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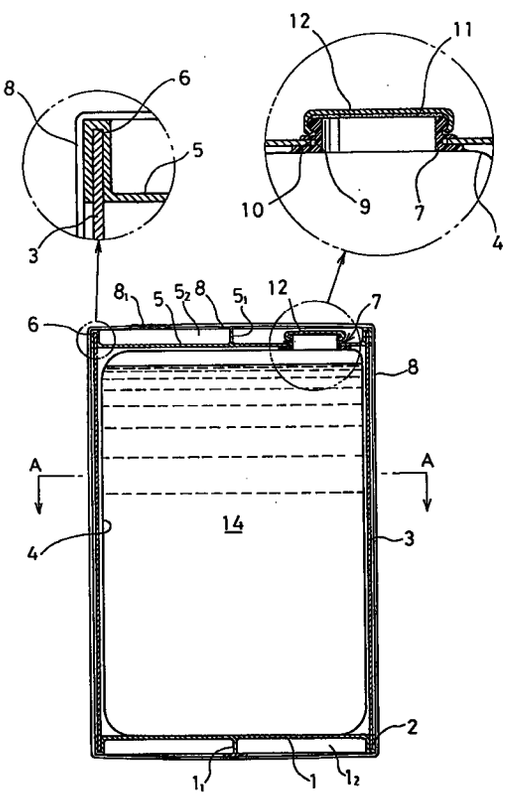
(54) Method for packaging and transporting liquid material

(57) A method for packaging and transporting liquid material, utilizing a three piece container strapped with bands. The lower edge of a cylindrical body (3) made of a water resistant, waste disposable material is inserted into a grooved or stepped structure formed at a peripheral portion of a lower plate (1) made of a water resistant, waste disposable material. An inner bag (4) attached to a nozzle (7) of an upper plate (5) made of a water resistant, waste disposable material is put in the cylindrical body. An upper edge of the cylindrical body is inserted into a grooved or stepped structure formed at a peripheral portion of the upper plate (5). A container is formed by strapping and fixing the upper plate (5), the cylindrical body (3) and the lower plate (1) with nonmetallic bands (8). The liquid material is filled in the container, which is transported thereafter. The inner bag (4) is a synthetic resin film such as a polyolefine film and the nozzle (7) is made of a synthetic resin such as a polyolefine. The synthetic resin employed will not give off toxic fumes when incinerated.

FIG. 1



EP 0 728 675 A1

Description

BACKGROUND Of THE INVENTION

1. Field of the Invention

The present invention relates to a method for transporting liquids, which include high viscous liquids or semi-gelled materials, and further powders or flours, and more particularly relates to a method for transporting liquid materials, in which these liquid materials are transported utilizing particular containers. The containers are disassembled and easily disposed after the liquid materals are used up. The invention further relates to a method, in which the container cost is reduced.

2. Description of the Prior Art

Blow-molded polyethylene containers, drums, metal cans and fiber drums are conventionally used for transporting liquids, high viscous liquids or semi-gelled materials such as soy sauce, alcoholic beverages, vinegar, mayonnaise, inks, paints, adhesives, greases and developers. There are, however, some disadvantage in utilizing these conventional containers, cans and drums; transportation of empty containers requires costs, there is no effective waste disposal method and the containers are disposed by paying fees. On the other hand, the bag in box, in which a polyethylene bag is set in the exterior box, is used as a non-returnable container. Since the outer packaging is a corrugated fiberboard and the fiberboard case has no water resistance it is impossible to store these boxes or cases in the open air.

SUMMARY OF THE INVENTION

When transporting liquid material in a container the waste disposal of the container after the liquid material is used up is a typical problem. When a plyethylene container is incinerated a high thermal energy such as 12,000 Kcal/Kgm is produced, and the roaster of an incinerator is damaged by heat. The disposal costs for the drums, metal cans and the metallic parts of the fiber drums are expensive.

On the other hand, the bag in box has an inefficient strength and compression resistance. Since the falling down is likely to occur even with three layers of the containers and the subsequent dangerous accident is quite probable, only two layers of the containers can be stacked up, and therefore the storage space is not effectively utilized.

In order to solve the aforesaid problems the applicant of the present invention has disclosed in the Japanese patent application No. 6-193566 a method of the waste disposal for containers for liquid, in which toxic fumes are not produced from the container during the waste disposal.

Thereafter, the applicant of the present invention has further studied and improved the method of the taste disposal of containers for liquid in order to solve the afore-mentioned problems, in which the water resistant capacity and the cost efficiency are increased.

The present invention is made in view of such circumstances and the object of the present invention is to provide a method for transporting liquid material, in which toxic fumes are not produced when the containers are incinerated after the liquid material is filled in the containers, the container is transported add the liquid material is used up; the thermal energy produced during the incineration is low, and therefore giving no damage by heat to the roaster; the disposal of the containers in the incinerator is readily made with a low cost; when the empty containers are transported they can be folded or flattened; the containers can be stacked up in 10 to 20 layers and the storage space such as a hold is effectively utilized; further, the container has a strong water resistance and can be stored in the open air, and the container itself is very reasonable; when the liquid material is used up the container can be disassembled, and therefore the volume of the container is decreased and the waste disposal is readily made; as needed only the bag in box for liquid can be incinerated and the outer packaging or box is folded or flattened, returned and recycled.

In order to achieve the aforesaid object with the method for transporting liquid material of the present invention, a container for liquid is used, in which a lower edge of a cylindrical body 3 made of a water resistant, waste disposable material is inserted into a grooved or stepped structure 2 formed at a peripheral portion of a lower plate 1 made of a water resistant, waste disposable material. An inner bag 4 attached to a nozzle 7 of an upper plate 5 made of a water resistant, waste disposable material is put in the cylindrical body 3. An upper edge of the cylindrical body 3 is inserted into a grooved or stepped structure 6 formed at a peripheral portion of the upper plate 5. A container is formed by strapping and fixing the upper plate, the cylindrical body and the lower plate with nonmetallic bands 8. The liquid material is filled in the container, which is transported thereafter. Said inner bag 4 is a synthetic resin film such as a polyolefine film and the nozzle 7 is made of a synthetic resin such as a polyolefine. Said synthetic resin will not give off toxic fumes when incinerated.

In an another working example of the present invention, an upper and a lower edges of a cylindrical body 3 are inserted into a grooved or stepped structure 6 formed at a peripheral portion of an upper plate 5 and into a grooved or stepped structure 2 formed at a peripheral portion of a lower plate 1 respectively. A container is formed by strapping and fixing the upper plate 5, the cylindrical body 3 and the lower plate 1 with nonmetallic bands 8. The liquid material is filled in the container, which is transported thereafter. The upper plate 5, the cylindrical body 3 and the lower plate 5 are made of a water resistant, waste disposable material and inte-

rior surfaces thereof are coated with a coating material having a resistance to chemical substances. A nozzle 7 made of a synthetic resin such as a polyolefine, which will not give off toxic fumes when incinerated, is provided in the upper plate 5. In this method the insert portions should be watertight with such as a caulking material except the case where the liquid material is powder or flour.

In the method with the container constitution described above, having a perfect water resistance the container can be stored in the open air during the transportation. Toxic fumes and black smokes are not given off when incinerated after the liquid material is used up. Since the heat energy is lower than that produced with coal the roaster is not damaged by heat and the waste disposal is readily made. Metal parts are not included in the container used in the present invention no disposal fee is charged unlike the case of metal cans, pails or drums.

Since the container for transporting liquid material is assembled rarely utilizing adhesives and is fixed with the nonmetallic fixing bands 8, the assembly cost and the container price are lowered. After the liquid material is used up the container is disassembled into the upper plate 5, cylindrical body 3 and lower plate 1 by cutting off the nonmetallic fixing bands 8 and the waste disposal of she container is readily made due to the decreased volume thereof. The container is carried and handled by grasping the nonmetallic fixing bands 8 and a grip or handle is not necessary to be attached, which will also reduce the costs. In the case of the container utilizing the inner bag, if necessary, only the bag is incinerated and the other members are returned and recycled after the liquid material is used up.

In the case where the liquid material is viscous, which includes such as powder and flour. A lower edge of a cylindrical body 3 made of a water resistant, waste disposable material is inserted into a grooved or stepped structure 2 formed at a peripheral portion of a lower plate 1 made of a water resistant, waste disposable material. The liquid material is filled in a bag 4 and an opening thereof is ligated. The bag 4 is put in the cylindrical body 3. An upper edge of the cylindrical body 3 is inserted into a grooved or stepped structure 6 formed at a peripheral portion of an upper plate 5 made of a water resistant, waste disposable material. A container is formed by strapping and fixing the upper plate, the cylindrical body and the lower plate with nonmetallic bands 8. Then, the container is transported. Said upper plate 5 has a wide opening, to which a nozzle is fitted. Said inner bag 4 is a synthetic resin film such as a polyolefine film and the nozzle 7 is made of a synthetic resin such as a polyolefine. Said synthetic resin will not give off toxic fumes when incinerated.

It is preferable that as the disposable material of the upper plate 5, lower plate 1 and cylindrical body 3 constituting a container the waste paper as a base material mixed or kneaded with a polyolefine as a binder is employed. The material is pelleted, which can be transformed into any shape by injection molding, and the material is water resistant and does not give off toxic fumes or black smokes. The price of the material is reasonable: about US$2.50- per kilogram and the effective utilization of waste paper will bring good economic effect. Of the polyolefine as a binder the synthetic resins such as a polyethylene and polypropylene are utilized, which are apt to deteriorate with the exposure of ultraviolet rays. These synthetic resins will deteriorate and the cracks are formed within one or two years, and the waste paper itself will also decompose naturally. Accordingly, the material will decompose naturally and with the solar lays in a landfill within one or two years, and the waste disposal is effectively made.

It is effective to use a container, in which the cylindrical body 3 has a generally square cross section and bulged portions 3a for folding and flattening are formed along four corner edges of the cylindrical body; or to use a container, in which the cylindrical body 3 having a generally square cross section is formed by connecting both side edges of a flat body blank 3' and notched portions 3b comprising a plurality of notches 3b' for folding and flattening are provided in an interior surface of the flat body blank so that the notched portions are arranged along four corner edges of the cylindrical body. Such a flat body blank may be produced by pelleting waste paper as a base material mixed with a polyolefine as a binder, extruding and cutting into a prescribed length.

It is also advantageous to use a container, in which the cylindrical body 3 having a generally square cross section is formed by connecting both side edges of a corrugated flat body blank 3"; or to use a container, in which the cylindrical body 3 having a generally square cross section is formed by connecting both side edges of a flat body blank 3_1" and corrugated portions 3_1a" are provided in the flat body blank so that the corrugated portions are arranged along four corner edges of the cylindrical body. In the similar manner as described above, the flat body blank is produced by pelleting waste paper as a base material mixed with a polyolefine as a binder, extruding to a sheet blank, forming a fluted corrugated board with a corrugator and cutting into a prescribed length. With a use of the corrugated board the flat body blank can be easily folded or bent to form corners. If the flat body blank is partially corrugated for the corner edge portions it can be printed on the flat portions or labels may be attached thereon. If three or four flutes of the corrugated portions are overlapped when connecting the both side edges of the flat body blank and inserting into the groove structures of the upper and lower plates, an adhesive or a glue may be omitted.

The cylindrical body 3 may be formed by connecting both side edges of a single faced corrugated flat body blank 3_2" with a flat side or liner board thereof arranged interiorly or exteriorly. In this case, a corrugated medium and a flat liner board are produced from the pelleted material as described above and adhered

with a hot melt adhesive to form a single faced corrugated board. With the use of a single faced corrugated board the flat body blank can be easily bent or folded along the corner edges thereof to form a cylindrical body having a sufficient inpact resistance in spite of its light weight. When connecting the side edges of a single faced corrugated board several flutes of the corrugated medium of a side edge are removed and the side edges of the flat liner board are overlapped and adhered.

When transporting the constituent members of the container the cylindrical body 3 is folded or remain flattened, which reduces the volume of the container, and the transportation is easily made. In the case of a container having the bulged portions 3a, the bulged portions act as effective ribs or columns when the containers are stacked up. The strength to vertical compression will be increased and the containers can be stacked up in 20 to 30 layers. The cylindrical body 3 having the bulged portions 3a in the four corner edges may be produced by extrusion while forming the bulged portions 3a. The cylindrical body 3 having the notched portions 3b in the four corner edges may be manufactured by extrusion and the plurality of notches 3b' are provided with a notching roller to form a flat body blank 3', both side edges of which are connected thereafter. Hence, the cylindrical bodies are manufactured in a simple manner (such a cylindrical body cannot be produced from a composite fiber material).

In the method of the present invention, the upper plates 5, the lower plates 1, the folded cylindrical bodies 3 or flat body blank 3', 3", 3_1", 3_2" and the inner bags 4 are separately packed and sent to the user. When needed the user assembles the separate members into the container, straps with the nonmetallic fixing band 8, fills the liquid material and the container is transported. The freight charge and the storage space for the empty container are reduced due to the smaller volume of the container, It is useful to store the containers for an emergency case. The waste disposal fee is not charged after the liquid material is used up and the container is readily incinerated or disposed.

On the other hand, in order to transport a large quantity of the liquid material it is effective that extensions 13 are formed at a lower, peripheral portion of the lower plate 1 so that the extensions 13 are located just inside the grooved or the stepped structure 6 provided at a periphery of the upper plate 5 of the container positioned below when vertically stacked. With the extensions the stacking of the containers in multi-layers can be easily made without a failure.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a vertical sectional view of the container used in the present invention (first and second embodiments);

Figure 2 is a top plan view of the container used in the first embodiment;

Figure 3 is a cross sectional view of the container used in the first embodiment, which is taken in the direction of the arrows A-A in Figure 1;

Figure 4 is a perspective of the container used in the first embodiment;

Figure 5 is a top plan view of the container used in the second embodiment;

Figure 6 is a cross sectional view of the container used in the second embodiment, which is taken in the direction of the arrows A-A in Figure 1;

Figure 7 is a perspective of the container used in the second embodiment;

Figure 8 is a partly cross sectional view of the cylindrical body inserted into the groove of the upper plate used in the third embodiment;

Figure 9 is a perspective of the container used in the third embodiment;

Figure 10 is a perspective of the container used in the fourth embodiment;

Figure 11 is a partly cross sectional view of the cylindrical body utilizing a single faced corrugated board;

Figure 12 is a vertical sectional view of the container used in the present invention (fifth embodiment);

Figure 13 is a vertical sectional view of the container used in the present invention (sixth embodiment);

Figure 14 is a vertical sectional view of the container used in the present invention (seventh embodiment);

Figure 15 shows a cross sectional view of the cylindrical body of the container when folded (first embodiment);

Figure 16 is a bottom end view of a lower plate having the extensions for stacking up (first embodiment);

Figure 17 shows a cross sectional view of the flat body blank of the container (second embodiment);

Figure 18 is a bottom end view of a lower plate having the extensions for stacking up (second, third or fourth embodiment); and

Figure 19 is a partially cutaway view of a stacked portion of the containers having the extensions.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The working examples of the present invention are explained hereinafter based on the attached drawings.

[Embodiment 1]

Figure 1 is a vertical sectional view of the container for liquid employed in the first embodiment of the present invention. The container holds 18 liters of a liquid material such as soy sauce, alcoholic beverage, vinegar, edible oil, ink and paint. The container is disposable In an incinerator after the liquid material is

used up. The base material of the upper plate 5 and the lower plate 1 of the container is waste paper. The waste paper is processed in a crusher and the fine pieces of paper are produced. These fine pieces of paper are mixed or kneaded with a thermoplastic resin such as a polyolefine (polyethylene, polypropylene) as a binder and the mixure thereof is pelleted or granulated. Then, the pellets or granules are injected into a mold (upper and lower cores), heated, compressed and formed into a prescribed shape.

Figure 2 is a top plan view of the container in Figure 1 and the container is generally square, having the rounds in its four corners. As shown in Figure 1, the upper plate 5 has a prescribed thickness add the grooved structure 6 with a prescribed width and the depth is formed at the periphery thereof. The nozzle opening 10 with a prescribed diameter for the nozzle 7 is formed in the vicinity of a corner of the upper plate and the vertically extended ribs 5_1, 5_2 with a prescribed thickness for reinforcement are formed crosswise on the upper plate. The grooved structure 6 receives the bulged portions 3a (refer to Figure 3) of the cylindrical body 3, which is described hereinafter, at the rounded corners of the square. On the other hand, the lower plate 1 has the same shape as with the upper plate 5 except the nozzle opening. The grooved structure 2 is formed at the periphery and the ribs 1_1, 1_2 are vertically extended crosswise in the lower plate.

The nozzle 7 inserted into the nozzle opening 10 has a prescribed diameter and the groove 9 is formed at the periphery of the nozzle between the flanges. The nozzle is made of a polyolefine such as a polyethylene and has a prescribed hardness. The inner bag 4 of a polyethylene film having a prescribed shape for containing a prescribed volume of content is attached to the lower flange, which forms the groove 9, by an adhesive or by a heating apparatus. The nozzle 7 is to be closed with the closure 12 via the packing 11. The inner bag 4, nozzle 7, packing 11 and closure 12 are made of a polyethylene or a polypropylene, which is disposable in an incinerator. The upper plate 5 and lower plate 1 are water resistant. The upper plate, lower plate, inner bag, nozzle, packing and closure all do not give off toxic fumes when incinerated and the combustion energy thereof is low.

The cylindrical body 3, the side wall of the container, is made of waste paper as a base material mixed or kneaded with a polyolefine as a binder, and the mixture thereof is pelleted, extruded and cut into a prescribed length. The cylindrical body is water resistant and has a generally square cross section. The U-shaped bulged portions 3a for folding and flattening are formed in the four corners of the square cross section (refer to Figure 3, which is a cross sectional view taken in the direction of the arrows A-A in Figure 1). Since the cylindrical body having the U-shaped bulged portions 3a in the four corner edges is extruded while forming the bulged portions, the production of such cylindrical bodies is quite simple. Not only she cylindrical body 3 is easily folded with the bulged portions 3a (refer to Figure 15) but also the bulged portions act as rims or columns when the container is assembled. Therefore, the resistance to the vertical compression is increased and the containers can be stacked up in 20 to 30 layers. Also the cylindrical body does not give off toxic fumes when disposed in an incinerator and the combustion energy is low.

Before filling the liquid material in the container and transporting it, the lower edge of the cylindrical body 3 is inserted into the grooved structure 2 of the loner plate 1 in order to assemble into the container. The inner bag 4 attached to the nozzle 7 in the upper plate 5 is set inside the cylindrical body 3 with the groove 9 formed between the flanges of the nozzle being fitted in the nozzle opening 10 of the upper plate 5. Then, the upper edge of the cylindrical body 3 is inserted into the grooved structure 6 of the upper plate 5. The assembled container comprising the uppper plate 5, cylindrical body 3 and lower plate 1 is strapped and fixed with the nonmetallic fixing bands 8 made of a polypropylene and having a prescribed width (e.g. 19 mm). The strapping is made on the assembled container crosswise by a strapping machine and the polypropylene bands 8 are connected on the upper plate 5 at the band connections 8_1 (refer to Figure 2). In this manner, the container is completed by tightly fixing the upper plate 5, cylindrical body 3 and lower plate 1 with the bands (refer to Figure 4).

Accordingly, adhesives are not necessary for assembling the container and the easy assembling results in a reduced total cost for the user. The container, whether filled or empty, can be carried by grasping the crossed section of the bands and no grip or handle is needed to he attached to the container. The plypropylene band 8 is known to be safe, tough and economical. For mass-production the strapping with the polypropylene bands is automatically and efficiently made by the strapping machine while the container is on a conveyor.

After the completion of the container the liquid material 14 is filled into the inner bag 4 via the nozzle 7. In the actual case, the inner bag 4 of a polyethylene inflation film is in contact with the inner surface of the cylindrical body 3 (except the vicinities of the U-shaped bulged portions), but the figures are drawn with a gap between the inner bag 4 and the interior surface of the cylindrical body 3 for clarity. The nozzle is then closed with the closure 12 and the container is transported. After the liquid material is used up the container is disassembled into the upper plate 5, lower plate 1, cylindrical bldy 3 and inner bag 4 by cutting off the polypropylene bands, and the container is readily disposed in an incinerator. As needed only the inner bag 4 is incinerated and the other members are returned and recycled. It is possible that the recycled members are crushed and pelleted again.

The container has a perfect water resistance and can be stored in the open air during the transportation

after the container is filled with the liquid material. The container is easily disposable in an incinerator after the container is transported and the liquid material is used up. Further, the container will not give off toxic fumes when incinerated and the heat energy is low as compared With that of the conventional blow-molded polyethylene containers, and therefore the damage to the roaster is avoidable. Since any metal parts are not employed in the container no disposal fee is charged unlike the case of metal cans, pails, drums or fiber drums having metal parts. Accordingly, the container is advantageously disposed after the liquid material is used up.

Adhesives are not required when assembling the container for transporting the liquid material, and the cost for assembling the container is minimized. The container can be disassembled by cutting off the nonmetallic fixing bands after the liquid material is used up, and the container is readily disposable as the volume of the container is reduced. Further, a grip or handle is not necessary to be attached to the container and the container price is also reduced.

The cylindrical body, a constituent member of the container, can be folded to a smaller volume and the empty container is effectively transported as in the case that the liquid material is used up and the container is recycled. Further, the bulged portions act as effective ribs or columns and the strength of the container to the vertical compression is increased, which allows the containers to be stacked up in 20 to 30 layers.

[Embodiment 2]

Figure 5 is a top plan view of the container for liquid used in the second embodiment, Figure 6 is a cross sectional view thereof and Figure 7 is a perspective thereof. In this embodiment, the inner bag 4, nozzle 7 and closure 12 are same with those utilized in the first embodiment, but the structures of the insert portions of the upper plate 5, lower plate 1 and cylindrical body 3 are altered: the structures of the four corner edges, in order to simplify the container structure. While the cylindrical body 3 in the first embodiment has a generally square cross section and the U-shaped bulged portions 3a for folding and flattening are formed in the four corner edged (refer to Figure 3, which is a cross sectional view taken in the direction of the arrows A-A in Figure 1), in the second embodiment the notched portions 3b comprising a plurality of notches 3b' for folding and flattening are formed in the four corner edges (refer to Figure 6, which is a cross sectional view of the cylindrical body). In the embodiment there are nine notches, each making a cut angle of 10° (refer to Figure 17); however, there may be seven notches at an angle of 12.85° according to the round curvature of the corner edge. The cylindrical body is formed by connecting the both side edges 3c' of the flat body blank 3' at the connection 3c, wherein the flat body blank 3' has four notched portions 3b separated by a equal distance and the side edges 3c' are cut obliquely (refer to Figure 17). Figure 1 is also a vertical secional view of the container used in the second embodiment.

The ways for forming the upper plate 5 and lower plate 1 of the container and the material used therefor in the second embodiment are approximately same with those used in the first embodiment. Further, the constitutions of the nozzle 7, inner bag 4, packing 11 and closure 12 are same and the detailed descriptions thereof are omitted. The cylindrical body 3, the side wall of the container, is made of waste paper as a base material mixed or kneaded with a polyolefine as a binder, and the mixture thereof is pelleted and extruded into a flat plate. The flat plate is notched by the notching roller to provide the notched portions 3b thereon with an equal pitch P and is cut into the flat body blank 3' having a prescribed length and the four notched portions (refer to Figure 17). The flat body blank is folded at the four notched portions 3b and the obliquely cut side edges 3c' are connected with an adhesive at the connection 3c (refer to Figure 6) to form the cylindrical body. The notched portions 3b comprising a plurality of notches 3b' for folding and flattening are located at the four corner edges of the cylindrical body.

The structues of the upper plate 5 and lower plate 1 are same with those used in the first embodiment except the portions of the grooved structure 6 or 2; said portions receive the bulged portions formed in the cylindrical body in the four corner edges. That is, the cross sectional view of the cylindrical body does not have the U-shaped bulged portions in the four corners but has simple rounded corners (refer to Figure 6).

Before completing the container, filling the liquid material into the container and transporting it, the cylindrical body 3 must be formed. The flat body blank 3' (refer to Figure 17) is folded with the use of a jig or fixture so that the square cross section having the prescribed rounds in the corners is formed (refer to Figure 6). The obliquely cut side edges 3c', 3c' of the flat body blank 3' are overlapped and connected with an appropriate adhesive while heating with heating means. Then, the lower edge of the cylindrical body 3 is inserted into the grooved structure 2 of the lower plate 1 (refer to Figure 6). The inner bag 4 attached to the nozzle 7 in the upper plate 5 is set inside the cylindrical body 3 with the groove 9 formed between the flanges of the nozzle being fitted in the nozzle opening 10 of the upper plate 5. The upper edge of the cylindrical body 3 is inserted into the grooved structure 6 of the upper plate 5. The assembled container comprising the upper plate 5, cylindrical body 3 and lower plate 1 is strapped and fixed with the nonmetallic fixing bands 8 made of a polypropylene and having a prescribed width. The strapping is made on the assembled container crosswise by a strapping machine and the polypropylene bands 8 are connected on the upper plate 5 at the band connections 8_1 (refer to Figure 5). In this manner, the container is completed by tightly fixing the upper

plate 5, cylindrical body 3 and lower plate 1 with the bands (refer to Figure 7).

After the completion of the container the liquid material 14 is filled into the inner bag 4 via the nozzle 7, which is closed with the closure 12, and the container is transported. The container is disassembled into the upper plate 5, lower plate 1, cylindrical body 3 and the inner bag 4 by cutting off the polypropylene bands 8 after the liquid material is used up. Accordingly, as mentioned in the first embodiment the container is readily disposable.

The cylindrical body, a constituent member of the container, is formed by merely connecting the both side edges or the flat body blank. The configuration of the grooved or stepped structure for receiving the upper and lower edges of the cylindrical body can be simplified. Further, the constituent members of the container are readily transported since the cylindrical body is foldable.

[Embodiment 3]

Figure 8 is a partly cross-sectional view of the cylindrical body 3 inserted into the groove of the upper plate 5, wherein a corrugated board is used as a material of the cylindrical body of the container for liquid in the third embodiment. Figure 9 is a perspective of the container for liquid. In this embodiment, the configurations of the insert portions of the cylindrical body 3, including the four corner edges thereof, the upper plate 5 and the lower plate 1 are same with those used in the second embodiment. Accordingly, the constitutions of the upper plate 5 and the lower plate 1 are same with those in the second embodiment. Further, the constitutions of the inner bag 4, nozzle 7 and closure 12 are same with those in the first or second embodiment. The only difference is the constitution of the cylindrical body 3. That is, in the third embodiment, the flat body blank 3" is made of a corrugated material with a prescribed dimension (for example, pitch: 5.0 mm, thickness: 2.5 mm), which corresponds to the width of the groove 2 or 6 (for example, 3.0 mm), so that the cylindrical body having the rounded corner edges is easily inserted into the grooved structure 2 of the lower plate 1 and the grooved structure 6 of the upper plate 5.

In the sane manner with the first or second embodiment, the corrugated flat body blank 3" is made of waste paper as a base material mixed or kneaded with polyolefine as a binder, and the mixture thereof is pelleted, extruded into a flat plate having a prescribed thickness, formed into a corrugated board comprising prescribed flutes through the corrugating rolls and cut into a prescribed length. The cylindrical body 3 is formed by folding the flat body blank 3" at the four corner edges and adhering 3"c (refer to Figure 8-A) the both side edges with an adhesive so that the cylindrical body is inserted into the grooved structures 2, 6. When forming the cylindrical body 3 from the corrugated flat body blank 3" it is not always necessary to adhere the both side edges thereof. Three or four flutes of the corrugated flat body blank may be overlapped and the cylindrical body is inserted into the grooved structures 2, 6 of the upper plate 5 and the lower plate 1. Then, the overlapped flutes 3"d will sustain the transverse tension caused on the cylindrical body (refer to Figure 8-B).

In the same manner with the second embodiment, before completing the container and transporting the liquid material the flat body blank 3" is folded with the use of a jig or fixture so that the square cross section having prescribed rounds in the corners is formed. The overlapped portions of the flutes are adhered 3"c with an adhesive while heating with heating means. Then, the lower edge of the cylindrical body 3 is inserted into the grooved structure 2 of the lower plate 1. The inner bag 4 attached to the nozzle 7 in the upper plate 5 is set inside the cylindrical body 3 with the groove 9 formed between the flanges of the nozzle being fitted in the nozzle opening 10 of the upper plate 5. The upper edge of the cylindrical body 3 is inserted into the grooved structure 6 of the upper plate 5. The assembled container comprising the uppper plate 5, cylindrical body 3 and lower plate 1 is strapped and fixed with the nonmetallic fixing bands 8 made of a polypropylene and having a prescribed width. In this manner, the container is completed by tightly fixing the upper plate 5, cylindrical body 3 and lower plate 1 with the bands (refer to Figure 9). The manner to fill the liquid material into the completed container and the process of cutting the polypropylene bands 8 after the transportation are same with those described in the first or second embodiment.

The cylindrical body having a square cross section can be easily formed from the flat material since the corrugated board is employed as a material for the cylindrical body, which constitutes the container. The both side edges of the flat body blank may be connected by overlapping them without the use of an adhesive, if desired. The container members are easily transportable as the cylindrical body material is flat or foldable.

[Embodiment 4]

Figure 10 is a perspective of the container for liquid used in the fourth embodiment, wherein only the four corner edge portions of the cylindrical body 3 are corrugated and the other portions remain flat. In this embodiment, the constitutions of the upper plate 5 and lower plate 1 are same with those in the second or third embodiment, the constitutions of the inner bag 4, nozzle 7 and closure 12 are same with those in the first, second or third embodiment, and only the constitution of the cylindrical body 3 is different. That is, in the fourth embodiment, only the four corner edge portions, which are inserted into the grooved structure 2 of the lower plate 1 and the grooved structure 6 of the upper plate 5, of the flat body blank 3_1" are same with those in the third embodiment, and the four corner edge portions are corrugated with a prescribed dimension (for example, pitch: 5.0 mm, thickness: 2.5 mm), which corresponds to the

width of the groove of a grooved structure (for example, 3.0 mm). The other portions remain flat (for example, the thickness is 2.5 mm corresponding to the width 3.0 mm of the groove), and the both side edges of the flat body blank 3_1" are cut obliquely (e.g. like the both side edges of the flat body blank 3' in the second embodiment) and connected with an adhesive.

The material of the flat body blank 3_1" corrugated at the four corner edge portions is same used in the first, second and third embodiment. The pelleted material is formed into a sheet with a pair of partly corrugating rolls having flat surfaces and corrugated surfaces, which dresses only the four corner edge portions to form the corrugated flutes and thus the flat body blank is produced.

Before transporting the liquid material the flat body blank 3_1" is folded with the use of a jig or fixture so that the square cross section having prescribed rounds in the corners is obtained. The cylindrical body 3 is formed by connecting the obliquely cut both side edges with an adhesive while heating by such as a heating plate. After that, in the sane manner as described in the third embodiment, the lower edge of the cylindrical body 3 is inserted into the grooved structure 2 of the lower plate 1. The inner bag 4 attached to the nozzle 7 in the upper plate 5 is set inside the cylindrical body 3 with the groove 9 formed between the flanges of the nozzle being fitted in the nozzle opening 10 of the upper plate 5. The upper edge of the cylindrical body 3 is inserted into the grooved structure 6 of the upper plate 5. The assembled container comprising the uppper plate 5, cylindrical body 3 and lower body 1 is strapped and fixed with the nonmetallic fixing bands 8 made of a polypropylene. The container is completed by tightly fixing the upper plate 5, cylindrical body 3 and lower plate 1 with the bands.

The cylindrical body having a square cross section can be easily formed from the flat body blank, whose corner edge portions are corrugated. Printing or labelling is also easily made on the flat portions. The container members are easily transportable as the cylindrical body material is flat or foldable.

It is possible to replace the corrugated cylindrical body of the third embodiment or the partly corrugated cylindrical body, in which only the corner edge portions are corrugated, of the fourth embodiment with the cylindrical body 3 comprising a single faced corrugated board as shown in Figure 11. As described above the pelleted material is extruded into a sheet or liner board. Some of them are further formed into the corrugated media having flutes of a prescribed pitch and thickness by means of a corrugator. Then, the liner board and the corrugated medium are adhered With a hot melt adhesive to form a single faced corrugated board having a prescribed thickness (for example, 2.5 mm). The flat body blank 3_2" is folded by means of a jig or fixture with the liner board outside (refer to Figure 11-A) or inside (refer to Figure 11-B) so that the square cross section having prescribed rounds in the corners is obtained. One or two flutes of the corrugated medium at one end of the flat body blank 3_2" are removed and the both side edges of the flat liner board are overlapped and adhered 3_2"c (refer to Figure 11) with an adhesive. With the use of the flat body blank 3_2" comprising a single faced corrugated board the cylindrical body 3 having a sufficient inpact resistance in spite of its light weight can be produced.

[Embodiment 5]

Figure 12 is a vertical sectional view of the container for liquid employed in the fifth embodiment of the present invention. In this embodiment, the structures of the inner bag 4, nozzle 7 and closure 12 are same with those used in the first, second, third or fourth embodiment and the structure of the corner edges of the cylindrical body 3, which is not corrugated in this embodiment as in the first or second embodiment, may be same with that employed in the first or second embodiment. The insert portions of the upper plate 5 and lower plate 1, which receive the upper and lower edges of the cylindrical body 3, are modified and simplified. The stepped portions 6, 2 provided at the peripheries of the upper plate 5 and lower plate 1 are formed by roughly removing the outer panels of the grooved structures 6, 2 used in the first or second embodiment.

The assembly of the container is made roughly in the same manner with the first or second embodiment. The upper and lower edges of the cylindrical body 3 are fitted into or engaged with the stepped portion 6 of the upper plate 5 and the stepped portion 2 of the lower plate 1 respectively. The strapping is made on the assembled container crosswise by a strapping machine with the polypropylene bands 8, which are connected on the upper plate 5 at the band connections 8_1. The container is completed by tightly fixing the upper plate 5, cylindrical body 3 and lower plate 1 with the bands.

In this embodiment, the strength of the fitting or engaging portions of the upper and lower edges of the cylindrical body 3 with the stepped portions 6, 2 of the upper plate 5 and lower plate 1 is weaker than that in the first or second embodiment. However, the structures of the upper plate 5 and the lower plate 1 can be simplified and the cost is slightly reduced. According to the liquid material used, the circumstances of the transportation and the storing location it is advantageous to utilize the simplified containers of this embodiment.

[Embodiment 6]

Figure 13 is a vertical sectional view of the container for liquid employed in the sixth embodiment of the present invention. In this embodiment, the container is utilized for transporting the liquid 15 such as powder, flour, gelled material and a high viscous liquid (e.g. adhesive, grease). The structures of the lower plate 1 and the cylindrical body 3 are same with those used in the first or second embodiment; however, the nozzle 7

provided in the upper plate 5 is wider and the inner bag 4 is not attached to the nozzle 7. The bag is a polyethylene film having a prescribed shape and containing a prescribed volume of content. Before transporting the liquid such as powder and high viscous liquid the lower edge of the cylindrical body 3 is inserted into the grooved structure 2 of the lower plate 1. The content 15 is filled into the bag 4, the opening of the bag is ligated 4b and the ligated bag is put in the cylindrical body from the upper opening of the cylindrical body 3. Then, the upper edge of the cylindrical body 3 is inserted into the grooved structure 6 of the upper plate 5 with the nozzle 7 closed by the closure 12.

On the other hand, it is of course possible that the upper plate 5 is assembled with the cylindrical body 3, then the ligated 4b inner bag 4 filled with the content 15 is inserted into the container through the wide nozzle 7 and the nozzle 7 is closed with the closure 12. In both cases, the strapping is made on the container filled with the liquid material crosswise by the polypropylene bands 8, which are connected on the upper plate 5 at the band connections 8_1. The container is completed by tightly fixing the upper plate 5, cylindrical body 3 and lower plate 1 with the bands and is transported. After transporting the container the polypropylene bands 8 are cut off, the closure 12 is removed from the wide nozzle 7 and the liquid material 15 is taken from the container.

In this embodiment, the powder or high viscous liquid can be filled in the bag 4 before assembling the container, and therefore the liquid material is more easily filled and taken out than in the case of the first, second, third, fourth or fifth embodiment, wherein the narrow nozzle is utilized. Further, having the wide nozzle the content in the container can be stirred with a mixing paddle before using the liquid.

[Embodiment 7]

Figure 14 is a vertical sectional view of the container for liquid employed in the seventh embodiment of the present invention, wherein the inner bag is not used. In this embodiment, the configurations of the upper plate 5, lower plate 1, and cylindrical body 3 are same with those used in the first or second embodiment, but the interior surfaces of the upper plate 5, lower plate 1 and cylindrical body 3 are coated in order to provide the water resistance and the resistance to chemical substances. According to the liquid content the coating material is chosen from such as silicon, Teflon, polyethylene, polyethylene terephthalate and two-layer coating thereof ("Teflon" is the trademark for polytetrafluoroethylene). The nozzle 7 having the flanges 7' in injection molded directly on the upper plate 5. Polyolefine (e.g. polyethylene, polypropylene) is employed as a nozzle material so that the nozzle will not give off toxic fumes when incinerated. The nozzle 7 is closed with the closure 12 via the packing 11. It is apparent that the nozzle and closure may be threaded or the closure may be a one-touch cap type.

The container is assembled by inserting the upper and lower edges of the cylindrical body 3 into the grooved structures 6, 2 of the upper and the lower plates respectively and is caulked with the caulking material to achieve the water tight structure. After the container is assembled the container is strapped crosswise with the polypropylene bands 8 having a prescribed width, the bands are connected at the connections 8_1 and the container is completed. The liquid content 14 is filled into the container and the nozzle 7 is closed with the closure 12 via the packing 11. The disassembling of the container is made by cutting off the plypropylene bands as the same manner described in the previous embodiments.

As is the case with the first embodiment the container is readily disposable in an incinerator after the liquid material is used up. The container will not give off toxic fumes, black smokes and there will be no damage on the roaster when incinerated. Since no metal parts are used waste disposal is reasonably and effectively made. The container price will be lowered and the container is readily disassembled and disposable by cutting off the nonmetallic fixing bands after the liquid material is used up. Further, a grip or a handle is not necessary to be attached to the container, which contributes to lowering the cost.

When the containers described in the aforementioned several embodiments are sent to the user, the upper plates 5, the lower plates 1, the folded cylindrical bodies 3 (refer to Figure 15) or flat body blanks 3' (refer to Figure 17) and the inner bags 4 are separately packed in order to minimize the volume and therefore the freight cost. It is apparent that the flat body blank includes the corrugated board 3", partly corrugated board 3_1" corrugated in the corner edge portions and single faced corrugated board 3_2". As needed the user assembles the upper plates 5, lower plates 1, cylindrical bodies 3 and inner bags 4 into the containers having the square cross section. The assembled containers are strapped with the nonmetallic fixing polypropylene bands 8, filled with the liquid material and transported.

The assembling the container with seldom applying adhesives will also reduce the fabrication cost. The container is carried and handled by grasping the crossed portion of the polypropylene bands and the grip or handle is not necessary to be attached to the container. When the liquid material in the container is used up the container is disassembled and can be effectively disposed. As needed only the inner bags can be incinerated and the other disassembled members are returned and recycled, which reduces the overall cost.

If the extensions 13 are provided at the lower peripheral portion of the lower plate 1 as shown in Figures 16, 18 the extensions 13 are to be located just inside the grooved or stepped structure 6 of the upper plate 5 of the container positioned below as shown in Figure 19, and therefore the containers can be advanta-

geously stacked up in multi-layers without falling down. When a large quantity of liquid is transported with the 18 liter containers, a large number of containers are safely and advantageously transported or stored.

The constituent members, such as the upper plate, lower plate and cylindrical body, of the container for liquid effectively utilize waste paper and have water resistance. The container is disposable in an incinerator after the liquid material is used up and will not give off toxic fumes. Accordingly, the disposable constituent members are fabricated economically and advantadeously.

The container described in the embodiments is a 18 liter container having a square cross section; however, it is apparent that the cross section of the container may be rectangular. Also the nozzle or the bulged portion of the cylindrical body may be of any practical shape. Within the scope of the gist of the present invention various containers may be fabricated for transporting the liquid material, which are disposable or partially recyclable.

Claims

1. A method for transporting liquid material, comprising the steps of:
inserting a lower edge of a cylindrical body 3 made of a water resistant, waste disposable material into a grooved or stepped structure 2 formed at a peripheral portion of a lower plate 1 made of a water resistant, waste disposable material;
putting an inner bag 4 attached to a nozzle 7 of an upper plate 5 made of a water resistant, waste disposable material in the cylindrical body 3;
inserting an upper edge of the cylindrical body 3 into a grooved or stepped structure 6 formed at a peripheral portion of the upper plate 5;
strapping and fixing the upper place the cylindrical body and the lower plate with nonmetallic bands 8 to form a container; and
filling the liquid material in the container, which is transported thereafter, wherein
said inner bag 4 is a synthetic resin film such as a polyolefine film and the nozzle 7 is made of a synthetic resin such as a polyolefine; and
said synthetic resin will not give off toxic fumes when incinerated.

2. A method for transporting liquid material, comprising the steps of:
inserting an upper and a lower edges of a cylindrical body 3 into a grooved or stepped structure 6 formed at a peripheral portion of an upper plate 5 and into a grooved or stepped structure 2 formed at a peripheral portion of a lower plate 1 respectively;
strapping and fixing the upper plate 5, the cylindrical body 3 and the lower plate 1 with nonmetallic bands 8 to form a container; and
filling the liquid material in the container, which is transported thereafter, wherein
the upper plate 5, the cylindrical body 3 and the lower plate 5 are made of a water resistant, waste disposable material and interior surfaces thereof are coated with a coating material having a resistance to chemical substances; and
a nozzle 7 made of a synthetic resin such as a polyolefine, which will not give off toxic fumes when incinerated, is provided in the upper plate 5.

3. A method for transporting liquid material, comprising the steps of:
inserting a lower edge of a cylindrical body 3 made of a water resistant, waste disposable material into a grooved or stepped structure 2 formed at a peripheral portion of a lower plate 1 made of a water resistant, waste disposable material;
filling the liquid material in a bag 4 and ligating an opening thereof;
putting the bag 4 in the cylindrical body 3;
inserting an upper edge of the cylindrical body 3 into a grooved or stepped structure 6 formed at a peripheral portion of an upper plate 5 made of a water resistant, waste disposable material;
strapping and fixing the upper plate, the cylindrical body and the lower plate with nonmetallic bands 8 to form a container; and
transporting the container, wherein
said upper plate 5 has a wide opening, to which a nozzle is fitted;
said liquid material is viscous;
said inner bag 4 is a synthetic resin film such as a polyolefine film and the nozzle 7 is made of a synthetic resin such as a polyolefine; and
said synthetic resin will not give off toxic fumes when incinerated.

4. The method for transporting liquid material according to claim 1, 2 or 3, wherein the disposable upper plate 5, lower plate 1 and cylindrical body 3 are made of waste paper as a base material mixed with a polyolefine as a binder.

5. The method for transporting liquid material according to claim 1, 2, 3, or 4, wherein the cylindrical body 3 has a generally square cross section and bulged portions 3a for folding and flattening are formed along four corner edges of the cylindrical body.

6. The method for transporting liquid material according to claim 1, 2, 3, or 4, wherein
the cylindrical body 3 having a generally square cross section is formed by connecting both side edges of a flat body blank 3'; and
notched portions 3b comprising a plurality of notches 3b' for folding and flattening are provided in an interior surface of the flat body blank so that the notched portions are arranged along four corner edges of the cylindrical body.

7. The method for transporting liquid material according to claim 1, 2, 3, or 4, wherein the cylindrical body 3 having a generally square cross section is formed by connecting both side edges of a flat body blank 3", which is a corrugated board.

8. The method for transporting liquid material according to claim 1, 2, 3, or 4, wherein the cylindrical body 3 having a generally square cross section is formed by connecting both side edges of a flat body blank 3_1"; and corrugated portions 3_1a" are provided in the flat body blank so that the corrugated portions are arranged along four corner edges of the cylindrical body.

9. The method for transporting liquid material according to claim 1, 2, 3, or 4, wherein the cylindrical body 3 having a generally square cross section is formed by connecting both side edges of a flat body blank 3_2", which is a single faced corrugated board, with a flat side thereof arranged interiorly or exteriorly.

10. The method for transporting liquid material according to claim 5, 6, 7, 8 or 9, wherein the upper plate 5, the lower plate 1, the folded cylindrical body 3 or flat body blank 3', 3", 3_1" or 3_2" and the inner bag 4 are separately supplied to a user; when needed the user assembles the upper plate, lower plate, cylindrical body and the inner bag into the container and straps and fixes with the nonmetallic bands 8; and the liquid material is filled and the container is transported.

11. The method for transporting liquid material according to any one of claims 1-9, wherein extensions 13 are formed at a lower, peripheral portion of the lower plate 1 so that the extensions 13 are located near an interior side of the grooved or the stepped structure 6 provided at a periphery of the upper plate 5 of a container positioned below when vertically stacked.

FIG. 1

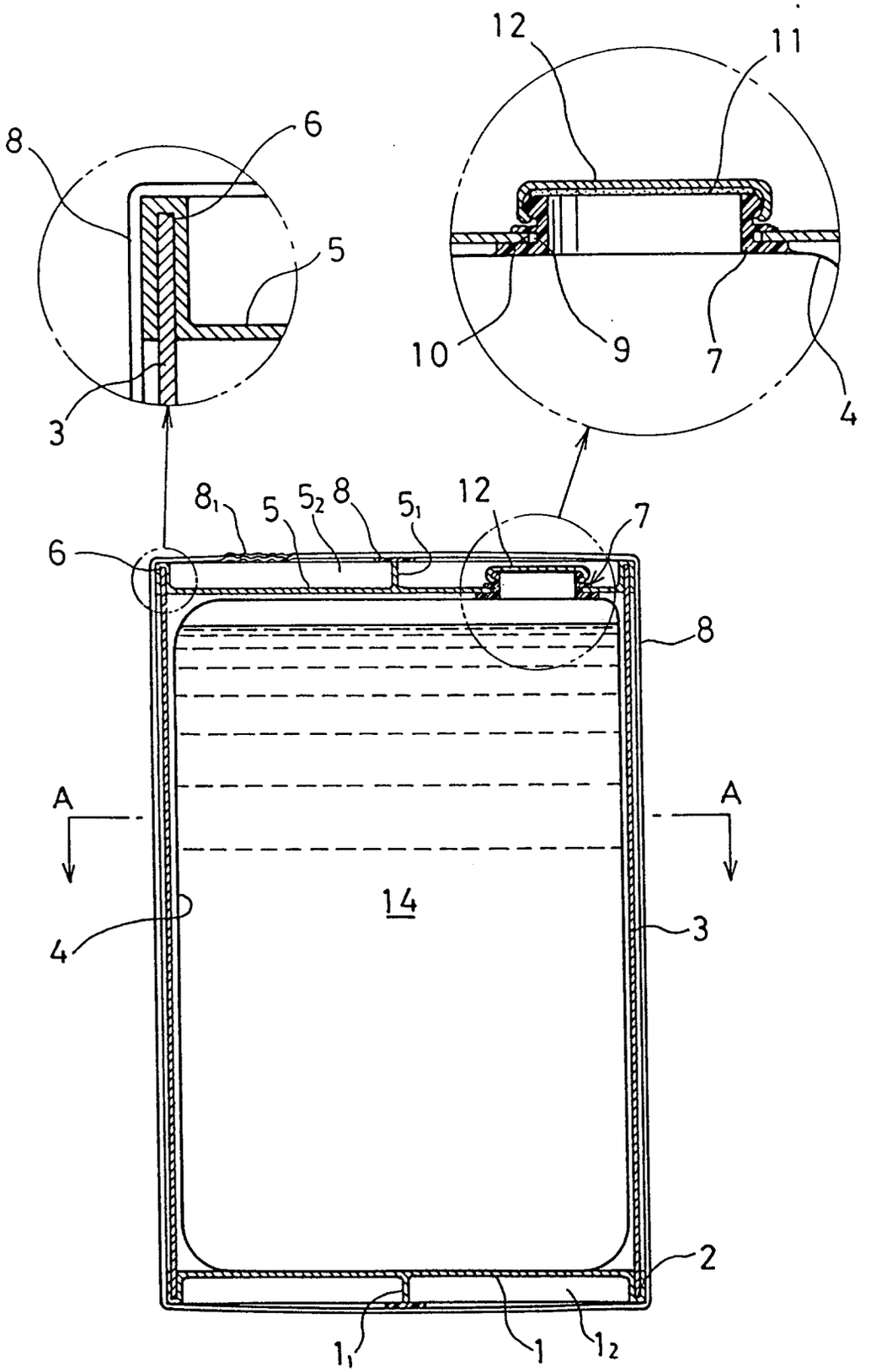


FIG. 2

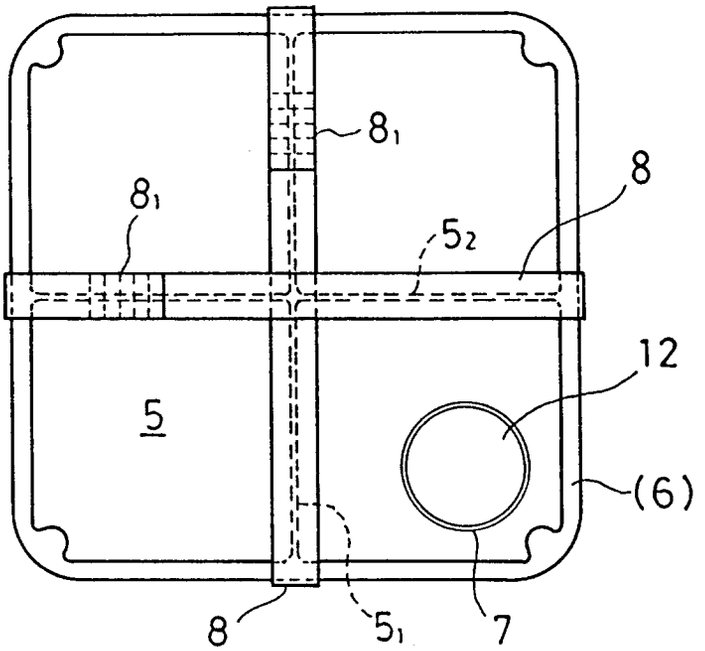


FIG. 3

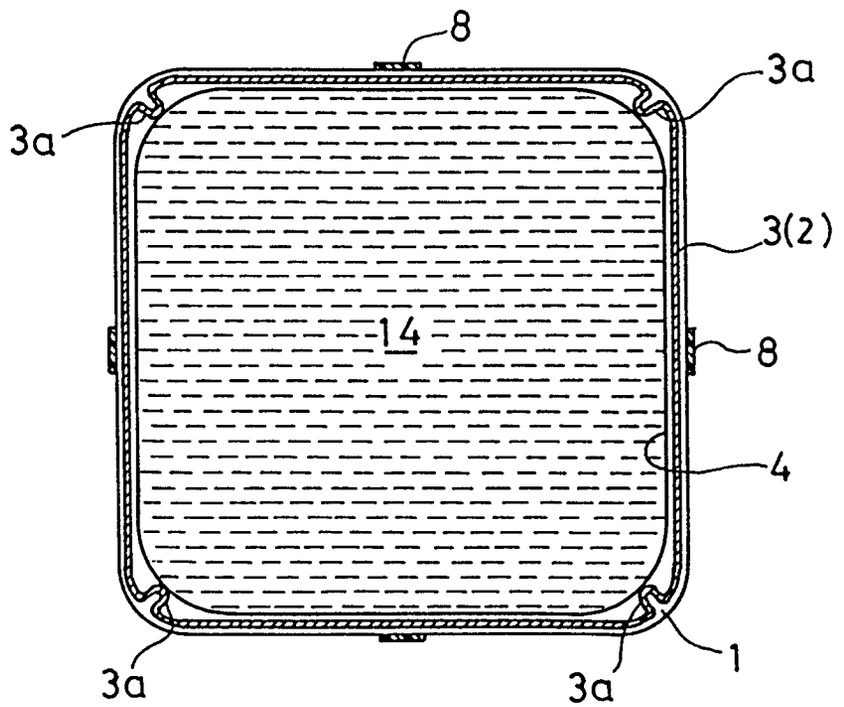


FIG. 4

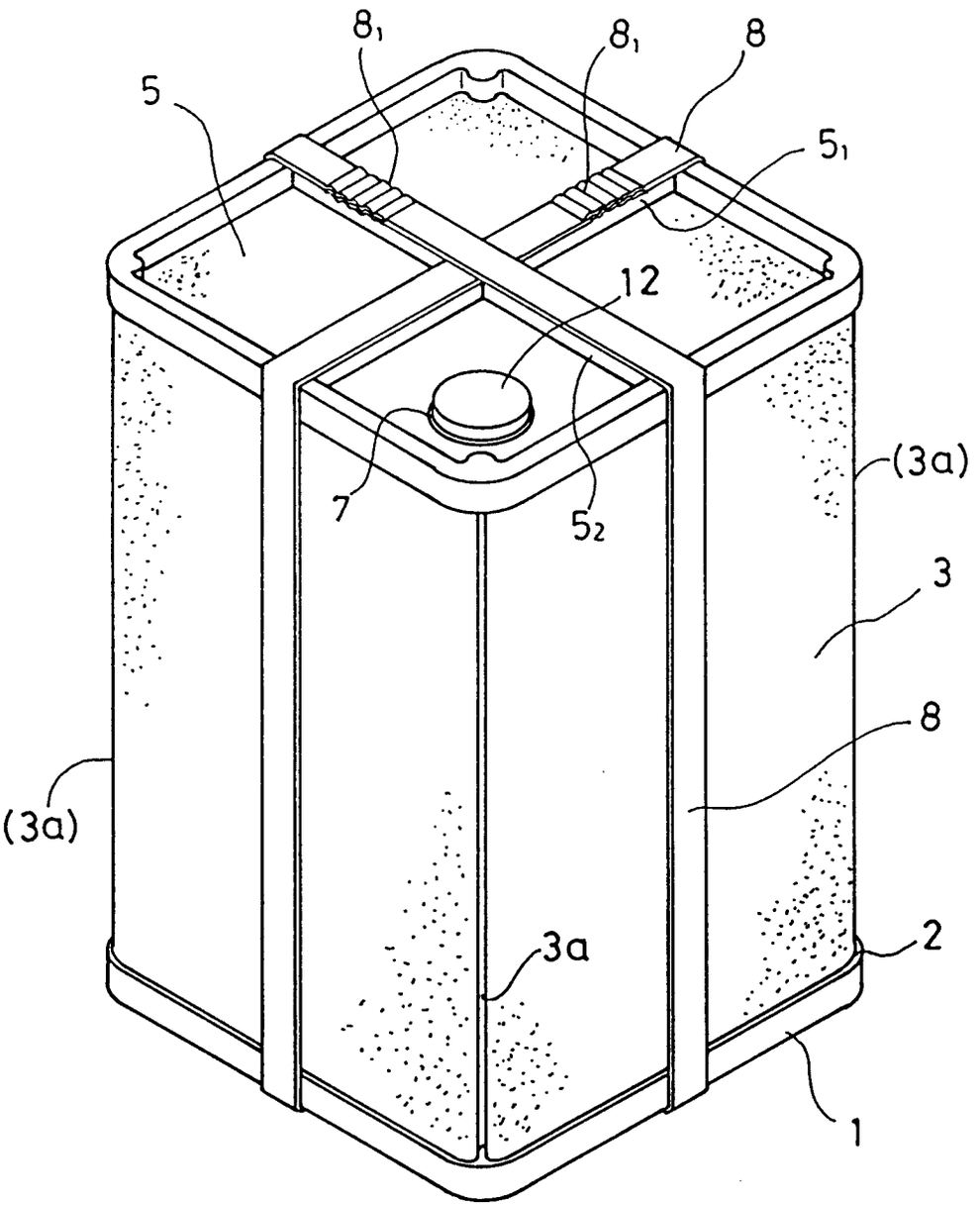


FIG. 5

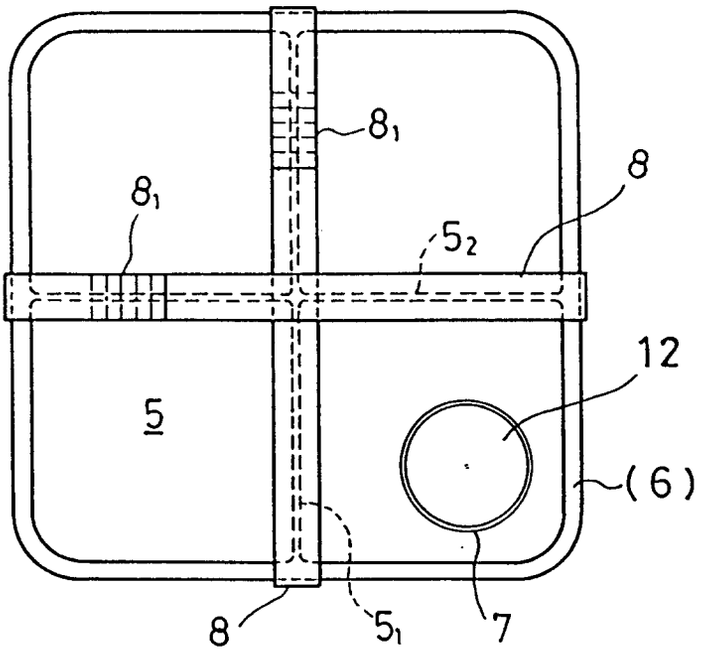


FIG. 6

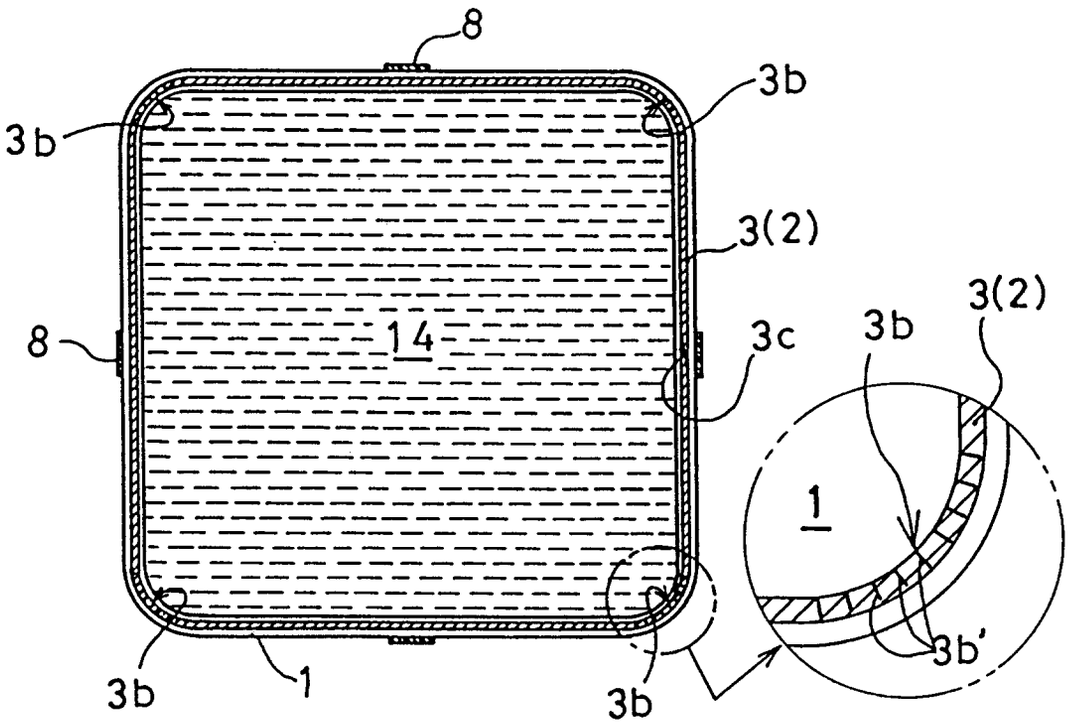


FIG. 7

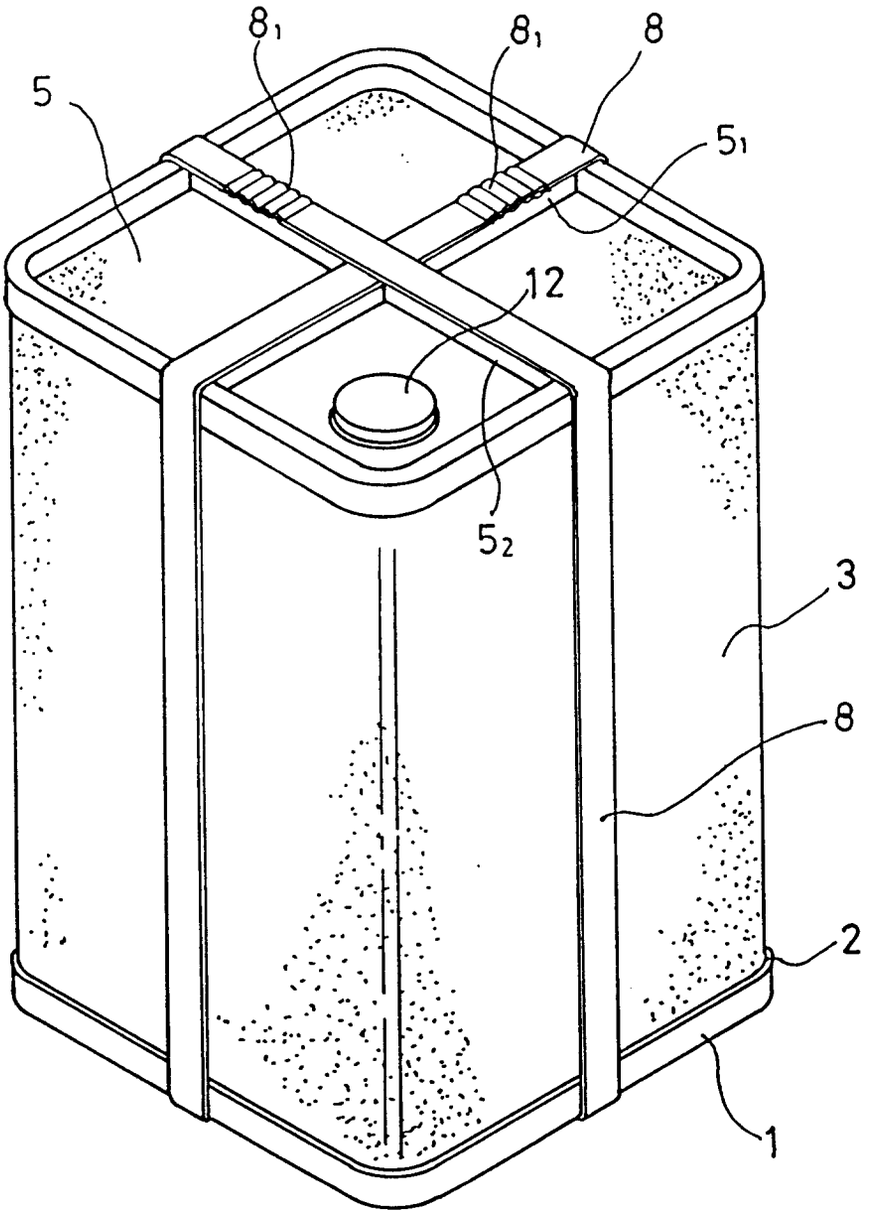


FIG. 8

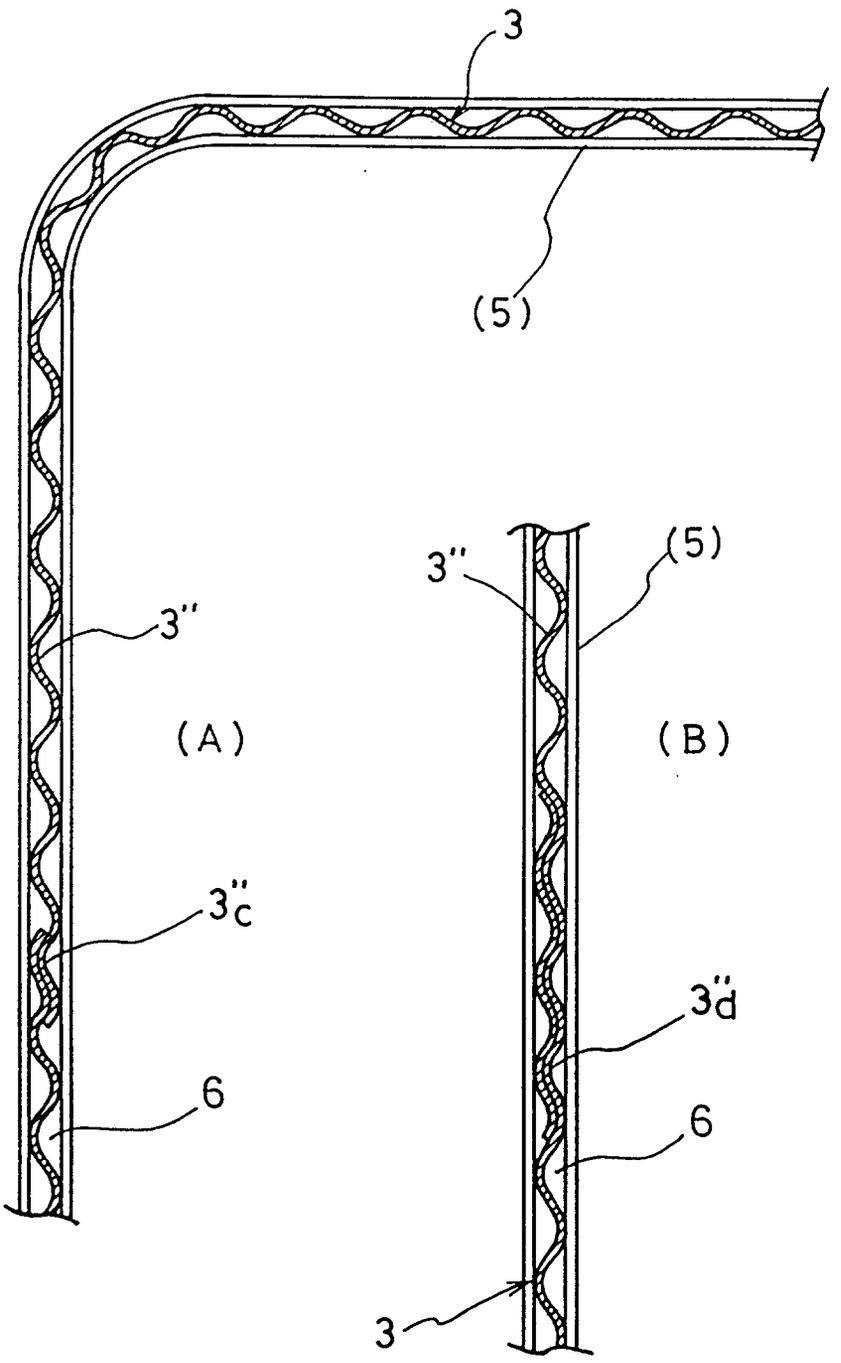


FIG. 9

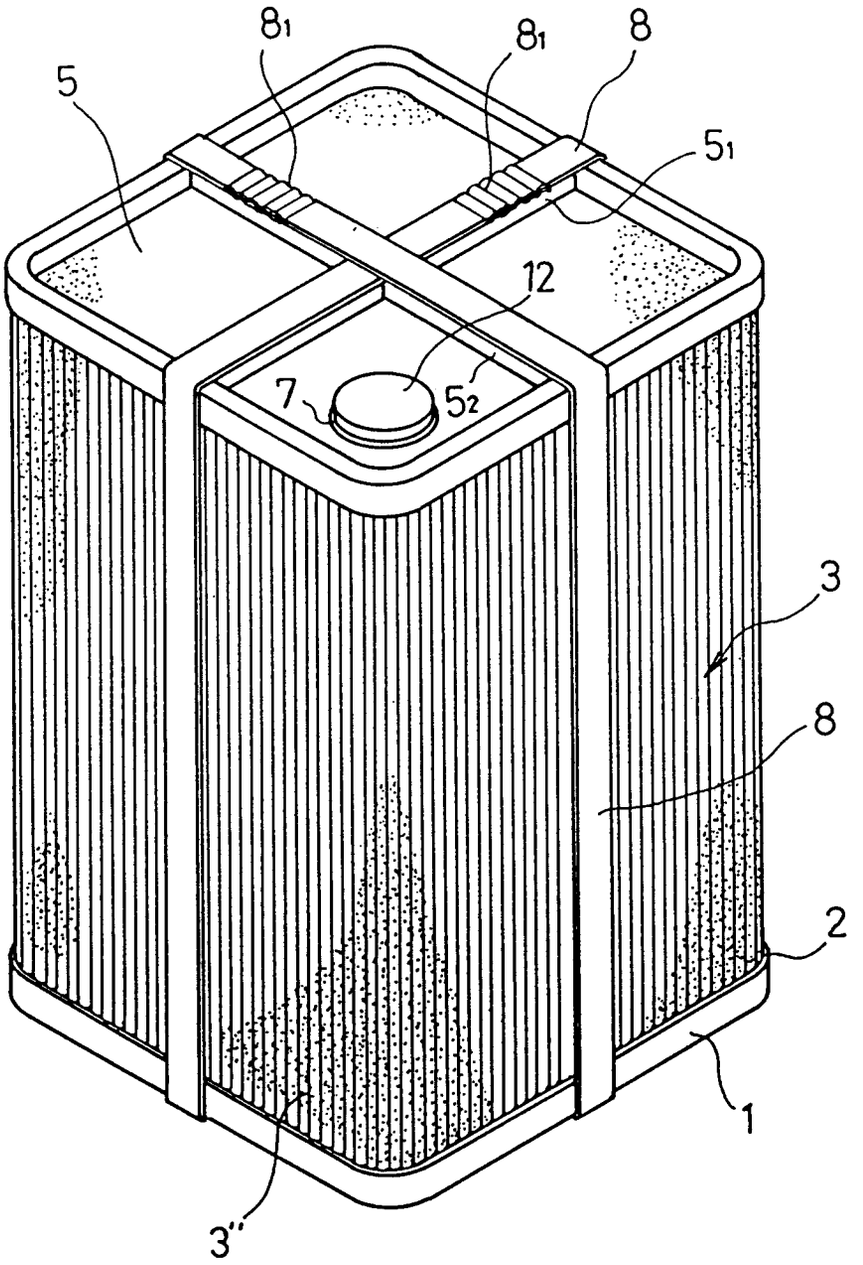


FIG. 10

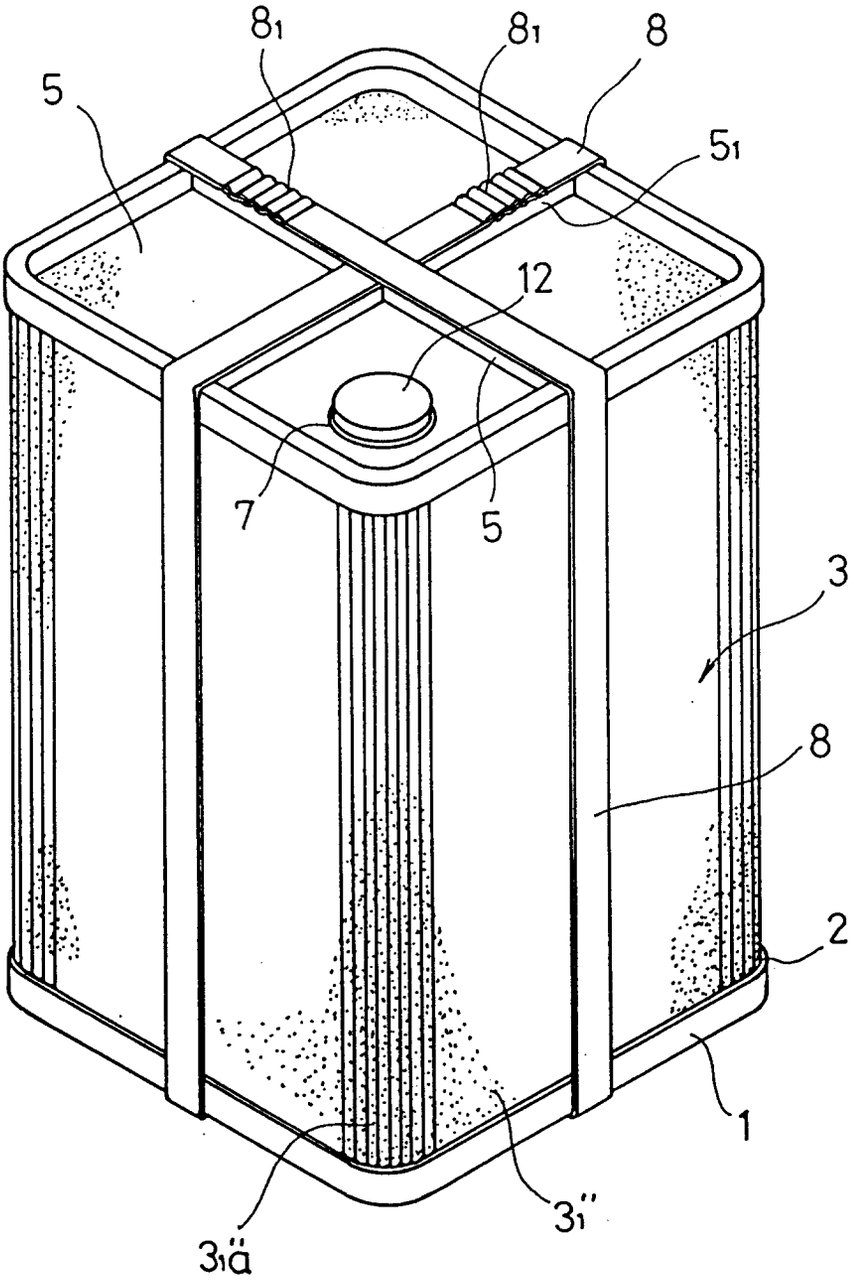


FIG. 11

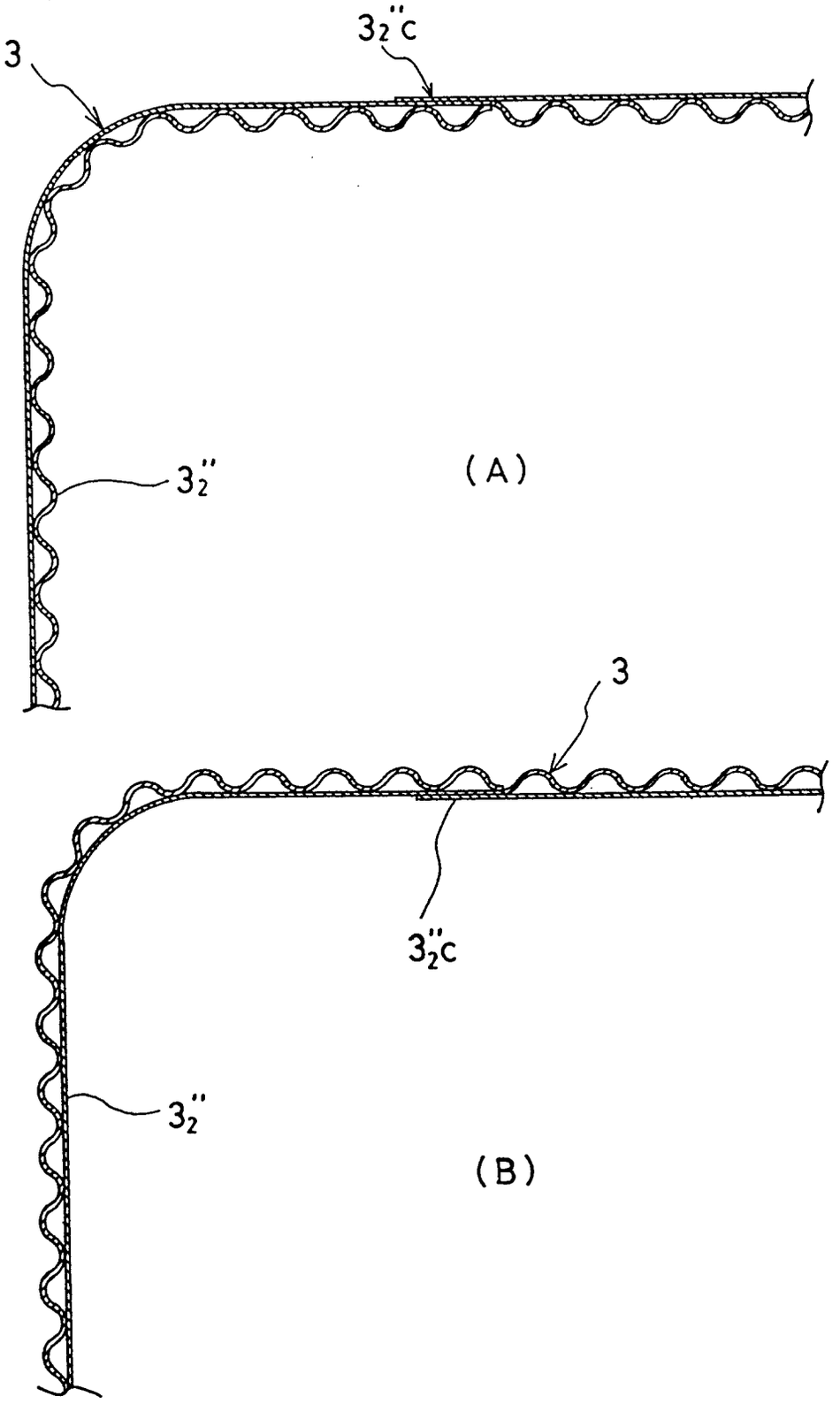


FIG. 12

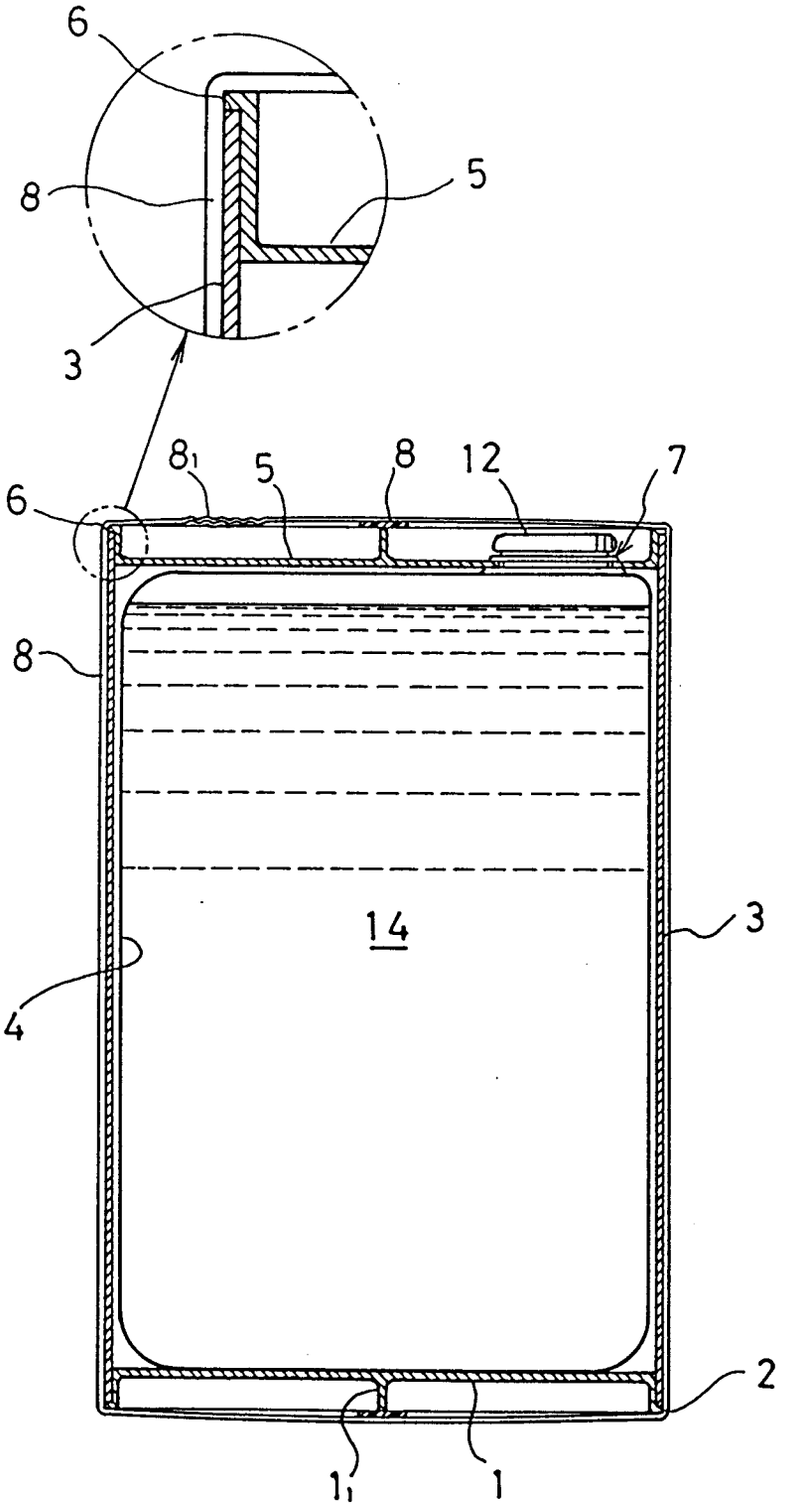


FIG. 13

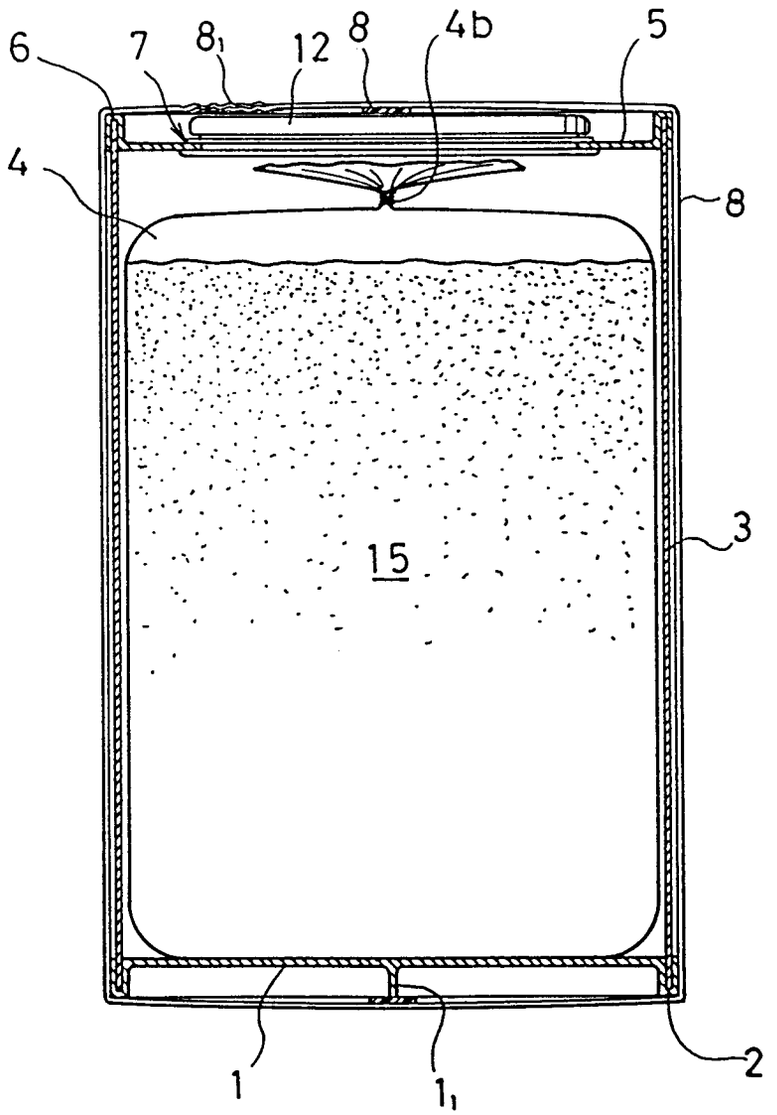


FIG. 14

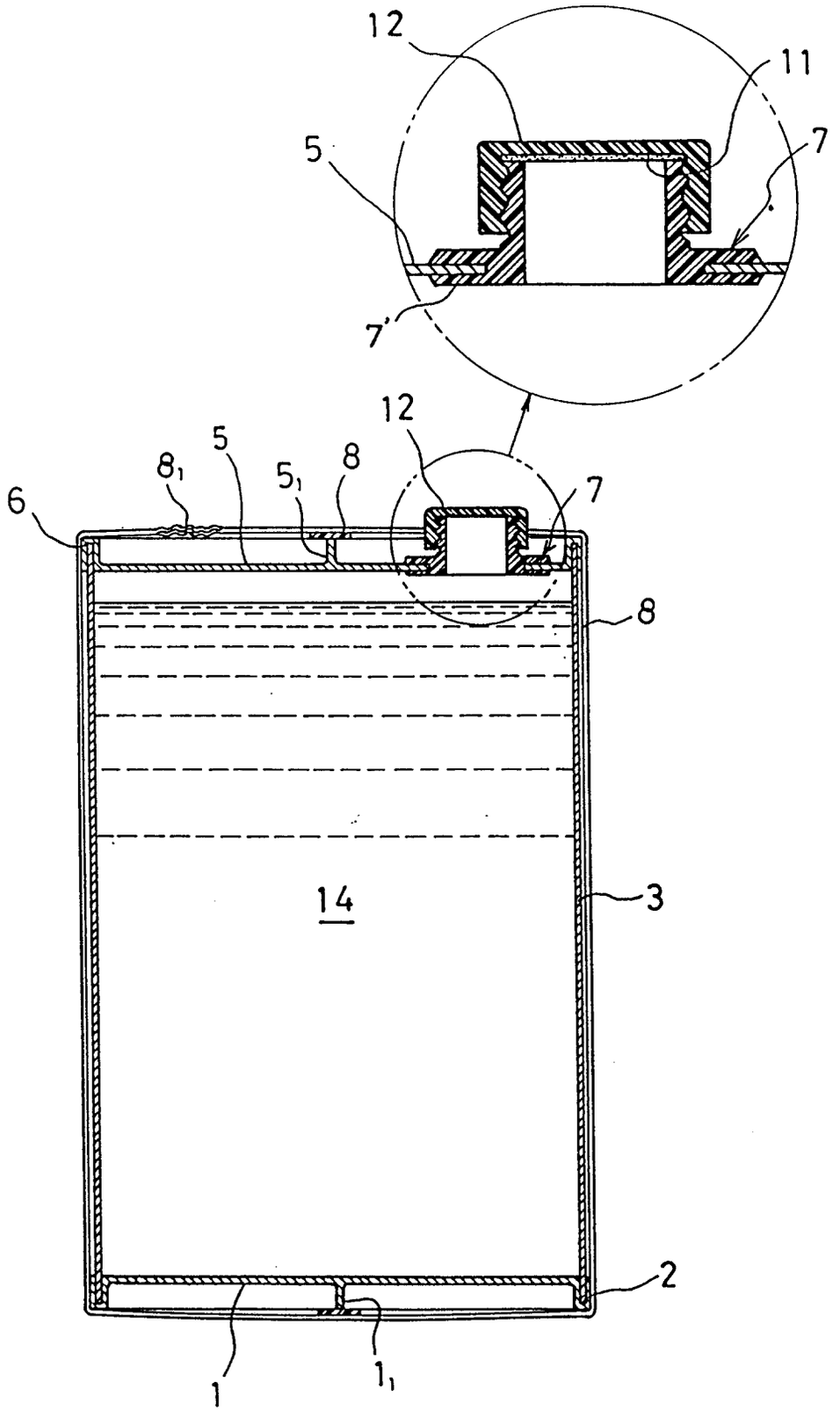


FIG. 15

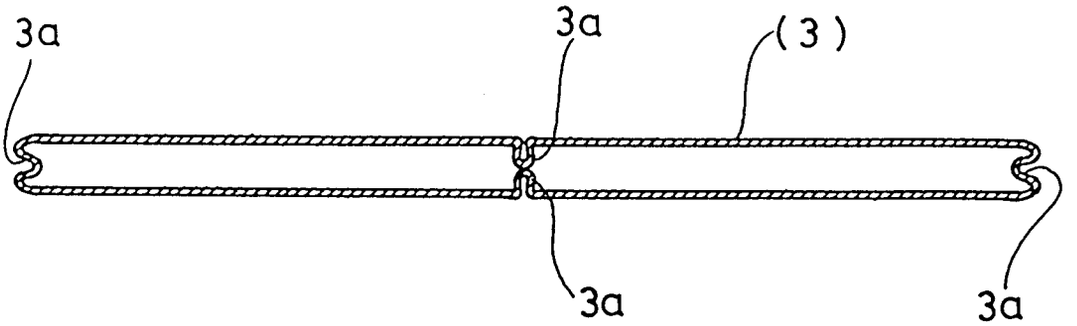


FIG. 16

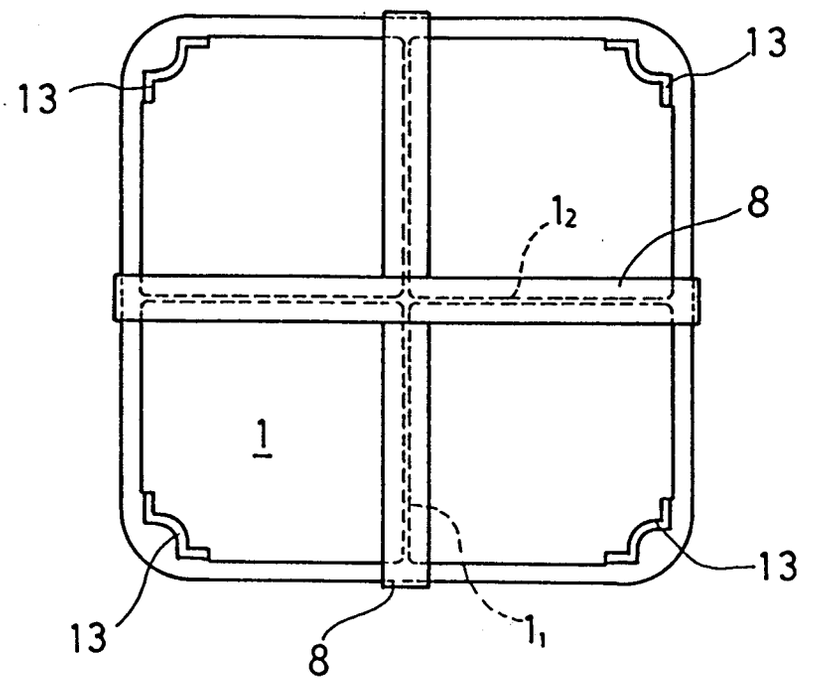


FIG. 17

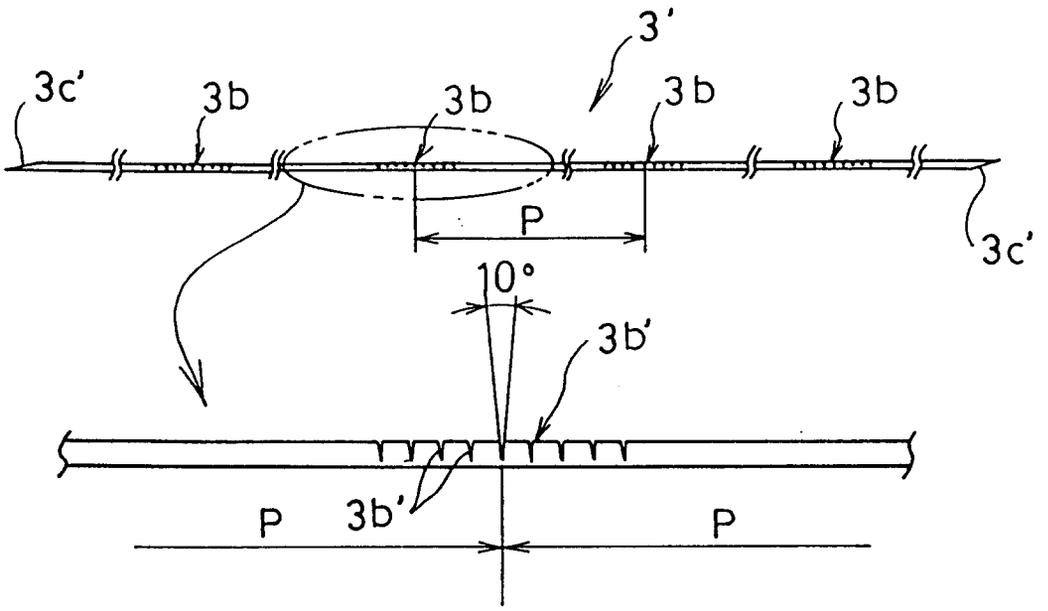


FIG. 18

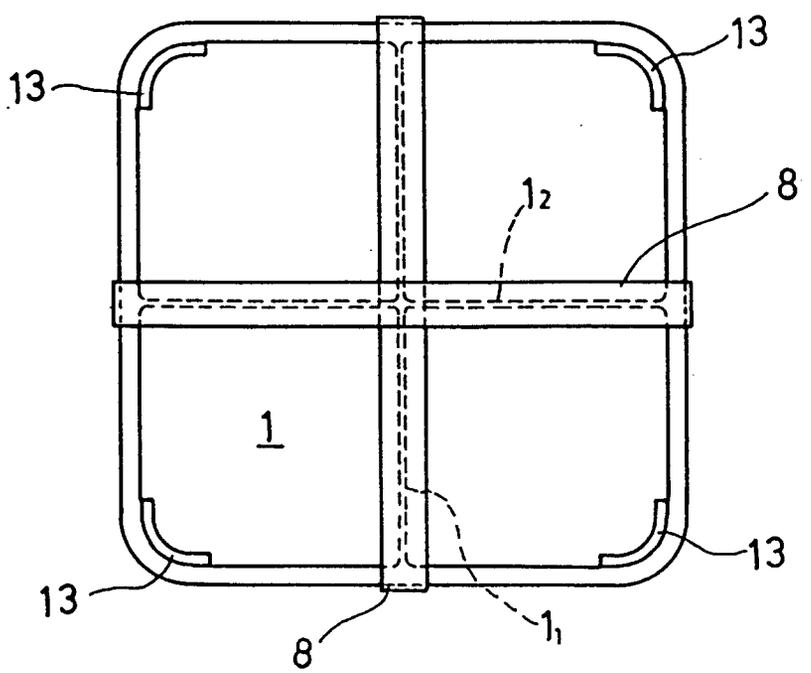
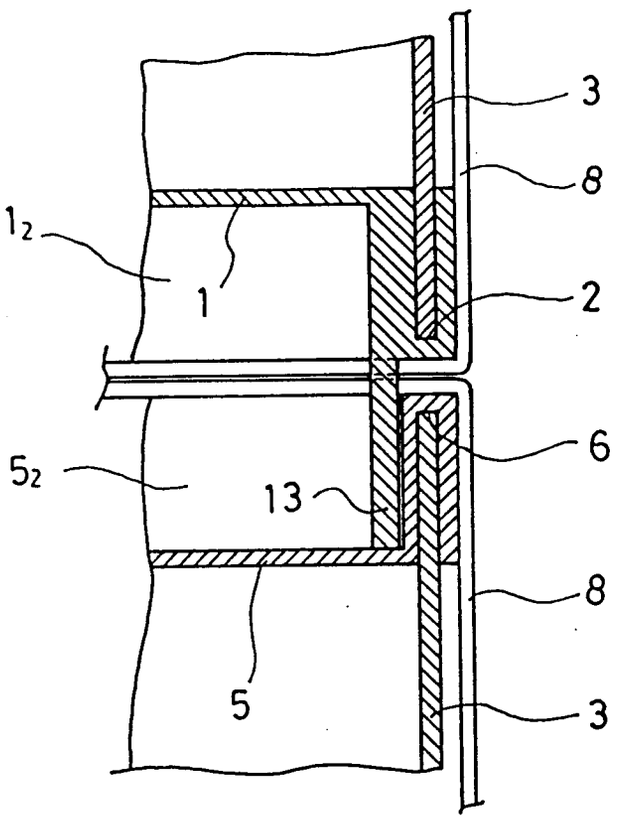


FIG. 19



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 10 2604

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	CA-A-1 025 786 (BENJAMIN) * page 9, line 12 - page 14, line 6; figures 1-6 *	1-3	B65D77/06 B65D5/40
A	DE-U-90 05 581 (HÖFLIGER VERPACKUNGSFORSCHUNG- UND ENTWICKLUNGSGESELLSCHAFT) * page 5, line 23 - page 8, line 2; figures 1,2 *	1-3	
A	GB-A-992 698 (WEYERHAUSER CY)		
A	DE-U-88 10 760 (VAN LEER)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	5 June 1996	Martens, L

CATEGORY OF CITED DOCUMENTS

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Y : particularly relevant if combined with another document of the same category
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D : document cited in the application
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