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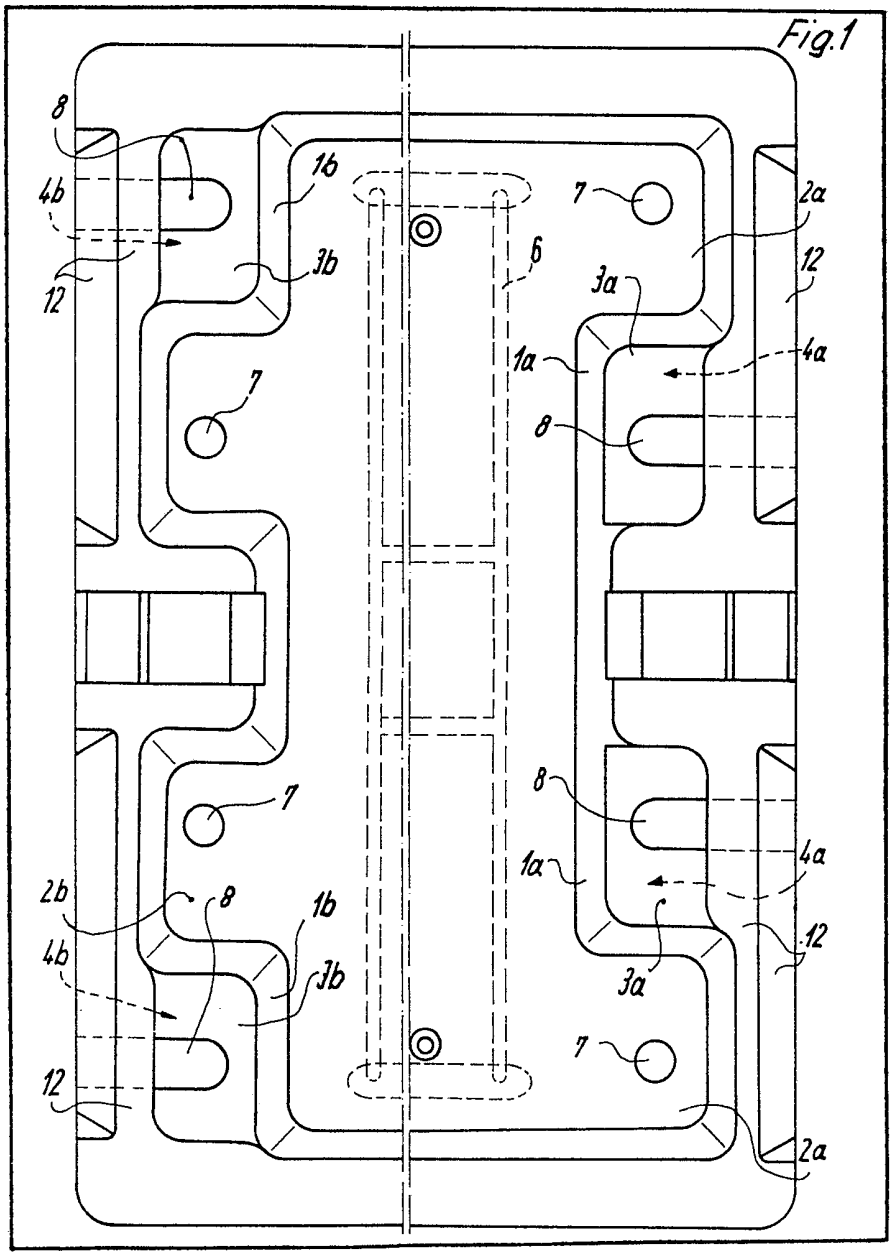
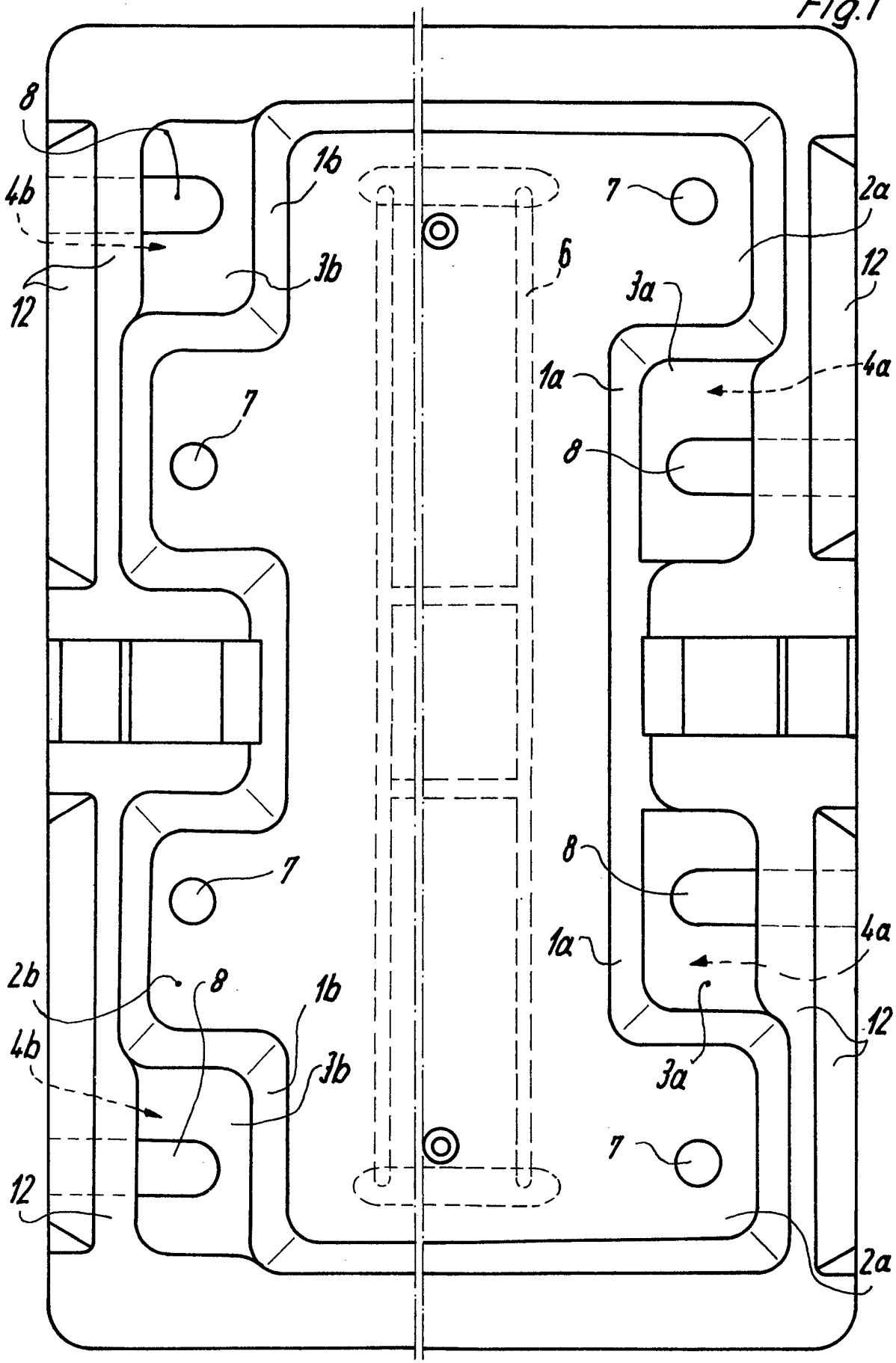
(54) **Stackable and nestable containers**

(57) Containers which can be stacked or nested depending on relative orientation are formed of plastics and have stacking struts (1*a*, 1*b*) preferably in end walls thereof, the stacking struts (1*a*, 1*b*) forming support surfaces (3*a*, 3*b*) at their upper ends with the struts (1*a*) at one end offset from the struts (1*b*) at the other end. The bottom walls have raised middle portions so that they drain to bottom wall portions (2*a*, 2*b*) for engaging the support surfaces (3*a*, 3*b*) when stacked, which wall portions (2*a*, 2*b*) have drain apertures therein (7). Drains (8) are provided from the support surfaces (3*a*, 3*b*) to drain away water, for example from ice in which fish is packed in the container, reaching the support surfaces (3*a*, 3*b*) via the drain apertures (7) in the superposed container.



This print takes account of replacement documents later filed to enable the application to comply with the formal requirements of the Patents Rules 1982.

Fig.1



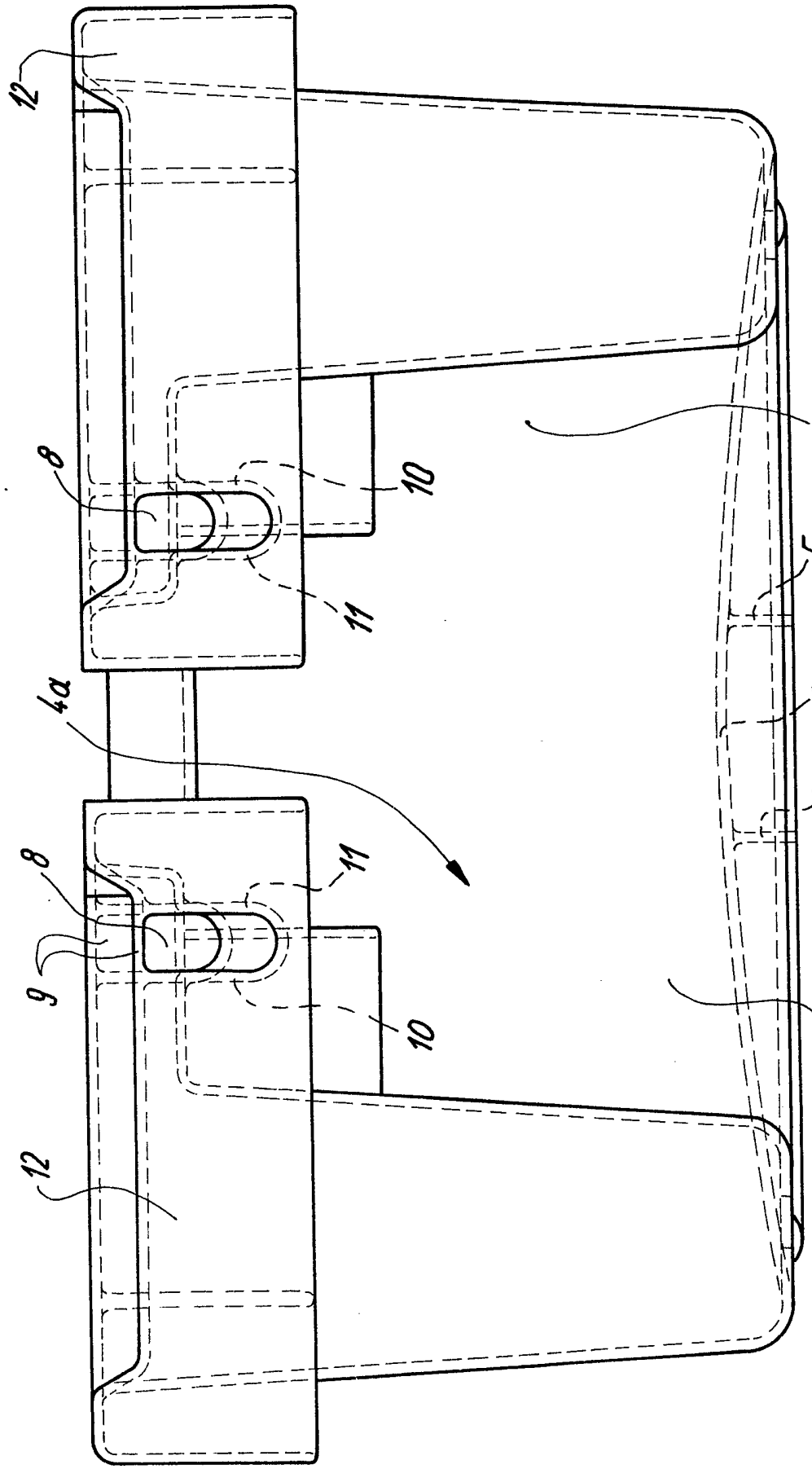


Fig. 2

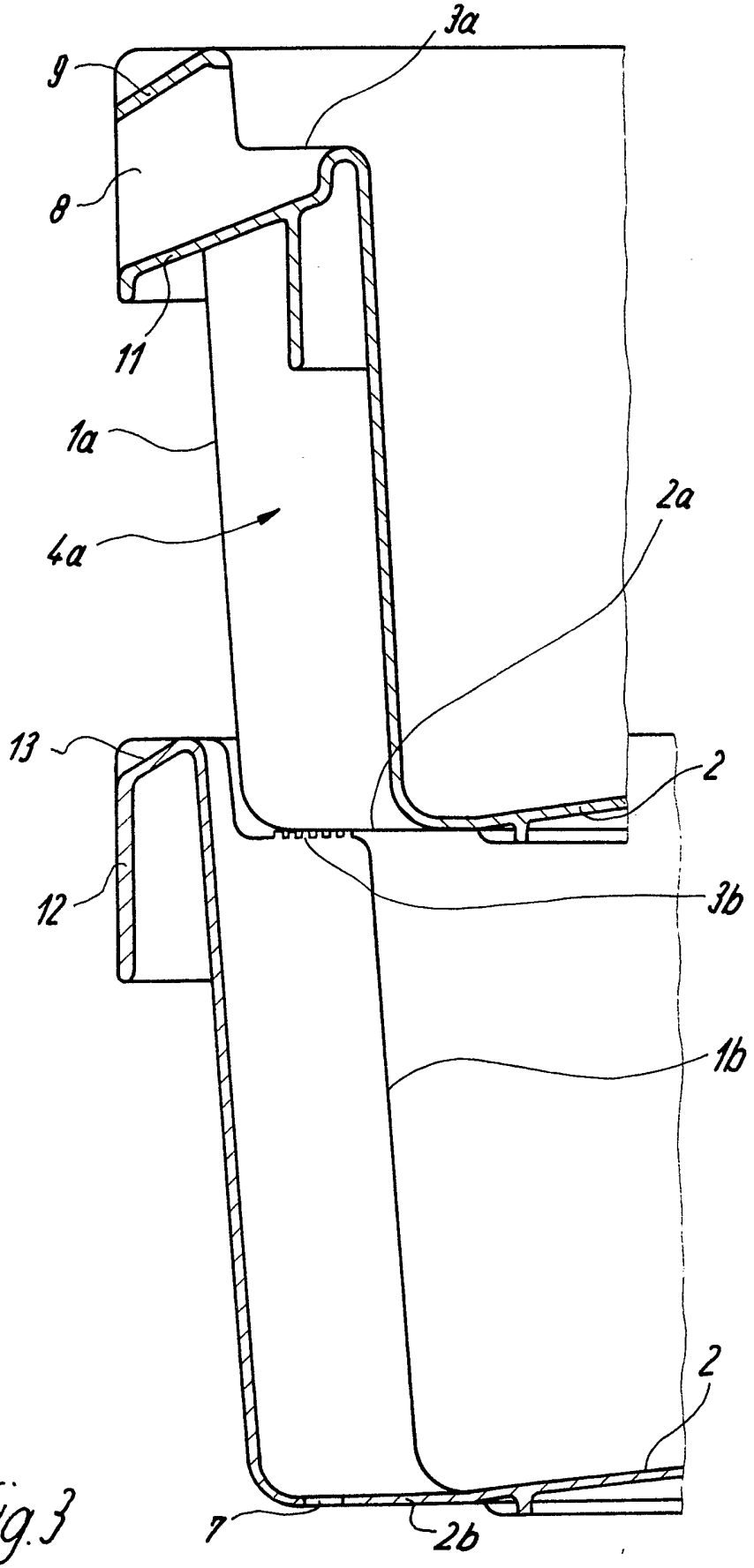


Fig.3

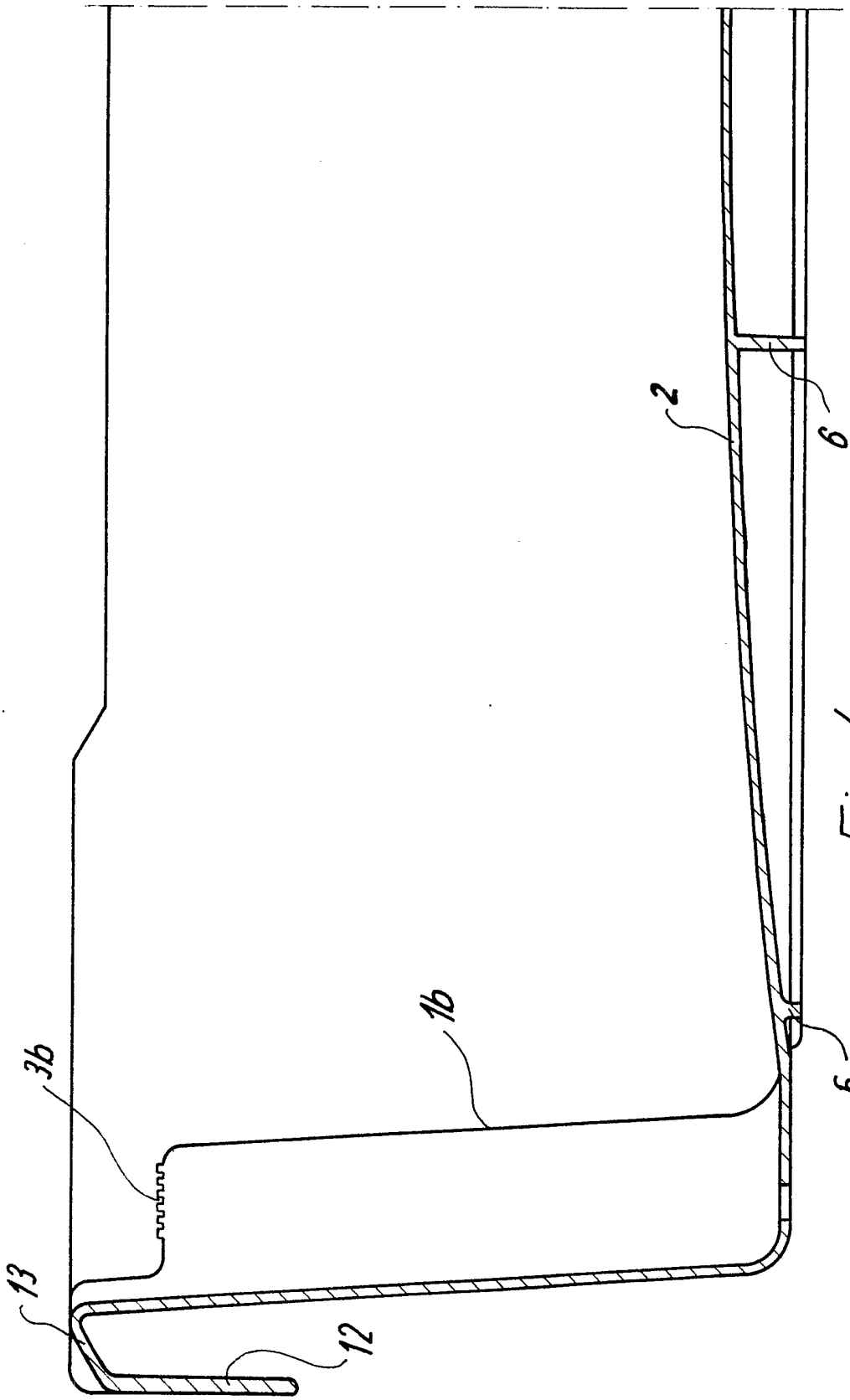


Fig. 4

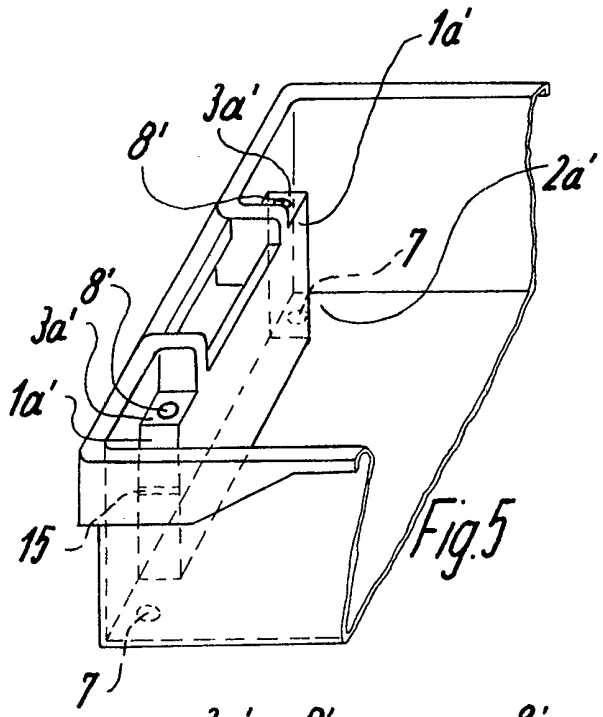


Fig.5

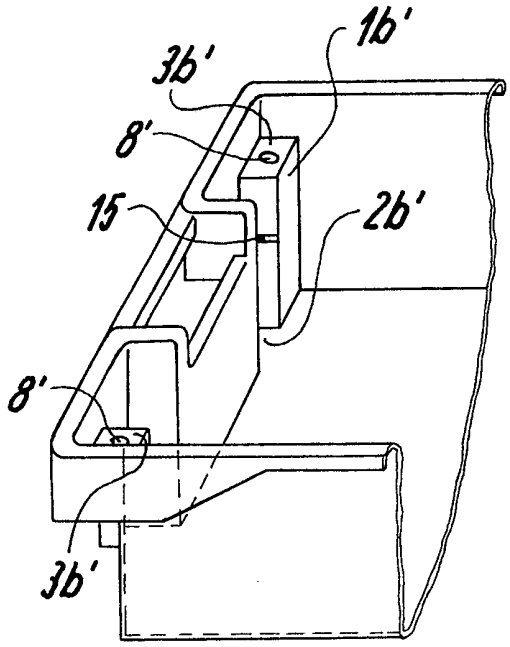


Fig.6

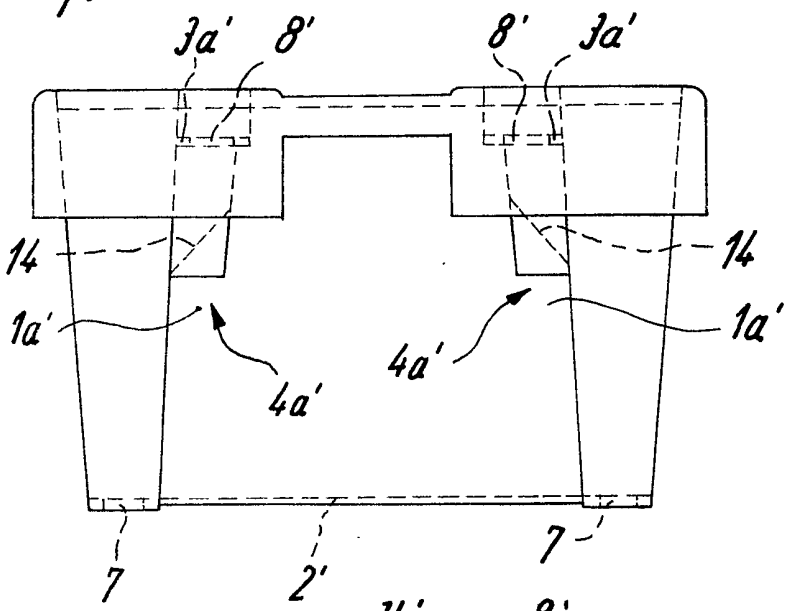


Fig. 7

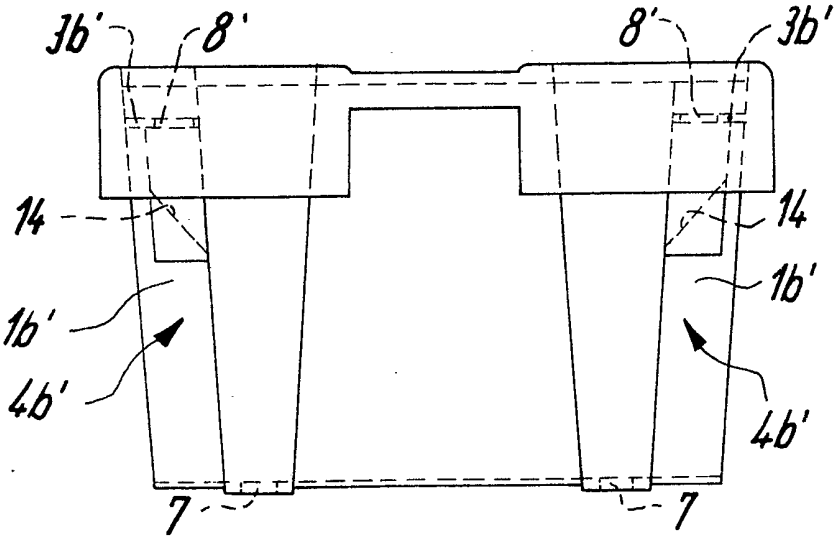
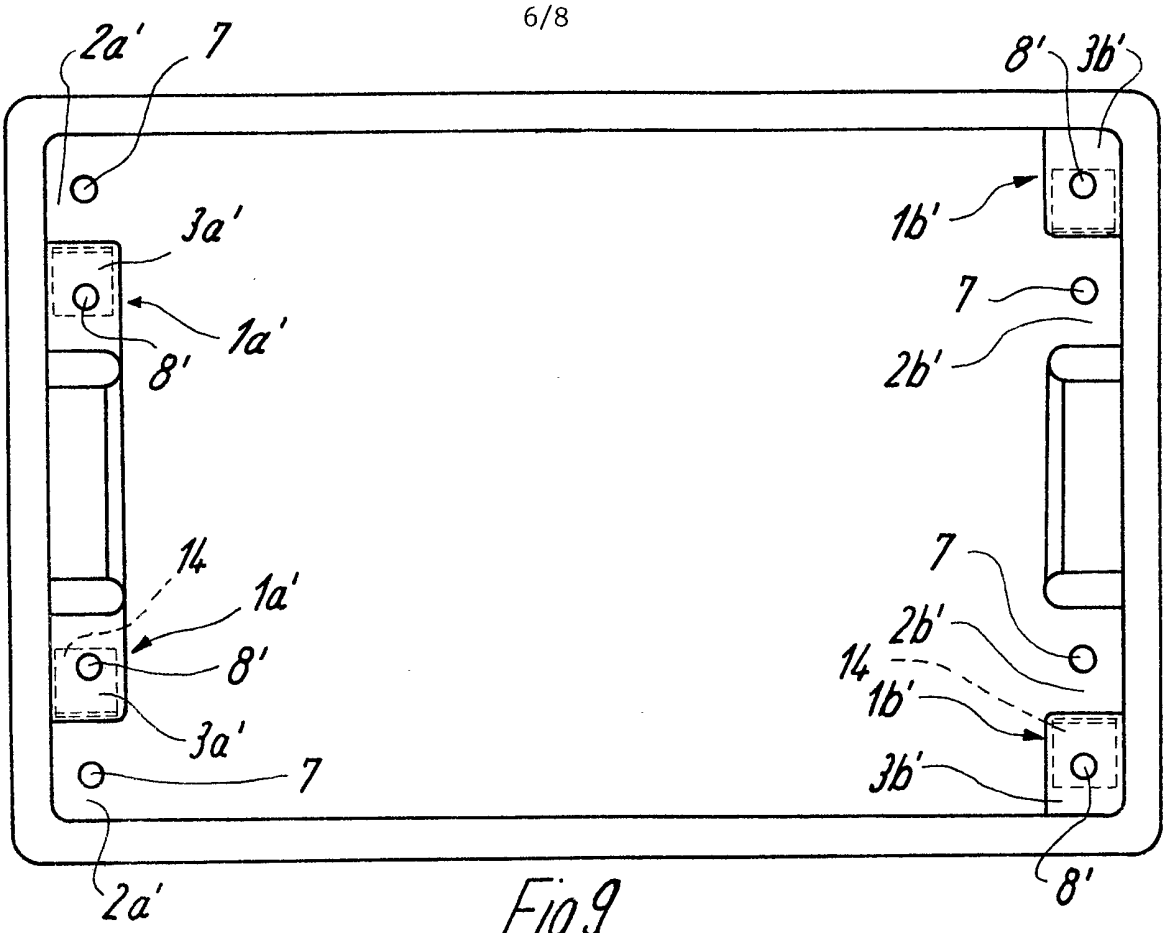


Fig.8.


2a'
7
8'
3b'
1b'
3a'
1a'
8'
7
2b'
14
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8'
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14
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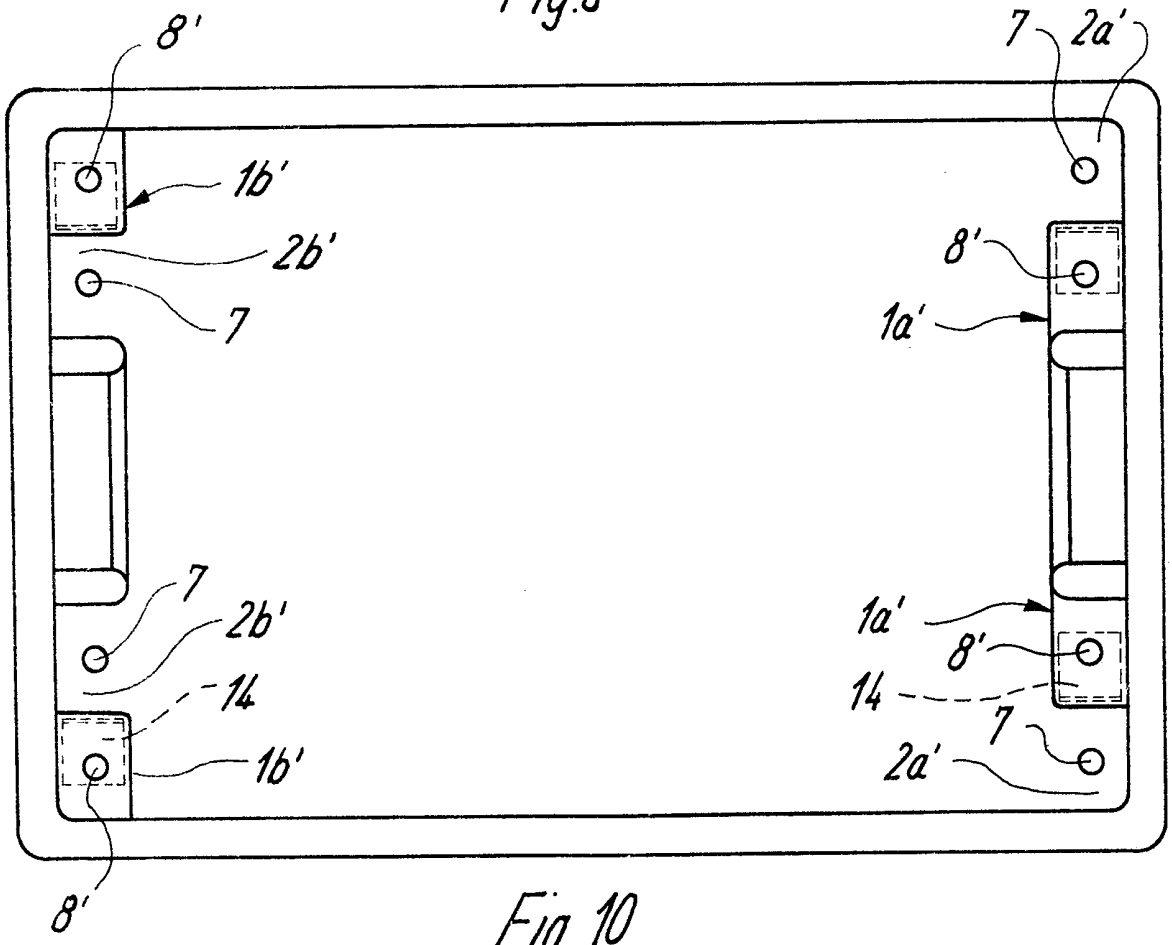
8'

Fig.9


8'
1b'
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7
7
2a'
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Fig. 10

Fig. 11

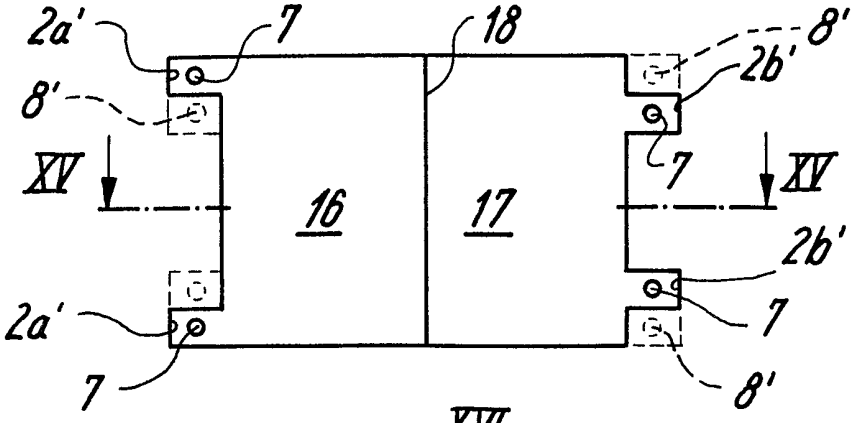


Fig. 12

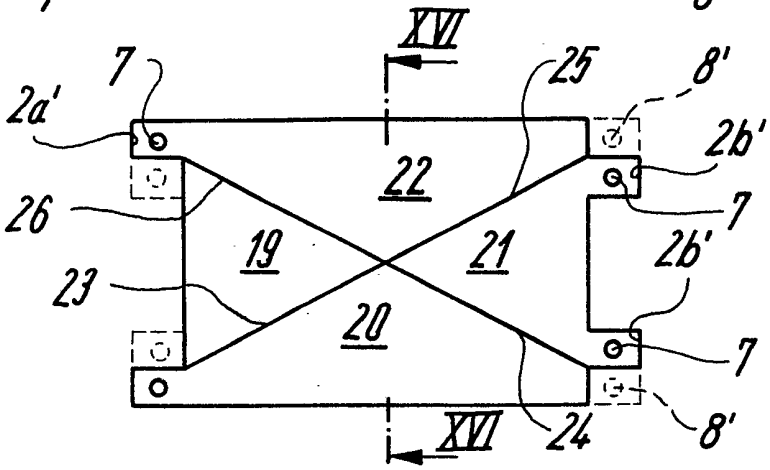


Fig. 13

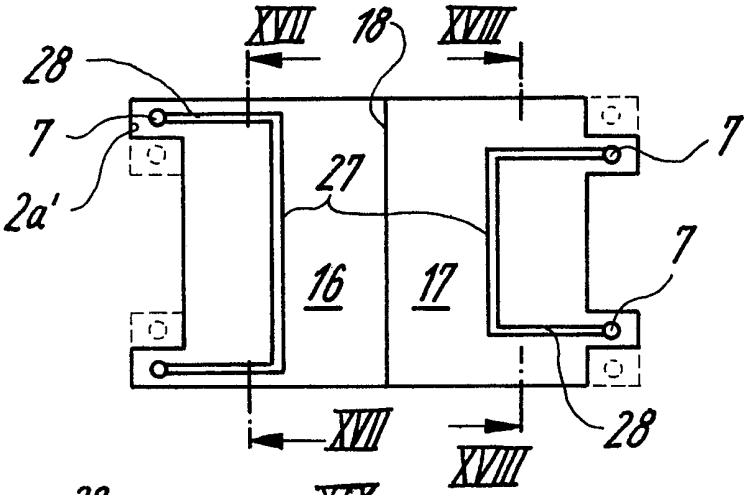


Fig. 14

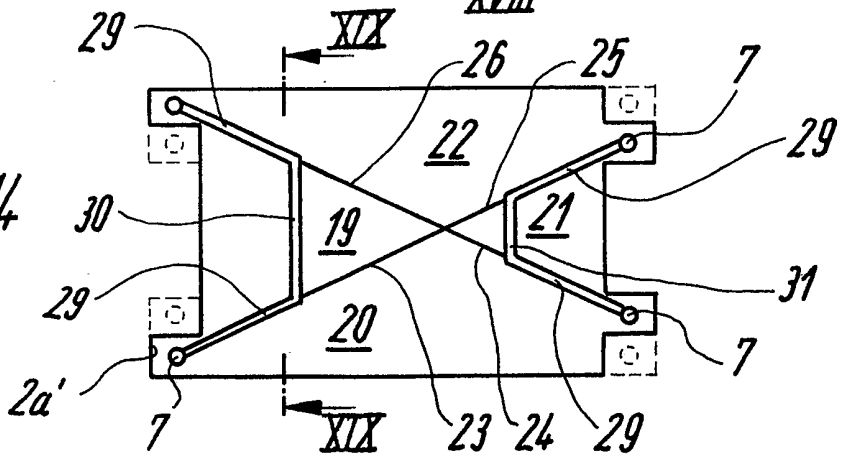


Fig. 15

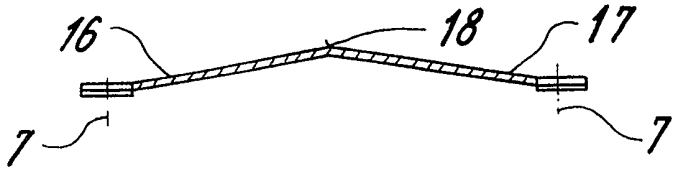


Fig. 16

Fig. 17

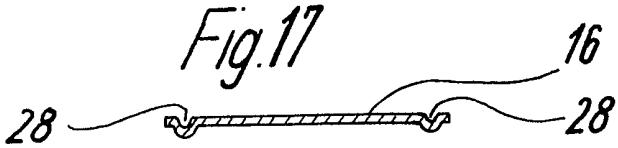


Fig. 18

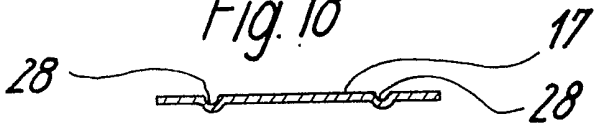


Fig. 19

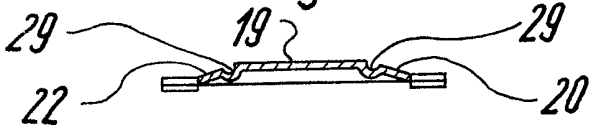


Fig. 20

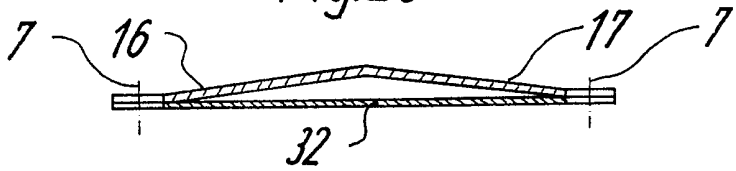
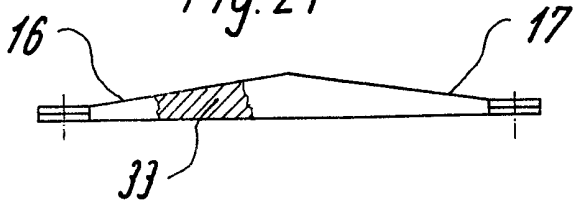


Fig. 21



SPECIFICATION

Stackable containers

The invention relates to stackable containers made of plastics material, and particularly to such containers which can be stacked on another similar container or, after relative rotation of the containers, can be nested therein.

Such a container may have stacking struts provided on two opposed sides of the container, the stacking struts forming support surfaces at their upper ends and the struts and stacking surfaces defining downwardly and outwardly open recesses in the container wall with the recesses in one of said sides offset from the recesses in the other of said sides.

Commercial stackable containers of this kind can be piled up, substantially nested one within another for transport, in one relative rotary position of the containers. In another relative rotary position, in the filled state, they may be stacked so that container bottom wall portions outside the recesses can rest on the upper support surfaces of the stacking struts of the container below, as a result of the offsetting of these struts from one side of the container to the other. Within a stack of containers therefore, the weight of the filled containers, in this filled and stacked position bears not on material or articles stored in the containers below but, via the support surfaces, on the actual container below.

When such stackable containers are used for storing fresh fish, the fish is put into them together with ice. Usually the ice is inserted on a fishing boat and particularly after landing and before the fish is auctioned, the ice will partially melt, As a means of removing the melted ice, stackable containers have been proposed with evenly distributed drain apertures provided in the bottom wall.

However, this construction provides only a very inadequate solution to the problem of melted ice. Usually up to six such containers are stacked, filled with fresh fish and ice. All the melted water from the upper containers then passes onto the fish in the lower ones. The lower the container is in the stack, the more water passes through it. The result of this, when storing fresh fish, is that the lower the container is in the stack, the more unattractive and the harder to sell the fish becomes. At auction, fish from the bottom containers of stacks of containers usually fetches a considerably reduced price compared with fish from higher containers in the stack.

There is a comparable problem with any material which has to be stored in such containers, if it liberates a liquid and is unfavourably affected by the liquid.

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According to the invention, there is provided a stackable container made of plastics, which container can be stacked on another similar container or, after relative rotation of the containers, nested therein, the container having stacking struts provided on two opposed sides of the container, the stacking struts forming support surfaces at their upper ends and, with the support surfaces, defining downwardly and outwardly open recesses in the container wall with the recesses in one of said sides offset from the recesses in the other of said sides, the container bottom wall has one or more surfaces descending to bottom wall portions, drain apertures are provided only in said bottom wall portions, a drain is provided in the region of each support surface, and, with two containers stacked one upon the other, the bottom wall portions of the upper container are supported on the support surfaces of the lower container.

The effect of the construction of the bottom wall and the disposition of the drain apertures solely in said bottom wall portions is that the water, which forms e.g. when fresh fish is stored with ice, deliberately drains to corner regions of the fish box. If a plurality of containers are piled up in the filled and stacked position, any melted ice which may drain into a container below will again be kept in the corner edge regions, *i.e.* the greater part of the fish stored in a container will not come into contact with the water.

In one embodiment methodical removal from the upper containers in the filled and stacked position can be ensured, by providing the support surfaces, with the drain apertures of an upper container in the filled and stacked position opening onto them, with grooves or ribs, between which the melted ice can run away.

In another preferred embodiment still more rapid removal of the melted ice can be achieved by providing drain holes in the support surfaces. Another effect of this arrangement is that, for example, the melted ice flowing down through the drain holes of a top box does not flow into the container immediately below it, but may possibly enter the container below that. In a further modified form, however, with a view to particularly methodical and concentrated removal of the melted ice, oblique guiding surfaces are provided in the support surfaces below the drain holes. The guiding surfaces can then lead the down-flowing water methodically through an inlet aperture into a corner edge portion of the container which in any case is hardly used for the fish.

In a specially preferred embodiment drain channels directed to the outside of the container lead from the support surfaces. This ensures that the water from an upper container can definitely not get into any container below it, since it passes out of the drain apertures of an upper container, directly into the channels in the support surfaces of the container immediately below it and is then diverted to the outside of the stack. This construction ensures that each container in the stack, and particularly the bottom one, is affected only by the water which forms in it and which it can discharge completely without any problems.

In particular, the very serious effect of accumulation in the bottom containers of the stack is completely avoided. This is a special advantage when water has to be removed from fresh fish stored with ice, since the rocking movements of the ship may lead repeatedly to spilling movements, and the spilling movements may cause even just the water concentrated in the bottom edge portions of the lower containers in the stack to be carried over and through the material in the bottom containers. It should further be emphasised that with this construction tooling costs for such a container can be kept within limits, since the mould construction to form the drain channels can be made without excessively high expenditure on the tool and in particular does not require an over-complex tool. Manufacture is not appreciably more complex or dearer than with conventional stackable containers.

Various configurations of bottom walls of the container may be provided to help to prevent water flowing from the drain channels of a container high in the stack from returning from the outside into the container or containers below it.

In connection with the construction of the bottom wall, arching towards the middle thereof or a pyramidal shape may be provided. The discharging capacity of the bottom wall may be further increased, if required, by channels provided specially in the inclined surfaces thereof.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:—

Figure 1 is a simplified plan view of one embodiment of a stackable container according to the invention;

Figure 2 shows an end elevation showing the righthand end of the container of Figure 1;

Figure 3 is a fragmentary cross-section through two of the containers of Figures 1 and 2 in their filled and stacked position;

Figure 4 is a further fragmentary section through such a container;

Figures 5 and 6 are perspective views of parts of two further embodiments of stackable containers according to the invention;

Figures 7 and 8 show elevations of the narrow sides of the two containers of Figures 5 and 6 respectively;

Figures 9 and 10 are plan views of the containers shown in Figures 5 and 6 respectively;

Figures 11 to 14 are diagrammatic plan views of various possible bottom wall constructions for stackable containers according to the invention;

Figures 15 to 19 are diagrammatic cross-sections taken on section lines indicated by respective Roman numerals in Figures 11 to 14; and

Figures 20 and 21 show similar views to Figures 15 to 19 of further embodiments of bottom walls of stackable containers according to the invention.

A stackable container, shown in plan in Figure 1 in a greatly shortened form, is provided with a stacking strut 1*a* and 1*b* respectively at each of its two opposed narrow sides, that is to say its ends. The struts extend upwards from a bottom wall 2 of the container to just below its top edge, where they form upper support surfaces 3*a* and 3*b* adjacent the outer wall of the container. The struts 1*a* and 1*b* further define recesses 4*a* and 4*b*, which are open towards the bottom and directed from the outer edge of the containers towards its interior, as seen from the outside. As will be seen particularly from Figure 1, the stacking struts 1*a* at one end of the container are offset from the struts 1b at the other end. In the example illustrated, for instance, the struts 1*b* are right in the corners of the container, while the struts 1*a* at the other end are offset from them in an inward direction. Thus, bottom wall portions 2*a* and 2*b* extending further out are formed at the ends of the container adjacent and between the recesses 4*a* and 4*b* respectively, with the bottom wall portions 2*a* at one end of the container opposite the support surfaces 3*b* at the other end, and with the bottom wall portions 2*b* at said other end opposite the support surfaces 3*a* at said one end.

Owing to the tapering shape of the container end walls including the struts 1*a* and 1*b*, the containers can be stacked compactly for transport or storage, substantially nested one within another in an empty stacking position, in a position of relative rotation where the struts 1*a* and 1*b* and thus the recesses 4*a* and 4*b* of superimposed containers are in alignment.

If two such containers are to be stacked in the filled state, without the weight of the upper container resting on the material contained in the lower one, the containers in the stack are piled up, in the example illustrated, with each container turned through 180° from the preceding one. In this relatively rotated position, the bottom wall portions 2*a* of an upper container are supported on the support surfaces 3*b* of the container below it, and the bottom wall portions 2*b* of the upper container are supported on the support surfaces 3*a* of the container below it.

The bottom wall 2 of the container is arched or bowed upwardly towards the centre from all sides. A plurality of longitudinal transverse struts 5, 6 is provided to support the bottom wall against deformation by the weight of the contents.

If for example, fresh fish together with ice is stored in such containers, water is normally formed through melting of the ice even while still on a fishing boat, and in any event during storage before the fish is auctioned. As a means of draining off the melted ice, or any liquid discharged from other materials which may be stored in the containers, drain apertures 7 are provided in end portions of the bottom wall 2, towards which drain apertures the water will flow due to the upwardly arched bottom wall 2. The drain apertures 7 are provided in the bottom wall portions 2*a* and 2*b*.

Drain channels 8, each directed obliquely downwardly and outwardly through the corresponding edge portion of the container sides in question to the outside of the container, lead from the support surfaces 3*a* and 3*b*.

The disposition is such that the drain apertures 7 at one end of the container are opposite the drain channels 8 at the other end. If a plurality of such containers are piled up in their filled and stacked position, the drain apertures 7 of an upper container will be immediately over the upper ends of the drain channels 8, in the support surfaces 3*a* and 3*b* of the container below, since in this stacked position the bottom wall portions 2*a* and 2*b* of the upper container are in fact supported on the support surfaces 3*a* and 3*b* of the container below it. In a stack of such containers the melted ice from an upper container thus passes directly out of the drain apertures 7 into the drain channels 8, which lead to the outside of the container below. In particular, it no longer passes inside the container below, so that in such a stack each individual container is affected only by the water formed therewithin.

As will be seen particularly from Figures 2 and 3, the drain channels 8 are formed by boundary walls 9, 10 and 11 extending obliquely outwardly and downwardly. These start at the stacking struts 1*a* and 1*b* and their support surfaces 3*a* and 3*b* and extend through an upper wall portion 13, 12 of the container, which extends outwardly and downwardly. The shape of the tool for making the containers from plastics can thus be kept relatively simple.

Figures 2 and 3 show in particular how the lower edge of each drain channel 8 discharges slightly above the lower edge of the downwardly extending upper wall portion 12 of the container, so that a small zone for collecting and guiding the outflowing water is formed below the discharge aperture of the drain channels 8. Furthermore, the upper boundary portion 13 of the upper wall portion 12, 13 of the container is inclined outwardly and downwardly, at least at the side of the container opposite the drain channels 8, as shown particularly in Figures 3 and 4. In the filled and stacked position of the containers therefore, the water running down from the drain channels 8 of an upper container and landing on this upper boundary portion 13 of the container below it is deflected outwards in a reliable manner and particularly away from the interior of the lower container.

The embodiment shown in Figures 5 to 10 has the same basic construction as that previously described. Stacking struts 1*a*′ and 1*b*′ are again provided at the two opposed narrow sides of the container, that is to say the ends, extending from the bottom wall 2′ to just below the top edge of the container, where they form support surfaces 3*a*′, 3*b*′. They again define recesses 4*a*′ and 4*b*′ directed towards the interior of the container and open towards the bottom. The struts 1*a*′ and 1*b*′ are offset from one another. The bottom wall portions 2*a*′ and 2*b*′, extending further outwards, are again formed in their corresponding spatial position relative to the support surfaces 3*a*′, 3*b*′. Nesting for transport and piling up in the filled and stacked position take place in the same way.

The drain apertures 7 are again provided in the corner regions in the bottom wall portions 2*a*′ and 2*b*′.

In the example shown in Figures 5 to 10 drains in the form of drain holes 8′ are provided in the support surfaces 3*a*′, 3*b*′ of the stacking struts 1*a*′ and 1*b*′. If two containers are piled up in their filled and stacked position, the drain holes 8′ will thus be directly below the drain apertures 7 in the corresponding bottom wall portions 2*a*′, 2*b*′. The water flowing out there from an upper container can thus not enter the lower container supporting it; the water thus virtually jumps past the container and possibly comes back into the corresponding edge portion of the next container down in the stack. Since this may create problems in respect of controlled and methodical disposal of the water, it is also possible for the water from the upper container to be taken deliberately back into the next container down in the stack. Thus an oblique guiding surface 14 may be provided, for example, on the containers, below the drain holes 8′ in the support surfaces 3*a*′, 3*b*′. The guiding surface 14 picks up the descending water and passes it to an inlet aperture 15 provided in the adjoining container wall. The water then passes through the aperture into the interior of the next container down in the stack. Here, however, it enters a corner edge region immediately above the drain apertures 7 of the container, *i.e.* a region where there may on occasion be very slight impairment of the fresh fish stored in the container.

In contrast with the example described above, in the simplest case the drains in the support surfaces of the stacking struts may consist simply of ribs or grooves provided in the support surfaces. The melted ice can flow down through the channels thereof, out of an upper container and into the corresponding corner edge regions of the container below. The construction of the support surface 3*b* of the lower container shown in Figure 3 is comparable.

In Figures 5 to 10 the detailed construction of the container bottom walls has not been shown for reasons of simplicity. Instead Figures 11 to 21 show details of various possible bottom wall constructions. In Figures 11 to 14 the bottom wall portions 2*a*′ and 2*b*′, responsible for removing the melted ice, which are shown in broken lines together with the drain apertures 7, are shown as being associated with the support surface portions 3*a*′, 3*b*′ located above them, with the drain holes 8′ therein.

In the construction of the base shown in Figure 11, the bottom wall has two inclined planes 16, 17, each descending to the bottom wall portions 2*a*′, 2*b*′ and intersecting in a common straight line 18 substantially in the middle of the bottom wall.

In the Figure 12 example the bottom wall is formed with four inclined planes 19, 20, 21 and 22, arranged in pyramid form, with the tip of the pyramid at the centre of the bottom wall. The four inclined planes 19 to 22 intersect at respective common straight lines 23, 24, 25 and 26.

Figure 15 is a simplified cross-section through the bottom wall shown in Figure 11. A corresponding section through the bottom wall in Figure 12 would look the same. Figure 6 is a simplified cross-section taken on line XVI—XVI in Figure 12.

The bottom wall shown in Figure 13 differs from that in Figure 11, in that channels 27 are provided in the inclined planes 16 and 17. The channels initially run parallel with the common straight line 18, then lead into channels 28 extending directly outwards to the drain apertures 7. This further enhances the ability to remove water rapidly. Figure 17 shows a corresponding section through the inclined plane 16, and Figure 18 a corresponding section through the inclined plane 17.

In Figure 14 example, drain channels are provided in a comparable way, in a bottom wall constructed as in Figure 12. In this example, drain channels 29, extending directly to the drain apertures 7, are located in the outer portions of the common straight lines 23, 24, 25, 26 of the four inclined planes 19, 20, 21, 22. The inclined planes 19 and 21 have transverse channels 30 and 31 respectively, connecting the channels 29. This is illustrated in Figure 19, by a cross-section through the inclined planes 19, 20, 22.

Figure 20 is a diagrammatic cross-section through a bottom wall comparable with that in Figure 15. A level wall portion 32, forming the actual bearing surface, is provided below the upwardly extending part of the base, *i.e.* below the inclined planes 16, 17 in the manner of a double base. In the Figure 21 example, a completely solid bottom wall portion 33 is provided below the inclined planes 16, 17.

Claims

1. A stackable container made of plastics, which container can be stacked on another similar container or, after relative rotation of the container, nested therein, the container having stacking struts provided on two opposed sides of the container, the stacking struts forming support surfaces at their upper ends and, with the support surfaces, defining downwardly and outwardly open recesses in the container wall with the recesses in one of said sides offset from the recesses in the other of said sides, the container bottom wall has one or more surfaces descending to bottom wall portions, drain apertures are provided only in said bottom wall portions, a drain is provided in the region of each support surface, and, with two containers stacked one upon the other, the bottom wall portions of the upper container are supported on the support surfaces of the lower container.

2. A stackable container according to claim 1, in which the drains in the support surfaces are provided in the form of ribs.

3. A stackable container according to claim 1, in which the drains in the support surfaces are provided in the form of drain holes.

4. A stackable container according to claim 3, in which inclined guiding surfaces are provided on the container below the drain holes of the support surfaces and the guiding surfaces are directed into the adjoining container wall by means of an inlet aperture.

5. A stackable container according to claim 1, in which the drains in the support surfaces are provided in the form of drain channels directed to the outside of the container and leading from the support surfaces.

6. A stackable container according to claim 5, in which the drain channels are formed by boundary walls directed obliquely outwardly and downwardly through an outwardly and downwardly extending upper wall portion of the container.

7. A stackable container according to claim 6, in which the lower edge of the discharge aperture of each drain channel is above the lower edge of the downwardly extending part of the upper wall portion of the container.

8. A stackable container according to claim 6, in which the outwardly extending part of the upper wall portion of the container is inclined outwardly, at least in the region opposite the drain channels on the opposed side of the container.

9. A stackable container according to claim 1, in which the container bottom wall is arched upwards from all sides to the middle of the container bottom wall.

10. A stackable container according to claim 1, in which the container bottom wall is formed by two inclined planes descending to its end regions and intersecting at a common straight line.

11. A stackable container according to claim 1, in which the container bottom wall is pyramid shaped, with four inclined planes converging in the middle of the bottom wall of the container.

12. A stackable container according to claim 10, in which transverse drain channels are provided in the inclined planes and discharge into further drain channels which lead directly to the drain apertures.

13. A stackable container according to claim 11, in which drain channels leading to the drain apertures are located in the outer portions of the common intersecting straight lines of the inclined planes, and pairs of these channels are interconnected by transverse drain channels so that they can convey liquid.

14. A stackable container according to any one of claims 9, 10 or 11, in which the bottom wall is reinforced on its underside by longitudinal and/or transverse ribs.

15. A stackable container according to any one of claims 9, 10 or 11, in which the bottom wall has a level base portion below its raised portions, thus forming a double base.

16. A stackable container according to any one of claims 9, 10, 11 or 16, in which the bottom wall is of solid construction below its raised portion.

17. A stackable container substantially as hereinbefore described and illustrated with reference to the accompanying drawings.

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