



(11)

EP 4 825 743 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.10.2026 Bulletin 2026/43

(51) International Patent Classification (IPC):
B65B 5/10 ^(2006.01) **B65B 7/26** ^(2006.01)
B65B 7/28 ^(2006.01)

(21) Application number: **25171000.0**

(52) Cooperative Patent Classification (CPC):
B65B 5/101; B65B 7/26; B65B 7/2807; B65B 43/39

(22) Date of filing: **16.04.2025**

(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**
 Designated Extension States:
BA
 Designated Validation States:
GE KH LA MA MD TN

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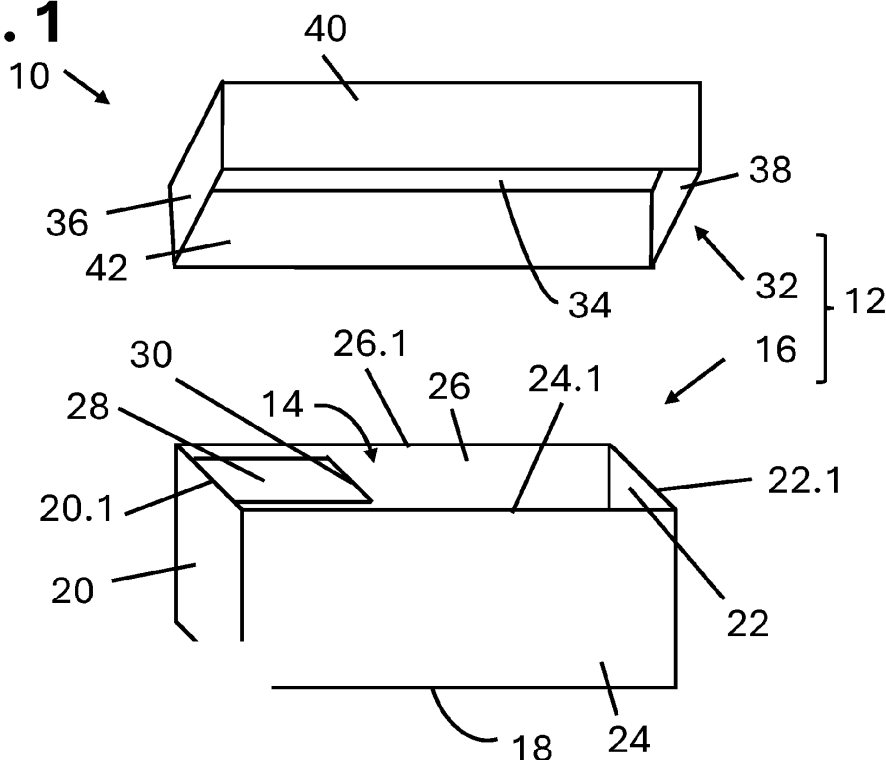
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(54) **PROCESS AND SYSTEM FOR PACKAGING A DETERGENT PRODUCT IN A CONTAINER**

(57) A process for packaging a detergent product (52) in a container (12) made of a paper-based material comprising: manufacturing the detergent product (52); positioning a box (16) in or on a box carriage system (44), moving the box (16), and while the box (16) moves: providing contact between an opening mechanism (46) located above the box carriage system (44)

and a top flap (28) of the box (16) to move the top flap (28) to the open orientation; dispensing detergent product (52) into the box (16); allowing the top flap to move toward the closed orientation; in response to moving the top flap towards the closed orientation, providing the lid (32) to the box (16) to form a closed container (12); and shipping said closed container (12).

FIG. 1



Description

BACKGROUND

[0001] This invention generally relates to processes and systems for packaging a detergent product in a container. Such containers containing detergent products are consumer products present in consumer homes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002]

FIG. 1 illustrates an example consumer product.

FIG. 2 illustrates an example process for packaging a detergent product in a container.

FIG. 3 illustrates an example of a part of a system for packaging a detergent product in a container.

FIG. 4 illustrates another example of a part of a system for packaging a detergent product in a container.

FIG. 5 illustrates another example of a part of a system for packaging a detergent product in a container.

FIG. 6A, 6B and 6C illustrates another example of a part of a system for packaging a detergent product in a container.

FIG. 7 illustrate another example of a part of a system for packaging a detergent product in a container.

FIG. 8 illustrates an example of another part of a system for packaging a detergent product in a container.

FIG. 9 illustrates an example of a box filled with detergent product.

DETAILED DESCRIPTION

[0003] Detergent product, such as unit dose detergent pouches or powdered/granular detergents, are commonly packaged in containers made of plastic material. However, recent environmental concerns have driven a shift towards cardboard-based container solutions to reduce plastic waste. Although beneficial for sustainability, cardboard containers introduce new challenges in detergent product handling.

[0004] For example, detergent products tend to adhere to the inner walls of a cardboard box. This may occur due to moisture absorption by the cardboard,

which can cause powdered or granular detergent product to clump and create tackiness that increases adhesion of unit dose detergent pouches. Indeed, in some examples, the detergent product contained in a box hereby described is in direct contact with paper-based material at an inner surface of a sidewall or base of the box. Additionally, exposure to humidity may increase friction between the detergent product and the cardboard surface.

[0005] When the detergent product sticks to the sidewall, consumers may resort to shaking or forcefully agitating the box, which could lead to rupture of the water-soluble film of the unit dose detergent pouches. Similarly, for powdered or granular detergents, adherence to the sidewalls can result in uneven dispensing, leading to excessive shaking or tapping the box to release the product, which is inconvenient and inefficient.

[0006] Therefore, the present disclosure relates to a consumer product that facilitates retrieval of the detergent product without excessive shaking or undesired direct consumer contact. The consumer product of the present disclosure promotes natural tilting of the box to allow gravity to assist in detergent product retrieval without excessive force. The consumer product of the present disclosure may also prevent damage to unit dose detergent pouches by avoiding unnecessary impact. The consumer product of the present disclosure can also enable efficient and even dispensing of powdered granular detergent product without excessive shaking or tapping.

[0007] In addition, consumer products generally comprise communicational information, including instructions for use, dosage guidelines and safety warnings, displayed on the container. However, poorly positioned information may not always be immediately visible during regular consumer product use. For example, communicational information positioned on the lid may no longer be visible to consumers at a point of product collection when the lid is removed to use the detergent product.

[0008] The consumer product of the present disclosure further can provide for clearly indicating communicational information, such that it naturally integrates with the use of the product. In particular, the information may be positioned such that it is viewed by tilting the box, thereby simultaneously facilitating detergent product movement and product retrieval while the communicational information can remain prominent and accessible to the user.

[0009] Therefore, the present disclosure relates to a consumer product that promotes tilting and product separation, while also enhancing user interaction with product instructions and information.

[0010] Further, consumer products should be designed to be robust and resistant to deformation to increase durability and reliability throughout their life-cycle. During transportation, handling, and everyday use, consumer products may be subjected to various

stresses, including impact, compression, and environmental factors. If a product lacks sufficient structural integrity, it may become damaged or deformed, compromising its functionality and consumer satisfaction. Therefore, the present disclosure relates to a consumer product with improved robustness, ensuring it maintains its intended shape.

[0011] In addition, in manufacturing consumer products, efficiency helps improving throughput time and cost-effective production. Complex manufacturing processes with numerous steps can lead to increased production time, higher costs, and greater potential for errors. Therefore, it is desirable to streamline the manufacturing process to enhance productivity and maintain consistency. The present disclosure provides a method for producing a consumer product which can reduce the complexity of the method while maintaining quality and functionality.

[0012] In particular, the packaging of the detergent product in a container should be performed efficiently to improve throughput time and accurate and consistent placement of the detergent product. However, certain features of the consumer product disclosed herein may obstruct or impede the packaging process, potentially leading to inefficiencies. Existing manufacturing techniques commonly used in conventional systems for packaging detergent products in the container may not be fully suitable for manufacturing the consumer product of the present disclosure.

[0013] The present disclosure therefore provides a process for packaging detergent products in a container which is suitable for manufacturing the consumer product of the present disclosure. The present disclosure further provides a system for implementing the process for packaging detergent product in the consumer product of the present disclosure.

[0014] Figure 1 illustrates a **consumer product 10**. A **consumer product 10** should in this disclosure be understood as a product which is provided, among others, to end consumers. Such consumer products may for example be available for purchase in supermarkets and end consumers may store such consumer products in their homes. Consumer products may be provided in large quantities and environmental concerns should thereby be taken into consideration when designing the products. Consumer products should also be designed taking transportation to a retail store into account. Consumer products should also be robust so as to withstand transportation as part of an e-commerce shipment. Consumer products should also be designed taking on the shelf storage in a retail store into account. Consumer products should also be designed taking transportation from a retail store to a consumer home into account. Consumer products should also be designed taking storage at a private end-consumer home into account. Consumer products should also be designed taking use of the consumer product at a private end consumer home into account. Consumer

products should also be designed taking disposal into account.

[0015] The consumer product 10 according to this disclosure comprises a **detergent product 52** (not visible on figure 1). Detergent products should be understood in this disclosure as products comprising a surfactant. Detergent products may also comprise a bleach or other ingredients. Example detergent product compositions are described in more detail herein below. In some examples, the detergent product comprises unit dose detergent pouches, preferably water-soluble unit dose detergent pouches, more preferably flexible water-soluble unit dose detergent pouches. Example unit dose detergent pouches are described in more detail herein below. In some examples, the detergent product may be in powder or granular form. One should note that in some cases, the containers according to this disclosure may also be suitable for content other than a detergent product, in particular for content of a perishable nature, such as food or unstable chemical substances for example.

[0016] In the present disclosure, the detergent product 52 may be in direct contact with the container 12. In some examples, the detergent product is a powder or granular detergent. In some examples, the detergent product is constituted by unit doses made each of a water-soluble pouch enclosing a liquid or powder. If the detergent product is a powder, at least some powder particles contact the sidewalls, the base or the cover of the container. If the detergent product is a detergent unit dose, the water-soluble pouch enveloping the active product constitutes part of the detergent product, and at least some of the water-soluble pouches are in contact with the sidewalls, the base or the cover of the container. In other words, in some examples no intermediate body (film, insert, layer or material, etc.) separates the content of the container from the container.

[0017] The consumer product 10 according to this disclosure further comprises a **container 12**. A container should be understood in this disclosure as an object housing a content, for example in a cavity of the container 12. The container facilitates protection, transport, storage, access and disposal of the consumer product 10.

[0018] In this disclosure, the container 12 comprises a **box 16**. A box should be understood as a generally parallelepiped, barrel shaped, cylindrical, round, oval or cubical three-dimensional object defining a cavity. The capacity of the box 16 may be comprised between 500ml and 7000ml, or in some examples between 800ml and 4000ml. The box 16 may have a maximum length comprised between 10 cm and 35 cm, a width comprised between 5 cm and 13 cm and a height comprised between 8 cm and 40 cm. The use of parallelepiped boxes may facilitate storage and transportation by permitting piling up boxes in a space efficient manner. In some examples, a box may be a parallelepiped provided with some rounded, tapered trapezium or

chamfered edges. The box 16 according to this disclosure comprises the detergent product. It should be understood that the detergent product is contained or stored in the box 16 directly, i.e., there is in some examples no intermediate layer or intermediate packaging separating the detergent product from the inner cavity of the box 16. When the detergent product is a detergent unit dose, the water-soluble pouch enveloping the active product constitutes part of the detergent product, i.e., there is in some examples no intermediate layer or intermediate packaging separating the box from the water-soluble pouch.

[0019] The box 16 according to this disclosure comprises a base 18 and sidewalls 20, 22, 24, 26. A **base** 18 according to this disclosure should be understood as a wall on which the container 12 may lie when placed on a supporting surface such as a shelf or a floor. The base 18 may be made from a plurality of flaps folded with respect to the sidewalls 20, 22, 24, 26 such that those flaps forming the base 18 lie in a substantially coplanar manner or in substantially parallel planes. In some examples, the base 18 is flat. In some examples, the base 18 is rectangular. In other examples, the base 18 is oval or round. In some examples, the base 18 has an embossed profile standing in or out in relief. During shipment, and/or during storage of the container 12, the container 12 may be positioned upside down, i.e., the base 18 being on top of the container 12. The container 12 may also be positioned sideways, i.e., with one of the sidewalls 20, 22, 24, 26 being on top and/or one of the sidewalls being at the bottom.

[0020] The **sidewalls** 20, 22, 24, 26 according to this disclosure should be understood as extending from the base 18. In some examples, the sidewalls 20, 22, 24, 26 are perpendicular to the base 18. In some examples, the base 18 is rectangular and has four sides, four sidewalls 20, 22, 24, 26 extending perpendicular from the base 18, each sidewall 20, 22, 24, 26 being rectangular, each sidewall 20, 22, 24, 26 being connected by a sidewall side to a side of the base 18, and by two other sidewall sides to two other of the four sidewalls. In some examples, the base 18 is oval or circular and the sidewalls 20, 22, 24, 26 form a generally cylindrical wall extending from the base 18 in a direction normal or perpendicular to the base 18. In some examples, sidewalls 20, 22, 24, 26 have a shape corresponding to one of a square, a rectangle, a trapeze, a polygon, a section of a sphere, a section of an ovoid, or a section of an ellipsoid. Writing provided on sidewalls 20, 22, 24, 26 of the box 16 are in some examples horizontally readable when the box 16 is in a position of being used. The sidewalls 20, 22, 24, 26 and the base 18 may form the inner cavity where the detergent product is received.

[0021] The sidewalls 20, 22, 24, 26 of the present disclosure have a respective **top edge** 20.1, 22.1, 24.1, 26.1. The top edge should be understood as an edge delimiting an end of each sidewall, which end is at the top of the sidewall, as the container 12 is arranged

in a regular position with its base 18 at the bottom.

[0022] Opposite the base 18, the container comprises an **opening 14** enabling access to the cavity delimited by the sidewalls 20, 22, 24, 26 and the base 18. In some examples, the opening 14 spans an area of at least 10 cm², preferably of at least 20 cm². Such opening 14 span may permit inserting fingers or even a hand in order to reach the inside of the box 12. In some examples whereby the detergent comprises water-soluble unit dose articles, the opening 14 spans an area of between 1.1 and 20 times a largest cross sectional area of a water-soluble unit dose article. In some preferred examples, the opening 14 spans an area of between 1.5 and 15 times of a largest cross sectional area of a water-soluble unit dose article contained in the container 12.

[0023] The container 12 may further comprise at least one **top flap 28**, hinged or connected to a top edge 20.1 or near the top edge 20.1 of a first sidewall 20 of the sidewalls 20, 22, 24, 26. The top flap 28 can assume at least two orientations, i.e., a closed orientation where the top flap covers at least part of the opening 14 (as in figure 1), and an open orientation, where the top flap 28 is pivoted upwards and away from the opening 14, thereby facilitating access to the cavity and the detergent product received therein. The top flap 28 comprises a distal edge 30, opposite the hinge, and, in the closed orientation, the distal edge 30 is distant from the second sidewall 22, opposite the first sidewall 20. The distance between the top edge 20.1 of the first sidewall 20 and the distal edge 30 of the top flap 28 may correspond to up to 90% of the distance between the first sidewall 20 and the second opposite sidewall 22. The distance may also be up to 80%, up to 70%, up to 60%, up to 50%, or up to 40% of the distance between the first sidewall 20 and the second opposite sidewall 22. The distance between the first sidewall 20 and the second opposite sidewall 22 should be understood to exclude the thickness of the first and second sidewalls 20, 22. If there is for a given box a degree of variability of such a distance, for example due to sidewalls not being perfectly flat, such a distance should be taken as the minimum distance between the first sidewall and the second opposite sidewall. The remaining distance between the distal edge 30 of the top flap 28 and the second sidewall 22 is sufficient to enable the top flap 28 to be freely movable between the closed orientation and the open orientation. At the same time, the top flap 28 is sufficiently long and covers a wide area of the box's opening 14, such that the user naturally tilts the box 16 to access the detergent product inside. The tilting action helps dislodge the detergent product from the inner walls and provides movement of the detergent product within the box 16, facilitating easier retrieval. The overall surface area of the top flap 28 also enables communicational information to be clearly visible to the consumer. In some examples, the remaining distance between the distal edge 30 of the top flap

28 and the second sidewall 22 is of at least 1 cm or of at least 1.5 cm when the top flap 28 is in the closed orientation in order to facilitate insertion of an adult finger through the remaining distance to lift the top flap 28 from the closed orientation to the open orientation. In some examples, the top flap 28 is substantially parallel to the base 18 in the closed orientation. The remaining distance should be understood as the minimum distance separating the distal edge 30 of the top flap 28 from the second sidewall 22.

[0024] In some examples, the top flap 28 may be hinged to the first sidewall 20 which forms one of the short sides of the parallelepiped-shaped box 16. In some examples, the first and second sidewalls 20, 22 define the width of the box 16, while the third and fourth sidewalls 24, 26, which connect them, define the length of the box 16. Consumers may manipulate the box 16 by grasping the box 16 by the third and fourth sidewalls and tilt the box by pivoting the box 16 around the first sidewall 20. This increases the movement of the detergent product, as the detergent product located close to the second sidewall 22 may be submitted to a stronger lever force, thereby generating a cascading movement of the detergent product within the box 16. In some examples, the base 18 of the box 16 is rectangular, the first and second sidewalls 20, 22 being shorter than the third and fourth sidewalls 24, 26 in the plane defined by the base 18. In some examples, the base 18 of the box 16 is rectangular, the first and second sidewalls 20, 22 being shorter than the third and fourth sidewalls 24, 26. In some examples, the base 18 of the box 16 is rectangular and each of the third and fourth sidewalls 24, 26 are at least 100% longer than each of the first and second sidewalls 20, 22 in the plane defined by the base 18. In some examples, the base 18 of the box 16 is rectangular and each of the third and fourth sidewalls 24, 26 are at least 150% longer than each of the first and second sidewalls 20, 22 in the plane defined by the base 18. Such elongated aspect ratios indeed tend to increase the cascading movement produced by tilting the box 16 around an axis parallel to the top edge 20.1 of the first side wall 20.

[0025] The top flap 28 may have a top surface that is visible to a user. The top surface may be provided with printed or labelled product communicational information or usage instructions. The top flap 28 may then constitute a support for advertisement, usage instructions or other regulatory or informative indications. In some examples, it may be beneficial for the user to be provided with some information directly as the user sees the open box 16 and its content. The top flap 28 may comprise perforations at the hinge point so that it can be torn off by the consumer (for instance at the end of life). In some examples, the top flap 28 may be printed with promotional instructions or barcodes such that the torn-off top flap become a coupon or promotion card for a further purchase by the user.

[0026] In some examples, the top flap 28 is made

integrally with the first sidewall 20 and extends from a top edge 20.1 of said first sidewall 20. In some examples, the top flap 28 comprises a main portion hinged to a proximal flap portion connected (for instance glued, stitched or integral) with the first sidewall 20. In some examples, the top flap 28 is offset with respect to the top edge 20.1, when in the closed orientation. In some examples, the offset is in the direction of the base 18: the top flap 28 in the closed orientation is closer to the base 28 than are the top edges 20.1, 22.1, 24.1, 26.1 of the sidewalls 20, 22, 24, 26.

[0027] In some examples, two or more top flaps 28 are provided and are hinged to either a same top portion of the first sidewall 20, or at least one of the two or more top flaps 28 may be hinged to a top portion of a second sidewall 22, opposite the first sidewall 20. Each one of the two or more top flaps 28 may contain the features listed in the previous paragraphs. In some examples, the two or more top flaps 28 are spaced apart so as to enable a human hand to pass through the opening 14 between the top flaps 28 to grasp detergent product contained in the box 16.

[0028] The container 12 comprises a lid 32 for the box 16. The lid 32 according to this disclosure should be understood as an element permitting to repeatedly close or open the opening 14 of the box 16. In some examples the lid 32 may be connected to the box 16, for example by a hinge, or may be separated from the box 16. The lid 32 according to this disclosure comprises a top or lid top 34 and flanks or lid flanks 36, 38, 40, 42. It should be understood that the top 34 of the lid 32 is aimed at covering the opening 14 of the box 16 when the lid 32 is in a closed position. In some examples, the top 34 of the lid 32 is rectangular. In some examples the top 34 of the lid 32 is round, hexagonal, octagonal, polygonal or oval, structures such as round or oval being for example approximated by multiplying a number of side panels and lid flaps. In some examples, the lid 32 comprises beveled edges. In some examples, the top 34 of the lid 32 is rectangular with rounded edges. It should be understood that while being named "top", the top 34 of the lid 32 may be positioned in different orientations. As for the lid flanks 36, 38, 40, 42, it should be understood that the flanks according to this disclosure are elements connected to the top 34 of the lid 32 and extending from the lid 32 in order to engage (e.g., partly cover) one or more sidewalls 20, 22, 24, 26 of the box 16, each flank 36, 38, 40, 42 having an extension along a corresponding sidewall 20, 22, 24, 26 between the connection to the top 34 of the lid 32 and a distal end of the flank 36, 38, 40, 42. In some examples, the extension is superior to 50% of the height of the sidewall, preferably superior to 60%, thereby reducing chances of an undesired removing the lid 32 when the lid is positioned on the box. The flanks 36, 38, 40, 42 participate in placing the top 34 of the lid 32 onto the opening 14. In some examples, the flanks 36, 38, 40, 42 extend perpendicularly from the

top 34 of the lid 32. In some examples, the flanks 36, 38, 40, 42 surround an entire perimeter of the top 34 of the lid 32. In some examples, the flanks 36, 38, 40, 42 partially surround an entire perimeter of the top 34 of the lid 32, a portion of the top 34 of the lid 32 being flank-less, for example along a hinge between the lid 32 and the box 16 in a case of a hinged lid. As the top 34 of the lid 32 covers the opening 14, at least a portion of the flanks 36, 38, 40, 42 may cover at least a specific portion of a specific sidewall of the sidewalls 20, 22, 24, 26 of the box 16. Movement of the lid 32 may be restrained by a connection to the box such as a hinge, or a flexible connector (strip, rope, etc.), or the lid 32 may be entirely removable, for example to provide an improved access to the content of the box 16, or to allow the lid 16 or the container 12 to be independently reusable. The box 16 and lid 32 cooperate to participate in fulfilling the role of the container 12 to store, transport and facilitate access to the content of the container 12.

[0029] The container may comprise a **lock** (not visible). A lock should be understood in this disclosure as a mechanism preventing or reducing the likelihood of opening the container by accident. The lock according to this disclosure is intended to maintain the lid in a closed position. It should be understood that the lock according to this disclosure is expected to function under normal use of the container. It should be understood that the lock may not fulfill its function when for example unusual use is made of the box, or when the box is under unusual conditions.

[0030] Figure 2 illustrates a process 1000 for packaging the detergent product 52 in the box 16. The existing manufacturing techniques currently applied in the conventional systems for packaging detergent product 52 in the box 16 might not be fully appropriate or suitable for manufacturing the above-described consumer product 10. In particular, the top flap 28 may obstruct part of the opening 14 through which detergent product 52 is dispensed into the box 16.

[0031] The process 1000 according to this disclosure comprises manufacturing 1010 the detergent product 52. Manufacturing 1010 the detergent product may comprise providing the ingredients of the detergent product, including at least a surfactant and, optionally, a bleach or other ingredients to form one or more compositions. The detergent composition is described in more detail below. Manufacturing 1010 the detergent product may comprise filling and sealing a water-soluble film with one or more compositions to form a water-soluble unit dose article. Manufacturing 1010 the detergent product may also comprise providing the detergent product in powder or granular form. A detergent product making unit may be configured to manufacture the detergent product 52.

[0032] The process 1000 further comprises providing 1020 a box carriage system 44 configured to move the box 16 in a machine direction MD. The box carriage system 44 may for example be a conveyor, a rail sys-

tem or a robot. The box 16 can be placed in or on the box carriage system 44 to be moved in the machine direction MD. In some examples, the box 16 is placed on the box carriage system 44 such that the first sidewall 20 and the top flap 28 are provided at a downstream position relative to the box 16, and the second sidewall 22 is provided at an upstream position relative to the box 16 following the machine direction MD. In some examples, the first sidewall 20 and the top flap 28 are provided upstream, and the second sidewall 22 is provided downstream. In some examples, top flaps 28 may be located at both the upstream position and the downstream position.

[0033] While moving in the machine direction MD, the box 16 may pass below an opening mechanism 46 located above the box carriage system 44. The opening mechanism 46 is configured to move the top flap 28 to the open orientation. The process 1000 comprises opening 1030 the top flap 28, by contact of the top flap 28 and the opening mechanism 46. In some examples, the opening mechanism 46 is rotatable, and opening the top flap 28 may comprise rotating the opening mechanism 46 in a first direction. In some examples, the opening mechanism 46 comprises a first reciprocating leg 48 extending between a proximal pivot point 48.1 and a distal end 48.2 adjacent to the box carriage system 44. The proximal pivot point 48.1 allows the first reciprocating leg 48 to oscillate in a controlled motion, either in the machine direction MD or opposite the machine direction MD. As the first reciprocating leg 48 moves, the distal end 48.2 may engage the top flap 28, applying force to lift the top flap 28 to the open orientation. If the top flap 28 is positioned downstream relative to the box 16, the first reciprocating leg 48 rotates with the machine direction MD to open the top flap 28. Conversely, if the top flap 28 is positioned upstream relative to the box 16, the first reciprocating leg 48 moves opposite the machine direction MD. In some configurations, two first reciprocating legs 48 may move in opposite directions to open top flaps 28 located at opposite sidewalls 20, 22 of the box 16. In other examples, the opening mechanism 46 may comprise one or more of a tucking mechanism, a folding wheel, a flap tucker or a guiding wheel.

[0034] While the top flap 28 is in the open orientation, the opening 14 of the box 16 remains unobstructed, allowing the detergent product to be dispensed freely. The process 1000 comprises dispensing 1040 detergent product while the top flap 28 is in the open orientation. In some cases, the opening mechanism 46 may continue to hold the flap 28 open while dispensing 1040 detergent product. A dispensing system 50 may be located above the box carriage system 44 to distribute detergent product 52 while the box 16 moves in the machine direction MD. The dispensing system 50 may comprise a hopper 54 configured to hold a predetermined amount of detergent product 52 to be dispensed in the box 16. The hopper 54 may comprise an up-

stream end and a downstream end, following the machine direction MD. In some examples, the hopper 54 may include oscillating upstream and downstream legs 56, 58, wherein each leg 56, 58 has a proximal end 56.1, 58.1 pivotably mounted to the corresponding hopper end and a distal end 56.2, 58.2 that moves back and forth in the machine direction MD. The upstream and downstream legs 56, 58 may synchronize their movement with the box 16, ensuring continuous and precise dispensing of detergent as the box 16 advances in the machine direction MD. In some examples, the upstream leg 56 or the downstream leg may form the first reciprocating leg 48 of the opening mechanism 46. Opening the top flap 28 can be realized by the dispensing system 50 itself.

[0035] In some examples, following dispensing, the top flap 28 may be released by the opening mechanism 46. The process 1000 comprises 1050 allowing the top flap 28 to move towards the closed orientation. The top flap 28 may move until the top flap 28 reaches a resting position, illustrated in figure 9. The resting position corresponds to the natural position adopted by the top flap 28 when no external forces are applied to the top flap 28. Moving to the resting position may be a result of gravity, the bending resistance and the spring-back force of the top flap 28. Over time, the resting angle α may change, particularly decreasing with use, as the spring-back effect of the top flap 28 diminishes due to repeated pivoting movements during consumer product 10 use. The resting angle α facilitates placing and removing the lid 32, with limited interference of the top flap 28. The consumer can place the lid 32 without significant obstruction of the top flap 28. A resting angle α between the top flap 28 and a horizontal plane defined by the top edges 20.1, 22.1, 24.1, 26.1 of the plurality of sidewalls 20, 22, 24, 26 may be greater than 30° and preferably less than 70° .

[0036] In another example, the box 16 may further pass below a closing mechanism 60 located above the box carriage system 44. In this case, the process 1000 comprises 1050 allowing the top flap to move to the closed orientation through contact between the top flap 28 and the closing mechanism 60. The closing mechanism 60 is configured to move the top flap 28 towards the closed orientation, after detergent product 52 has been dispensed in the box 16. In some examples, the closing mechanism 60 is rotatable, and closing the top flap 28 may comprise rotating the closing mechanism 60 in a second direction, opposite the first direction. In some examples, both the opening mechanism 46 and the closing mechanism 60 are formed of the first reciprocating leg 48. In some examples, the closing mechanism 60 comprises a second reciprocating leg 62 extending between a proximal pivot point 62.1 and a distal end 62.2 adjacent to the box carriage system 44. The proximal pivot point 62.2 allows the second reciprocating leg 62 to oscillate in a controlled motion, either in the machine direction MD or opposite

the machine direction MD. As the second reciprocating leg 62 moves, the distal end 62.2 may engage the top flap 28, applying force to push the top flap 28 towards the closed orientation. If the top flap 28 is positioned downstream relative to the box 16, the second reciprocating leg 62 moves opposite machine direction MD to close it. Conversely, if the top flap 28 is positioned upstream relative to the box 16, the second reciprocating leg 62 moves in the machine direction MD. In some configurations, two second reciprocating legs 62 may move in opposite directions to close flaps 28 located on opposite sides of the box 16. In some examples, the upstream leg 56 or the downstream leg 58 may form the second reciprocating leg 62 of the closing mechanism 60. Closing the top flap 28 can be realized by the dispensing system 50 itself. In some examples, the opening mechanism 44 and the closing mechanism 60 are a single reciprocating leg. In some examples, the closing mechanism 60 is part of a second dispensing system 64 located downstream of the above-described dispensing system 50. In other examples, the closing mechanism 60 may comprise one or more of a tucking mechanism, a folding wheel, a flap tucker, a guiding wheel or a guiding rail. The closing mechanism 60 may release the top flap 28, such that the top flap 28 adopts the resting position, illustrated in figure 9. The top flap 28 may adopt the resting position as soon as 0.1 seconds or as of 0.5 seconds up to 5 seconds or up to 3 seconds or up to 1 second after the closing mechanism 60 releases the top flap 28.

[0037] After the detergent product 52 is dispensed, the process 1000 comprises providing 1060 the lid 32 to the box 16 to close the box 16 and form the consumer product 10. In some examples, a lid engagement system 66 may be provided above the box carriage system 44. The lid engagement system 66 may retain the lid 32 and engage the lid 32 with the box 16 as the box passes below the box engagement system 66. In some examples, the resting angle α of the top flap 28 is closed enough to directly engage the lid 32 with the box 16. Alternatively, there may be provided a guiding rail 68 upstream of the lid engagement system 66 configured to guide the top flap 28 to the closed orientation. The lid 32 may be placed on the box 16 upon release of the top flap 28 by the guiding rail 68, before the top flap 28 returns to the resting position. In some examples, the guiding rail 68 may act as the closing mechanism 60. In some examples, the lid 28 may be inclined by an angle θ comprised between 4° and 8° relative to the horizontal plane defined by the top edges 20.1, 22.1, 24.1, 26.1 of the plurality of sidewalls 0, 22, 24, 26. The angle θ may be oriented in the same direction as the resting angle α of the top flap 28, such that the top flap 28 does not obstruct the engagement of the lid 32.

[0038] The process 1000 also comprises shipping 1070 the closed container 12. The closed container 12 may be shipped, for example to a retail store to be sold to consumers.

Examples of the system of the present disclosure

[0039] Figure 3 illustrates a first example of a system for packaging the detergent product 52 in the box 16. In figure 3, the system is represented in the step of opening 1030 the top flap 28. In this example, the box 16 is positioned on the box carriage system 44 such that the top flap 28 is at a downstream position relative to the box 16. The dispensing system 50 comprises the hopper 54 provided above the box carriage system 44 to dispense detergent product 52 into the opening 14 as the box 16 moves in the machine direction MD. The opening mechanism 46 is formed of a single first reciprocating leg 48 hinged downstream of the hopper 54. In this example, the first reciprocating leg 48 may rotate in the machine direction MD so that the distal end 48.2 of the first reciprocating leg 48 contacts and pushes the top flap 28 to the open orientation. The detergent product 52 may be dispensed while the first reciprocating leg 48 holds the top flap 28 in the open orientation. In some examples, following dispensing, the first reciprocating leg 48 may release the top flap 28. The top flap 28 may move back to the resting position as a result of gravity, the bending resistance and the spring-back force of the top flap 28. In another example, the closing mechanism 60 may also be formed by the first reciprocating leg 48. The first reciprocating leg 60 may move in the machine direction MD until the distal end 48.2 of the first reciprocating leg 48 is downstream of the top flap 28. Then, the first reciprocating leg 48 may rotate opposite the machine direction MD so that the distal end 48.2 contacts and pushes the top flap 28 towards the closed orientation.

[0040] Figure 4 illustrates a second example of a system for packaging the detergent product 52, at the step of opening 1030 the top flap 28. In this example, the opening mechanism 46 is formed of the first reciprocating leg 48 discussed above. The closing mechanism 60 comprises a second reciprocating leg 62 located downstream of the first reciprocating leg 48. In this case, the first reciprocating leg 48 may hold the top flap 28 in the open orientation during dispensing detergent product 52. Following dispensing, the first reciprocating leg 48 may remain such that the distal end 48.2 is not moved downstream of the top flap 28. The first reciprocating leg 48 may move back opposite machine direction following dispensing without contacting the top flap 28. In this case, following dispensing detergent product 52 in the box 16, the second reciprocating leg 62 may rotate opposite the machine direction MD, the distal end 62.2 of the second reciprocating leg 62 may contact and push the top flap 28 towards the closed orientation.

[0041] Figure 5 illustrates a third example of a system for packaging detergent product 52 at the step of opening 1030 the top flap 28. In this example, the hopper 54 comprises an upstream leg 56 and a downstream leg 58 hinged at their proximal ends 56.1, 58.1 at the upstream and downstream ends of the hopper

54, respectively. The upstream and downstream legs 56, 58 may simultaneously move in the machine direction MD to follow the movement of the box 16 and to guide the detergent product 52 into the box 16 as the detergent product 52 is dispensed. The distal ends 56.2, 58.2 of the upstream leg and the downstream leg 56, 58 may remain adjacent to the first and second sidewalls 20, 22 during dispensing. In this example, the downstream leg 58 may correspond to the first reciprocating leg 48 adapted to open and close the top flap 28. In this case, following dispensing of detergent product 52, the downstream leg 58 may move in the machine direction MD until the distal end 58.2 of the downstream leg 58 is located downstream of the top flap 28. Then, the downstream leg 58 may move opposite the machine direction to push the top flap 28 towards the closed orientation. Alternatively, the downstream leg 58 may not move further downstream than the top flap 28 such that upon release of contact of the downstream leg 58 with the top flap 28, the top flap freely returns to the resting position.

[0042] Figure 6a to 6c illustrate a fourth example of a system for packaging the detergent product 52 in the box 16. In figure 6a, the system is represented in the step of opening 1030 the top flap 28. In figure 6b, the system is represented in the step 1040 of dispensing detergent product 52 in the box 16. In figure 6c, the system is represented in the step 1050 of allowing the top flap 28 to move towards the closed orientation after dispensing detergent product 52 in the box 16. In this example, a second dispensing system 64 is located above the box carriage system 44, downstream of the first dispensing system 50. The second dispensing system 64 comprises a second hopper 70. The second hopper 70 comprises a second upstream leg 72 and a second downstream leg 74 as described above. In some examples, the upstream leg distal end 56.2, the downstream leg distal end 58.2, the second upstream leg distal end 72.2 and the second downstream leg distal end 74.2 may rotate simultaneously during dispensing the detergent product 52. Detergent product 52 may for example be dispensed in two consecutive boxes 16 moving in the machine direction MD on the box carriage system 44, and throughput time may be increased. In this example, the downstream leg 58 may correspond to the first reciprocating leg 48 adapted to open the top flap 28 upon rotation in machine direction MD (see figure 6a). The detergent product 52 may be dispensed by the hopper 54 (see figure 6b). The second upstream leg 72 may correspond to the second reciprocating leg 62 adapted to close the top flap 28 upon rotation opposite machine direction MD (see figure 6c).

[0043] Figure 7 illustrates a fifth example of a system for packaging the detergent product 52 in the box 16. In figure 7, the system is represented in the step of opening 1030 the top flap 28. In this example, the box 16 is positioned on the box carriage system 44 such that the

top flap 28 is at an upstream position relative to the box 16. The opening mechanism 46 is formed of the upstream leg 56 hinged upstream of the hopper 54. The upstream leg 56 may rotate opposite the machine direction to open the top flap 28. In some examples, dispensing the detergent product 52 may occur while the upstream leg 56 and the downstream leg 58 move opposite the machine direction and while the top flap 28 is opened by the upstream leg 56. In some examples, the closing mechanism 60 may be formed of the upstream leg 56. Following dispensing, the upstream leg 56 may continue to move opposite machine direction so that the distal end 56.2 of the upstream leg 56 releases the top flap 28 and is positioned upstream of the top flap 28. Then, the upstream leg 56 may rotate in the machine direction MD to close the top flap 28. Alternatively, the closing mechanism 60 may be formed of the downstream leg 58 as it rotates in the machine direction MD following dispensing detergent product 52. Alternatively, after dispensing, the top flap 28 may be released from the upstream leg 56 so that the top flap 28 may freely return to the resting position without further contact with a reciprocating leg.

[0044] Figure 8 illustrates a fifth example of a system for packaging the detergent product. In figure 8, the system is represented at step 1060 of providing a lid 32 to the box 16. Figure 8 illustrates a guiding rail 68 and a lid engagement system 66, located downstream of the hopper 54, and optionally second hopper 70. The guiding rail 68 may be an inclined rail such that, during movement of the box 16 in the machine direction MD, the top flap 28 is guided to the closed orientation by the guiding rail 68. In some examples, the guiding rail 68 may form the closing mechanism 60 configured to move the top flap 28 towards the closed orientation. A downstream end of the guiding rail 68 may be proximate to the lid engagement system 66 such that the lid 32 may be placed on the box 16 prior to the top flap 28 fully returning to the resting position.

[0045] In some examples, a wheel is provided upstream of the guiding rail 68, the wheel being configured to push the top flap 28 from the resting position to the closed orientation to ensure it is in the closed orientation when engaging with the guiding rail 68. The wheel may provide insurance that the top flap 28 is in the closed orientation when placing the lid 32 despite variability in the resting angle between different boxes due to the flexible nature of the paper-based material. When the box 16 is positioned on the box carriage system 44 such that the top flap 28 is at an upstream position relative to the box 16, the wheel may close the top flap 28 prior to engagement with the guiding rail 68.

[0046] Any of the example systems for packaging a detergent product hereby described may comprise a controller, for example an electronic hardware or software based controller, the controller being configured to operate the system for packaging a detergent product according to any of the example processes for

packaging a detergent product hereby described. Such controller may comprise a processor and a computer instructions non-transitory computer readable storage medium connected to the processor, the storage medium comprising instructions to operate the system for packaging a detergent product according to any of the example processes for packaging a detergent product hereby described.

Detergent composition

[0047] In some examples, the consumer product comprises at least one water-soluble unit dose article and the container. The consumer product can be sold 'as is', in other words the consumer product is the item that the consumer picks up from the shelf. Alternatively, the consumer product could be housed as one unit of a multi-component product. For example, more than one consumer product could be housed within an outer package and the multiple packaged consumer products sold together in a single purchase. The consumer product may comprise aesthetic elements, for example shrink sleeves or labels attached to the container. Alternatively, the container may be coloured or printed with aesthetic elements or informative print such as usage instructions.

[0048] In some examples a water-soluble unit dose article comprises at least one water-soluble film orientated to create at least one-unit dose internal compartment, wherein the at least one-unit dose internal compartment comprises a detergent composition. The water-soluble film and the detergent composition are described in more detail below. In some examples the consumer product comprises at least one water-soluble unit dose article, in some cases at least two water-soluble unit dose articles, in some cases at least 10 water-soluble unit dose articles, in some cases at least 20 water-soluble unit dose articles, in some cases at least 30 water-soluble unit dose articles, in some cases at least 40 water-soluble unit dose articles, in some cases at least 45 water-soluble unit dose articles. A water-soluble unit dose article is in some examples in the form of a pouch. A water-soluble unit dose article comprises in some examples a unitary dose of a composition as a volume sufficient to provide a benefit in an end application. The water-soluble unit dose article comprises in some examples one water-soluble film shaped such that the unit-dose article comprises at least one internal compartment surrounded by the water-soluble film. The at least one compartment comprises a cleaning composition. The water-soluble film is sealed such that the cleaning composition does not leak out of the compartment during storage. However, upon addition of the water-soluble unit dose article to water, the water-soluble film dissolves and releases the contents of the internal compartment into the wash liquor. The unit dose article may comprise more than one compartment, at least two compartments, or at

least three compartments, or at least four compartments, or even at least five compartments. The compartments may be arranged in superposed orientation, i.e. one positioned on top of the other. Alternatively, the compartments may be positioned in a side-by-side orientation, i.e. one orientated next to the other. The compartments may be orientated in a 'tyre and rim' arrangement, i.e. a first compartment is positioned next to a second compartment, but the first compartment at least partially surrounds the second compartment, but does not completely enclose the second compartment. Alternatively, one compartment may be completely enclosed within another compartment. In some examples the unit dose article comprises at least two compartments, one of the compartments being smaller than the other compartment. In some examples the unit dose article comprises at least three compartments, two of the compartments may be smaller than the third compartment, and in some examples the smaller compartments being superposed on the larger compartment. In some examples the unit dose article comprises up to six compartments of which up to five compartments are smaller compartments superposed on the larger compartment. The superposed compartments are in some examples orientated side-by-side. In some examples each individual unit dose article may have a weight of between 10g and 40g, or even between 15g and 35g. The water-soluble film may be soluble or dispersible in water. Prior to being formed into a unit dose article, the water-soluble film has in some examples a thickness of from 20 to 150 micron, in other examples 35 to 125 micron, in further examples 50 to 110 micron, in yet further examples about 76 micron. Example water soluble film materials comprise polymeric materials. The film material can, for example, be obtained by casting, blow-moulding, extrusion or blown extrusion of the polymeric material. In some examples, the water-soluble film comprises polyvinyl alcohol homopolymer or polyvinyl alcohol copolymer, for example a blend of polyvinylalcohol homopolymers and/or polyvinylalcohol copolymers, for example wherein the polyvinyl alcohol copolymers are selected from sulphonated and carboxylated anionic polyvinylalcohol copolymers especially carboxylated anionic polyvinylalcohol copolymers, for example the water-soluble comprises a blend of a polyvinylalcohol homopolymer and a carboxylated anionic polyvinylalcohol copolymer, or alternatively a blend of polyvinyl alcohol homopolymers. Alternatively the polyvinyl alcohol in the water-soluble film consists of an anionic polyvinylalcohol copolymer, especially a carboxylated polyvinylalcohol copolymer. In some examples water soluble films are those supplied by Monosol under the trade references M8630, M8900, M8779, M8310. In some examples the film may be opaque, transparent or translucent. The film may comprise a printed area. The area of print may be achieved using techniques such as flexographic printing or inkjet printing. The film may com-

prise an aversive agent, for example a bittering agent. Suitable bittering agents include, but are not limited to, naringin, sucrose octaacetate, quinine hydrochloride, denatonium benzoate, or mixtures thereof. Example levels of aversive agent include, but are not limited to, 1 to 5000ppm, 100 to 2500ppm, or 250 to 2000ppm. The water-soluble film or water-soluble unit dose article or both may be coated with a lubricating agent. In some examples, the lubricating agent is selected from talc, zinc oxide, silicas, siloxanes, zeolites, silicic acid, alumina, sodium sulphate, potassium sulphate, calcium carbonate, magnesium carbonate, sodium citrate, sodium tripolyphosphate, potassium citrate, potassium triphosphate, calcium stearate, zinc stearate, magnesium stearate, starch, modified starches, clay, kaolin, gypsum, cyclodextrins or mixtures thereof.

[0049] In some examples the container comprises a first part, wherein the first part comprises a first compartment in which the at least one water-soluble unit dose article is contained. In some examples the first compartment comprises at least two water-soluble unit dose articles. The first compartment may comprise between 1 and 80 water-soluble unit dose articles, between 1 and 60 water-soluble unit dose articles, between 1 and 40 water-soluble unit dose articles, or between 1 and 20 water-soluble unit dose articles. The volume of the first compartment may be between 500ml and 5000ml, in some examples between 800ml and 4000ml.

[0050] In some examples the detergent product comprises a detergent composition. The detergent composition may be a laundry detergent composition, an automatic dishwashing composition, a hard surface cleaning composition, or a combination thereof. The detergent composition may comprise a solid, a liquid or a mixture thereof. The term liquid includes a gel, a solution, a dispersion, a paste, or a mixture thereof. The solid may be a powder. By powder we herein mean that the detergent composition may comprise solid particulates or may be a single homogenous solid. In some examples, the powder detergent composition comprises particles. This means that the powder detergent composition comprises individual solid particles as opposed to the solid being a single homogenous solid. The particles may be free-flowing or may be compacted. A laundry detergent composition can be used in a fabric hand wash operation or may be used in an automatic machine fabric wash operation, for example in an automatic machine fabric wash operation. Example laundry detergent compositions comprise a non-soap surfactant, wherein the non-soap surfactant comprises an anionic non-soap surfactant and a non-ionic surfactant. In some examples, the laundry detergent composition comprises between 10% and 60%, or between 20% and 55% by weight of the laundry detergent composition of the non-soap surfactant. Example weight ratio of non-soap anionic surfactant to nonionic surfactant are from 1:1 to 20:1, from 1.5:1 to 17.5:1,

from 2:1 to 15:1, or from 2.5:1 to 13:1. Example non-soap anionic surfactants comprises linear alkylbenzene sulphonate, alkyl sulphate or a mixture thereof. Example weight ratio of linear alkylbenzene sulphonate to alkyl sulphate are from 1:2 to 9:1, from 1:1 to 7:1, from 1:1 to 5:1, or from 1:1 to 4:1. Example linear alkylbenzene sulphonates are C10-C16 alkyl benzene sulfonic acids, or C11-C14 alkyl benzene sulfonic acids. By 'linear', we herein mean the alkyl group is linear. Example alkyl sulphate anionic surfactant may comprise alkoxy-
 5 alky sulphate or non-alkoxylated alkyl sulphate or a mixture thereof. Example alkoxyalkyl sulphate anionic surfactant comprise an ethoxylated alkyl sulphate anionic surfactant. Example alkyl sulphate anionic surfactant may comprise an ethoxylated alkyl sulphate anionic surfactant with a mol average degree of ethoxylation from 1 to 5, from 1 to 3, or from 2 to 3. Example alkyl sulphate anionic surfactant may comprise a non-ethoxylated alkyl sulphate and an ethoxy-
 10 lated alkyl sulphate wherein the mol average degree of ethoxylation of the alkyl sulphate anionic surfactant is from 1 to 5, from 1 to 3, or from 2 to 3. Example alkyl fraction of the alkyl sulphate anionic surfactant are derived from fatty alcohols, oxo-synthesized alcohols, Guerbet alcohols, or mixtures thereof. In some exam-
 15 ples, the laundry detergent composition comprises between 10% and 50%, between 15% and 45%, between 20% and 40%, or between 30% and 40% by weight of the laundry detergent composition of the non-soap anionic surfactant. In some examples, the non-ionic surfactant is selected from alcohol alkoxy-
 20 late, an oxo-synthesized alcohol alkoxy-
 25 late, Guerbet alcohol alkoxy-
 30 lates, alkyl phenol alcohol alkoxy-
 35 lates, or a mixture thereof. In some examples, the laundry detergent composition comprises between 0.01% and 10%, between 0.01% and 8%, between 0.1% and 6%, or between 0.15% and 5% by weight of the liquid laundry detergent composition of a non-ionic surfactant. In some exam-
 40 ples, the laundry detergent composition comprises between 1.5% and 20%, between 2% and 15%, between 3% and 10%, or between 4% and 8% by weight of the laundry detergent composition of soap, in some exam-
 45 ples a fatty acid salt, in some examples an amine neutralized fatty acid salt, wherein in some examples the amine is an alkanolamine for example selected from monoethanolamine, diethanolamine, triethanolamine or a mixture thereof, in some examples monoethanolamine. In some examples, the laundry detergent composition is a liquid laundry detergent composition. In some examples the liquid laundry detergent composition comprises less than 15%, or less than 12% by weight of the liquid laundry detergent composition of water. In some examples, the laundry detergent composition is a liquid laundry detergent composition comprising a non-aqueous solvent selected from 1,2-propanediol, dipropylene glycol, tripropyleneglycol, glycerol, sorbitol, polyethylene glycol or a mixture thereof. In some exam-
 50 ples, the liquid laundry detergent composition com-

prises between 10% and 40%, or between 15% and 30% by weight of the liquid laundry detergent composition of the non-aqueous solvent. In some examples, the laundry detergent composition comprises a perfume. In some examples, the laundry detergent composition comprises an adjunct ingredient selected from the group comprising builders including enzymes, citrate, bleach, bleach catalyst, dye, hueing dye, brightener, cleaning polymers including alkoxyalkylated polyamines and polyethyleneimines, soil release polymer, surfac-
 10 tant, solvent, dye transfer inhibitors, chelant, encapsulated perfume, polycarboxylates, structurant, pH trimming agents, and mixtures thereof. In some examples, the laundry detergent composition has a pH between 6 and 10, between 6.5 and 8.9, or between 7 and 8, wherein the pH of the laundry detergent composition is measured as a 10% product concentration in demineralized water at 20°C. When liquid, the laundry detergent composition may be Newtonian or non-Newtonian. In some examples, the liquid laundry detergent composition is non-Newtonian. Without wishing to be bound by theory, a non-Newtonian liquid has properties that differ from those of a Newtonian liquid, more specifically, the viscosity of non-Newtonian liquids is dependent on shear rate, while a Newtonian liquid has a constant viscosity independent of the applied shear rate. The decreased viscosity upon shear application for non-Newtonian liquids is thought to further facilitate liquid detergent dissolution. The liquid laundry detergent composition described herein can have any suitable viscosity depending on factors such as formulated ingredients and purpose of the composition.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm".

Claims

1. A process for packaging a detergent product (52) in a container (12), the container (12) being made of a paper-based material, the container (12) comprising a box (16) and a lid (32),

the box (16) comprising:

- a base (18);
- a plurality of sidewalls (20, 22, 24, 26) extending from the base (18), each sidewall having a top edge (20.1, 22.1, 24.1, 26.1) opposite the base (18);
- an opening (14) opposite the base (18); and
- a top flap (28) hinged or connected to the

top edge (20.1) or near the top edge (20.1) of a first sidewall (20) of the plurality of sidewalls (20, 22, 24, 26), the top flap (28) being foldable between an open orientation and a closed orientation, wherein the top flap (28) covers at least part of the opening (14) when in the closed orientation, the top flap (28) having a distal edge (30) separated from the top edge (20.1) of the first sidewall (20) by a distance corresponding to up to 95 % of a distance between the first sidewall (20) and a second sidewall (22) of the plurality of sidewalls (20, 22, 24, 26) opposite the first sidewall (20);

wherein the process comprises:

- manufacturing the detergent product (52);
- providing a box carriage system (44) configured to move the box (16) in a machine direction (MD);
- positioning the box (16) in or on the box carriage system (44),
- moving the box (16) in the machine direction (MD), and while the box (16) moves in the machine direction (MD):
 - o providing contact between an opening mechanism (46) located above the box carriage system (44) and the top flap (28) to move the top flap (28) to the open orientation;
 - o dispensing detergent product (52) into the box (16) through the opening (14) while the top flap (28) is in the open orientation;
 - o in response to the dispensing, allowing the top flap (28) to move towards the closed orientation;
 - o allowing the top flap (28) to move towards the closed orientation, wherein allowing the top flap (28) to move towards the closed orientation optionally comprises providing contact between a closing mechanism (60) located above the box carriage system (44) and the top flap (28);
 - o in response to moving the top flap towards the closed orientation, providing the lid (32) to the box (16) for covering the opening (14) of the box (16) and form a closed container (12); and
- shipping said closed container (12).

2. The process according to claim 1, wherein dispen-

sing detergent product (52) into the box (16) occurs while the top flap (28) is held in the open orientation by the opening mechanism (46).

3. The process according to any of claims 1 or 2, wherein providing contact between the opening mechanism (46) located above the box carriage system (44) and the top flap (28) comprises rotating the opening mechanism (46) in a first direction.
4. The process according to claim 3, wherein providing contact between the closing mechanism (60) located above the box carriage system (44) and the top flap (28) comprises rotating the closing mechanism (60) in a second direction, opposite the first direction.
5. The process according to any of claims 3 or 4, wherein the opening mechanism (46) comprises a first reciprocating leg (48) having a distal end (48.2), and wherein rotating the opening mechanism (46) in the first direction comprises rotating the first reciprocating leg (48) such that the distal end (48.2) of the first reciprocating leg (48) contacts the top flap (28) and pushes the top flap (28) to the open orientation.
6. The process according to claim 5, wherein the closing mechanism (60) comprises the first reciprocating leg (48), and wherein rotating the closing mechanism (60) in the second direction comprises rotating the first reciprocating leg (48) such that the distal end (48.2) of the first reciprocating leg (48) contacts the top flap (28) and pushes the top flap (28) towards the closed orientation.
7. The process according to claim 5, wherein the closing mechanism (60) comprise a second reciprocating leg (62), located downstream of the first reciprocating leg (48) following the machine direction, and the second reciprocating leg (62) comprises a distal end (62.2), and wherein rotating the closing mechanism (60) in the second direction comprises rotating the second reciprocating leg (62.2) such that the distal end (62.2) of the second reciprocating leg (62) contacts the top flap (28) and pushes the top flap (28) towards the closed orientation.
8. The process according to any of claims 3 to 7, wherein positioning the box (16) in or on the box carriage system (44) is such that the top flap (28) is at a downstream position and the second sidewall (22) is at an upstream position following the machine direction, and wherein the first direction to open the top flap (28) corresponds to the machine direction.

9. The process according to any of claims 1 to 8, wherein dispensing the detergent product (52) is realized by a dispensing system (50) located above the box carriage system (44), the dispensing system (50) comprising:

- a detergent product hopper (54) having a downstream end and an upstream end;
- a downstream leg (58) provided at the downstream end; and
- an upstream leg (56) provided at the upstream end;

wherein dispensing detergent product (52) into the box (16) comprises guiding the detergent product (52) between the upstream leg (56) and the downstream leg (58).

10. The process according to claim 9, wherein the upstream leg (56) comprises a pivotable upstream leg distal end (56.2) and the downstream leg (58) comprises a pivotable downstream leg distal end (58.2), and dispensing detergent product (52) into the box (16) comprises simultaneously rotating the upstream leg distal end (56.2) and the downstream leg distal end (58.2) in the machine direction.

11. The process according to any of claims 8 or 9, in combination with any of claims 5 to 7, wherein the downstream leg (58) is the first reciprocating leg (48) and is configured to guide the detergent product (52) and to move the top flap (28) to the open orientation.

12. The process according to any of claims 10 or 11, wherein a second dispensing system (64) is located above the box carriage system (44), downstream of the dispensing system (50), the second dispensing system (64) comprising:

- a second detergent product hopper (70) having a downstream end and an upstream end;
- a second downstream leg (74) provided at the downstream end, the second downstream leg comprising a second pivotable downstream leg distal end (74.2); and
- a second upstream leg (72) provided at the upstream end, the second upstream leg (72) comprising a second pivotable upstream distal end (72.2);

and dispensing detergent product (52) into the box (16) comprises rotating synchronously the upstream leg distal end (56.2), the downstream leg distal end (58.2), the second upstream leg distal end (72.2) and the second downstream leg distal end (74.2) in the machine direction.

13. The process according to claim 12, in combination with claim 7, wherein the second upstream leg (72) is the second reciprocating leg (62) and is configured to move the top flap (28) towards the closed orientation.

14. The process according to any of claims 1 to 13, wherein providing a lid (32) to the box comprises:

- providing a guiding rail (68) configured to push the top flap (28) to the closed orientation;
- providing a lid engagement system (66) above said box carriage system (44) and downstream of said dispensing system (50), wherein the lid (32) is positioned within the lid engagement system (55);
- releasing the top flap (28) from the guiding rail (68) such that the top flap (28) moves from the closed orientation towards a resting angle (α), the resting angle being formed between the top flap (28) and a horizontal plane defined by the top edges (20.1, 22.1, 24.1, 26.1) of the plurality of sidewalls (20, 22, 24, 26) and being below 70°;
- engaging the lid (32) with the box (16) after releasing the top flap (28) from the guiding rail (68) via the lid engagement system (66) to close the box (16) and form the closed container (12), wherein engaging the lid (32) preferably occurs while the top flap (28) moves from the closed orientation towards the resting angle (α).

15. A system for packaging a detergent product (52) in a container (12), the container (12) being made of a paper-based material, the container (12) comprising a box (16) and a lid (32),

the box (16) comprising:

- a base (18);
- a plurality of sidewalls (20, 22, 24, 26) extending from the base (18), each sidewall having a top edge (20.1, 22.1, 24.1, 26.1) opposite the base (18);
- an opening (14) opposite the base (18); and
- a top flap (28) hinged or connected to the top edge (20.1) or near the top edge (20.1) of a first sidewall (20) of the plurality of sidewalls (20, 22, 24, 26), the top flap (28) being foldable between an open orientation and a closed orientation, wherein the top flap (28) covers at least part of the opening (14) when in the closed orientation, the top flap (28) having a distal edge (30) separated from the top edge (20.1) of the first sidewall (20) by a distance corre-

sponding to up to 95 % of a distance between the first sidewall (20) and a second sidewall (22) of the plurality of sidewalls (20, 22, 24, 26) opposite the first sidewall (20);

5

and the system comprising:

- a detergent product making unit configured to provide detergent product (52); 10
- a box carriage system (44), the box carriage system (44) being configured to move the box (16) placed thereon or therein in a machine direction (MD);
- a dispensing system (50) positioned above the box carriage system (44) and configured to dispense detergent product (52) into the box (16) preferably while the box moves in the machine direction (MD); 15
- an opening mechanism (46) located above the box carriage system (44) to move the top flap (28) to the open orientation and, 20
- optionally, a closing mechanism (60) located above the box carriage system (44) to move the top flap (28) towards the closed orientation after dispensing detergent product (52), and 25
- a lid engagement system (66) located above the box carriage system (44) and configured to cover the opening (14) of the box (16) and form a closed container (12). 30

16. The system according to claim 15, wherein the dispensing system (50) comprises: 35

- a detergent product hopper (54) having a downstream end and an upstream end;
- a downstream leg (58) provided at the downstream end and comprising a pivotable downstream distal end (58.2); and 40
- an upstream leg (56) provided at the upstream end and comprising a pivotable upstream distal end (56.2); 45

and wherein the opening mechanism (46) comprises the downstream leg (58) configured to position the top flap (28) in the open orientation. 50

17. The system according to claim 16, further comprising a second dispensing system (64), downstream of the dispensing system (50), the second dispensing system (64) comprising: 55

- a second detergent product hopper (70) having a downstream end and an upstream end;
- a second downstream leg (74) provided at

the downstream end and comprising a second pivotable downstream distal end (74.2); and
- a second upstream leg (72) provided at the upstream end and comprising a second pivotable upstream distal end (72.2);

and wherein the closing mechanism (60) comprise the second upstream leg (72) configured to move the top flap (28) towards the closed orientation after dispensing detergent product (52) into the box (16).

FIG. 1

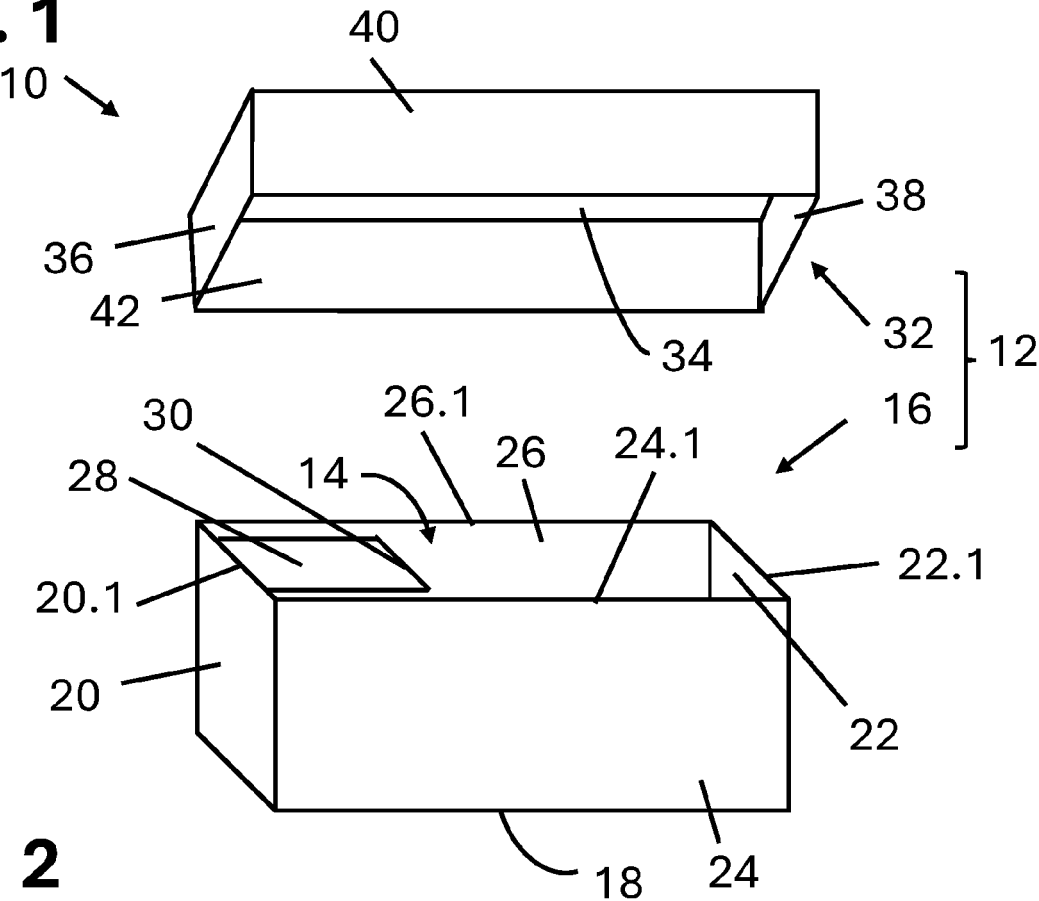


FIG. 2

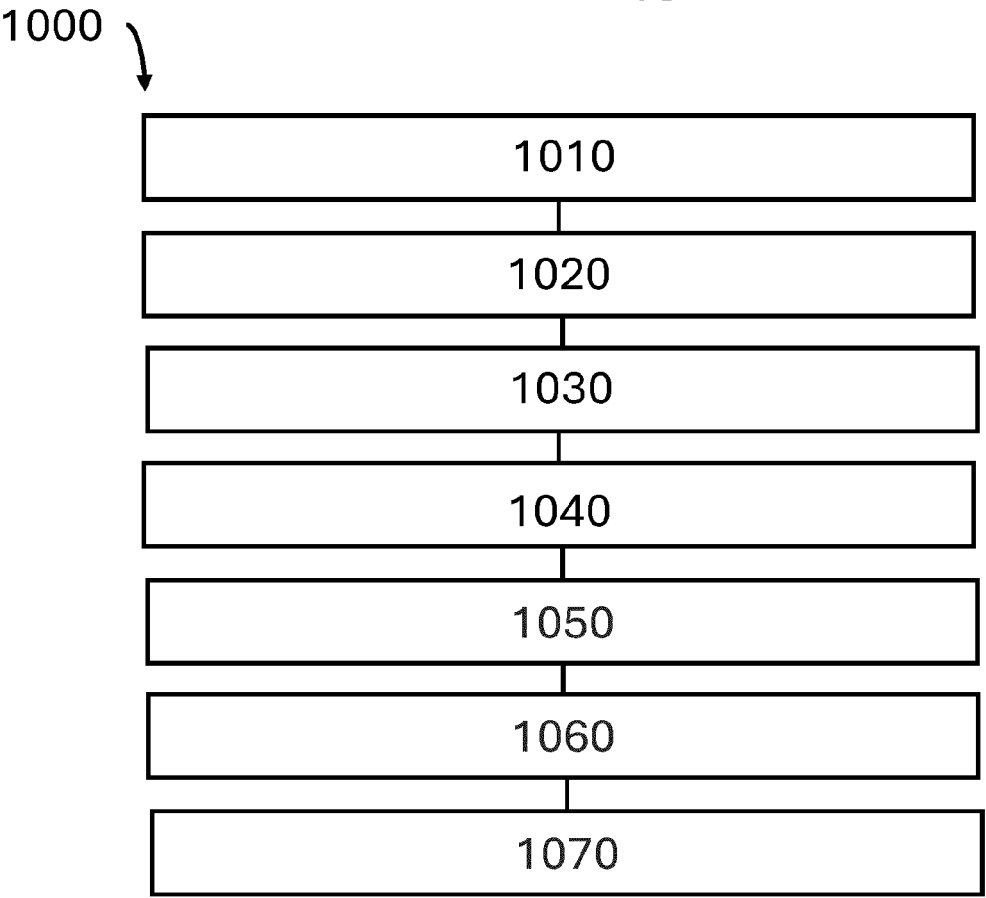


FIG. 3

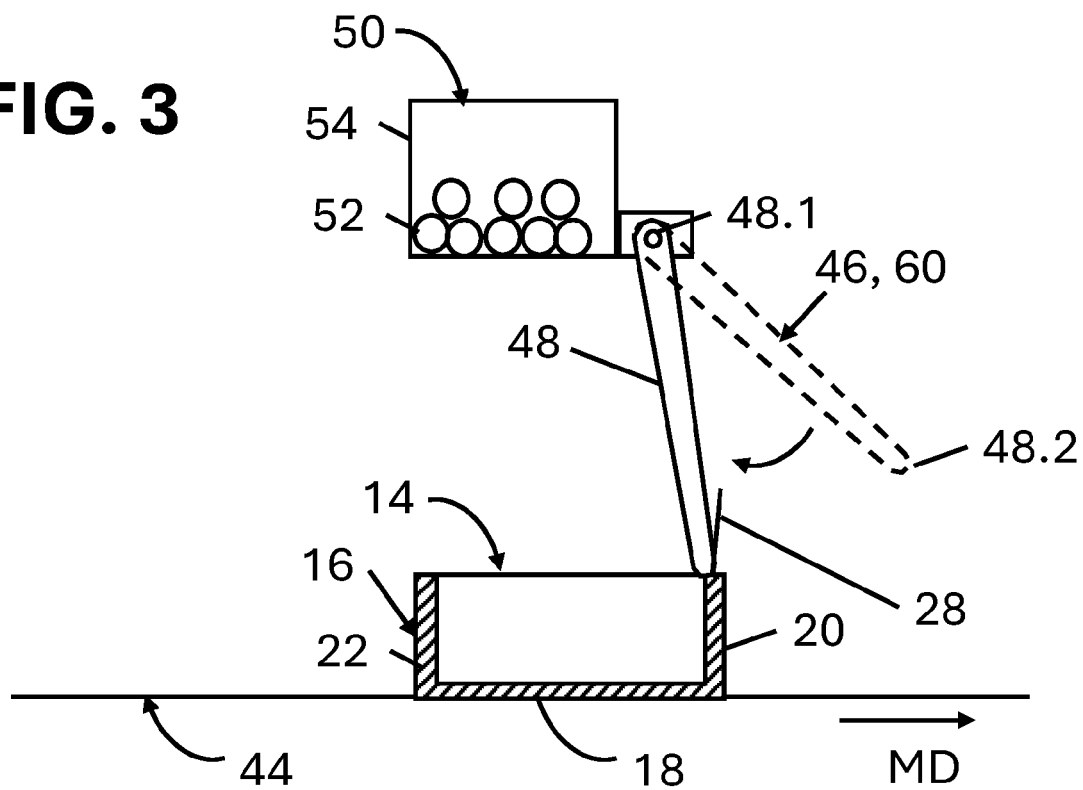


FIG. 4

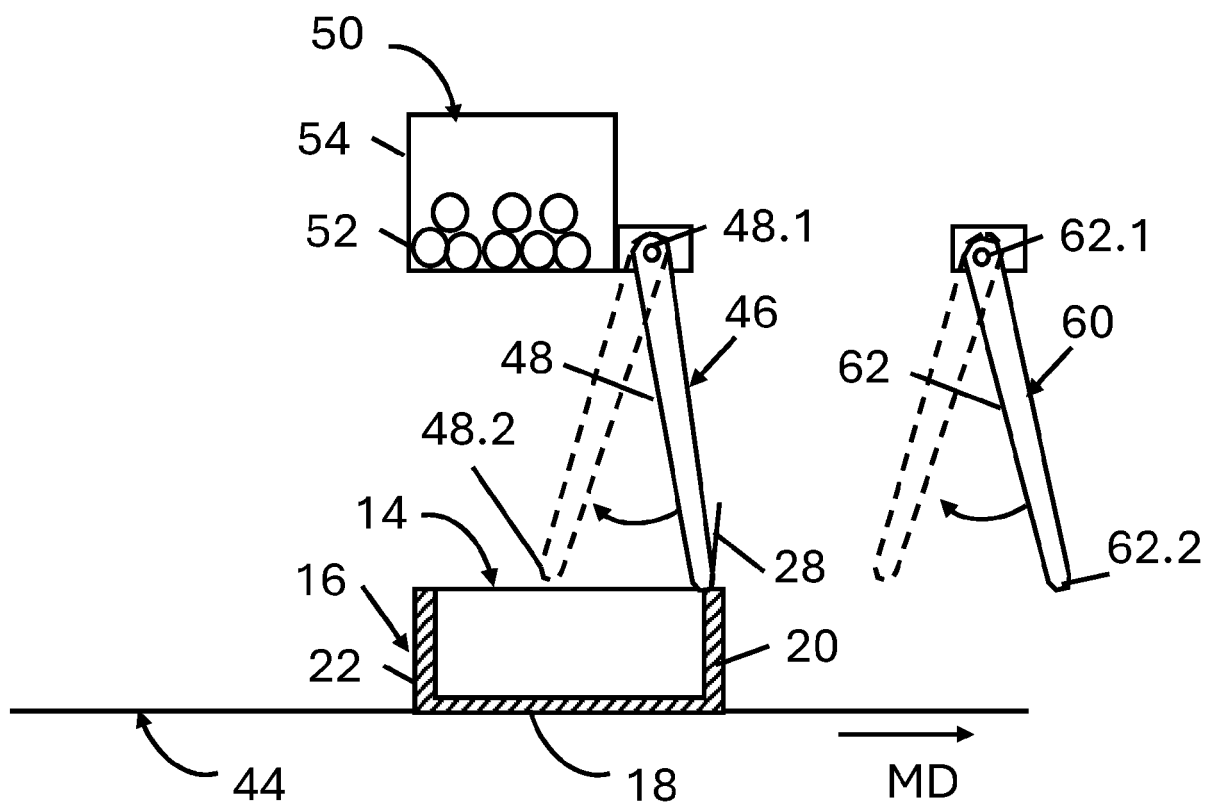


FIG. 5

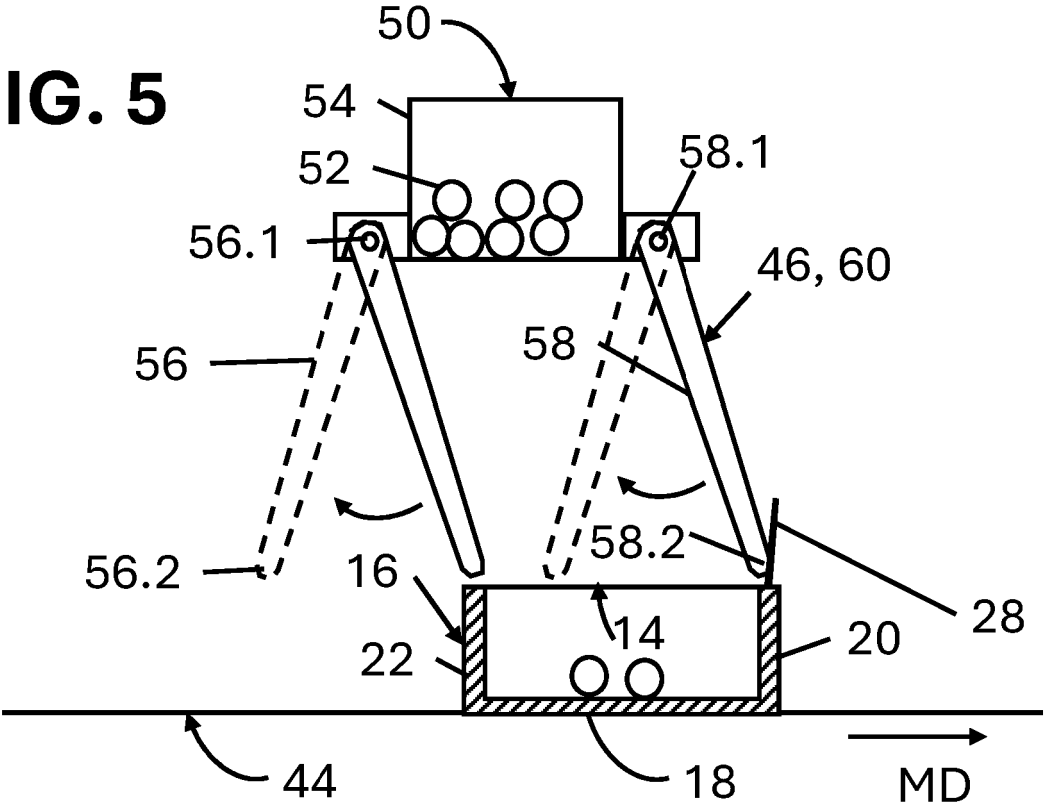


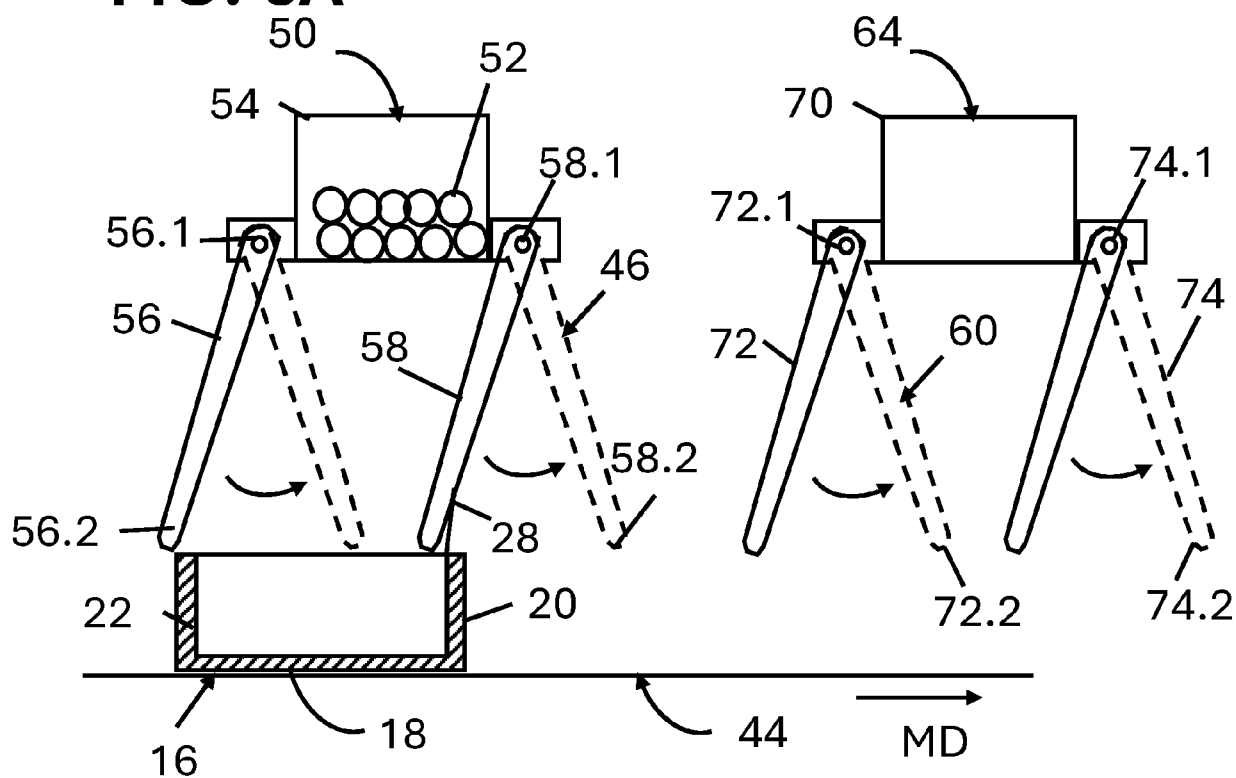
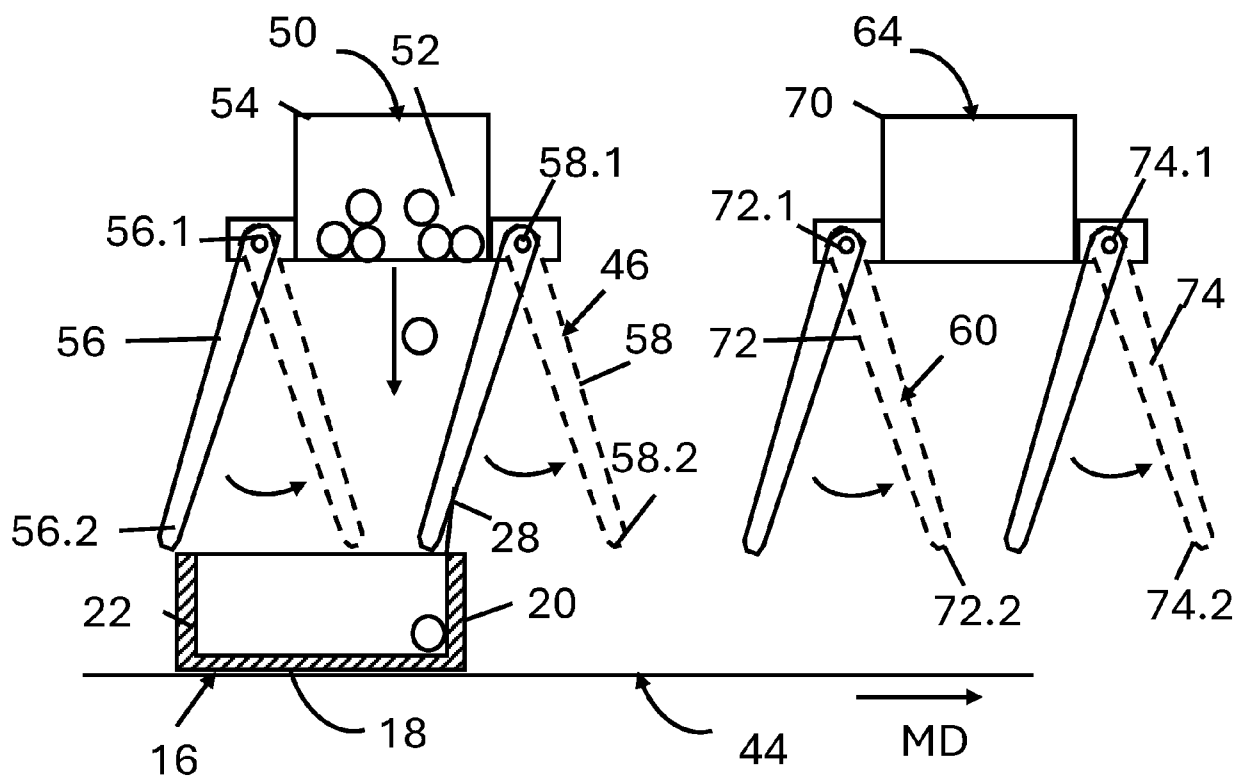
FIG. 6A**FIG. 6B**

FIG. 8

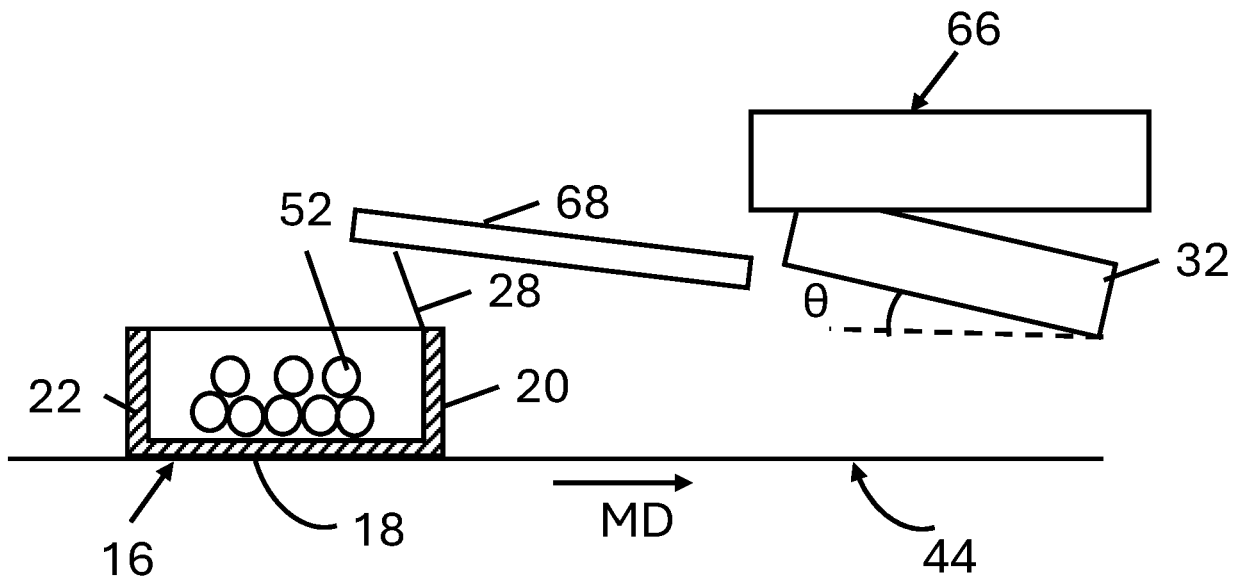
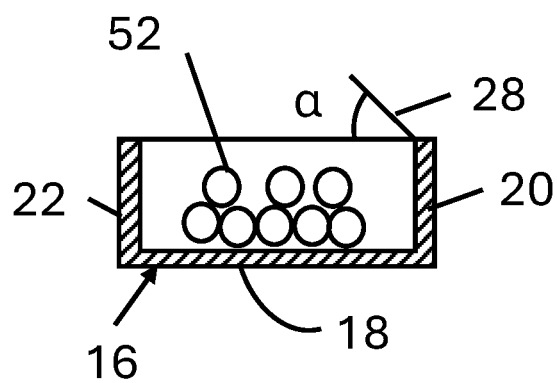


FIG. 9





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