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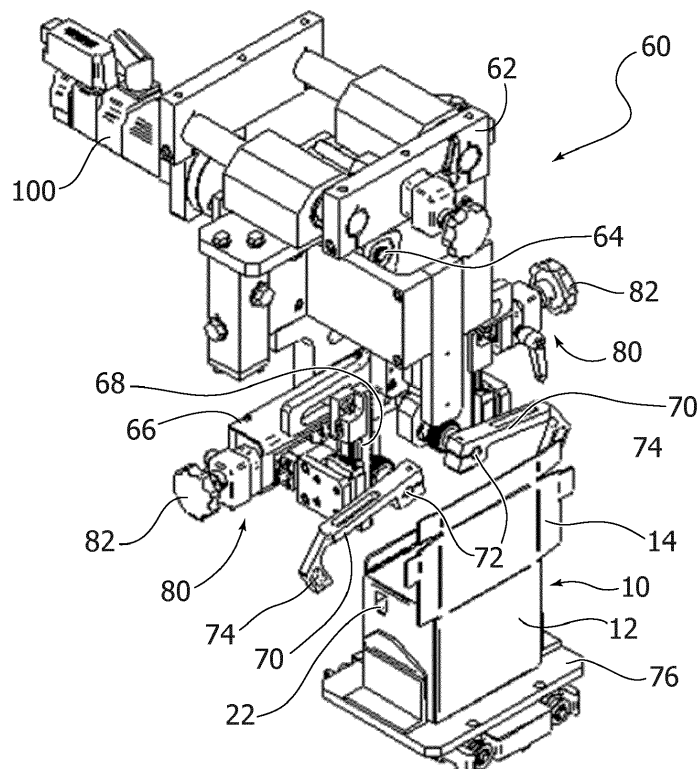
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(54) **FORMING METHOD, UNIT AND APPARATUS FOR THE MANUFACTURING OF CHILD-PROOF CONTAINERS**

(57) Forming method, unit and apparatus for the manufacturing of containers (10) for detergent pods and the like, comprising a container body (12) and a cover (14) having a pair of engagement tabs (48) which in a closed configuration of the cover (14) within the container body (12) engage respective windows (30) to form

child-proof engagement formations. A pair of pushing members (70, 74) are provided to enter into the container body (12) through the through holes (28) and associated windows (30) so as to displace the stop flaps (50) substantially perpendicularly to the body side walls (22).

FIG. 8



Description

Field of the invention

[0001] The present invention relates to containers, in particular even if not exclusively to containers for household products such as laundry and dishwasher detergent pods.

Prior art

[0002] Many containers are nowadays made to a greater or lesser extent of paper or cardboard which - as such - represent environmentally sustainable materials with a low environmental impact as they are totally recyclable.

[0003] However, the creation of child-proof containers made of paper or cardboard is a challenge, as it is difficult to make re-closable child-proof containers made of paper or cardboard that meet the requirements of child-resistant standards.

[0004] European patent application No. 21166876.9 (unpublished at the filing date of the present application) is disclosing box-like container for detergent pods comprising a container body and a movable cover having a pair of engagement tabs which in a closed configuration engage respective windows of the container body to form child-proof engagement formations. Namely, each of the body side walls comprises an outer layer having a through hole and an inner layer having a through window facing the through hole of the outer layer. The inner layer of each body side wall has a flap folded towards the interior of the container body and extending along a lower edge of the respective through window. The cover, which is movable between a closing position and an open position of the container, comprises a top wall and a pair of cover sides parallel to each other and orthogonal to the top wall, each having an engagement tab folded over a respective outer surface. In the closed configuration the outer surfaces of the cover sides are in contact with respective portions of inner surfaces of respective body side walls, and the cover sides bear on the two flaps of the body side walls. The engagement tabs of the cover sides engage into the through windows of the body side walls so as to retain the movable cover: a user can release the cover from the container body only by inserting a finger in each of the through holes and pressing inwardly the engagement tabs.

[0005] A problem arises in connection with the two flaps of the body side walls during manufacturing of the container, since folding the two flaps around the lower edge of the respective through windows of the body side walls has to be carried out not only after the box-like container has been formed starting from a flat creased blank, but also after the filling stage of the container, which is necessary in order to avoid any interference of the flaps with the products being introduced into the container during filling.

Object and summary of the invention

[0006] The object of the present invention is to provide a solution to the above problem, and more specifically to provide a forming method, unit and apparatus designed to provide the two flaps of the body side walls of the container along its producing line efficiently and at a high rate, so as to cope with the manufacturing rates of the container.

[0007] In accordance with the present invention, this object is achieved by the forming method, unit and apparatus as set forth in the appended claims.

[0008] According to the main peculiar feature of the invention a pair of pushing members are provided to enter into the container body through the through holes and associated windows so as to displace the stop flaps substantially perpendicularly to the body side walls.

[0009] The claims form an integral part of the technical disclosure provided here in relation to the invention.

Brief description of the drawings

[0010] The present invention will now be described in detail with reference to the attached drawings, given purely by way of non-limiting example, wherein:

- Figure 1 is a perspective view of a container formed according to the present invention, shown in a closed configuration,
- Figure 2 is a perspective view of the container of Figure 1 in an open configuration,
- Figure 3 is a cross-section taken along the line III-III of figure 1,
- Figure 4 is a diagrammatic sketch summarizing the manufacturing flow of the container of Figures 1-3,
- Figure 5 is a diagrammatic elevational and partially sectioned view of a first embodiment of the forming unit according to the invention,
- Figure 6 is an enlarged view of a detail of the forming unit of Figure 5,
- Figure 7 is a diagrammatic elevational view of a first variant of the forming unit according to the invention,
- Figure 8 is a diagrammatic perspective view of a second variant of the forming unit according to the invention,
- Figures 9 and 10 are elevational front views showing the forming unit of Figure 8 in two different operative positions, and
- Figure 11 is a diagrammatic perspective view of a third variant of the forming unit.

Detailed description

[0011] With reference to figures 1 and 2, a box-like paper or cardboard container to which the present invention is applied to is generally indicated by the reference numeral 10. The container 10 comprises a container body 12 and a movable cover 14. The container body 12

has an aperture and the movable cover 14 is hingedly or removably applied onto the aperture and is movable between a closed configuration shown in figure 1 and an open configuration shown in figure 2.

[0012] In the embodiment shown the movable cover 14 is formed in one piece with the body 12 and is hinged thereto. In a variant the cover 24 can be detachable from the container body 12.

[0013] The container body 12 and the cover 14 are produced, as disclosed in already cited European patent application No. 21166876.9, starting from a flat blank (or respective flat blanks) of paper or cardboard sheets or from a continuous paper sheet unwound from a reel. The blank (or each blank) has a plurality of folding lines and the container body 12 and the cover 14 are obtained by folding the blank (or each blank) along such folding lines.

[0014] The container body 12 comprises a bottom wall 18 opposite the aperture 16, a pair of body front walls 20 parallel to each other and orthogonal to the bottom wall 18, and a pair of body side walls 22 parallel to each other and orthogonal to the bottom wall 18.

[0015] Each of the body side walls 22 comprises an outer layer 24 and an inner layer 26 overlapped to each other. The outer layer 24 has a through hole 28 and the inner layer 26 has a through window 30 facing the through hole 28 of the outer layer 24. The through holes 28 and the through windows 30 of the body side walls 22 are aligned to each other and may have either a round configuration, as shown in figures 1 and 2, or any other design such as for instance a quadrangular or an elongated shape.

[0016] The cover 14 is hinged at 52 on top of one front wall 20 and comprises a top wall 42 and a pair of cover sides 44 parallel to each other and orthogonal to the top wall 42. The cover 14 may also comprise a front wall 46 parallel orthogonal to the top wall 42.

[0017] The cover 14 has a pair of engagement tabs 48 projecting from the lower edges of the respective cover sides 44. Each engagement tab 48 is folded over an outer surface of the respective cover side 44. The engagement tabs 48 may be fixed, e.g. by glue, to the respective outer surfaces of the cover sides 44 or they may be free, i.e. not fixed to the respective outer surfaces of the cover sides 44.

[0018] The engagement tabs 48 and the through windows 30 together with the through holes 28 may be located in central portions of the cover sides 44 and body side walls 22, respectively, or as shown in Figures 1 and 2 at a location which is closer to the front wall 20 opposite to the hinge 52.

[0019] With reference to figures 1 and 3, in the closed configuration of the paper or cardboard container 10 the outer surfaces of the cover sides 44 are in contact with respective portions of the inner surfaces of the respective body side walls 22 and the cover front walls 46 are in contact with respective portions of the inner surfaces of the body front walls 20. The engagement tabs 48 of the cover sides 44 engage into respective windows 30 of the

body side walls 22 and retain the cover 14 to the container body 12.

[0020] A user may release the cover 14 from the container body 12 by inserting a finger in each of the through holes 28 and pressing inwardly on the engagement tabs 48, so as to disengage the engagement tabs 48 from the respective through windows 30 and simultaneously raising the movable cover 14.

[0021] The operations necessary for opening the cover 14 are sufficiently complex to ensure that the paper or cardboard container 10 is child-proof compliant.

[0022] With reference again to figures 2 and 3, each body side wall 22 has a stop flap 50 folded towards the interior of the container body 12 from the inner layer 26, perpendicularly thereto or at an angle slightly greater than 90°, and extending along the lower edge of the respective through window 30. In the closed position of the cover 14 the stop flaps 50 bear against the lower edges of the engagement tabs 48, thus preventing the cover 14 being pushed inside the container body 12 beyond the position in which the engagement tabs 48 are engaged into the respective through windows 30.

[0023] As diagrammatically depicted in Figure 4 the manufacturing cycle of the container 10 starts from a flat blank of paper or cardboard sheet B having the plurality of folding lines, and the container body 12 along with the cover 14 is formed by converting the blank by folding it along such folding lines (step 1). After folding of the blank the two flaps 50 are arranged parallelly to the side walls 22 of the container body 12, in front of the respective windows 30 and associated through holes 28.

[0024] Then the container body 12 is filled with products, such as for instance laundry and dishwasher detergent pods, while the cover 14 is kept in its raised open position (step 2). The container 10 is then transferred to the forming unit of the invention (step 3) disclosed herebelow.

[0025] According to the main peculiar feature of the invention a pair of pushing members are provided to enter into the container body 12 through the through holes 28 and associated windows 30 so as to displace the stop flaps 52 substantially perpendicularly to the body side walls 22, after the content (such as for instance laundry and dishwasher detergent pods) has been introduced into the container.

[0026] Referring now to Figure 5 the forming unit of the invention is generally designated as 60 and comprises a fixed support 62 bearing superiorly an actuator (not visible in then figure) which is driving an eccentric shaft 64. Rotation of the shaft 64 operates the alternate vertical displacement of a movable support 66 carrying a pair of spaced-apart vertical toothed racks 68 which in turn provide an alternate swinging motion of two juxtaposed toothed arms 70, meshing with the two racks 68, around respective transverse pivots 72. In Figure 5 only one arm 70 and the related pivot 72 are visible.

[0027] Each swinging arm 70 is provided with a shaped pusher end 74. Upon the alternate vertical downwardly

and upwardly motion of the two racks 68 and the consequent alternate swinging motion of the two arms 70, the pusher ends 74 are alternatively moved between a mutually distal position and a mutually proximal position, shown in Figure 5 as well as in the detail of Figure 6.

[0028] In operation, a conveyor diagrammatically designated as 76 transfers the container 10 with its open cover 14 beneath the forming unit 60, between the two pusher ends 74 of the arms 70 set in the mutually distal position following displacement upwardly of the racks 68. The conveyor is stopped as soon as the container 10 is positioned with the through holes 28 and the windows 30 in the side walls 22 of the container body 12 aligned with the pusher ends 74 of the arms 70 set in the distal position. Then the two racks 22 are moved downwardly so as to displace, by virtue of the consequent swinging of the arms 70, the pusher ends 74 to the proximal position so as to enter the through holes 28 as well as the windows 30 and urge the flaps 50 to the folded position shown in Figures 5 and 6, wherein such flaps 50 are extending perpendicularly to the side walls 22 towards the interior of the container body 12.

[0029] Opening and closing of the arms 70 along with the pusher ends 74 can be operated at appreciably high speed so as to efficiently cope with the high rate of the manufacturing cycle of the containers.

[0030] Starting from this position the two arms 70 can be further lowered by slightly shifting downwardly the movable support 66, pushing the flaps 50 further downwardly as show with dotted lines in Figure 6 so as to form an angle beyond 90° with the respective side wall 22. Such an extra folding is intended to overcome the elastic memory of the cardboard and prevent that the flaps 50 may return towards the original position.

[0031] The variant shown in Figure 7 differs from the embodiment already disclosed in the above only in that the support 62 of the forming unit 60 is movable, namely is alternatively shifted by means of a motor (not visible in the figure) along a rail 78 in synchronism with the displacement of the container 10 on the conveyor 76. The formation of the folded flaps 50 is thus carried out without the need of stopping the container 10 along the production line.

[0032] In the further embodiment shown in Figures 8 through 10, wherein parts identical or similar to those already disclosed in the above are indicated by the same reference numerals, the two racks 68 and the associated arms 70 along with the related pivots 72 form respective assemblies 80 which are slidable along the movable support 66 in opposite direction, so as to vary the mutual distance between the pusher ends 74 and adjust it to containers 10 of different sizes.

[0033] In Figure 9 the distance between the two assemblies 80 is minimum, whereby the forming unit 10 is adapted to operate with containers 10 having a minimum width, while in Figure 10 the distance between the two assemblies 80 is maximum, whereby the forming unit 10 is adapted to operate with containers 10 having a maxi-

mum width.

[0034] Displacement of the two assemblies 80 can be operated for instance by means of respective rack-and-pinion or screw-and-nut devices, not shown in detail since within the knowledge of the skilled practitioner, controlled either manually by means of control knobs 82 or in a motorized fashion.

[0035] Figure 8 also shows the electric motor, referenced as 100, driving the eccentric shaft 64 operating the alternate vertical displacement of the movable support 66 carrying the two assemblies 80.

[0036] In the further embodiment shown in Figure 11 folding of the two flaps 50 is carried out by means of a pair of mutually convergent extensible actuators 84, such as for instance telescopic fluid or electric stems, which are carried by respective slides 86 in turn displaceable in mutual opposite directions along a rail 88 by means of an actuator 90.

[0037] Of course, without prejudice to the principle of the invention, the details of construction and the embodiments can be widely varied with respect to those described and illustrated, without thereby departing from the scope of the invention as defined by the claims that follow.

Claims

1. A forming method in the manufacturing of child-proof containers (10) comprising a container body (12) and a cover (14) movable between an open configuration and a closed configuration, wherein the container body (12) comprises a pair of body side walls (22) having respective through holes (28) and associated windows (30) aligned to each other, wherein the movable cover (14) comprises a pair of cover sides (44) having respective engagement tabs (48), wherein in said closed configuration the outer surfaces of said cover sides (44) are in contact with respective portions of inner surfaces of the respective body side walls (22), wherein in said closed configuration the engagement tabs (48) of the cover sides (44) engage into said through windows (30) of said body side walls (22) and retain the movable cover (14) to the container body (12), wherein each of said body side walls (22) has a stop flap (50) extending along a lower edge of the respective window (30) and which has to be displaced, during manufacturing of the container (10), towards the interior of the container body (12) so as to prevent the cover (14), when closed, being pushed inside the container body (12) beyond the position in which said engagement tabs (48) are engaged into the respective through windows (30) of the body side walls (22), **characterized in that** a pair of pushing members (70, 74; 84) are provided to enter into the container body (12) through said through holes (28) and associated windows (30) so as to displace said stop flaps (50) substantially

perpendicularly to said body side walls (22).

2. Method according to claim 1, **characterized in that** during displacement of said stop flaps (50) said container (10) is moving along a manufacturing line. 5
3. Method according to claim 1 or 2, **characterized in that** said stop flaps (52) are initially displaced at 90° with respect to said body side walls (22) and subsequently slightly beyond 90°. 10
4. Method according to any one of claims 1 to 3, **characterized in that** the mutual distance between said pushing members (70, 74; 84) is adjustable. 15
5. Method according to any one of claims 1 to 4, **characterized in that** displacing of said stop flaps (50) is performed after the content has been introduced into the container (10). 20
6. A forming unit (60) for the manufacturing of child-proof containers (10) comprising a container body (12) and a cover (14) movable between an open configuration and a closed configuration, wherein the container body (12) comprises a pair of body side walls (22) having respective through holes (28) and associated windows (30) aligned to each other, wherein the movable cover (14) comprises a pair of cover sides (44) having respective engagement tabs (48), wherein in said closed configuration the outer surfaces of said cover sides (44) are in contact with respective portions of inner surfaces of the respective body side walls (22), wherein in said closed configuration the engagement tabs (48) of the cover sides (44) engage into said through windows (30) of said body side walls (22) and retain the movable cover (14) to the container body (12), wherein each of said body side walls (22) has a stop flap (50) extending along a lower edge of the respective window (30) and which has to be displaced, during manufacturing of the container (10), towards the interior of the container body (12) so as to prevent the cover (14), when closed, being pushed inside the container body (12) beyond the position in which said engagement tabs (48) are engaged into the respective through windows (30) of the body side walls (22), **characterized in that** said forming unit (60) comprises a pair of pushing members (790, 74; 84) designed to enter into the container body (12) through said through holes (28) and associated windows (30) so as to displace said stop flaps (50) substantially perpendicularly to said body side walls (22). 25 30 35 40 45 50
7. Unit according to claim 6, **characterized in that** it comprises a pair of spaced-apart toothed racks (68) alternately displaceable vertically, a pair of juxtaposed swinging toothed arms (70) meshing with said racks (68) and having respective pusher ends (74), 55

said arms (70) being swingable relatively to the container (10) set therebetween, upon displacement of said racks (68), from a mutually distal position to a mutually proximal position in which said pusher ends (74) enter said through holes (28) and windows (30) and fold said stop flaps (50).

8. Unit according to claim 6 or 7, **characterized in that** during displacement of said stop flaps (50) said unit (60) is displaceable in synchronism with the displacement of the container (10) on a conveyor (76). 10
9. Unit according to any one of claims 6 to 8, **characterized in that** said two arms (70) in said mutually proximal position are slightly moved downwardly so as to further fold said stop flaps (50) beyond 90°. 15
10. Unit according to any one of claims 6 to 9, **characterized in that** it comprises means (80, 82) to adjust the mutual distance between said racks (68) and related arms (70). 20
11. Unit according to claim 5, **characterized in that** said pushing members comprise two mutually converging extensible actuators (84). 25
12. A forming apparatus for the manufacturing of child-proof containers (10) comprising a container body (12) and a cover (14) movable between an open configuration and a closed configuration, wherein the container body (12) comprises a pair of body side walls (22) having respective through holes (28) and associated windows (30) aligned to each other, wherein the movable cover (14) comprises a pair of cover sides (44) having respective engagement tabs (48), wherein in said closed configuration the outer surfaces of said cover sides (44) are in contact with respective portions of inner surfaces of the respective body side walls (22), wherein in said closed configuration the engagement tabs (48) of the cover sides (44) engage into said through windows (30) of said body side walls (22) and retain the movable cover (14) to the container body (12), wherein each of said body side walls (22) has a stop flap (50) extending along a lower edge of the respective window (30) and which has to be displaced, during manufacturing of the container (10), towards the interior of the container body (12) so as to prevent the cover (14), when closed, being pushed inside the container body (12) beyond the position in which said engagement tabs (48) are engaged into the respective through windows (30) of the body side walls (22), **characterized in that** it comprises a forming unit (60) including a pair of pushing members (790, 74; 84) designed to enter into the container body (12) through said through holes (28) and associated windows (30) so as to displace said stop flaps (50) substantially perpendicularly to said body side walls (22). 30 35 40 45 50

13. Apparatus according to claim 12, **characterized in that** it comprises a pair of spaced-apart toothed racks (68) alternately displaceable vertically, a pair of juxtaposed swinging toothed arms (70) meshing with said racks (68) and having respective pusher ends (74), said arms (70) being swingable relatively to the container (10) set therebetween, upon displacement of said racks (68), from a mutually distal position to a mutually proximal position in which said pusher ends (74) enter said through holes (28) and windows (30) and fold said stop flaps (50). 5 10
14. Apparatus according to claim 12 or 13, **characterized in that** it comprises means (80, 82) to adjust the mutual distance between said racks (68) and related arms (70). 15
15. Apparatus according to claim 12, **characterized in that** said pushing members comprise two mutually converging extensible actuators (84). 20

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FIG. 1

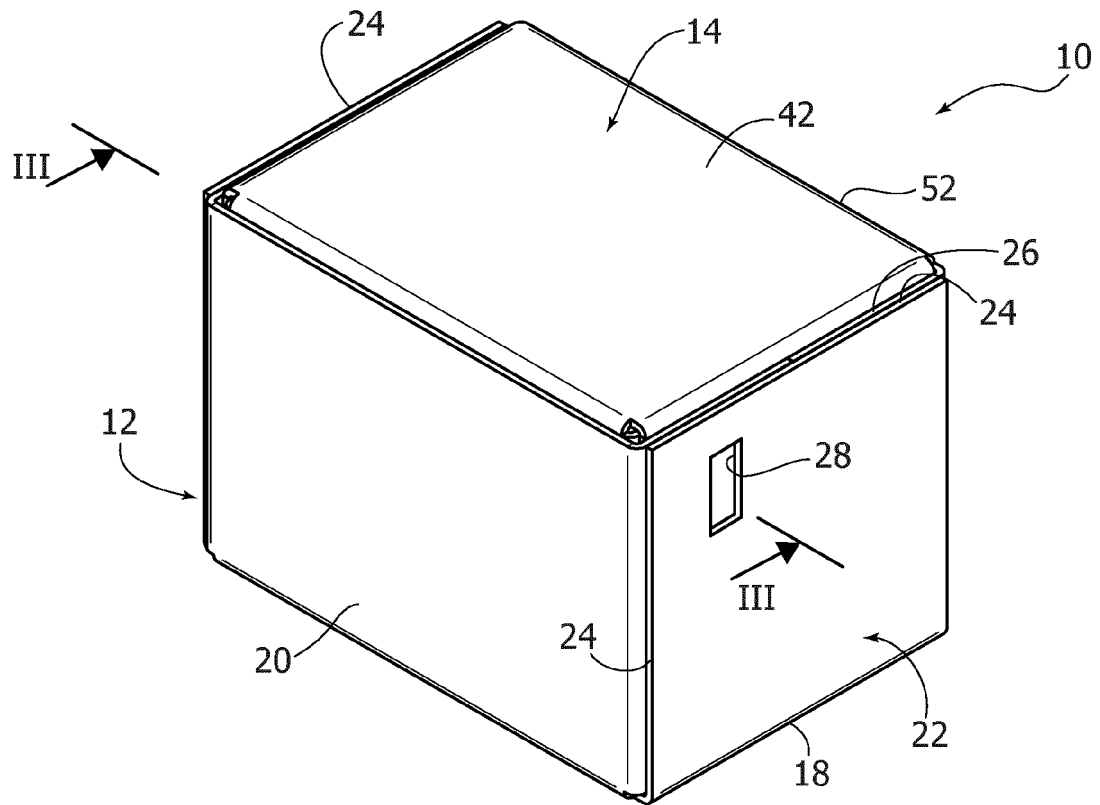


FIG. 2

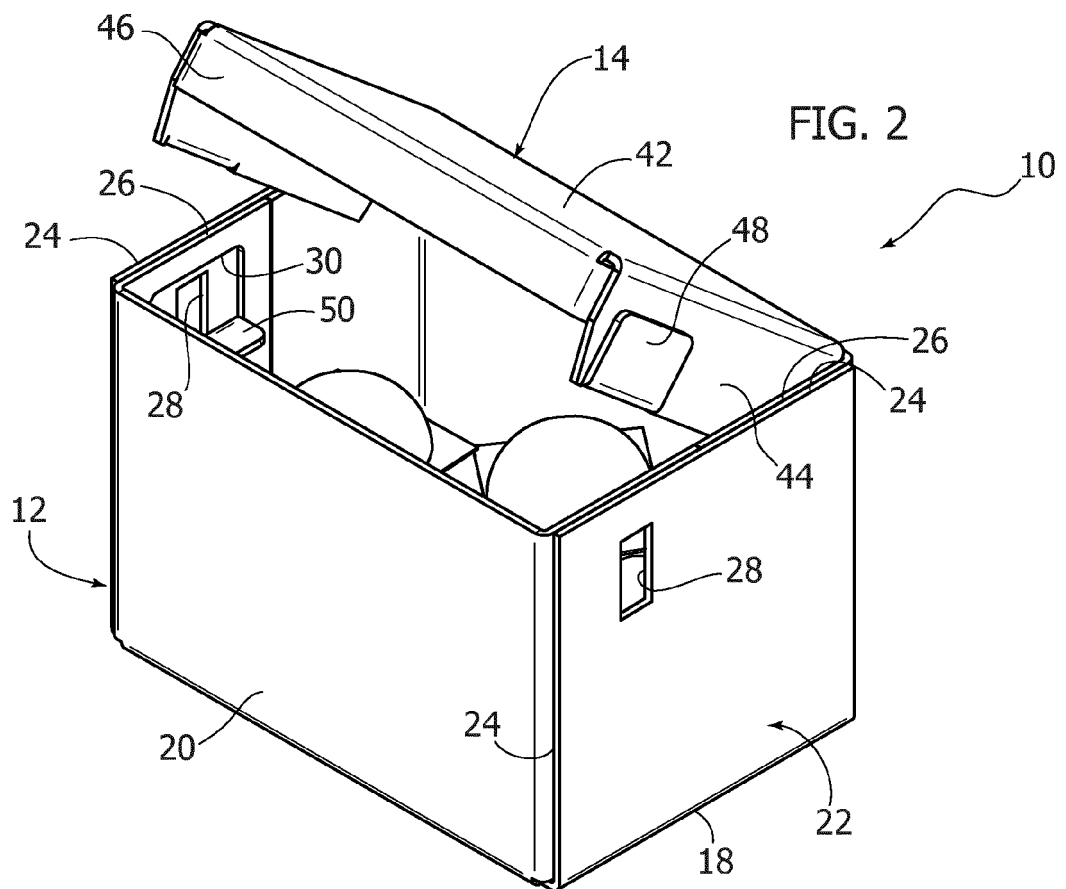


FIG. 3

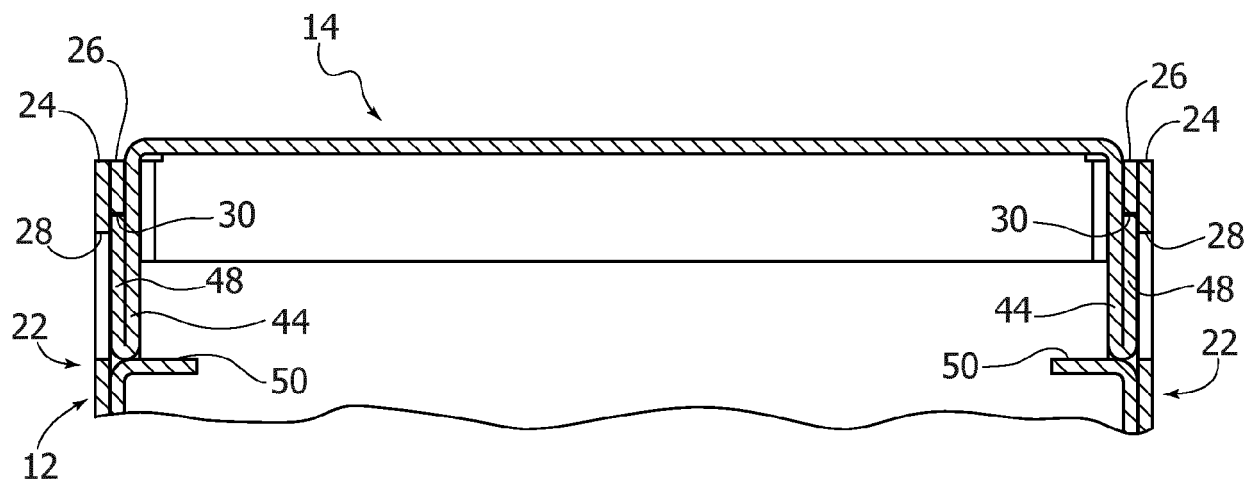
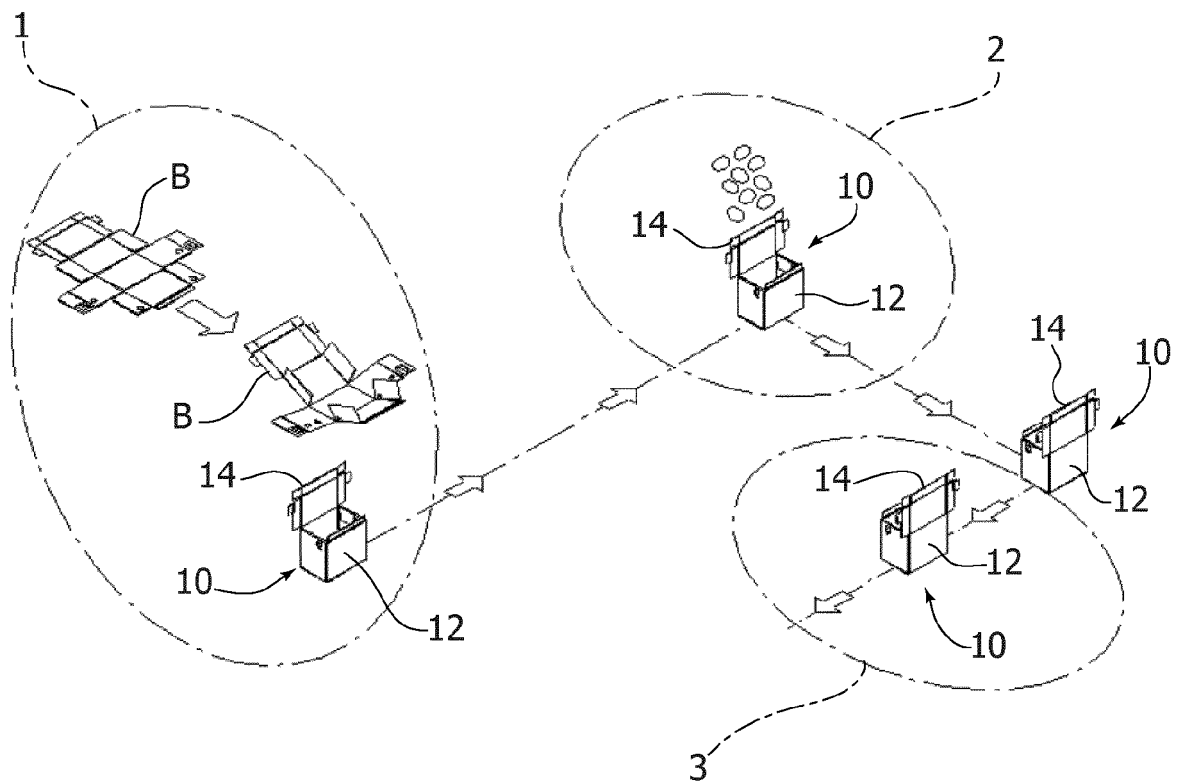


FIG. 4



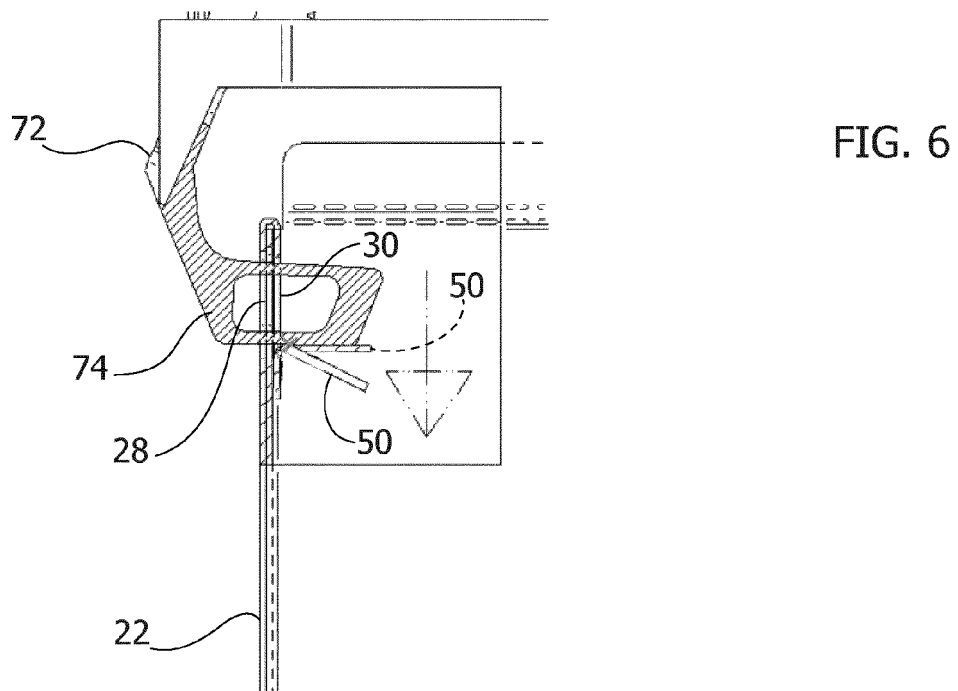
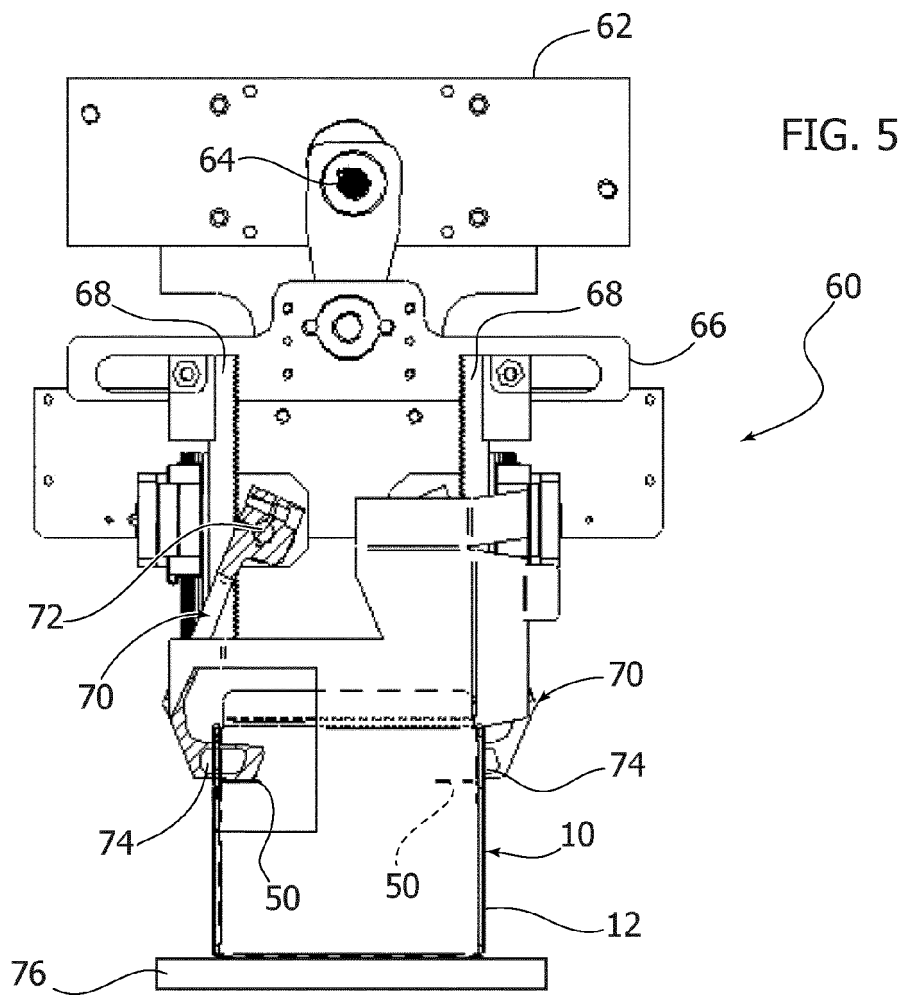


FIG. 7

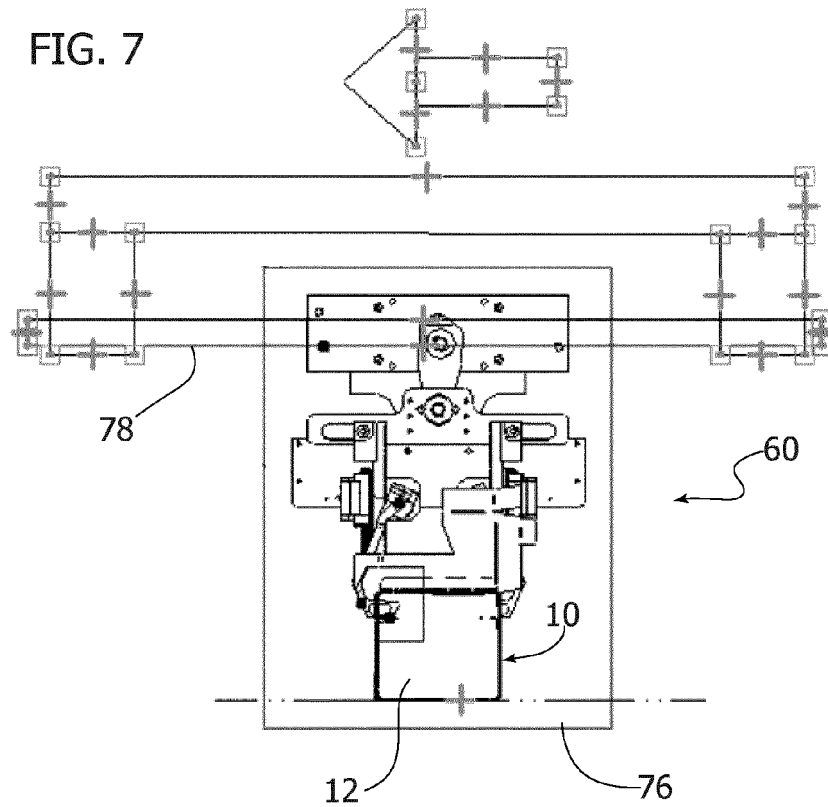
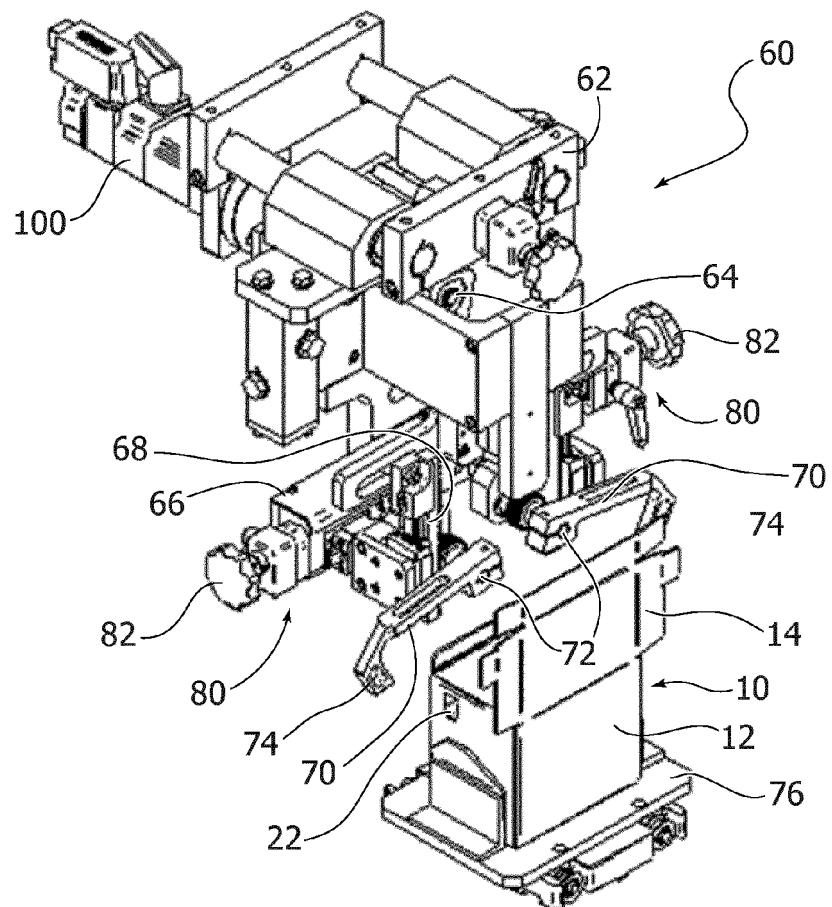


FIG. 8



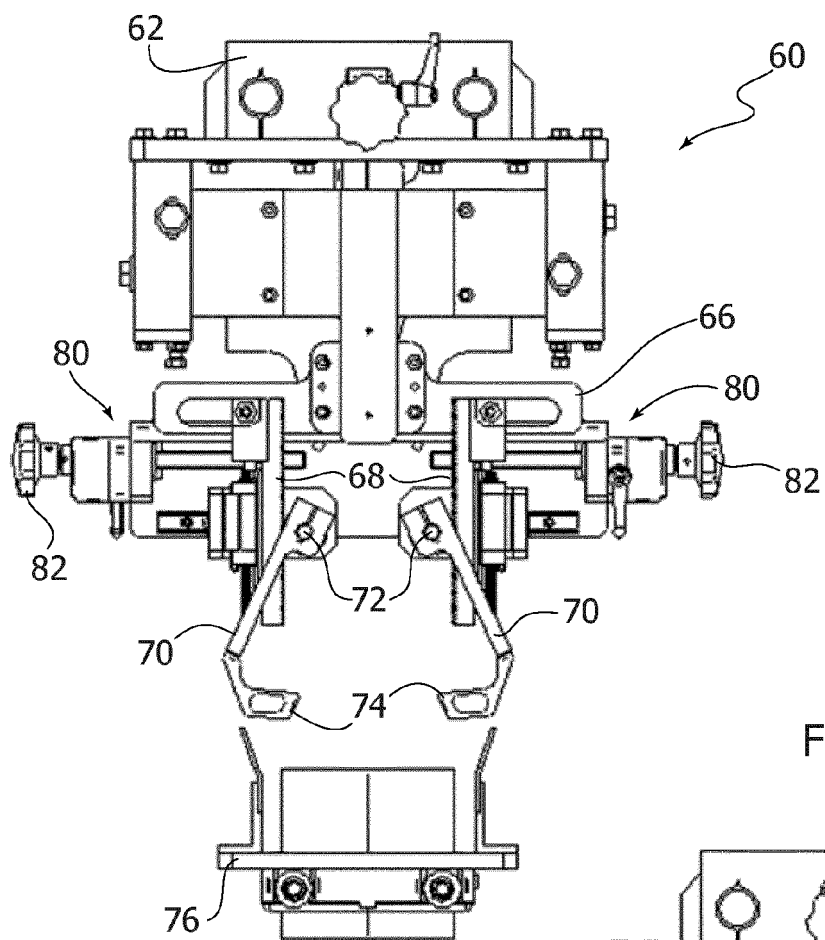


FIG. 10

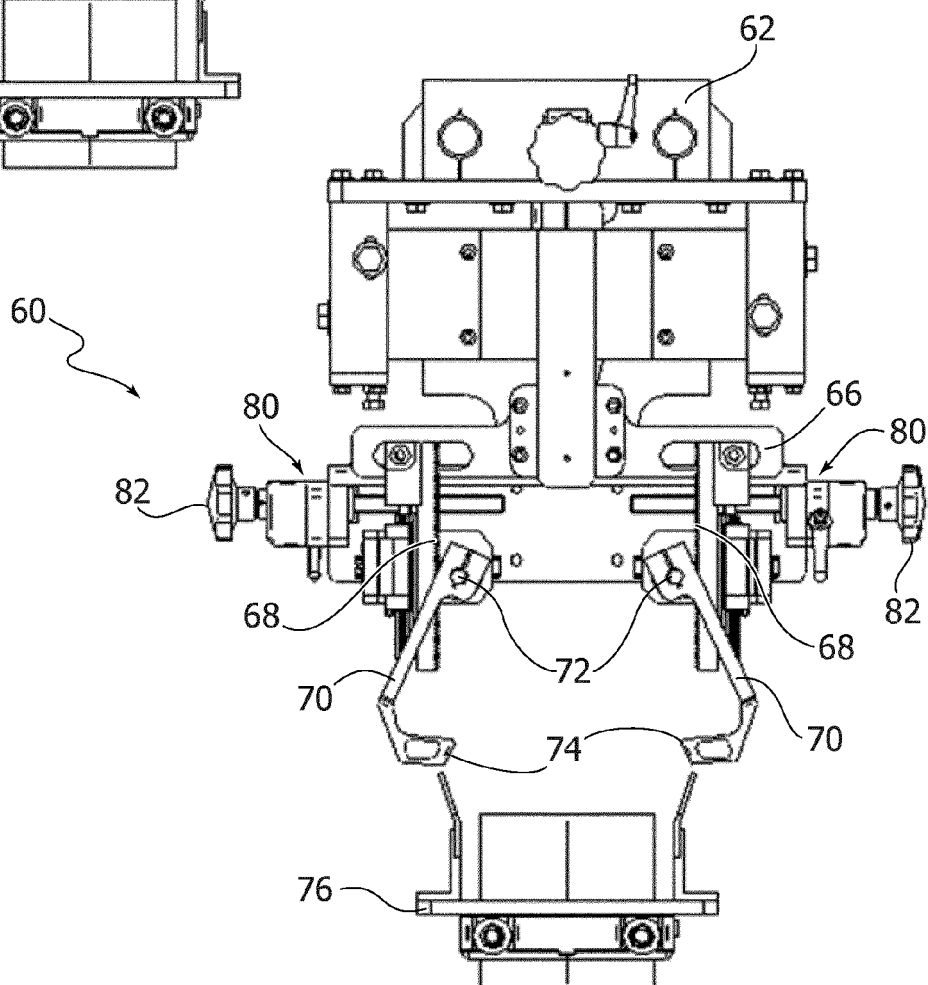
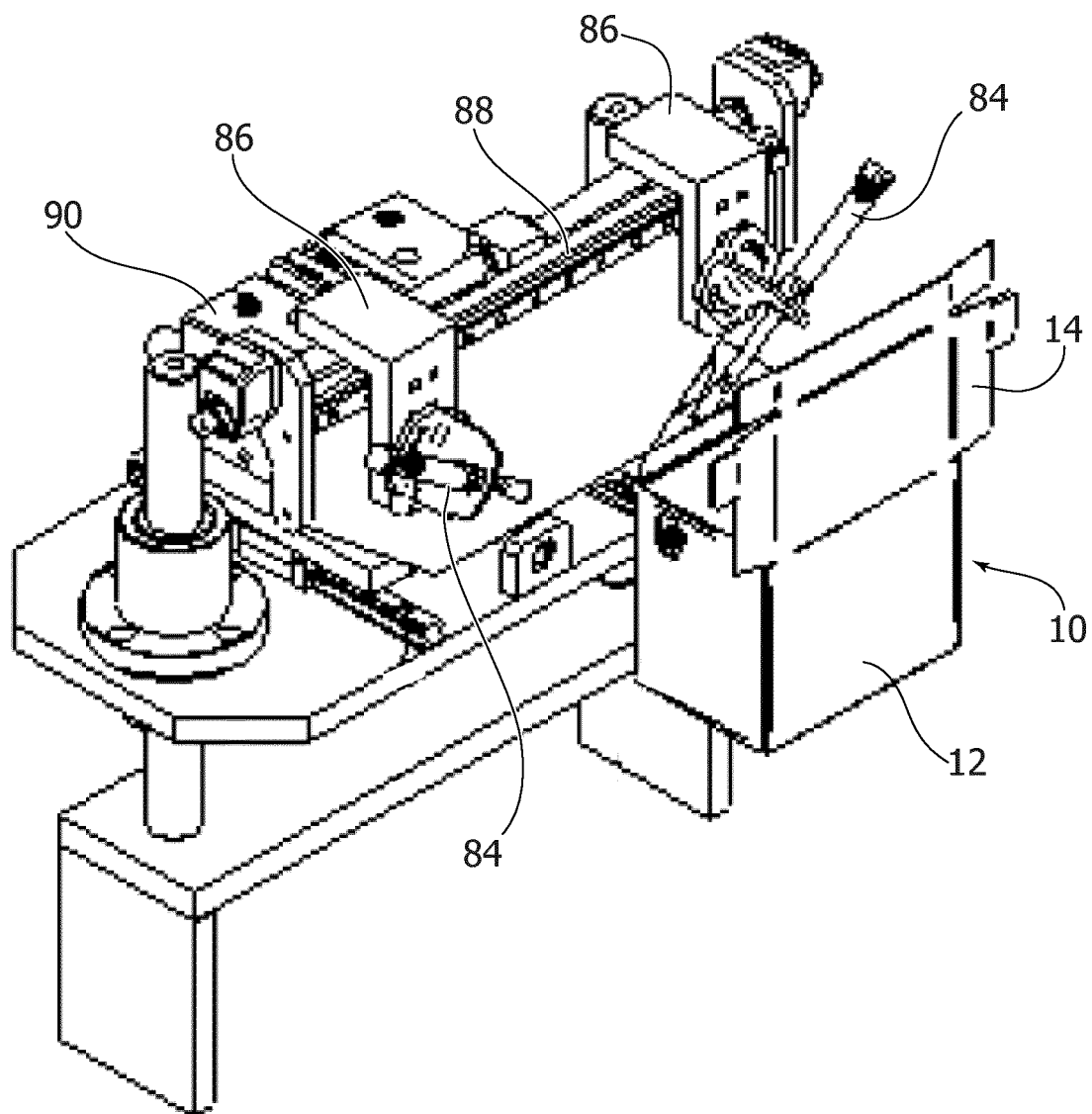


FIG. 11





EUROPEAN SEARCH REPORT

Application Number

EP 21 21 5807

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	NL 1 020 300 C2 (KAPPA PACKAGING [NL]) 7 October 2003 (2003-10-07)	1, 5-7, 9, 12, 13, 15	INV. B65B7/20
Y	* page 4, line 6 - page 6, line 10 *	2, 4, 8, 10, 11, 14	B65D5/66 B65B7/24
A	-----	3	B65B7/28
X	US 3 394 529 A (GREENWAY GERALD W) 30 July 1968 (1968-07-30)	1, 5-7, 9, 12, 13, 15	
Y	* column 1, line 69 - column 4, line 24 *	2, 4, 8, 10, 11, 14	
A	-----	3	
Y	US 4 196 563 A (FENSKE HARVEY J [US] ET AL) 8 April 1980 (1980-04-08)	2, 4, 8, 10, 11, 14	
	* column 2, line 36 - column 11, line 10 *		

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65B B65D
1	Place of search	Date of completion of the search	Examiner
	Munich	8 June 2022	Yazici, Baris
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 21 5807

5 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
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08-06-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
NL 1020300	C2	07-10-2003	NONE
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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