(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 332 015 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.03.2024 Bulletin 2024/10

(21) Application number: **22216604.3**

(22) Date of filing: **23.12.2022**

(51) International Patent Classification (IPC):
B65D 43/16 *(2006.01)* ***B65D 1/24*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B65D 1/24; B65D 43/162; B65D 2251/1033;
B65D 2543/00027; B65D 2543/0012;
B65D 2543/00194; B65D 2543/00222;
B65D 2543/00296; B65D 2543/00351;
B65D 2543/00398; B65D 2543/00435;
B65D 2543/00509; B65D 2543/00546;
B65D 2543/00583; B65D 2543/0062; (Cont.)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **01.09.2022 PL 44218522**

(71) Applicant: **KGL Spolka Akcyjna**
05-080 Izabelin (PL)

(72) Inventors:
- **Ptak, Rados aw**
  01-212 Warszawa (PL)
- **Mazurkiewicz, Konrad**
  05-191 Mi koszyn (PL)
- **Udzielak, Ireneusz**
  04-384 Warszawa (PL)
- **Skibi ski, Adam**
  01-931 Warszawa (PL)
- **Radowiecki, Micha**
  62-069 D browa (PL)
- **Nagel, Sebastian**
  62-080 Lusówko (PL)
- **S dek, Sylwia**
  05-408 Lipowo (PL)
- **Skibi ski, Jerzy**
  62-050 Mosina (PL)
- **Frydrych, Anita**
  01-471 Warszawa (PL)

(74) Representative: **Krekora, Magdalena**
ul. Gorna 95
PL-32-091 Michalowice (PL)

(54) DINNER PACKAGING FOR FOOD PRODUCTS, SUITABLE FOR PACKING READY-TO-GO MEALS

(57) A dinner packaging for food products, suitable for packing ready-to-go meals, consists of at least one-compartment main chamber (1) and a lid (2) connected with the main chamber by a thin, flexible strip. All parts of the packaging form a uniform structure. On the edge of the lid (2) and the main chamber (1) there is a system of closures, which includes at least two horizontal protrusions (4) of the lid (2) having embossings (5) and the main chamber (1) has at least two horizontal protrusions (6) of the chamber (1), each of which has a recess (7) with a width smaller than the width of the horizontal protrusions (4) of the lid (2). At the bottom of the recesses (7), on both their sides, there are horizontal slots (8) extending under the unembossed part of the protrusion (6) of the chamber (1), additionally the lid (2) has a vertical, circumferential projection (9) with a flange (10) flanged outward located around its edge and the main chamber (1) has a vertical, circumferential projection (11) with a flange (11a), located around its edge except for the area of the strip (3). Below the vertical projection (11) of the main chamber (1) there is a first horizontal, circumferential offset (12) and below it there is a second horizontal, circumferential offset (13) where the vertical projection (9) of the lid (2) is supported on the second offset (13) of the chamber (1) in the closed position of the packaging and two corners (14) of the main chamber (1) located on the edge with a flexible strip (3) have additional horizontal projections (14a) located above the first horizontal, circumferential offset (12) and the packaging is made of non-oriented, multi-layer expanded polypropylene film.

EP 4 332 015 A1

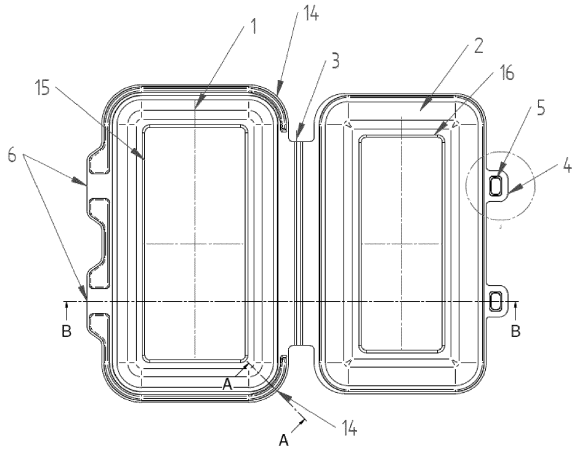


Fig. 2

(52) Cooperative Patent Classification (CPC): (Cont.)
B65D 2543/00694; B65D 2543/00731;
B65D 2543/00805

Description

[0001] The subject of the present invention is a dinner packaging for food products, suitable for packing ready-to-go meals, in particular hot ones.

[0002] There are known methods of forming menuboxes from various materials and many packaging constructions. There are several variants of packaging construction and material versions, one of them is the formation of menubox containers from a strip of expanded EPS polystyrene foil. Packagings are also made in thermoforming technology.

[0003] Packagings suitable for packing ready-to-go dishes are adapted to the type of the dish. For dishes served cold, the packagings do not have to have thermal insulation properties and, on the other hand, it is expected that the packagings will be transparent. Polyethylene terephthalate is most often used for this purpose. These packagings also do not usually contain dishes with a large mass, so their high stiffness is not required.

[0004] On the other hand, specific requirements apply to dishes packaged and transported as hot dishes. The most important feature of such packagings is their high ability to maintain temperature, low absorbency and stiffness. Expanded polystyrene is commonly used for this type of packagings. This material has good thermal insulation properties, however obtaining sufficient stiffness is achieved by increasing the thickness of the packaging walls. Moreover hot dishes often contain various types of liquid products, such as sauces, and thus their very important feature should be their leak-tightness. This feature is not satisfied by packagings known from the prior art.

[0005] Known packagings may be single-chambered and/or divided into several compartments for the components of a complete dish. The packagings have a main chamber and a lid, connected with each other by a thinner, flexible strip forming an arch, and all parts of the packaging form a uniform structure. They are closed with two protrusions in the lid, mounted in two slots of the main chamber. This connection does not provide the leak-tightness of the packaging.

[0006] The aim of the invention is to obtain a leak-tight food packaging intended for the transport of ready-to-go meals, in particular hot ones, prepared in restaurants.

[0007] The packaging consists of at least one-compartment main chamber and a lid. The lid is connected with the main chamber by a thin, flexible strip, and all parts of the packaging form a uniform structure. At the edge of the lid there are at least two horizontal protrusions of the lid having embossings. The main chamber has at least two horizontal protrusions of the chamber, each of which has a recess with a width smaller than the width of the horizontal protrusions of the lid. Moreover, at the bottom of the recesses, on both sides, there are horizontal slots extending under the unembossed part of the protrusion of the chamber. The lid has a vertical, circumferential projection with a flange flanged outward located around its edge. Additionally the main chamber has a vertical, circumferential projection with a flange flanged outward, located around its edge except for the area of the strip. Moreover below the vertical projection of the main chamber there is a first horizontal, circumferential offset and below it there is a second horizontal, circumferential offset. The vertical projection of the lid is supported on the second offset of the chamber in the closed position of the packaging. The terms vertical and horizontal relate to their position in space, when the packaging is closed and stands on a horizontal surface. Two corners of the main chamber located on the edge with the flexible strip have additional horizontal projections located above the first horizontal, circumferential offset. The packaging is made of non-oriented, multi-layer expanded polypropylene film.

[0008] Preferably the main chamber and the lid have two horizontal protrusions. Preferably the main chamber is divided into two and/or three compartments.

[0009] Preferably the thin, flexible strip has three longitudinal and parallel bends, between which it has the shape of arches bent to the outside of the packaging.

[0010] Preferably the bottom of the main chamber and the top of the lid have embossings on their surface.

[0011] The packaging according to the invention, thanks to the shape of the protrusions and projections of the lid and the main chamber, is a click closure, protecting against uncontrolled opening. The horizontal offsets of the main chamber and the vertical protrusions of the lid seal the packaging. Under the additional protrusions in the two corners of the main chamber, goes a flanged part of the lid's flange, creating another click closure protecting against uncontrolled opening of the packaging and its sealing. A flexible strip with three longitudinal and parallel bends, between which it has the shape of arches bent outside the packaging, on one hand, allows for flat unfolding of the packaging, on the other hand, it reduces the packaging's resistance to closing and unsealing. Applied closures and seals provide full tightness of the packaging, prevent uncontrolled opening and increase thermal insulation. The packagings of menubox type made of expanded polypropylene XPP are ideal for packaging meals prepared on an ongoing basis, as these packagings are characterized by excellent thermal insulation, thanks to which one can easily deliver the meal to the customer without great loss of heat. Additionally, the content of the packaging do not spill out. Due to the wide range of operating temperatures from 2°C to 120°C of the material used, these packagings are also suitable for storing meals in the refrigerator and for heating products in packaging using a microwave oven.

[0012] The method of production of the packagings consists in going through all subsequent stages in the thermoforming process. The material in the form of a web of film is unwound from the rolls of the film by means of driven rollers in the unwinding station. The foil then goes to the pre-heating cabinet, where the hot air circulation preheats the foil. The conditions in the cabinet are defined

by the requirements of different thicknesses of XPP material in the range of 80°C to 150°C.

[0013] The pre-heated foil is directed to the forming machine, where the foil is guided by chains responsible for foil movement, in the first part the material is heated to the temperature of 150-250°C. In this process, an important element before the forming station is stretching the film guiding chains so that the film sheet transported to the forming station is taut and wrinkle-free. The next stage is the forming station, where the foil sheet is pre-stretched mechanically using forming punches and the main forming using compressed air and vacuum. The time of 1 molding cycle in a single or multi-cavity mold is from 2-7 s. The material that has spent a certain period of time in the forming cavity reproduces the final shape of the packaging. After the forming cycle, which takes several seconds, the formed foil sheet is released and then the sheet with formed moldings is transported to the cutting station, where the moldings are cut out with the help of guides in the upper cutting plate and dies made of steel tape and adapted to the shape of the packaging. The cutting station operates using toggle levers. The blades are equipped with point transport bridges enabling further transport of packagings to the stacking station. In the stacking station, the packagings are separated from the blanking scrap. With the help of a robot, which is equipped with arms ended with vacuum suction cups, molded parts are collected. At the bottom of the robot, there are baskets used to push packagings out of the foil sheet. The robot moves in three axes in vertical and horizontal guides and performs axial rotation. The robot's operation is set by programming the parameters depending on the multiplicity of the mould, dimensions of the packaging and stacking height. Packagings collected in stacks of a few and/or several pieces are transferred by means of a robot to the conveyor belt to be collected and packed into cardboard boxes. The material remaining after cutting out the packagings in the form of a blanking scrap is wound on a winder and/or is led directly to the mill for reuse in other processes.

[0014] Film for production of packagings is made of non-oriented, multi-layer expanded polypropylene film. It is obtained by an extrusion method using polypropylene in the form of granules. The XPP foil extrusion technology can be divided into the following stages:

- preparation of a mixture of plastics and their dosing,
- plasticizing in extruder B and extruder A,
- gas application to extruder B
- filtration of molten materials enabling separation of raw materials,
- flow of material through the co-extrusion block providing inserts of layers' layout,
- forming to the required dimensions by pouring the molten mass onto the calender roller,
- smoothing and simultaneous cooling of the mass on the rollers
- measuring the thickness of the product obtained and adjusting the thickness to the required parameters,
- cutting the film to the finished size,
- collecting and rolling the film.

[0015] XPP film is characterized by excellent technical parameters, while maintaining very good optics of the material. The raw material from which the menubox packaging film is made is resistant to weak acids, alkaline solutions, oils and fats, therefore the film can be used as a monopackaging, which is a component of trays for packaging food products. The structure of the XPP film by its expanding generates the appropriate surface tension of the film, and therefore it is possible to print the packaging with offset inks, as well as flexographic or screen printing.

[0016] Packagings made of XPP foil are formed in a production line intended for thermoforming packagings from unrolled foil web. The machine is made of the following elements, one after the other:

- loading station of the film being on a spool
- material pre-heating cabinet
- main heating station
- forming station
- cutting station
- packaging collection and stacking station
- conveyor belt for finished products
- winding station of the waste in the form of blanking strip and/or a mill

The subject of the invention was disclosed in the drawing, in which Fig. 1 shows the unfolded packaging in a side view, Fig. 2 shows an open packaging with one compartment of the main chamber in a top view, Fig. 3 shows a flexible strip in a side view when the packaging is open, Fig. 4 shows a recess with slots, Fig. 5 shows a top view of the lid's protrusion with visible embossing, Fig. 6 shows a side view of the lid's protrusion, Fig. 7 shows part of the corner cross-section with an additional horizontal projection, Fig. 8 shows the packaging with the main chamber divided into two compartments and Fig. 9 shows the packaging with the main chamber divided into three compartments.

Example 1.

[0017] The packagings consists of a main chamber 1 divided into two compartments 1a and 1b and a lid 2. The lid 2 is connected with the main chamber 1 by a thin, flexible strip 3, and all parts of the packaging form a uniform structure. On the edge of the lid 2 there are two horizontal protrusions 4 of the lid 2 having embossings 5. The main chamber 1 has at two horizontal protrusions 6 of the chamber 1, each of which has a recess 7 with a width smaller than the width of the horizontal protrusions 4 of the lid 2. Moreover at the bottom of the recesses 7, on both their sides, there are horizontal slots 8 extending under the unembossed part of the protrusion 6 of the

chamber 1. The lid 2 has a vertical, circumferential projection 9 with a flange 10 flanged outward located around its edge. The main chamber 1 has a circumferential, vertical projection 11 with a flange 11 a flanged outward located around its edge except for the area of the strip 3. Additionally below the vertical projection 11 of the chamber 1, inside, there is a first horizontal, circumferential offset 12 and below it there is a second horizontal, circumferential offset 13. The vertical projection 9 of the lid 2 is supported on the second offset 13 of the chamber 1 in the closed position of the packaging. The terms vertical and horizontal relate to their position in space, when the packaging is closed and stands on a horizontal surface. Two corners 14 of the main chamber 1 located on the edge with a flexible strip 3 have additional horizontal protrusions 14a located above the first horizontal, circumferential offset 12. The thin, flexible strip 3 has three longitudinal and parallel bends 3a, between which it has the shape of arches bent to the outside of the packaging. The packaging is made of non-oriented, multi-layer expanded polypropylene film.

[0018] Innovative methods of the packaging closure were used in the construction of the packaging. The packaging was made of 1.4 mm thick XPP foil. Additionally the packaging is characterized by excellent thermal resistance, what was confirmed by tests. This resistance is possible due to the use of a tight structure and use of expanded polypropylene film, which increases thermal insulation due to the content of air bubbles. A test consisting in measuring the temperature of liquid heated to 100°C after 10 minutes showed higher temperature by more than 10°C for the said containers in comparison to the currently used packagings made from EPS.

Example 2.

[0019] A packaging was made as in the example 1, where the chamber 1 was divided into three compartments 1a, 1b and 1c.

Example 3.

[0020] A packaging was made as in the example 1, where the chamber had one compartment. In order to reduce the weight and thickness of the packaging and to reduce the share of plastics, the packaging was made of a thinner foil with a thickness of 1.05 mm. In order for the packaging to have sufficient stiffness, embossings 15 and 16 were made in the bottom of the main chamber 1 and in the lid 2. By applying construction changes, it was possible to reduce the weight of the packaging by 20% without losing the thermal resistance described in example 1.

Claims

1. A dinner packaging for food products, suitable for packing ready-to-go meals, consisting of at least one-compartment main chamber and a lid connected with the main chamber by a thin, flexible strip, and all parts of the packaging form a uniform structure, and of the closure system being on the edge of the lid and the main chamber, the packaging being made of expanded plastic, **characterized in that** the closure system includes at least two horizontal protrusions (4) of the lid (2) having embossings (5) and the main chamber (1) has at least two horizontal protrusions (6) of the chamber (1), each of which has a recess (7) with a width smaller than the width of the horizontal protrusions (4) of the lid (2) and, moreover, at the bottom of the recesses (7), on their both sides, there are horizontal slots (8) extending under the unembossed part of the protrusion (6) of the chamber (1), additionally the lid (2) has a vertical, circumferential projection (9) with a flange (10) flanged outward located around its edge and the main chamber (1) has a vertical, circumferential projection (11) with a flange (11a), located around its edge except for the area of the strip (3), and below the vertical projection (11) of the main chamber (1) there is a first horizontal, circumferential offset (12) and below it there is a second horizontal, circumferential offset (13) where the vertical projection (9) of the lid (2) is supported on the second offset (13) of the chamber (1) in the closed position of the packaging and two corners (14) of the main chamber (1) located on the edge with a flexible strip (3) have additional horizontal projections (14a) located above the first horizontal, circumferential offset (12) and the packaging is made of non-oriented, multi-layer expanded polypropylene film.

2. The packaging according to claim 1, **characterized in that**, the main chamber (1) and the lid (2) have two horizontal protrusions (6) and (4) accordingly.

3. The packaging according to claim 1 or 2, **characterized in that**, the main chamber (1) is divided into two and/or three compartments.

4. The packaging according to claim 1 or 2 or 3, **characterized in that**, the thin, flexible strip (3) has three longitudinal and parallel bends (3a), between which it has the shape of arches bent to the outside of the packaging.

5. The packaging according to any of the preceding claims, **characterized in that**, the bottom of the main chamber (1) and the top of the lid (2) have on their surface embossings (15) and (16) accordingly.

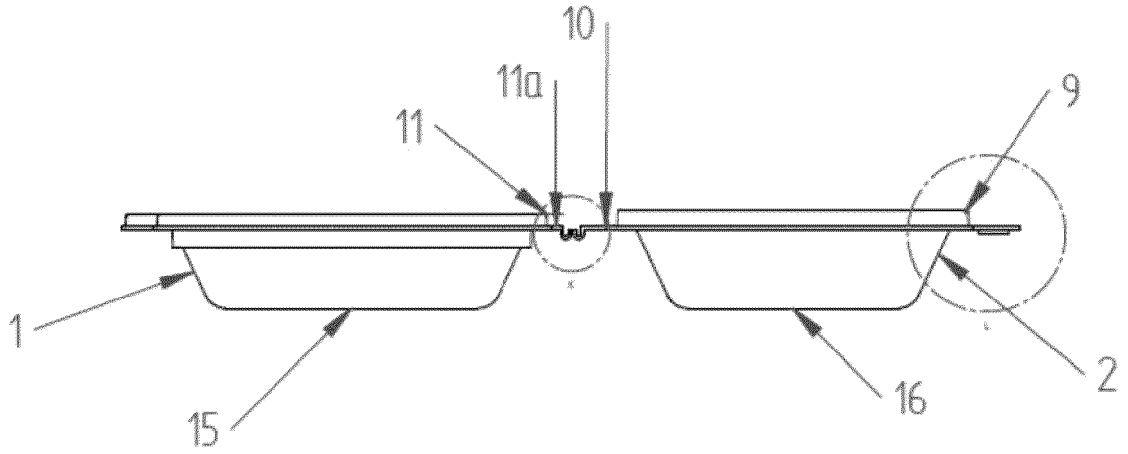


Fig. 1

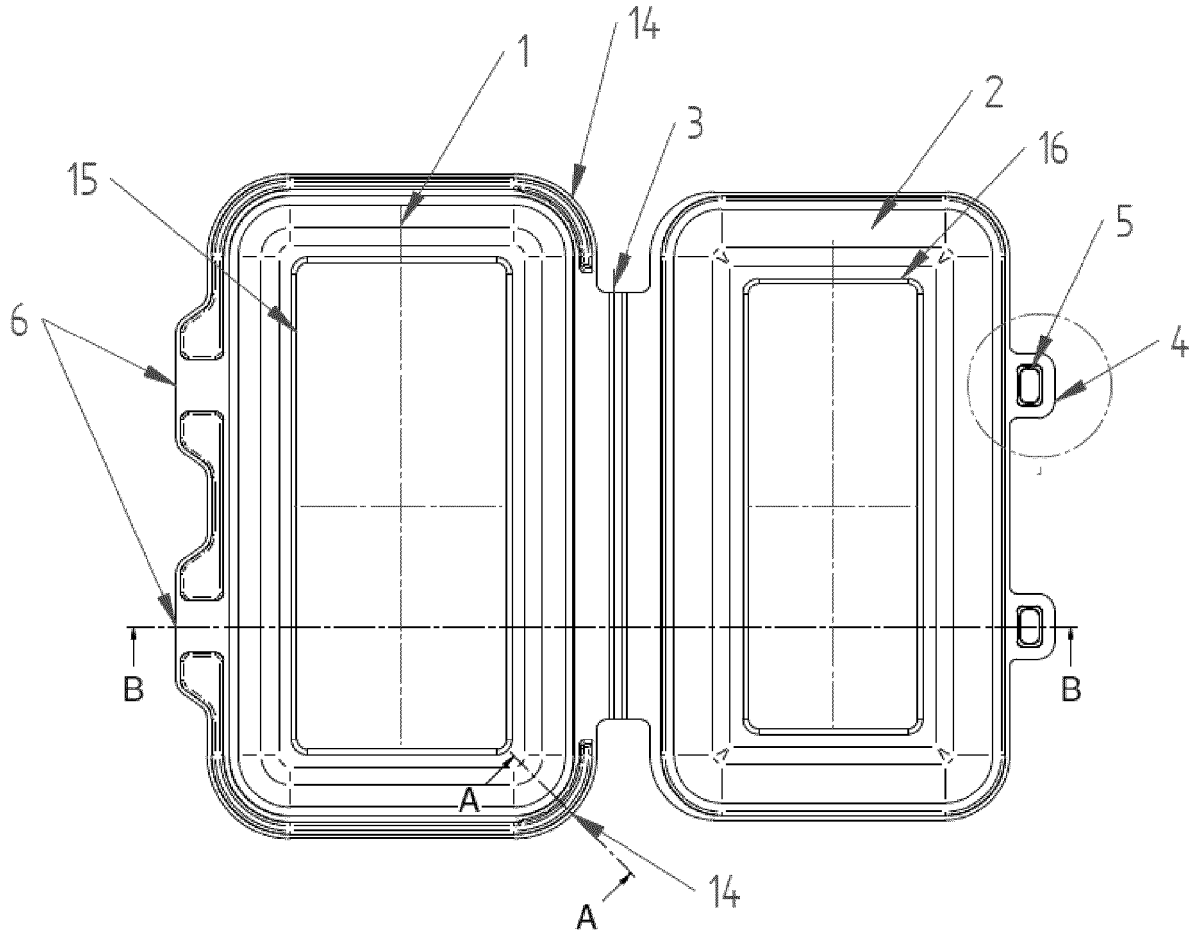
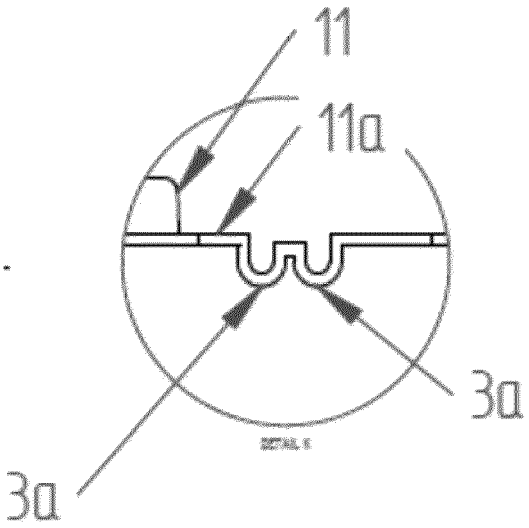


Fig. 2



Fig, 3

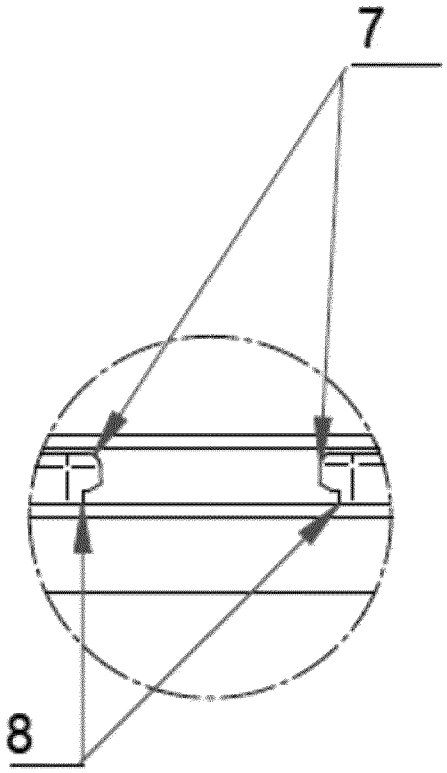


Fig. 4

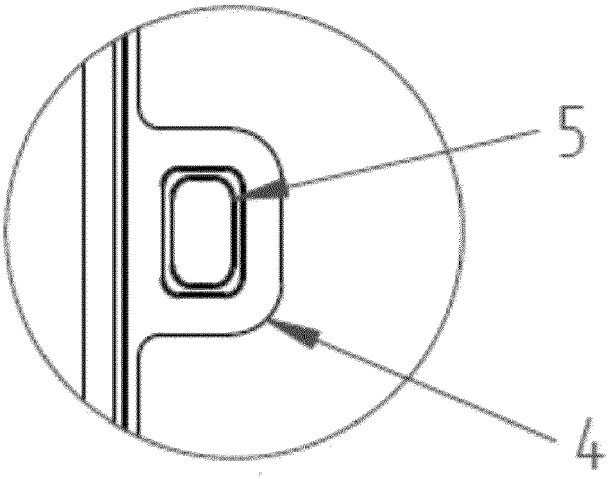


Fig. 5

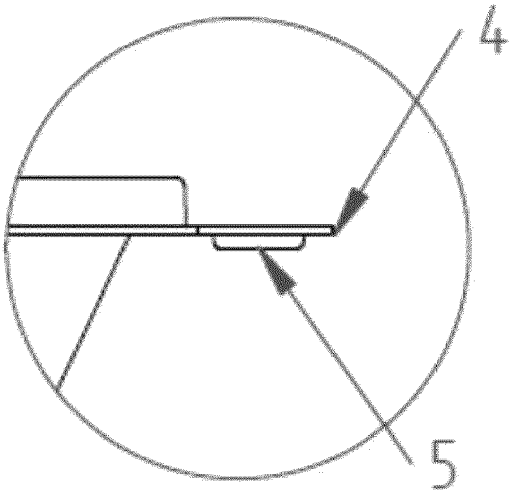


Fig. 6

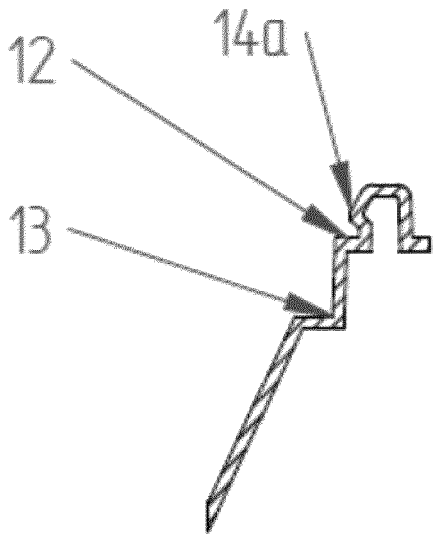


Fig. 7

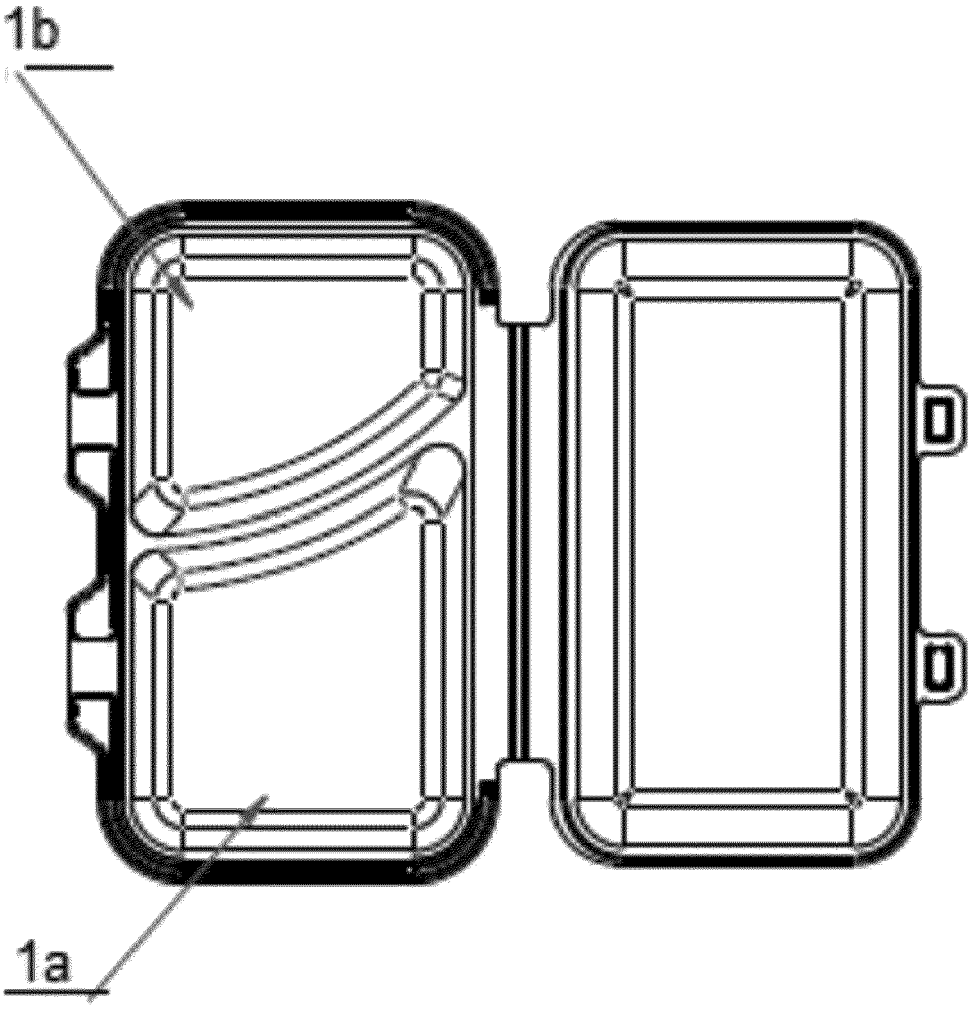


Fig. 8

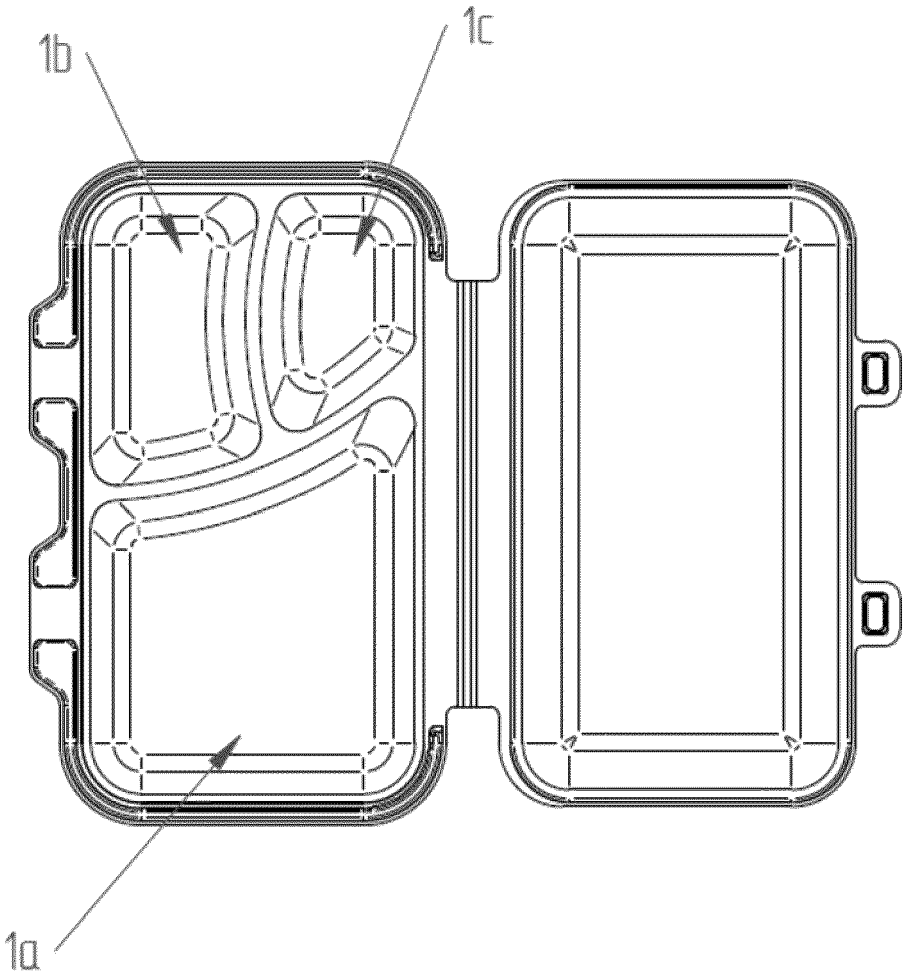


Fig. 9

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 21 6604

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US D 907 482 S1 (NG TSING KOU [US]) 12 January 2021 (2021-01-12) * figures 1-8 *	1-5	INV. B65D43/16 B65D1/24
A	US 2017/001767 A1 (CIMMERER TIM [US] ET AL) 5 January 2017 (2017-01-05) * figures 1-6 *	1-5	
A	FR 2 888 568 A1 (GROUPE GUILLIN SA [FR]) 19 January 2007 (2007-01-19) * figures 1-4 *	1,4	
A	US 2021/229880 A1 (GUIRGUIS SAMEH [US]) 29 July 2021 (2021-07-29) * figures 4B, 4D *	1-5	
A	US 9 187 209 B1 (HANNA ROGER [US] ET AL) 17 November 2015 (2015-11-17) * figure 7 *	1-5	
A	KR 2014 0003532 U (SANGJI INT) 12 June 2014 (2014-06-12) * figures 2-4 *	1-5	TECHNICAL FIELDS SEARCHED (IPC) B65D
Y	US 2021/331838 A1 (MARCOUX PHILIPPE [CA]) 28 October 2021 (2021-10-28) * figures 5,6 *	1-5	
A	US 2021/139206 A1 (WANG TONG-CHANG [TW]) 13 May 2021 (2021-05-13) * figure 2 *	1-5	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	31 August 2023	Tzianetopoulou, T

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 21 6604

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

31-08-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US D907482 S1	12-01-2021	NONE	
US 2017001767 A1	05-01-2017	NONE	
FR 2888568 A1	19-01-2007	NONE	
US 2021229880 A1	29-07-2021	CA 3165574 A1	29-07-2021
		US 2021229880 A1	29-07-2021
		WO 2021151049 A1	29-07-2021
US 9187209 B1	17-11-2015	NONE	
KR 20140003532 U	12-06-2014	NONE	
US 2021331838 A1	28-10-2021	CA 3115618 A1	24-10-2021
		US 2021331838 A1	28-10-2021
US 2021139206 A1	13-05-2021	AU 2020250229 A1	27-05-2021
		AU 2020257030 A1	27-05-2021
		CN 112777076 A	11-05-2021
		EP 3819230 A1	12-05-2021
		EP 3819232 A1	12-05-2021
		ES 2944867 T3	26-06-2023
		JP 6990868 B2	12-01-2022
		JP 7064669 B2	11-05-2022
		JP 2021075337 A	20-05-2021
		JP 2021075339 A	20-05-2021
		KR 20210056896 A	20-05-2021
		KR 20210056900 A	20-05-2021
		NZ 768793 A	25-11-2022
		NZ 769192 A	29-04-2022
		TW 202118703 A	16-05-2021
		US 2021139206 A1	13-05-2021
		US 2022194669 A1	23-06-2022

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82