



(51) International Patent Classification:

B65D 5/66 (2006.01) *B31B 50/59* (2017.01)
B65D 5/00 (2006.01)

(21) International Application Number:

PCT/EP2019/059297

(22) International Filing Date:

11 April 2019 (11.04.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

18167996.0 18 April 2018 (18.04.2018) EP

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(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,

CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: CLAMSHELL PACKAGING FOR AIRTIGHT PACKAGING OF FOODSTUFF

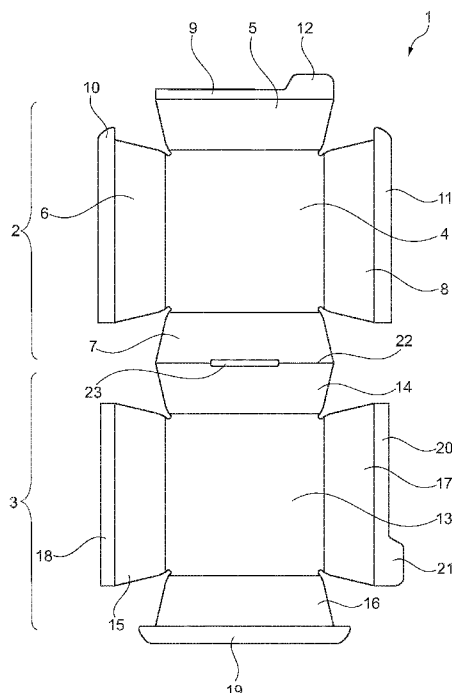


Fig. 1

(57) Abstract: The invention relates to a clamshell packaging for airtight packaging of foodstuff, which packaging comprises: - a tray folded out of a single sheet of material, preferably cardboard, which tray has at least two adjacent pool parts, each pool part having a bottom wall and upstanding walls arranged around the circumferential edge of the bottom wall, wherein the at least two adjacent pool parts are hingedly connected to each other along an upper edge of a respective upstanding wall, such that the at least two adjacent pool parts can be hinged on top of each other to form a closed box, - a circumferential, horizontal flange arranged to the tray to at least some of the upper edges of the upstanding walls, and - a plastic barrier foil arranged in the pool parts and extending onto and substantially covering the circumferential, horizontal flange wherein the circumferential, horizontal flange comprises a seal zone extending along the full length of the flange, wherein the seal zone is line symmetrical along the hinge line at the upper edge of the connected walls.

Clamshell packaging for airtight packaging of
foodstuff

The invention relates to a clamshell packaging for
5 airtight packaging of foodstuff, which packaging comprises:

- a tray folded out of a single sheet of material,
preferably cardboard, which tray has at least two adjacent
pool parts, each pool part having a bottom wall and upstanding
walls arranged around the circumferential edge of the bottom
10 wall,

wherein the at least two adjacent pool parts are
hingedly connected to each other along an upper edge of a
respective upstanding wall, such that the at least two
adjacent pool parts can be hinged on top of each other to form
15 a closed box,

- a circumferential, horizontal flange arranged to
the tray to at least some of the upper edges of the upstanding
walls, and

- a plastic barrier foil arranged in the pool parts
20 and extending onto and substantially covering the
circumferential, horizontal flange.

Such a clamshell packaging is known from US 5356070.

US 5356070 discloses a tray with two or more pool
parts, which tray is provided with a plastic layer by blow
25 moulding. The plastic layer is foremost used to keep the
cardboard wall parts together, such that the tray maintains
its folded erected state. According to the publication, a top
seal foil can be arranged on the flange of the tray to
airtight seal the tray.

30 US 5356070 furthermore suggests that if the pool
parts are made identical, a clamshell packaging is provided.
However, the publication does not disclose how to close such a
clamshell packaging such that an airtight packaging for

foodstuff is provided. It therefore appears that the publication suggests an alternative for the typical hamburger packaging, which is solely made out of cardboard. Such a hamburger packaging is a folded sheet of cardboard providing a clamshell packaging, which is only intended for keeping the hamburger warm for a small amount of time. Such a cardboard packaging is not air tight and not suitable to keep the hamburger fresh for a number of days.

It is an object of the invention to provide a clamshell packaging, which is suitable for airtight packaging of foodstuff.

This object is achieved with a clamshell packaging according to the preamble, which is characterized in that the circumferential, horizontal flange comprises a seal zone extending along the full length of the flange, wherein the seal zone is line symmetrical along the hinge line at the upper edge of the connected walls.

By providing a line symmetrical seal zone, the clamshell packaging can be sealed closed after the at least two adjacent pool parts are hinged on top of each other to form a closed box. The seal zones on both sides of the hinge line will overlap with each other, such that the seal zone is in direct contact with itself, allowing for an air tight seal along the circumferential, horizontal flange. As the plastic barrier foil is arranged in the pool parts and extends onto and substantially covering the circumferential, horizontal flange, the sealing of the seal zone provides an air tight space enclosed by the plastic barrier foil and the tray folded to a closed box.

By sealing the seal zones on both sides of the hinge line together a strong box is provided, which allows for the sheet material thickness to be reduced, reducing the costs of the clamshell packaging.

In a preferred embodiment of the clamshell packaging according to the invention, the circumferential, horizontal flange is composed out of a number of abutting flange parts, each flange part being arranged to a respective upper edge of an upstanding wall, and wherein each of the transitions of two abutting edges of the flange parts are positioned line asymmetrically along the hinge line, such that none of the transitions overlap with each other when the at least two adjacent pool parts are hinged on top of each other.

Abutting in the context of this inventions means without overlapping parts. So when two flange parts abut, the flange parts are only in contact with each other along respective edges and not by an edge of one flange part in contact with a surface of another flange part.

By composing the circumferential flange out of a number of abutting flange parts, the tray can easily be folded out of an unfolded sheet of cardboard. Having the transitions of two abutting edges of the flange parts positioned asymmetrically, it is ensured that when folding the pool parts on top of each other none of the transitions overlap. So each transition will abut against a flange part and when sealing the sealing zones together, the sealing at the transition will be substantially more reliable, then when two transitions overlap. In this latter case, when sealing two overlapping transitions, the chance is considerable that a channel will remain present along the transitions, such that the packaging is not air tight sealed.

In a further embodiment of the clamshell packaging according to the invention the circumferential, horizontal flange is provided with two tabs, each arranged on opposite sides of the hinge line and line asymmetrically along the hinge line, and preferably on the same side of the tray.

The two tabs provide a grip for a user to tear two

sealed pool parts from each other to open an air tight sealed packaging.

Preferably, the difference in distance to the hinge line of the two tabs is at least equal to half of the combined
5 length of the two tabs. This ensures that the tabs do not overlap when the at least two adjacent pool parts can be hinged on top of each other to form a closed box and provides maximum gripping space for the user.

In a further preferred embodiment of the clamshell
10 packaging according to the invention, the plastic barrier foil is a laminate of at least a skin foil layer and a release medium layer, wherein the skin foil layer is in direct contact with tray.

This laminate allows for a good adherence to the
15 walls of the tray, while the release medium layer allows for good sealing properties when brought into contact with itself at the seal zone and for easy opening of the packaging, which is called in the field "easy peel".

In prior art, such as known from EP 2441697, the
20 release medium layer will be arranged on the top seal foil and not to the skin foil, which is laminated into the tray. Also with the prior art US 5356070, a release medium layer would not be possible to be arranged due to the blow moulding technique.

25 The materials used for the skin foil layer and the release medium layer are common general knowledge for a person skilled in the art.

In yet another embodiment of the clamshell packaging according to the invention, the tray is provided with a slot
30 arranged in the connected upstanding walls along the hinge line. When the foil is arranged over the connected upstanding walls and the two adjacent pool parts are hinged on top of each other to form a closed box, the foil is pressed together

at the hinge and could force the connected upstanding walls inwardly. By arranging the slot along the hinge line, additional space is provided for the foil such that the foil is less compressed at the hinge and the connected upstanding
5 walls are not urged inwardly.

In still a further preferred embodiment of the clamshell packaging according to the invention the circumferential, horizontal flange is wider adjacent to a first pool part than adjacent to a second pool part.

10 When the two pool parts are hinged on top of each other the wider portion of the horizontal flange will cover the smaller portion of the horizontal flange, such that any small misalignment is not directly visible for a consumer.

It is furthermore preferred if the folding line
15 between the horizontal flange and the adjacent upright walls is provided such, that the horizontal flange folds back up a bit, such that the pool parts, when hinged on top of each other, are slightly spaced apart. This allows for gassing the packaging just before sealing the packaging closed.
20 Furthermore, the horizontal flange will be in good contact with itself upon sealing, because the folding line is arranged such, that the flange folds back up a bit.

To achieve the effect of the flange folding back up a bit, a suitable perforation or scoreline can be provided at
25 the folding line.

The invention also relates to a device for sealing a clamshell packaging according to the invention, wherein two adjacent pool parts are hinged on top of each other to form a closed box, which device comprises:

- 30 - a mould for accommodating a first pool part of the tray with the horizontal circumferential flange on the upper surface of the mould;
- a heated frame movable on top of the upper

surface, wherein inner dimensions of the frame correspond to the inner dimensions of the horizontal, circumferential flange, such that a second pool part can extend through the frame, while the horizontal, circumferential flange is clamped
5 between the mould and the frame to seal the seal zone together.

As a sealed clamshell packaging is already strong by itself, the sheet material thickness can be reduced, such that sealing of the seal zone together by feeding heat through the
10 sheet material of the flange into the seal zone of the foil in order to seal the seal zone together is quicker.

The invention furthermore relates to a method for providing a clamshell packaging according to the invention, which method comprises the steps of:

- 15 - providing an unfolded sheet for folding a tray;
- providing a mould having at least two recesses;
- folding the unfolded sheet to a tray by pressing the unfolded sheet into the mould, wherein the tray has at least two pool parts, each pool part having a bottom wall and
20 upstanding walls arranged around the circumferential edge of the bottom wall, which pool parts are each accommodated in a recess of the mould, and a horizontal, circumferential flange composed out of a number of flange parts, each flange part being arranged to a respective upper edge of an upstanding
25 wall of the pool parts, which flange parts compose an endless circumferential flange and wherein adjacent wall parts and adjacent flange parts of the pool parts abut;
- providing a plastic barrier foil;
- heating the plastic barrier foil;
- 30 - pressing the heated plastic barrier foil against the inner wall of the two pool parts and covering the circumferential flange, such that the plastic barrier foil is laminated to the tray.

A similar method is known from EP 2441697 of the same applicant. This known method does not disclose the provision of a mould having two recesses and the folding of an unfolded sheet into a tray according to the invention.

5 Preferably, the bottom walls of the pool parts are pushed towards each other, while pressing the unfolded sheet into the mould. By pushing the bottom walls of the pool parts together, the connected walls of the two pool parts are folded towards the desired position.

10 An embodiment of the method according to the invention further provides two shape blocks each to act at least on a bottom wall of a respective pool part to shape the unfolded sheet while pressing the unfolded sheet into the mould.

15 In a preferred embodiment of the method according to the invention the two shape blocks are each guided along a guide arranged under an angle with the top surface of the mould, such that the two shape blocks move towards each other, while being moved into the mould to fold the unfolded sheet.

20 In another preferred embodiment of the method according to the invention the two shape blocks are guided along a first guide parallel to the top surface of the mould and are guided along a second guide perpendicular to the top surface of the mould, wherein the shape blocks first move
25 along the first guide to fold the connected wall parts of both pool parts and then the shape blocks move along the second guide to fold the sheet into the mould.

These and other features of the invention will be elucidated in conjunction with the accompanying drawings.

30 Figure 1 shows a top view of an unfolded sheet for a clamshell packaging according to the invention.

Figure 2 shows the unfolded sheet of figure 1 folded to a clamshell packaging.

Figure 3 shows the packaging according to figure 2 folded closed.

Figure 4 shows schematically a cross sectional view of a device for sealing a clamshell packaging according to figure 3.

Figure 5A and 5B show schematic steps of a first embodiment of a method according to the invention.

Figures 6A - 6C shows schematic steps of a second embodiment of a method according to the invention.

Figure 7 shows a top view of an unfolded sheet for a second embodiment of a clamshell packaging according to the invention.

Figure 8 shows a cross-sectional view along the flanges of the embodiments shown in the figures 1 - 3 and 7.

Figure 1 shows a top view of an unfolded sheet 1 for a clamshell packaging according to the invention. The unfolded sheet 1 has a first pool part 2 and a second pool part 3. The first pool part 2 has a bottom wall 4 and upstanding walls 5, 6, 7, 8 arranged around the circumferential edge of the bottom wall 4. The upstanding walls 5, 6, 8 have at its respective upper edge a flange part 9, 10, 11. The flange part 11 is furthermore provided with a tab 12.

The second pool part 3 has a bottom wall 13 with upstanding walls 14, 15, 16, 17 around the circumferential edge. The upstanding walls 15, 16, 17 are provided with flange parts 18, 19, 20, where flange part 20 is provided with a tab 21.

The wall parts 7 and 14 are connected to each other along the upper edge 22, which is provided with a slot 23.

Figure 2 shows the unfolded sheet 1 of figure 1 folded to a clamshell packaging.

The walls 5, 6, 7, 8 of the first pool part 2 and the walls 14, 15, 16, 17 of the second pool part 3 are folded

up, such that the edges of adjacent walls abut, i.e. that the edges touch each other. The respective flange parts 9, 10, 11, 18, 19, 20 are also folded such that adjacent flange parts 9, 10, 11, 18, 19, 20 abut and form a circumferential, horizontal flange along the tray formed by the two pool parts 2, 3.

The folded sheet 1 is kept in folded position by laminating a plastic foil to the inside of the pool parts 2, 3 and covering the circumferential, horizontal flange. The lamination can be done in a similar way as described in the European patent no. 2441697 of the applicant. To this end, suction holes 24 are provided, although not essential, which improve the pressing of the foil into the folded sheet by creating an underpressure between the foil and the folded sheet.

The upstanding walls 7, 14, which are connected to each other at the upper edge 22 provide a hinge line 25 around which the second pool part 3 can be hinged on top of the second pool part, as shown in figure 3.

The hinge line 25 also provide a line of symmetry for the flange parts 9, 10, 11, 18, 19, 20 which form the seal zone. The seal zone does not include the tabs 12, 21 as they are not symmetrically arranged relative to the hinge line 25.

The abutting edges of the flange parts 9, 10, 11, 18, 19, 20 provide transitions 26, 27, 28, 29, where the foil bridges from one flange part to the other, adjacent flange part.

The transitions 26, 27 are arranged perpendicular to the hinge line 25, whereas the transitions 28, 29 are arranged parallel to the hinge line 25, such that the transitions 26, 27, 28, 29 are arranged asymmetrically along the hinge line 25 and will not overlap when the second pool part 3 is hinged on top of the second pool part, as shown in figure 3.

Figure 4 shows schematically a cross sectional view

of a device for sealing a clamshell packaging 30 according to figure 3. The device has a mould 31 with a recess in which the first pool part 2 is accommodated. A heated frame 32 is arranged above the mould 31 and can be pressed on top of the mould 31 to clamp the flange 9, 19 and seal the foil of the seal zone together to close the packaging 30.

The frame 32 has an opening 33, which corresponds with the second pool part 3, such that it can extend through the frame 32.

Figure 5A and 5B show schematic steps of a first embodiment of a method according to the invention. As shown in figure 5A, an unfolded sheet 40 is provided, similar to the sheet of figure 1. A removable pin 43 is provided between the shape blocks 41, 42. The shape blocks 41, 42 are guided along guides 44, 45, such that when the shape blocks 41, 42 are pushed towards the mould 46, the sheet 40 is brought into contact with the removable pin 43, such that the hinge line 47 is folded into the sheet 40, while the shape blocks 41, 42 move towards each other.

The removable pin 43 is then removed, such that the prefolded sheet 40 can be pushed further into the mould 46 to fully fold the sheet 40 into a tray as shown in figure 2. (See figure 5B)

Figures 6A shows schematic steps of a second embodiment of a method according to the invention. A storage 50 with a number of stacked, unfolded sheets 51 is provided.

Two shape blocks 52, 53 grab the bottom sheet 51 and then move towards each other to pre-fold the sheet 52. As shown in figure 6B, the pre-folded sheet 51 has a hinge line 54 when the two shape blocks 52, 53 are in contact with each other.

Then the shape blocks 52, 53 are rotated such that the pre-folded sheet 51 can be pressed further into a mould 55

to fully fold the sheet 52 into a tray as shown in figure 2.

Figure 7 shows a top view of an unfolded sheet 60 for a second embodiment of a clamshell packaging according to the invention. The unfolded sheet 60 is similar to the
5 unfolded sheet 1 of figure 1 and similar parts are identified with the same reference number.

The first pool part 2 has a bottom wall 4 with upstanding walls 5, 6, 7, 8 to which flange parts 61, 62, 63 are arranged. The second pool part 3 has a bottom wall 13 with
10 upstanding walls 14, 15, 16, 17 to which flange parts 64, 65, 66 are arranged.

The flange parts 61, 62, 63 of the first pool part 2 have a width w_1 , while the flange parts 64, 65, 66 of the second pool part 3 have a width w_2 . Because the width w_2 is
15 larger than the width w_1 , the flanges 64, 65, 66 will cover the flanges 61, 62, 63, when the two pool parts 2, 3 are folded on top of each other.

The feature of the differing width of the flange parts can also be used on other embodiments of the invention
20 including the embodiment 1 shown in the figures 1 - 3.

Figure 8 shows a cross-sectional view along the flanges 19, 61 and 9, 65 of either embodiment 1 or 60 of the packaging according to the invention.

A plastic barrier foil 70 is arranged on the flanges
25 9, 19, 61, 65, which has a skin foil 71 in direct contact with the flanges 9, 19, 61, 65 and a release medium layer 72. When the two pool parts 2, 3 are folded on top of each other, the release medium layer 72 will be folded on top of it self and can be laminated. The release medium layer 72 ensures that
30 after sealing the packaging closed, it can still easily be opened.

Claims

1. Clamshell packaging for airtight packaging of foodstuff, which packaging comprises:

5 - a tray folded out of a single sheet of material, preferably cardboard, which tray has at least two adjacent pool parts, each pool part having a bottom wall and upstanding walls arranged around the circumferential edge of the bottom wall,

10 wherein the at least two adjacent pool parts are hingedly connected to each other along an upper edge of a respective upstanding wall, such that the at least two adjacent pool parts can be hinged on top of each other to form a closed box,

15 - a circumferential, horizontal flange arranged to the tray to at least some of the upper edges of the upstanding walls, and

 - a plastic barrier foil arranged in the pool parts and extending onto and substantially covering the

20 circumferential, horizontal flange

characterized in that

 the circumferential, horizontal flange comprises a seal zone extending along the full length of the flange, wherein the seal zone is line symmetrical along the hinge line
25 at the upper edge of the connected walls.

2. Clamshell packaging according to claim 1, wherein the circumferential, horizontal flange is composed out of a number of abutting flange parts, each flange part being arranged to a respective upper edge of an upstanding wall, and
30 wherein each of the transitions of two abutting edges of the flange parts are positioned line asymmetrically along the hinge line, such that none of the transitions overlap with each other when the at least two adjacent pool parts are

hinged on top of each other.

3. Clamshell packaging according to claim 1 or 2, wherein the circumferential, horizontal flange is provided with two tabs, each arranged on opposite sides of the hinge
5 line and line asymmetrically along the hinge line and preferably on the same side of the tray.

4. Clamshell packaging according to claim 3, wherein the difference in distance to the hinge line of the two tabs is at least equal to half of the combined length of the two
10 tabs.

5. Clamshell packaging according to any of the preceding claims, wherein the plastic barrier foil is a laminate of at least a skin foil layer and a release medium layer, wherein the skin foil layer is in direct contact with
15 tray.

6. Clamshell packaging according to any of the preceding claims, wherein the tray is provided with a slot arranged in the connected upstanding walls along the hinge line.

20 7. Clamshell packaging according to any of the preceding claims, wherein the circumferential, horizontal flange is wider adjacent to a first pool part than adjacent to a second pool part.

8. Device for sealing a clamshell packaging
25 according to any of the preceding claims, wherein two adjacent pool parts are hinged on top of each other to form a closed box, which device comprises:

- a mould for accommodating a first pool part of the tray with the horizontal circumferential flange on the upper
30 surface of the mould;

- a heated frame movable on top of the upper surface, wherein inner dimensions of the frame correspond to the inner dimensions of the horizontal, circumferential

flange, such that a second pool part can extend through the frame, while the horizontal, circumferential flange is clamped between the mould and the frame to seal the seal zone together.

5 9. Method for providing a clamshell packaging according to any of the claims 2 - 7, which method comprises the steps of:

- providing an unfolded sheet for folding a tray;
- providing a mould having at least two recesses;
- 10 - folding the unfolded sheet to a tray by pressing the unfolded sheet into the mould, wherein the tray has at least two pool parts, each pool part having a bottom wall and upstanding walls arranged around the circumferential edge of the bottom wall, which pool parts are each accommodated in a
- 15 recess of the mould, and a horizontal, circumferential flange composed out of a number of flange parts, each flange part being arranged to a respective upper edge of an upstanding wall of the pool parts, which flange parts compose an endless circumferential flange and wherein adjacent wall parts and
- 20 adjacent flange parts of the pool parts abut;
- providing a plastic barrier foil;
- heating the plastic barrier foil;
- pressing the heated plastic barrier foil against the inner wall of the two pool parts and covering the
- 25 circumferential flange, such that the plastic barrier foil is laminated to the tray.

10. Method according to claim 9, wherein the bottom walls of the pool parts are pushed towards each other, while pressing the unfolded sheet into the mould.

30 11. Method according to claim 10, further providing two shape blocks each to act at least on a bottom wall of a respective pool part to shape the unfolded sheet while pressing the unfolded sheet into the mould.

12. Method according to claim 11, wherein the two shape blocks are each guided along a guide arranged under an angle with the top surface of the mould, such that the two shape blocks move towards each other, while being moved into
5 the mould to fold the unfolded sheet.

13. Method according to claim 11, wherein the two shape blocks are guided along a first guide parallel to the top surface of the mould and are guided along a second guide perpendicular to the top surface of the mould, wherein the
10 shape blocks first move along the first guide to fold the connected wall parts of both pool parts and then the shape blocks move along the second guide to fold the sheet into the mould.

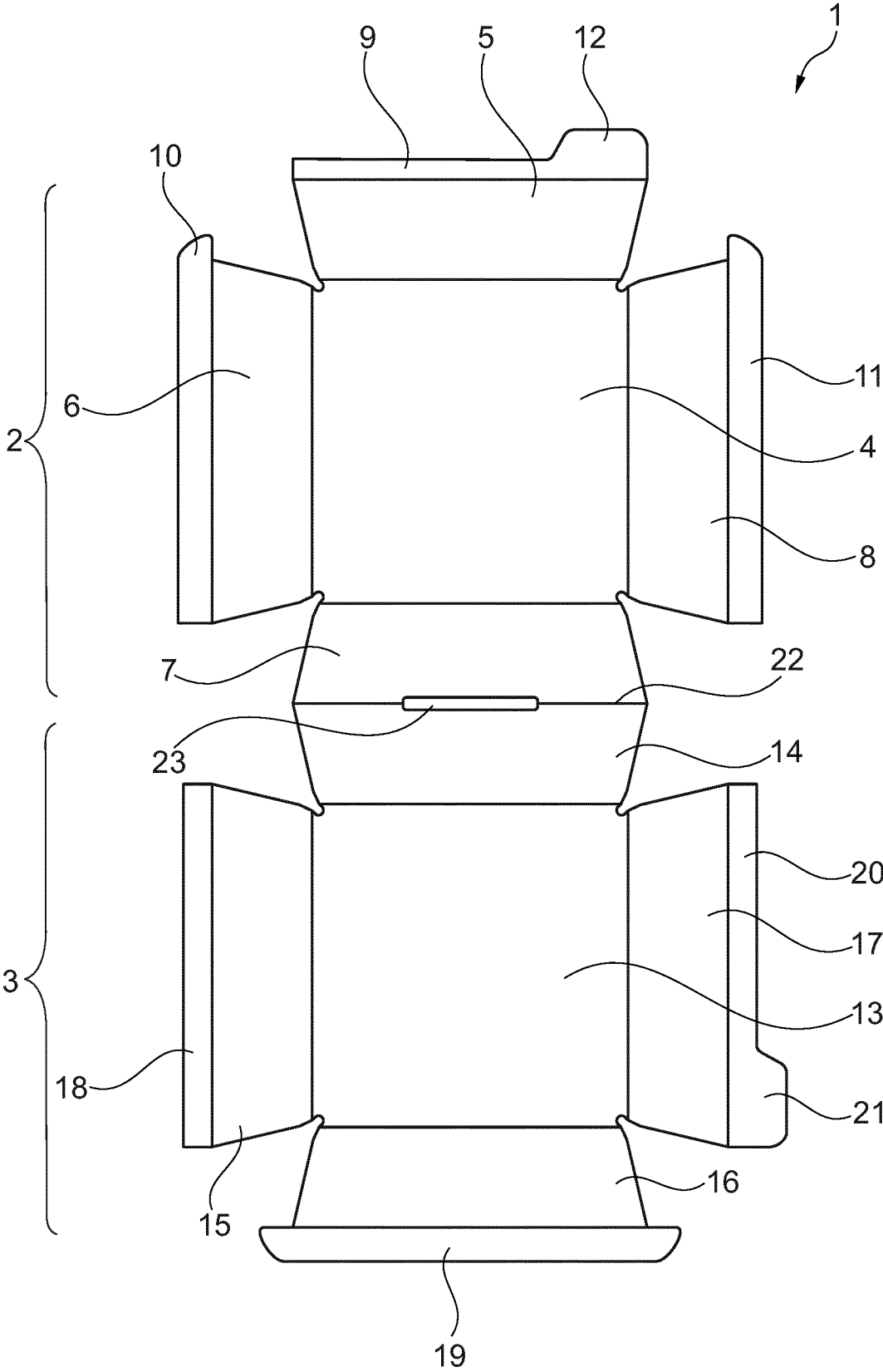


Fig. 1

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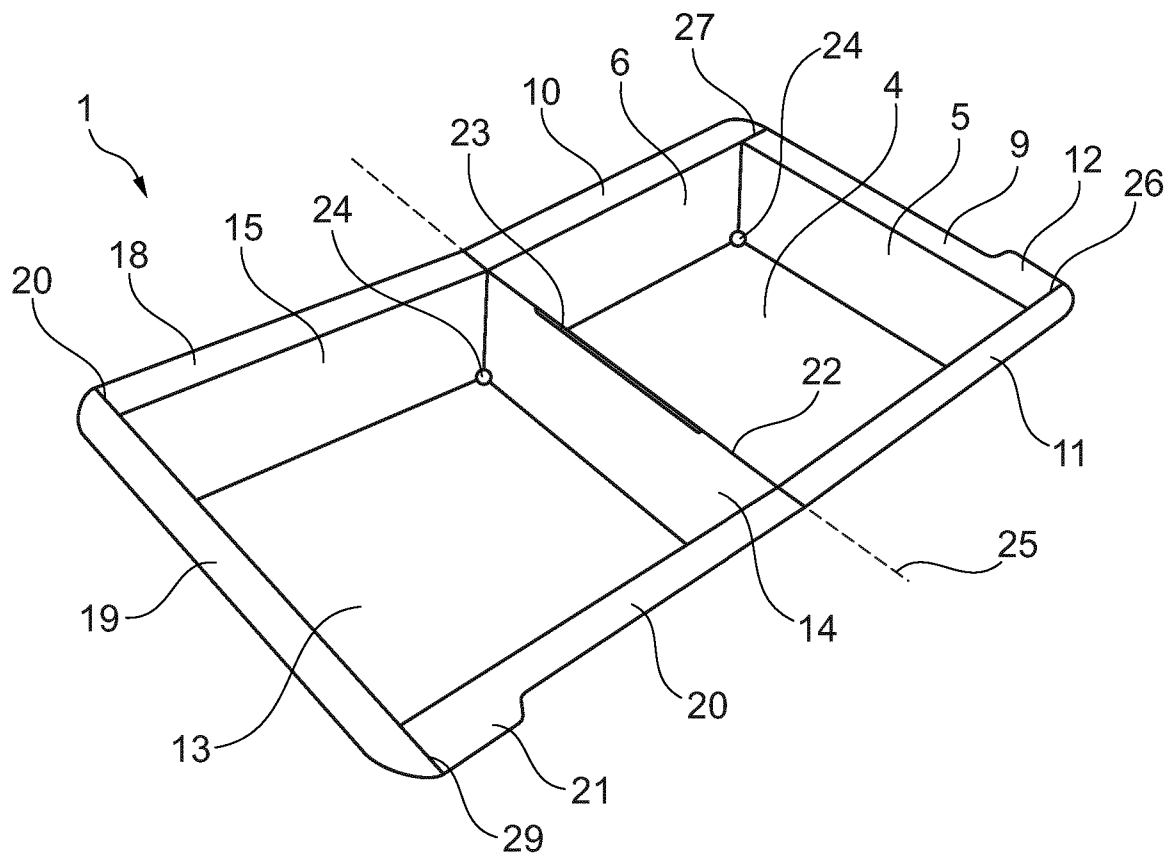


Fig. 2

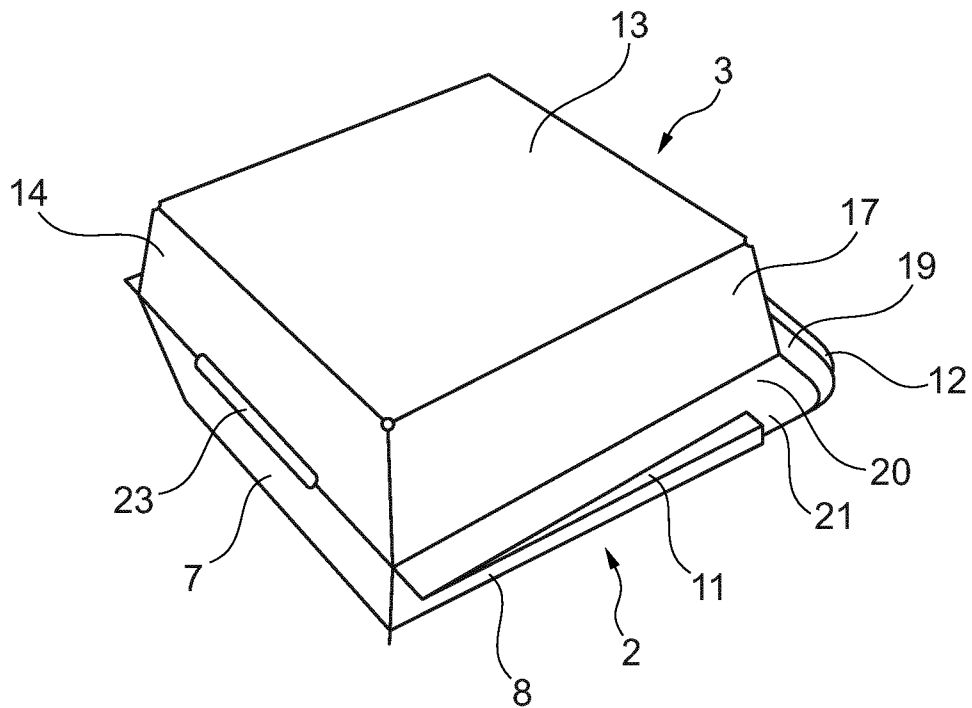


Fig. 3

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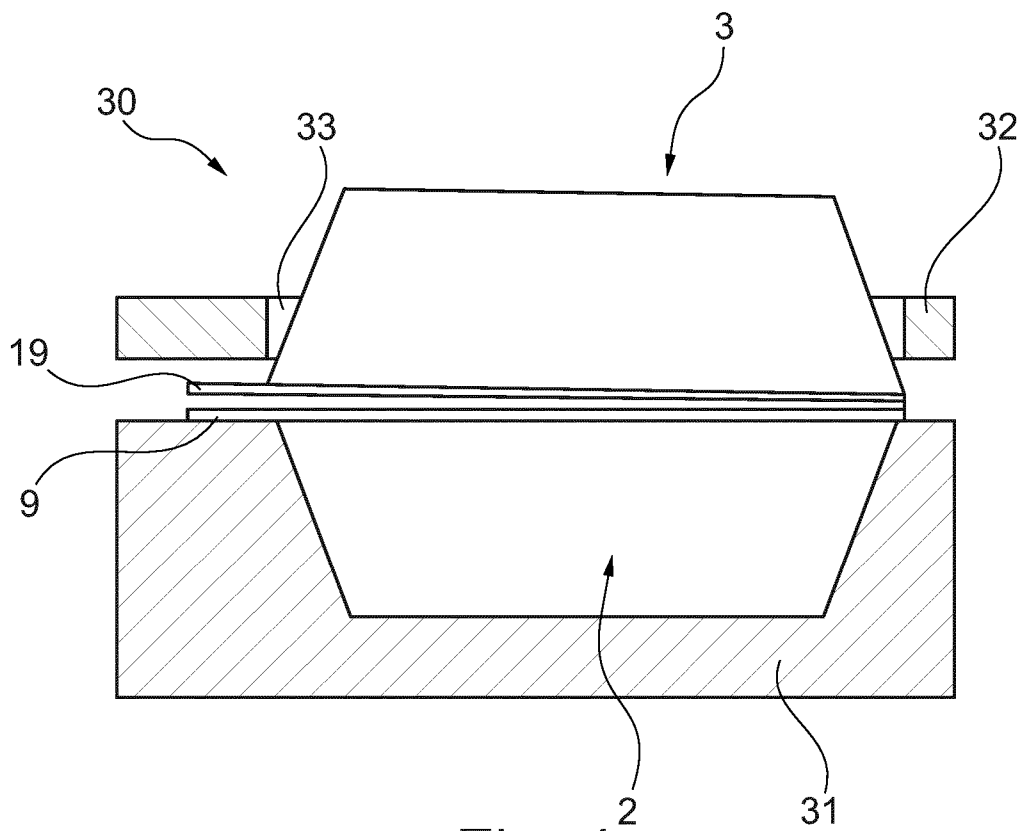


Fig. 4

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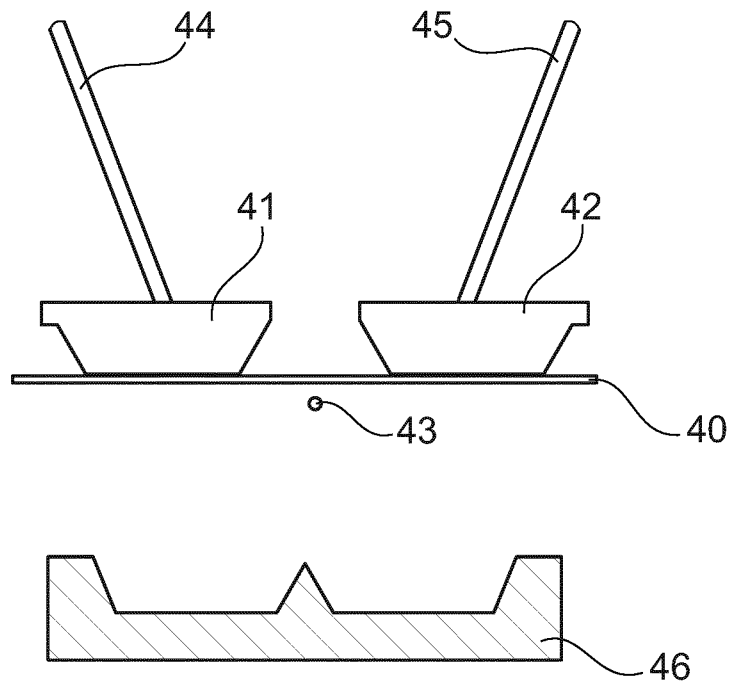


Fig. 5A

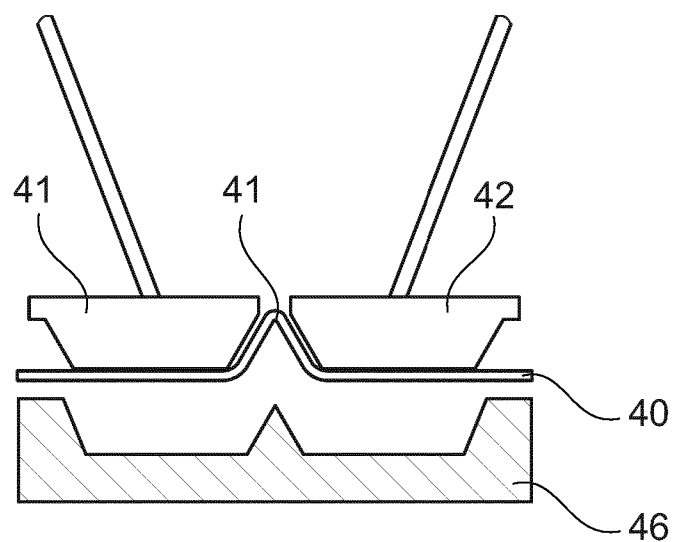


Fig. 5B

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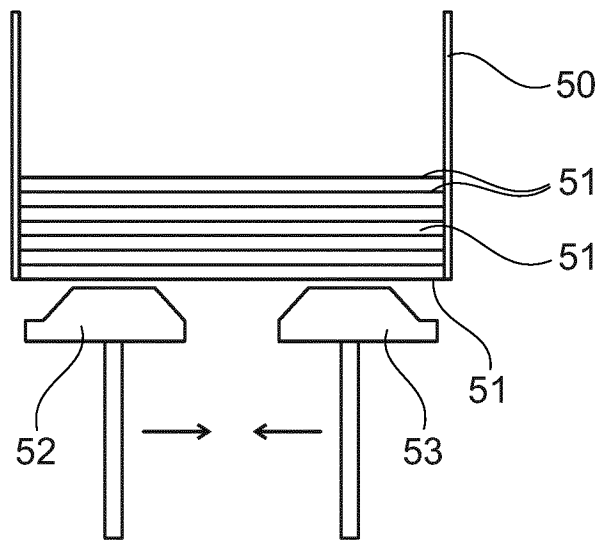


Fig. 6A

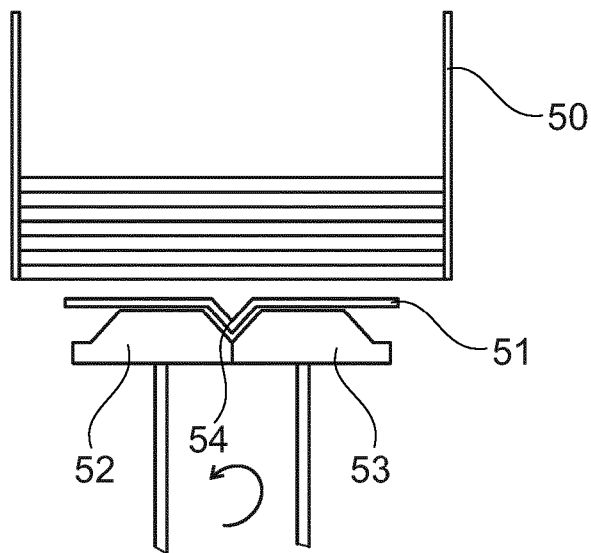


Fig. 6B

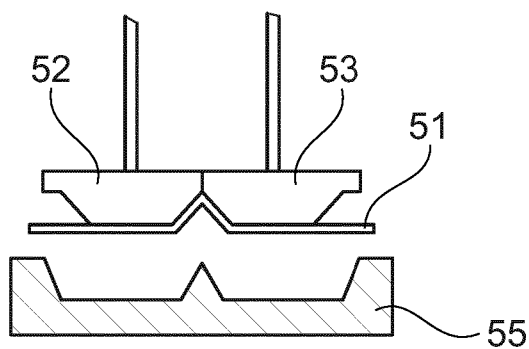


Fig. 6C

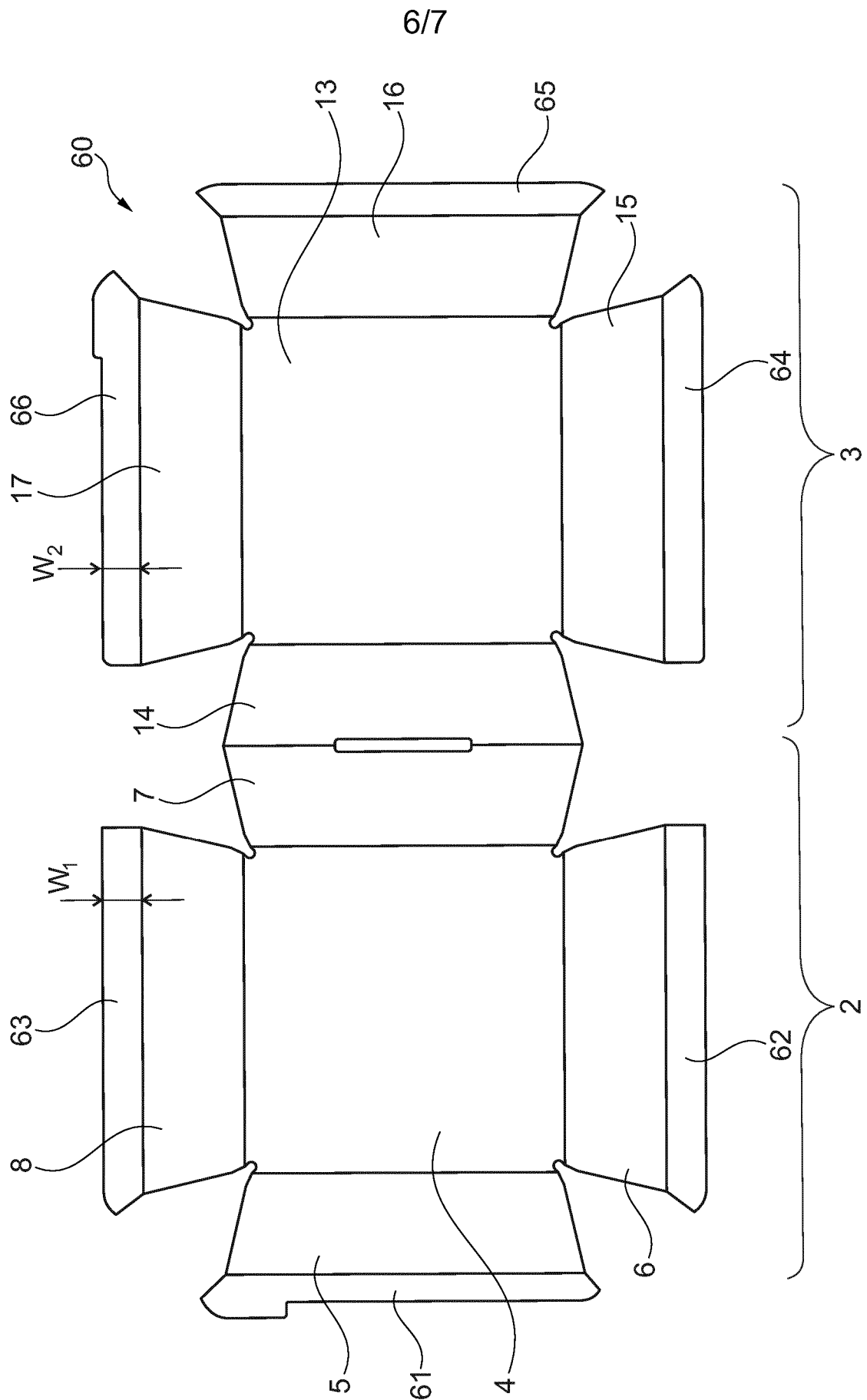


Fig. 7

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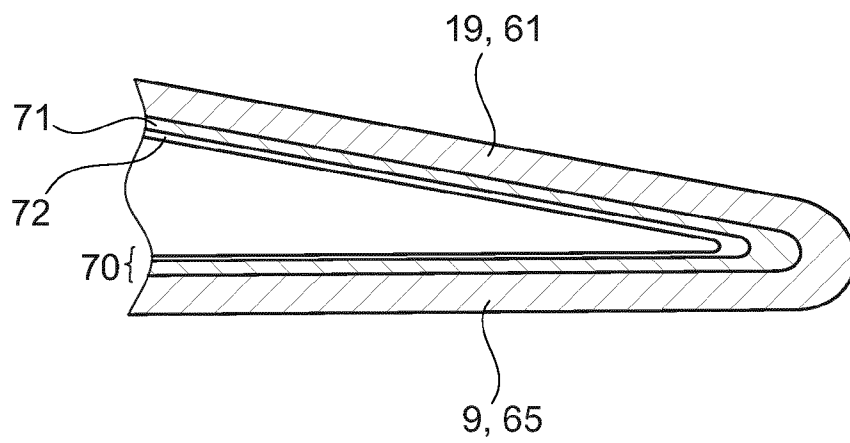


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/059297

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D5/66 B65D5/00 B31B50/59
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D B31B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2001 002056 A (DAINIPPON PRINTING CO LTD) 9 January 2001 (2001-01-09) figures 20-22	1,2,5,7
Y		3,4
A		6
Y	----- US 5 735 454 A (JENSEN KURT D [US]) 7 April 1998 (1998-04-07) figure 2	3,4
X	----- EP 0 419 068 A2 (WESTVACO CORP [US]) 27 March 1991 (1991-03-27)	8-10
A	figures 8-16	11-13
A	----- EP 2 441 696 A1 (PACKABLE B V [NL]) 18 April 2012 (2012-04-18) the whole document	1-13



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Date of the actual completion of the international search

13 May 2019

Date of mailing of the international search report

29/05/2019

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2019/059297

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