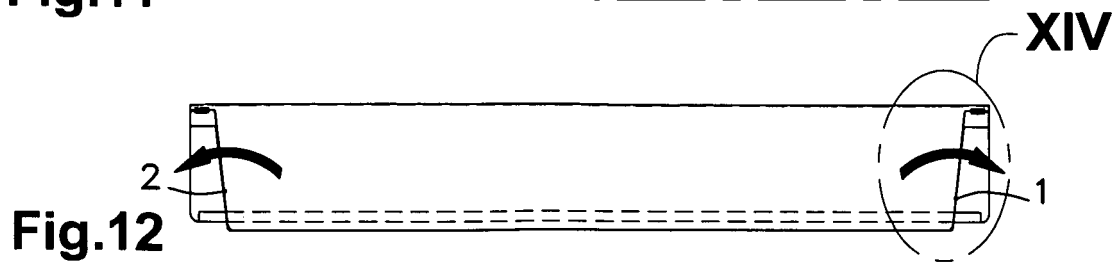
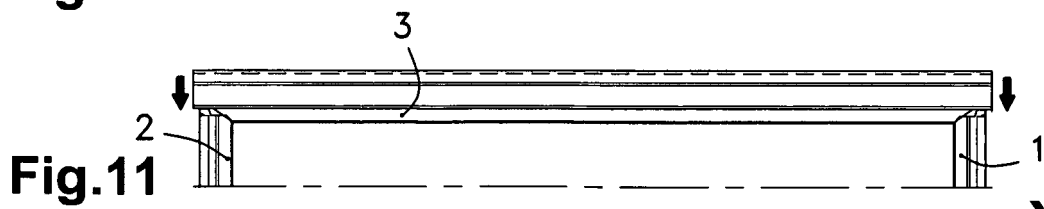
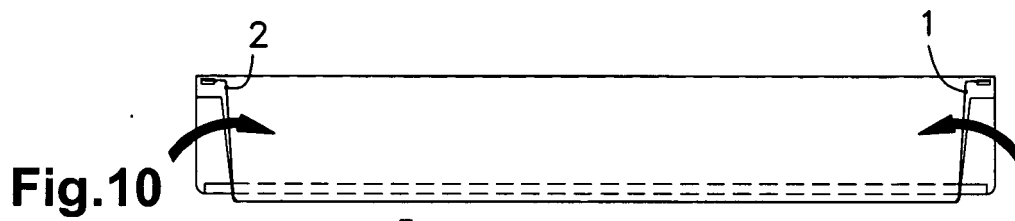
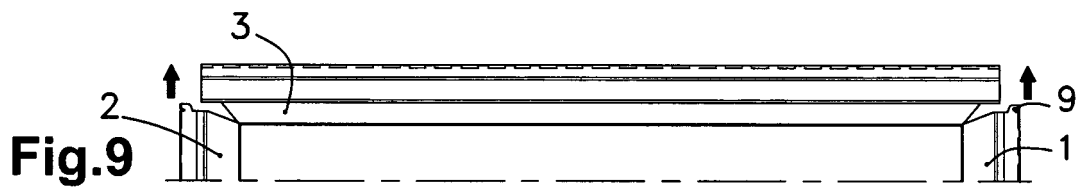
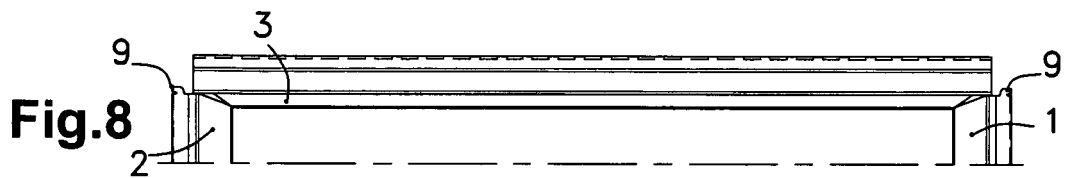
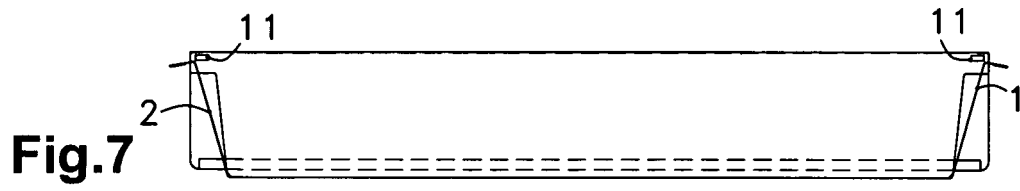


Fig. 6



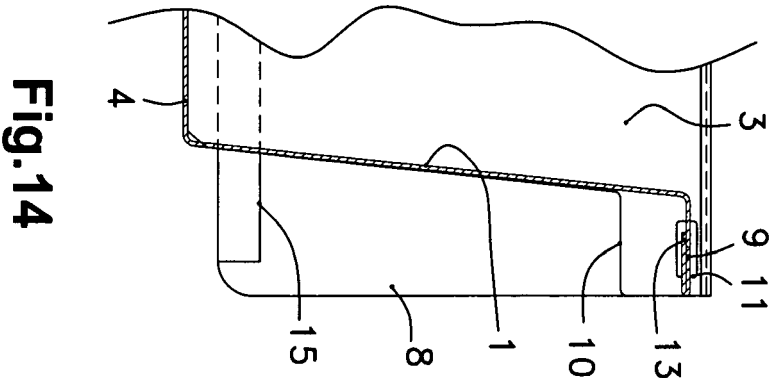


Fig. 14

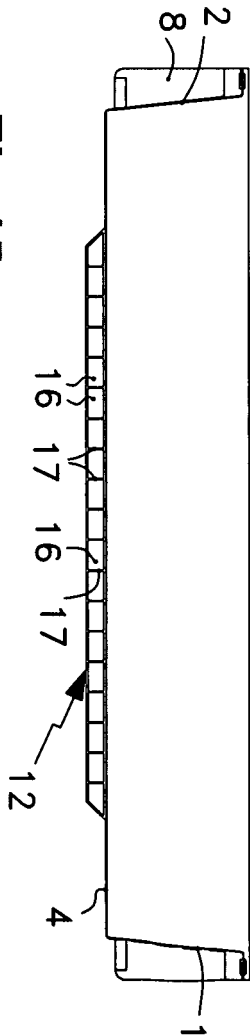


Fig. 15

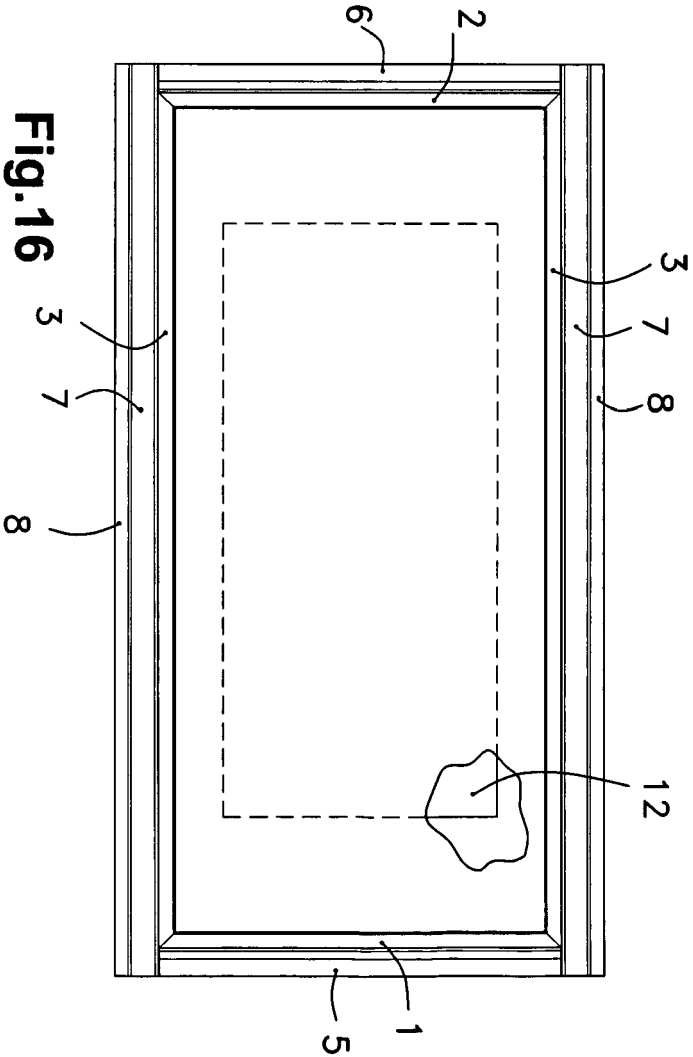
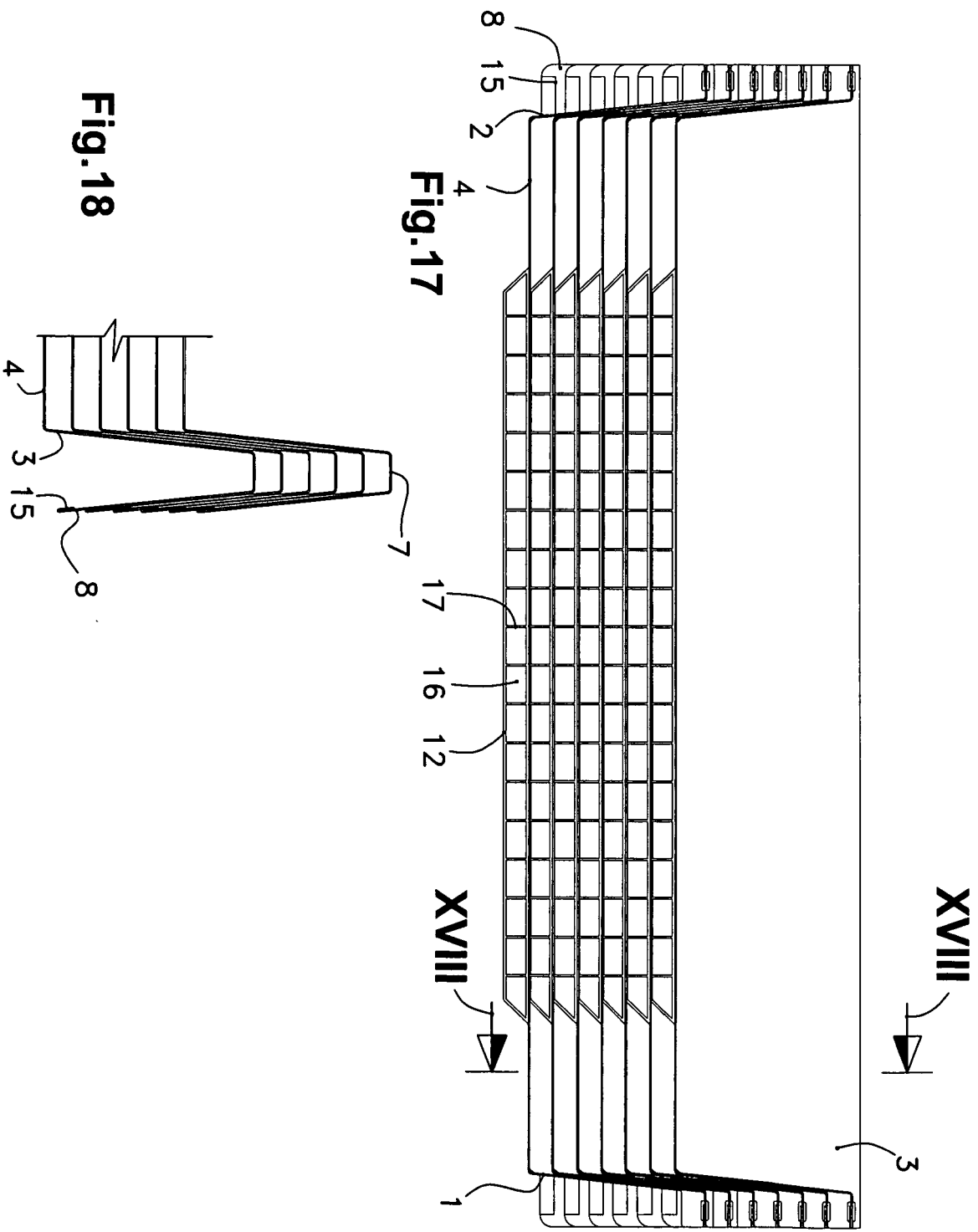


Fig. 16





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 02 0947

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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