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(71) Applicant : **AB AKERLUND & RAUSING**
Box 22
S-221 00 Lund (SE)

(72) Inventor : **Nilsson, Bertil**
Ljunitsvägen 8
S-232 54 Akarp (SV)

(74) Representative : **Kristiansen, Alf P. et al**
Albihn West AB Box 142
S-401 22 Göteborg (SE)

(54) Method of manufacturing a packaging container.

(57) The invention concerns a method of producing a tray-like packaging container consisting of an outer and inner case. The package is formstable and strong, with or without contents. The inner case and the outer case can be of the same material type and the inner case is dimensioned so as to give the package its strength and formstability, whilst the outer case has a decorative purpose.

The package is produced in a modified production line for the manufacture of assembled trays.

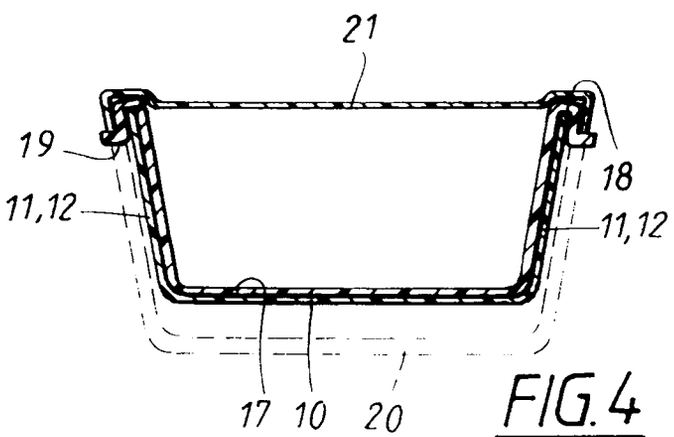

FIG.4

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The invention concerns tray-like packages and relates more precisely to a method of producing tray-like packaging containers, nowadays more generally known as "table packaging", and which are especially used for margarine, cooking fat, cheese spreads and other spreadable products. Trays of this type have replaced the wrappers of waxed paper, plastic laminates and laminates comprising plastics and aluminium which were used as packaging at the consumer stage during the first period of modern distribution of foodstuffs of this type.

The known and so-called table packages comprise an assembled tray formed from an outer tray or case as well as an inner tray or case. In a way known from lamination technology, the properties of the various layers are used to give the tray, formed from an assembled inner tray and outer tray, its necessary properties relating to strength, impermeability, sealability, printability etc.

Since consumer packaging containers for foodstuffs are made as disposable packages for known reasons, it is clearly important that the choice of material is optimised, firstly in order to take account of material costs whilst at the same time paying attention to the above-mentioned possible synergous effects and, secondly, takin account of available production technology and techniques.

Since the advent of packaging technology the meaning of "strong" packages has always been taken to mean packages of cardboard material. The techniques for handling cardboard material for packaging have therefore been given priority. Cardboard is a relatively cheap material and is suitable for printing and punching-out (e.g. by die punching). For example, plastic-coated cardboard constitutes an ideal base for offset printing. Moreover, since the production of plastic coated cardboard is carried out in large extrusion equipment having high running speeds, it is very favourable in terms of cost for packaging manufacturers to buy such material in rolls and to punch this out into sheets themselves. In the packaging field, printing of the decorative outer layer is usually performed using simple and cheap, plane offset machines.

In terms of known technology it lies at the heart of every packaging technologist to use cardboard material to the greatest possible extent. Since cardboard is also a particularly environmentally-friendly material, the entire view is even more positively, if possible, in favour of using cardboard in particular for packages requiring strength and stability.

Thus, according to known technology, when the problem of choosing the material for a table pack consisting of two joined trays arose, all factors seemed to point in favour of using cardboard as the material which should give the assembled tray structure its strength. Additionally the conclusion was very soon reached that the tray part made of cardboard must be placed on the outside of the table pack, and that a grease-impermeable material was required for the inside part of the assembled tray. It was thereby chosen, and this is still the case, to use easily thermoformable materials such as PVC, PS (polystyrene), PP (polypropylene) or associated laminates. Other thermoformable materials can however also be used.

Concerning the joining of the inner and outer trays, adhesive is normally used, generally molten adhesive, as a separate layer between the thermoformed inner tray and the plastic coated cardboard, which normally is coated with temperature and pressure activated material. Originally even the inner tray's flange was used for the fixing of the inner tray to the outer cardboard tray.

Since the plastic material, when it is formed from relatively thin sheet or from film in roll form, can possess so-called mechanical memory, i.e. tendency to return upon renewed heating, especially if a tray has been formed below a temperature corresponding to the plastic's vitrification temperature (glass temperature), it has been shown to be appropriate to bring about fixing or adhesion between the inner tray and the outer tray at as many places as possible, or in a particular pattern between the two trays. This is normally achieved with the help of a thick layer of molten adhesive on the cardboard, i.e. on its non-decorated surfaces.

Such a known tray construction can thus comprise four (or more) different material layers, namely a plastic layer, commonly polyethylene coated on the cardboard layer, a thick molten adhesive layer on the cardboard's other side as well the thermoformed layer. The outer plastic layer is nowadays often replaced by offset applied lacquers.

Known packages are particularly adapted to their purpose and also very cost-economical, but the handling problems involved with recycling of the different material layers in the package causes problems and is costly. Recycling from an energy point of view, i.e. by burning, is naturally not excluded and the known trays have of course a future in this respect.

In order to make it possible to separate the material layers, the earlier mentioned mechanical adhesion between the inner and outer trays has been the subject of additional development recently and there is a construction which, as such, does allow separation of the layers of different materials. The technique however requires interfering with the presently existing high speed production methods and thus to the machine lines to an appreciable amount and/or the possibility to be able to use the same or similar materials for both layers.

The aim of the invention is to arrive at a tray construction which fulfils not only the requirement for material recycling in all of its meanings, but also the requirement for production without resorting to a too far-reaching

modification of the existing production lines for table packages.

The latter implies i.a. a cost-economic printing of high quality on the outer tray to achieve its decoration, in roll or sheet fed offset printing machines or similar. The basic idea of the invention with respect to the problem to be solved is to be found in the total reversal of the philosophy concerning the source of strength of the finished package and the idea has produced the result that a previously untested method is now used, namely in that the thermoformed layer is given the task of being the assembled tray's strength-imparting element. A number of types of so-called complete plastic trays are of course already known, which per se possess strength and formstability, but even in their basic form these trays are costly compared to earlier known trays constituted by inner and outer assembled trays.

GB-A-1 232 783 discloses an example of a combined tray having an inner tray of plastics material which has formstability and whereby said inner tray is either vacuum formed or moulded. The outer layer is formed of flexible material and is attached by adhesion to the inner tray. The process involved herewith is obviously time consuming due to the manner in which the two layers are attached to each other.

A further two-element assembled container is known from EP-A-0 442 720, whereby a composite tray is constructed by erecting an outer tray of rigid or semi-rigid material and then thermoforming a thin inner liner layer therein. Such thermoforming of a thin inner layer is however associated with particular problems since when the web is drawn down into the erected outer tray, it is difficult to ensure that the inner layer will totally seal the corner and edge regions at the base of the outer tray. This is due to the stretching during thermoforming which is at a maximum at these particular areas. This problem is overcome by increasing the thickness of the inner layer web so that sufficient material is present at these locations after thermoforming.

Summary of the invention

It has now shown itself possible to maintain the concept of the inner tray/outer tray idea and the production technology associated therewith whilst still fulfilling the economic considerations, despite the changing of the strength-imparting element to now be a thermoformed inner plastic tray part of an assembled tray instead of the previous solution whereby an outer tray of cardboard was used.

Thus the essential features of the invention are defined in the appended independent method claim, preferred features being defined in the dependent claims.

Moreover by manufacturing the outer tray of a thin material in accordance with the invention, as opposed to manufacturing the outer from thick cardboard material and also when the outer tray is of the same material type as the inner tray, the requirements for recycling can be met to the full. At the same time the printability in simple offset printing machinery is maintained.

According to the invention, an overall material saving is achieved since the functions of strength and decoration are separated in such a way that the outer case performs only a decorative function and can thereby be kept very thin compared to the inner tray. The outer case's wall thickness does not need to go beyond a maximum of about 10% of the wall thickness of the inner tray, or even less, measured after thermoforming. The only criteria for the outer layer is that it should have a thickness such that it is possible to print in an offset machine, flexographic printing machine or other corresponding machine, with competitively high speed and high print quality.

In order to ensure an aesthetic appearance of the assembled tray, without the presence of bubbles and folds, the outer and inner layers are heat sealed directly to each other. This possibility of direct sealing, without an intermediate layer of different material e.g. hot melt adhesive, is moreover fully in accordance with the recyclability of the material in its entirety.

It is of course still possible to form the per se thicker, inner tray with a per se known, encircling flange serving as fastening means for a lid. The flange can moreover be foreseen with protrusions directed towards the tray bottom in order to prevent all round flange-to-flange contact when the trays are stacked inside each other, thus preventing wedging.

To additionally support the quest for uniformity of the material, i.e. to meet the requirement of recyclability to the full, the lid is preferably made of the same material type as the inner and outer trays. For this purpose, materials of the type polypropylene, polyester and other thermoformable, heat sealable thermoplastics can be used.

To further achieve economies in the packaging industry, as mentioned, the outer case including bottom and sidewall areas is punched out from a decorated band or web of outer case material.

The invention thus achieves a method for manufacturing a strong tray-like package which is formstable with or without contents, comprising an outer case erected from a planar blank having base and sidewall areas, as well as an inner case of thermoformable material. The method is such that the inner case and the outer case are manufactured in a modified line for the production, in the mentioned way, of assembled trays, where

the material for the inner tray and the thermoforming are carried out so that the inner tray is the assembled tray's strength imparting part, and whereby said thermoforming is carried out directly into the erected outer tray material, and whereby the material type of both the inner tray and the outer tray is chosen to be similar and compatible from the point of view of sealing.

The invention will now be exemplified with reference to the accompanying drawings, in which:

Fig.1 shows a planar, decorated outer blank for the assembled tray,

Fig.2 shows a variant A of the erected outer blank, and

Fig.3 shows a variant B of the erected outer blank, and

Fig.4 is a section through an assembled tray according to the invention

The outer tray blank in fig.1 comprises a base area 10, two sidewall areas 11, 12 as well as sealing flaps 13, 14. In a preferred embodiment, the blank consists of polypropylene and has a thickness of about 20 to ca. 60µ or more and is punched from a web of said material. The web is printed by flexographic printing or alternatively offset printing, on the side which is to be the outside of the tray. Other materials may of course be used such as polyester, which can be modified in a convenient manner, as well as polyethylene and other heat-sealable thermoplastic materials.

The blank is erected in a mould of a modified production line for assembled trays into the state shown in fig. 2, whereby the sidewall flaps 11, 12 are positioned edge-to-edge in accordance with the manner indicated in the figure by the references 15 and 16. Fig. 3 shows a reversed alternative, with the sidewalls on the inside of the flaps.

When the blank is erected in this manner, it is placed in a final station, whereby in a way known per se a web of thermoformable material is placed over the erected outer tray - in the production machine there are in fact a plurality of erected outer trays lying parallel to this one - and with the help of pressure and/or vacuum the web is formed into cavities corresponding to the final form of the inner tray 17. The web is hereby ideally chosen to be of the same material as the material of the outer tray and the thickness of the web is such that, in the final state according to fig.4, the inner tray 17 imparts the assembled tray with its necessary strength and formstability, with or without contents. By supplying heat to the inside of the erected inner tray and/or to the underside of the thermoformable web, the surfaces of the inner and outer trays which will come into contact are rendered heat-sealable, and the sealing is completed by pressure in the mould together with the ensuing cooling.

In the depicted embodiment the supporting inner tray 17 is formed with flanges 18 which extend all the way around the upper edge of the tray 10 and which can extend downwardly along the outside of the tray 10. Protrusions acting as abutment surfaces are formed at least at two places, said protrusions serving as distancing means for the case when the completed trays are stacked on top of each other. An imaginary tray is shown in dashed lines 20 and it is thus evident that a gap occurs between the adjacent tray bottoms 20, thus preventing wedging.

The inner tray 17, which is thus the bearing element can have a thickness in the region of circa 80-200µ or more.

The surrounding flange 18 on the outside of the tray forms an acute angle with the vertical plane and serves as a snap locking means for an associated lid 21, whereby the assembled tray becomes reclosable. The lid is moreover made of the same type of material as that of the inner and outer trays.

Even though only a few possible embodiments of the invention have been described and depicted, it is clear that numerous modifications are possible within the scope of the invention defined by the following claims.

Claims

1. Method of manufacturing a strong, tray-like package, being formstable both with and without contents therein and comprising an outer case erected from a planar blank provided with base and sidewall areas, as well as an inner case of thermoformable material, whereby the inner case and the outer case are attached together in a modified production line for the production of assembled trays and whereby the inner case is chosen of such a material and is dimensioned so as to give the package its strength and formstability, and whereby further the inner case is thermoformed directly into the erected outer case, without intermediate adhesive material.

2. Method according to claim 1, whereby the inner case and the outer case are of the same material.

3. Method according to claims 1 or 2, whereby the erected outer case is heated so that the adhesion of the

outer case to the inner case is achieved whilst lying in contact with the outer case and by the ensuing cooling.

4. Method according to any of claims 1 to 3, whereby the outer case is appreciably thinner than the inner case.

5. Method according to claim 4, whereby the thickness of the outer case walls is about 10% of the thickness of the inner case walls, measured after thermoforming.

6. Method according to any of claims 1 to 5, whereby the inner case, in a way known per se, is formed with a surrounding flange (18) which serves as a fastening means for a corresponding lid.

7. Method according to any preceding claim, whereby a lid is provided and whereby the lid is thermoformed from the same sort of material as the inner and outer cases.

8. Method according to any preceding claim, whereby the thin outer case blank comprising bottom and side-wall areas is stamped from a web of material having decoration thereon.

9. Method according to any one of claims 6 to 8, whereby the tray is conical as seen in cross section and whereby the flange is provided with protrusions for preventing all round flange-to-flange contact when the trays are stacked inside each other.

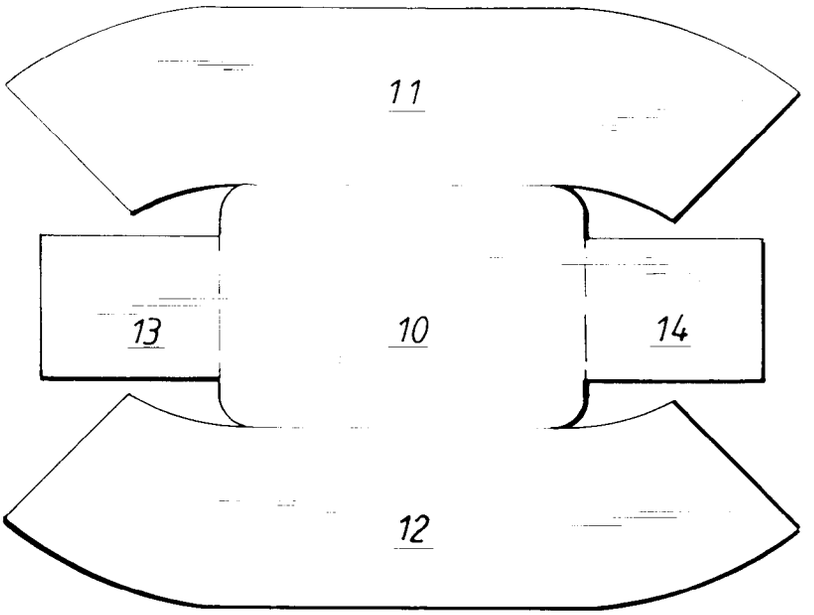

FIG. 1

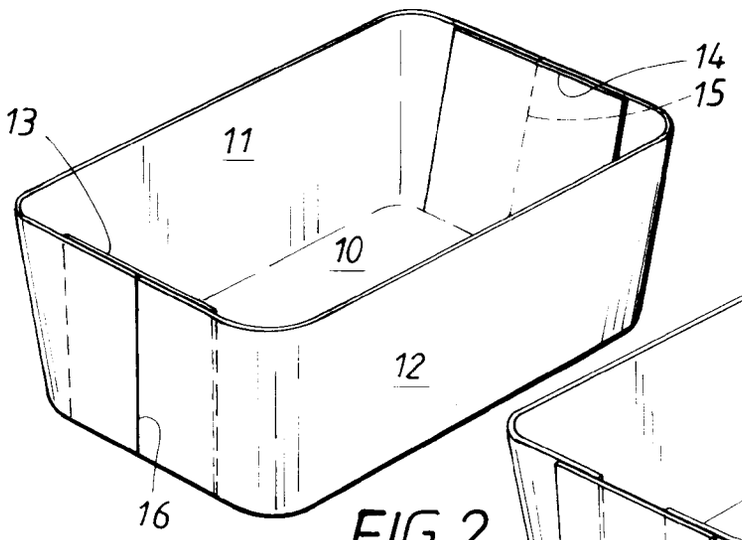

FIG. 2

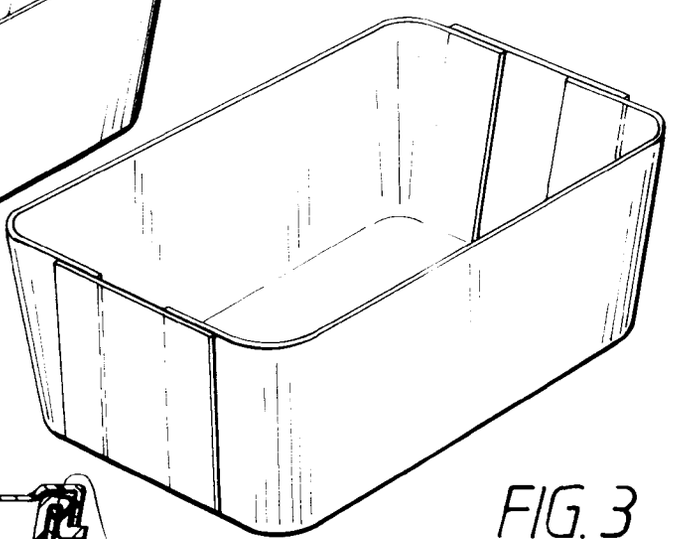

FIG. 3

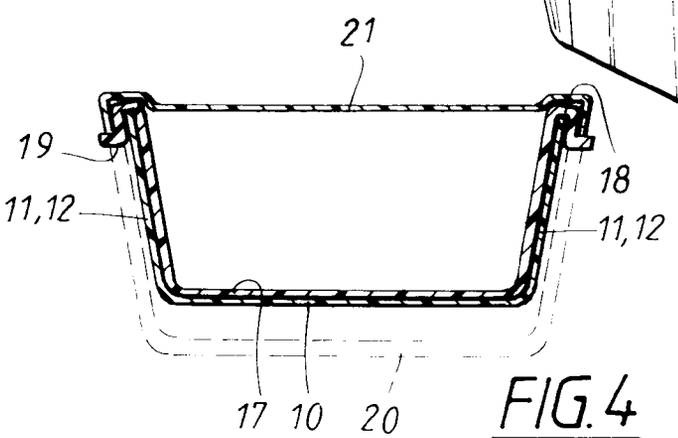

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 93850018.8

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.5)
X	EP,A2, 0 492 052 (NIPPLA CO., LTD) *See page 2, column 2, lines 11, 12,17,51-53*	1-6,8	B 31 B 15/60 B 65 D 5/62
A	SE,B, 3 730 090 (MO OCH DOMSJÖ AB) *See page 3, lines 15-17, page 3 lines 32-34*	1,6-9	
A	GB,A, 1 246 811 (ES & A ROBINSON LIMITED) *See the whole document*	1,2,6-8	
A	GB,A, 1 232 783 (ES & A ROBINSON LIMITED) *See the whole document*	1,6,8	
A	FR,A1, 2 602 740 (ETABLISSEMENTS HELLION) *See the whole document*	1,2,4-6 8	
A	EP,A1, 0 442 720 (W.R. GRACE & CO., COON.) *See the whole document*	1	
A	EP,A1, 0 408 016 (SUMITOMO BAKELITE COMPANY LIMITED) *See the whole document*	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5) B 31 B B 65 D
A	EP,A2, 0 313 406 (MITSUI TOATSU CHEMICALS INC) *See the whole document*	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
STOCKHOLM	30-04-1993	Åkerlund, H.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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