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(54) **TRAY**

(57) A Tray (1) for holding items (2) is provided. The tray (1) comprises a main body (3) having a plate like shape, at least one flap (4) being arranged at an edge (5) of the main body (3), at least one transition element (6) which connects the at least one flap (4) with the main body (3) and which is configured such that the at

least one flap (4) is moveable between a holding position and a retracted position. In the retracted position the at least one flap (4) is bent toward the main body (3). Further, a method of producing a tray (1) is provided.

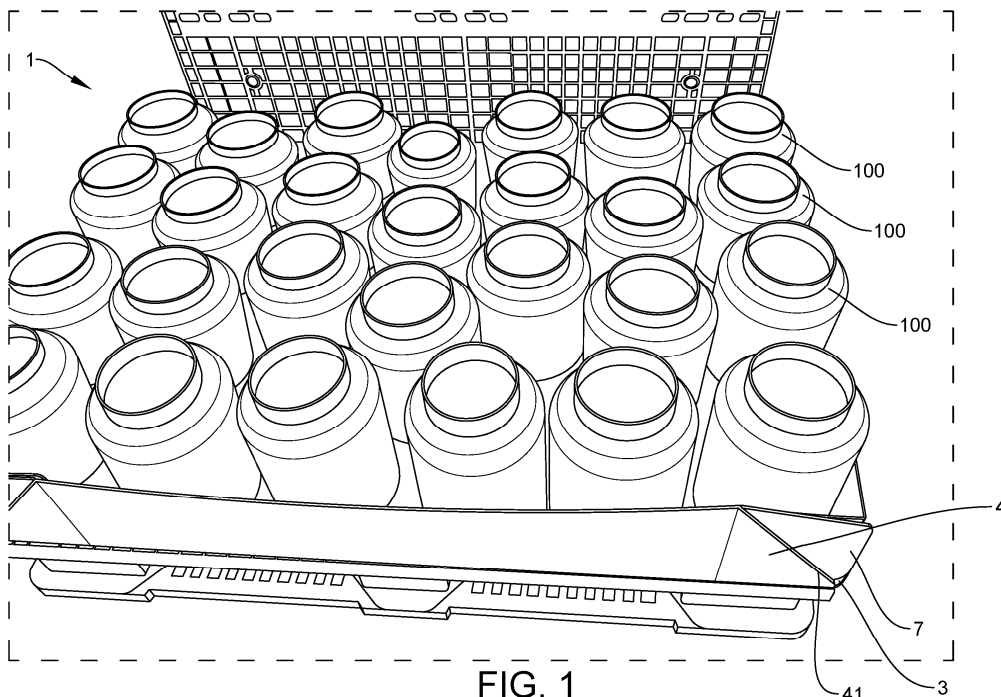


FIG. 1

EP 4 818 065 A1

Description

[0001] The present disclosure relates to a tray for holding items and a method of producing the tray. In more detail, the present disclosure relates to packaging systems and methods for arranging and protecting items during storage and transportation. Specifically, the present disclosure pertains to the use of a tray as a top cover or as an intermediate layer between stacked items, enhancing stability and protection in stacked configurations.

[0002] In the field of packaging and storage solutions, trays are commonly used to hold and organize various items. Known systems typically involve trays with fixed dimensions and rigid structures, which can limit their versatility and adaptability for different applications. Traditional trays often have fixed side walls and are made of cardboard, making it challenging to accommodate items of varying sizes or to optimize space utilization. In addition, reuse of the known trays is not possible. Despite their widespread use, conventional trays can be cumbersome to store and transport when not in use, as they do not offer any adaptability.

[0003] Despite the substantial advances in the field of tray design and manufacturing, there remains a need for improved solutions that offer greater flexibility, adaptability, and efficiency. It is therefore a problem underlying the present invention to provide a tray system that at least partially overcomes the disadvantages of known systems.

[0004] It is an object of this invention to provide a tray that overcomes one or more of the disadvantages of known systems.

[0005] According to an aspect of the present disclosure tray for holding items is provided. The tray may comprise a main body having a plate like shape, at least one flap being arranged at an edge of the main body, at least one transition element which connects the at least one flap with the main body and which is configured such that the at least one flap is moveable between a holding position and a retracted position. In the retracted position the at least one flap may be bent toward the main body.

[0006] The subject matter involves a tray designed for holding items such as jars, cans, or bottles. The tray includes a main body with a plate-like shape, providing a flat surface for placing items. An edge of the main body features at least one flap, which is connected to the main body via a transition element. This transition element allows the flap to move between a holding position and a retracted position. The transition element may have at least one axis of rotation. That is, the transition element may be bent at one position (in a cross section if the transition element) in order to move the at least one flap between the retracted position and the holding position. In other words, the transition element may be configured to be bent only at one position (i.e., exclusively around one axis). In the retracted posi-

tion, the flap bends towards the main body. In other words, the flap is towards the center of the main body. The term "tray" refers to a reusable container designed to hold items such as bottles. "Flap" denotes a movable part of the tray that can be adjusted to various positions. "Main body" indicates the primary structure of the tray. The transition element may form a uniform piece with the main body and the at least one flap. The transition element may have two folds permitting moving of the flap between the retracted position and the holding position.

[0007] The main body offers a stable base for items. The flap at the edge enhances the tray's ability to secure items, preventing them from falling off. The transition element ensures flexibility, allowing the flap to be positioned as needed. When retracted, the flap's bent position saves space and facilitates stacking, aiding in efficient transport and storage. The main body may have four edges. At least one flap may be provided at one of these edges. Optionally, a flap may be provided at each of these edges. The flap provided at an edge of the main body may substantially extend along the whole edge. Accordingly, items can be securely held. The tray may be made of plastic material. Accordingly, the tray may be reusable. Further, the tray may be washable. Thus, the tray is usable in the food industry, for example. Further, the tray may be light weight which may reduce transport costs. The size of the tray may be substantially 1179mm x 778mm x 156mm (length, width, height) in the retracted position. The tray may weight substantially 1000g. The items may be put onto the tray automatically. Thus, the efficiency of using the tray may be increased.

[0008] In addition, the tray may be transferred between the retracted position and the holding position automatically. In the holding position, the at least one flap may be oriented substantially 90° with respect to the main body. The tray may be configured such that the tray has a larger size in the holding position than in the retracted position. That is, the circumference length of the tray (e.g., in a top view) is larger in the holding position. Accordingly, in the retracted position the tray may need less space. In more detail, the transition element may be configured to have a bigger extension in the plane of the main body when the tray is in the holding position (e.g., in a top view). In other words, the transition element may be configured to have a smaller extension in the plane of the main body when the tray is in the retracted position (e.g., in a top view). Therefore, trays being in the retracted position may be stacked into a tray being in the holding position.

[0009] Further, the at least one flap may be maintained in the holding position once the holding position is entered. A magnet or a protruding pin-like extension that snaps into a holding position by slightly overstretching the flap permits to fix the extended flap in a 90° angle to the main body and avoiding its collapse. From the holding position, the at least one flap may

return to the retracted position only by actively applied force (e.g., a pushing force pushing the flap back toward the retracted position). Thus, the flaps may be maintained erected in the holding position, once they have entered the holding position. Accordingly, an unwanted transition back to the retracted position may be avoided. The at least one flap may be held in the holding position by a connection element connecting a flap with an adjacent one (e.g., oriented substantially orthogonal to each other). Additionally or alternatively, the at least one flap may be maintained erected (i.e., in the holding position) by a reinforcement element which connects the flap with the main body. Further, the flap itself may be configured to keep standing in the holding position. In other words, the at least one flap can have a bending edge so that the at least one flap does not move by itself from the holding position to the retracted position. Accordingly, the tray may be maintained in the holding position such that a loading of the tray may be facilitated.

[0010] Optionally the transition element has at least two axes of rotation. This feature enhances the mechanism of communication between the components by providing a more versatile and flexible movement of the flap. The inclusion of at least two axes of rotation allows the flap to pivot and rotate such that the flap may be placed on the main body, thereby offering improved adaptability in positioning the flap relative to the main body. This can be particularly beneficial in scenarios where the tray needs to accommodate items of varying sizes and shapes, as the flap can be adjusted more precisely to secure the items effectively. Additionally, the multiple axes of rotation can contribute to the durability and longevity of the tray by distributing the mechanical stress more evenly across the transition element, reducing the likelihood of wear and tear. In other words, the transition element may be bent at two positions. Each position may allow the transition element to be deviated around an individual axis of rotation. The enhanced movement capability provided by the two axes of rotation also facilitates easier manipulation of the flap, making the tray more user-friendly and efficient in practical applications. In other words, the transition element may be rotated at each axis not more than 90° in order to place the flap on the main body. Thereby, the stability of the transition element may be maintained. This improvement in the transition element's design underscores the tray's functionality and versatility, making it a more robust solution for holding items securely while allowing for convenient retraction when not in use.

[0011] In a further implementation, the two axes of rotation are parallel to each other and the edge of the main body. In other words, a specific configuration for the tray, focusing on the relationship between the axes of rotation and the edge of the main body is defined. This parallel arrangement of the axes of rotation provides a more stable and predictable movement for the

flaps, ensuring that they can be easily and reliably transitioned between the holding position and the retracted position. The parallel configuration enhances the mechanical efficiency of the tray, allowing for smoother and more controlled movements of the flaps. This feature is particularly beneficial in applications where precise positioning and secure holding of items are critical. By having the axes of rotation parallel to each other and to the edge of the main body, the tray can achieve a more uniform and consistent operation, reducing the likelihood of misalignment or mechanical failure. This design also simplifies the construction and maintenance of the tray, as the parallel axes can be more easily integrated into the overall structure without requiring complex mechanisms or additional components. Further, the axes can be spaced apart from each other. Therefore, the thickness of the flap and of the main body can be compensated when the flap is put onto the main body. In more detail, the distance between the first axis and the second axis may be at least half the thickness of the main body and/or of the flap. Thus, the retracted position is more compact.

[0012] Optionally the transition element has a smaller material thickness as compared to the main body. The tray is reusable and made from plastic material, designed to be used multiple times, targeting up to 50 uses. The transition element, having reduced material thickness, enhances the tray's flexibility and ease of folding, which is beneficial for both manual and automated processes. The thinner transition element also contributes to effective drying using spin drying machines, making the tray suitable for food packaging applications where washing and drying are necessary. That is, during drying process the transition element may function as a duct and may guide water towards a drain hole in order to discharge the water.

[0013] Optionally, in the holding position the at least one flap encloses an angle in a range of 80° to 100°, preferably 85° to 95°, with the main body. The flap is a movable part of the tray that can be adjusted to secure items within the tray. The main body refers to the primary structure of the tray that provides support and containment. The specified angle range ensures the flap remains stable and doesn't collapse inward, facilitating efficient placement of items such as bottles. This design enhances the tray's usability by reducing the time required to position items, addressing the problem of self-closing flaps in previous prototypes. The angle range also contributes to the tray's reusability, allowing it to be used multiple times without compromising its structural integrity.

[0014] Optionally, in the retracted position the at least one flap contacts the main body. The tray is designed for reuse, targeting up to 50 uses, and can be handled manually or automatically. The flap's contact with the main body ensures stability during transport and storage, reducing the risk of accidental opening and facilitating efficient stacking. This design enhances the

tray's usability in various processes, including filling with bottles or other stackable products. In other words, the flap may be provided on the main body so as to be parallel to the main body. Thus, the space required in the retracted position is minimized.

[0015] Optionally, in the retracted position the at least one flap encloses an angle in a range of 0° to 10°, preferably 0° to 5°, with the main body. The specified angle range ensures that the flap closely aligns with the main body, facilitating compact stacking and efficient storage during transport. This design minimizes the risk of the tray inadvertently closing, thereby reducing the time required to place items onto the tray and enhancing operational efficiency.

[0016] Optionally, the transition element has a smaller extension perpendicular to the edge than the flap, in particular a five times smaller extension. The transition element refers to the part of the tray that connects the flap to the main body. The expansion of the transition element and the flap can be measured if the tray theoretically lies flat on a plane (which is not intended in practice, however, and is only given here for descriptive purposes). In other words, the flap may have a bigger extension than the transition element. The transition element may be only responsible for providing a flexibility of the flap to be moved between the holding position and the retracting position. That is, the transition element may be configured such that it does not come in contact with items provided on the main body. Therefore, damage of the transition element may be avoided.

[0017] Optionally, the at least one flap is inflexible. The inflexible nature of the flap ensures that it maintains a 90-degree angle relative to the tray when opened, preventing it from closing inward unintentionally. This design feature improves efficiency by reducing the time needed to place items onto the tray, thus enhancing the usability in both manual and automated processes. Further, the items provided on the main body may be securely held by the flap. In other words, the flap may not be deformed by the items (i.e., by the weight of the items).

[0018] Optionally, at each edge of the main body only one flap is provided. The advantage of having only one flap at each edge is that it simplifies the design, making the tray easier to manufacture and handle. This design reduces the likelihood of the tray closing by itself when opened manually, thus speeding up the process of placing items onto the tray. Additionally, it ensures that the edges maintain a 90-degree angle to the tray when opened, which is crucial for efficient stacking and transport. Further, even small items may be securely held by the flap. In other words, each flap may be continuous and may not have any openings or through holes, for example.

[0019] Optionally, the main body has a substantially rectangular shape. The rectangular shape offers advantages such as efficient stacking and alignment with standard pallet sizes, facilitating easy handling and

transport. This shape contributes to the tray's ability to be used multiple times, enhancing its reusability. The design supports both manual and automated processes, making it versatile for different applications. Substantially rectangular may mean that the main body has rounded edges. Therefore, the main body may be robust and damages thereof may be avoided. Further, drain holes may be created between the rounded edges of the main body and the flaps.

[0020] Optionally, at least four flaps are each connected to two opposite edges of the main body by means of the transition element. The flaps provide structural support and stability, ensuring the tray maintains its shape when opened. This design allows for efficient stacking and transport, reducing the risk of accidental closure during manual handling. The transition element facilitates smooth folding and unfolding, enhancing usability in both manual and automated processes. The tray's reusability and robust construction contribute to reduced waste and improved longevity compared to single-use cardboard trays. As a result, the items may be held by the flaps provided at each edge of the main body.

[0021] Optionally, the at least one flap extends along the at least one edge of the main body. The flap is a flexible or hinged part that can be folded or extended. The edge refers to the boundary or perimeter of the tray's main body. This configuration enhances the tray's structural integrity, preventing unintended folding during manual handling. It facilitates efficient stacking and transport, ensuring the tray remains open at a 90-degree angle when in use, thus reducing placement time for items like jars. The design supports multiple uses, aligning with the goal of reusability, and allows for easy integration into automated processes, improving operational efficiency. In particular, a flap provided at an edge may extend along the whole edge (i.e., continuously).

[0022] Optionally, first transition elements provided on opposing edges of the main body differs from second transition elements provided at the other opposing edges of the main body. The advantage of having different transition elements on opposing edges of the main body is that it enhances the tray's structural integrity and usability. This design ensures that the tray maintains a 90-degree angle when in holding position, preventing it from unwanted collapsing inward. This feature significantly reduces the time required to place jars onto the tray, improving efficiency in manual or automated processes. Further, the adaptability is improved. For example, the flaps connected with the first transition elements may be moved further away from the main body than the flaps which are connected with the second transition elements with the main body. Specifically, the flaps provided at the shorter edges of the main body may be adjusted such that the distance between the flaps mounted on the short edges may be changed more than the orthogonal distance between the flaps provided at the longer edges of the main body.

In other words, depending on whether the flaps are connected to the main body via the first transition element or the second transition element, the mobility of the respective flap is different.

[0023] Accordingly, the storing space defined by the flaps may be varied. In particular, the first transition elements are provided on the longer edge of the main body. The first transition element can be designed in such a way that the flap attached to it can move less far away from the main body compared to the flap attached to the second transition element. This prevents the longer flap from tilting in relation to the main body and thus hindering the tray loading process.

[0024] Optionally, the at least one flap includes a connection element configured to be connected with another adjacent flap. This connection element prevents the tray from collapsing inward, facilitating quicker placement of items onto the tray. The technical effect of this feature is improved stability and efficiency during manual or automated handling, reducing the time required for arranging items in the tray. The connection element may be configured to fix the extended flap in a substantially 90° angle to the main body (i.e., in the holding position) and avoiding a collapse, such fixing via a magnet or a protruding pin-like extension that snaps into correspondent element by slightly overstretching the flap (i.e., elastically deformation of the flap). The connection element may be configured such that two flaps may be connected in the retracted position and in the holding position. Accordingly, there is no gap between two flaps independent of the position of the flaps. The implementation introduces a specific mechanism of communication between the components of the tray, specifically focusing on the connection element. The connection element may be created by a folding line, which signifies a structural modification that enhances the functionality and usability of the tray. This folding line serves as a pivotal feature that allows the at least one flap to be connected with another adjacent flap, thereby facilitating the assembly and stability of the tray. The folding line as a connection element brings several new features to the tray.

[0025] Firstly, it simplifies the manufacturing process by providing a straightforward method of creating a connection without the need for additional materials or complex mechanisms. This can lead to cost savings and efficiency in production. Secondly, the folding line enhances the structural integrity of the tray by ensuring that the flaps are securely connected, reducing the likelihood of disassembly or instability during use. This is particularly advantageous in applications where the tray needs to support weight or withstand movement. It simplifies the transition process between the retracted position and the holding position, making it more intuitive and less time-consuming. In summary, the implementation introduces a folding line for defining the connection element, which brings new features such as simplified manufacturing, enhanced structural integrity,

design versatility, ease of use, and improved handling to the tray.

[0026] Optionally, the connection element comprises a retaining element configured to couple two adjacent flaps with one another. The implementation specifies that the connection element includes a retaining element, which is designed to couple two adjacent flaps with one another. This feature enhances the functionality of the tray by providing a more secure and stable connection between flaps, which may be particularly useful in scenarios where the tray is subjected to movement or external forces that could otherwise cause the flaps to separate. In other words, two adjacent flaps may be securely connected to one another. The retaining element serves as a physical means of communication between the flaps, ensuring that they remain connected and aligned. This could be achieved through various mechanisms such as clips, hooks, or interlocking parts that physically engage with each other to maintain the connection. The introduction of a retaining element as part of the connection element offers several advantages. It potentially increases the structural integrity of the tray, making it more robust and reliable for transporting or storing items. The retaining element may be a magnet. Accordingly, a connection between two flaps can be established very easily and by advancing the two connecting partners close to each other. Alternatively, the retaining element may be a push button, Velcro fastener, a snap connection or any other suitable connection. It is important that the connection between the flaps is not loosened if this is not intended.

[0027] Optionally, the at least one flap has a cut out such that a part of an adjacent flap can be put inside the cut out to couple the two adjacent flaps to one another. This cut-out allows a part of an adjacent flap to be inserted into it, effectively coupling the two adjacent flaps together. The "cut-out" may be an opening or notch in the flap designed to receive a portion of another flap. This coupling mechanism ensures the flaps remain securely attached, providing structural stability and preventing the tray from collapsing inward during use. This design enhances the efficiency of manual or automated processes by maintaining the tray's edges at a 90-degree angle, facilitating easier placement of items within the tray.

[0028] Optionally, the at least two adjacent flaps are connected to each other in the retracted position and in the holding position. The connection between adjacent flaps ensures that the tray remains stable and maintains a 90° angle when opened, preventing it from closing on its own. This feature facilitates efficient manual or automated handling, reducing the time required to place items onto the tray. The connected flaps also contribute to the structural integrity of the tray, making it suitable for stacking and transport, and compatible with cleaning and drying processes.

[0029] Optionally, the tray is made of plastic. The use of plastic as the material provides several advantages.

Plastic trays are durable, allowing for multiple uses and reducing the need for frequent replacements. This enhances reusability, targeting up to 50 uses, which is significantly higher than cardboard trays that have limited reuse. Plastic trays can be used in both manual and automated processes, offering versatility in handling. Additionally, the plastic material allows for effective cleaning and disinfection, which is crucial for food packaging applications. The design also supports efficient drying using spin drying machines. The plastic tray can be transported efficiently by stacking, protecting the products during transit.

[0030] Optionally, the tray is made of corrugated material having a weight of 400 to 800, preferably 600 Grams per Square Meter (g/m²). Corrugated material refers to a type of material that consists of a fluted corrugated sheet and one or two flat liner-boards, for example. This construction provides strength and durability, making the tray suitable for multiple uses, targeting up to 50 uses. The specified weight of 600 g/m² ensures the tray is robust enough to handle various applications, including manual or automated processes for filling with bottles or other stackable products. This material choice also allows effective drying using spin drying machines, enhancing its reusability and reducing the need for frequent replacements, thus lowering the scrap rate.

[0031] Optionally, the material of the main body and/or of the at least one flap includes a plurality of channels extending parallel to a surface thereof. The channels within the material enhance structural integrity and rigidity, preventing the tray from collapsing inward when handled or loaded. The tray can therefore last longer and is less susceptible to damage.

[0032] Optionally, the edge of the main body and/or the edges of the flaps are sealed. This feature also contributes to the durability and longevity of the tray, as sealed edges are less prone to wear and tear, and can better withstand environmental factors such as moisture, temperature variations, and physical stress. The sealed edges can also facilitate easier handling and transportation of the tray, as they can provide a more secure grip and reduce the risk of accidental opening or damage. This feature is particularly relevant in the context of the aspect, which specifies that the material of the main body and/or the flaps includes a plurality of channels extending parallel to a surface thereof. The sealing of the edges can complement this design by ensuring that the channels are effectively enclosed, thereby maintaining their structural integrity and functional purpose. Overall, the introduction of sealed edges as a feature in the implementation enhances the tray's usability, reliability, and hygienic qualities, making it a more versatile product for various applications.

[0033] Optionally, the tray includes at least one drain hole. The inclusion of a drain hole refers to an opening in the tray that allows liquid to pass through. This feature is particularly advantageous for applications where

the tray may come into contact with liquids, such as during cleaning or when used in environments where moisture is present. The drain hole facilitates efficient drying and prevents liquid accumulation, enhancing the tray's usability and hygiene. This design is beneficial for reusable trays, especially in industries like food packaging, where cleanliness is paramount. Optionally, the tray may include a recess space at each corner. Accordingly, the flaps (if at least two adjacent flaps are provided) do not interfere their movement between the holding position and the retracted position. In other words, the recess spaces may suppress material accumulation when folding, which would otherwise counteract the folding process and create pressure that could cause the flaps to unfold unintentionally.

[0034] Optionally, the tray includes four drain holes one at each corner of the main body. This specific configuration of drain holes enhances the tray's drainage capabilities by ensuring that liquid can be efficiently expelled from all corners, reducing the risk of pooling and potential damage to the tray or its contents. The communication between the components in this implementation involves the integration of the drain holes into the main body of the tray, which is designed to facilitate the flow of liquid out of the tray. The inclusion of four drain holes at the corners of the tray's main body represents a significant improvement over a tray with a single drain hole, as it provides a more balanced and effective drainage system.

[0035] This feature results in several advantages, including improved hygiene by preventing the accumulation of stagnant liquid, increased durability of the tray by minimizing the exposure to moisture, and enhanced usability by ensuring that the tray remains dry and clean during use. The placement of the drain holes at the corners is particularly beneficial as it aligns with the natural flow of liquid towards the edges, thereby optimizing the drainage process. Furthermore, this design can be especially useful in applications where the tray is used to hold items that produce or are exposed to liquids, such as food service, medical equipment, or industrial components. The strategic positioning of the drain holes also contributes to the structural integrity of the tray, as it reduces the likelihood of liquid-related stress points that could lead to material degradation or failure. Overall, the introduction of four drain holes at each corner of the main body significantly enhances the functionality and reliability of the tray, making it a more effective and practical solution for various uses where efficient drainage is crucial.

[0036] Optionally, the tray is configured such that in the holding position of one tray a plurality of other trays being in the retracted position may be stacked inside the one tray being in the holding position. The aspect describes a tray designed to allow multiple trays to be stacked within one another when in a retracted position. The tray in the holding position can accommodate several other trays, enhancing storage efficiency. This

configuration reduces space requirements during transport and storage, providing a compact solution for handling multiple trays. Especially, due to the transition element, the trays may be stacked into each other as the transition element may allow for different outer contours of the trays. The smaller shape when folded is also supported by the drain holes.

[0037] Optionally, the at least one flap and/or the transition element is configured such that the at least one flap is retained in the holding position once the holding position is reached. This configuration prevents the flap from closing unintentionally, thereby facilitating the efficient placement of items onto the tray. The technical effect of this feature is the reduction of time required to place items onto the tray, enhancing the overall efficiency of the process. For example, an abutment may be provided which hinders the at least one flap from returning to the retracted position. Further, other means may be implemented to hold the at least one flap in the holding position. For example, a holding element may be provided which holds the at least one flap on the holding position. The holding element may be a rod like element which connects the at least one flap and the main body in order to avoid an unwanted transition of the at least one flap from the holding position to the retracted position.

[0038] Optionally, the transition element is configured as a double hinge, in particular as a film hinge. A tray is a flat, open container used for holding or transporting items. The transition element refers to a component that connects different parts of the tray, allowing movement or flexibility. A double hinge is a type of hinge that provides two pivot points, enhancing the range of motion and stability. A film hinge is a thin, flexible hinge made from a continuous piece of material, offering smooth movement and durability. The use of a double hinge, particularly a film hinge, provides improved flexibility and ease of opening and closing the tray, reducing the time required for placing items on the tray and enhancing its usability in both manual and automated processes.

[0039] According to a further aspect of the present disclosure a method of producing a tray, in particular according one of the preceding embodiments, is provided. The method may comprise: providing a sheet material, defining a main body and at least one flap, generating a transition element between the main body and the at least one flap. The transition element may be configured such that the at least one flap is moveable between a holding position and a retracted position. In the retracted position the at least one flap may be bent toward the main body.

[0040] The method involves producing a tray by using a sheet material to define a main body and at least one flap. A transition element is generated between the main body and the flap, allowing the flap to move between a holding position and a retracted position. In the retracted position, the flap bends toward the

main body. The use of a transition element enhances the tray's functionality by enabling the flap's movement, facilitating efficient stacking and storage. This design supports multiple uses, aiming for up to 50 cycles, and accommodates both manual and automated handling processes. The tray's reusability and adaptability make it suitable for diverse applications, including serving as a top cap for pallets with plastic bottles. Additionally, the tray's design allows for effective cleaning and drying, which is crucial for food packaging applications. The method addresses the issue of trays closing on their own by ensuring the edges maintain a 90-degree angle when opened, improving the efficiency of placing items onto the tray.

[0041] Optionally, the method further including: sealing edges of the at least one flap and/or the main body by ultrasound sealing. This feature builds upon the aspect, which outlines a method for producing a tray involving the provision of sheet material, defining a main body and at least one flap, and generating a transition element between them. The addition of ultrasound sealing in the implementation provides a specific mechanism for communication between the components of the tray, namely the flap and the main body. Ultrasound sealing is a process that uses high-frequency sound waves to create heat and bond materials together, offering a precise and efficient method for sealing edges. This method of sealing enhances the structural integrity and durability of the tray by ensuring that the edges are securely bonded, preventing any potential separation or leakage that might occur with other sealing methods. Furthermore, ultrasound sealing is known for its ability to produce clean and strong seals without the need for adhesives or additional materials, which could be beneficial in maintaining the purity and safety of the tray, especially if it is intended for food or medical use.

[0042] Optionally, the generating of a transition element is executed by thinning of the material of the main body and the at least one flap. This mechanism involves the thinning of the material of both the main body and the flap. The thinning process is significant because it directly affects the flexibility and movement of the flap, allowing it to transition between the holding position and the retracted position more efficiently. By thinning the material, the transition element is created in such a way that it facilitates the bending of the flap toward the main body when in the retracted position. This method of thinning the material brings several advantages. It ensures that the flap can be moved without requiring additional components or complex mechanisms, thereby simplifying the manufacturing process. The thinning of the material can be precisely controlled to achieve the desired flexibility and strength, ensuring that the flap remains durable while being easy to manipulate.

[0043] Furthermore, this method can be applied to various types of sheet materials, providing versatility in

the production of trays. The thinning process can be executed using different techniques, such as mechanical and/or thermal thinning, chemical etching, or laser cutting, each offering distinct benefits depending on the material used and the specific requirements of the tray design. This implementation enhances the method of producing a tray by specifying a practical and effective way to create the transition element, which is crucial for the functionality of the flap. It addresses potential issues related to the movement and durability of the flap, ensuring that the tray can be used reliably in various applications. The introduction of material thinning as a means to generate the transition element adds a layer of technical detail to the method, providing a clear and actionable approach for manufacturers. This feature not only improves the overall design and usability of the tray but also contributes to the efficiency and cost-effectiveness of the production process.

[0044] According to a further aspect of the present disclosure, a use of a tray according to one of the preceding embodiments is provided, wherein the tray is used as a top cover of items and/or as an intermediate layer between layers of stacked items. The subject matter involves using a tray as a top cover for items or as an intermediate layer between layers of stacked items. The tray is reusable and made of corrugated material with sealed edges, providing durability and multiple uses, targeting up to 50 uses. It supports both manual and automatic handling, enhancing efficiency in various processes. The tray's design allows effective drying, which is beneficial for food packaging applications requiring washing after each use. Additionally, the tray-in-tray stacking method optimizes transport, protecting products and maximizing truck capacity.

[0045] Features and embodiments of the above outlined can be combined so as to create new embodiments. Modifications and effects in connection with these features or embodiments are also true for the new embodiments. Configurations and effects in connection with the device are analogues applicable to the method and vice versa.

[0046] In the following, embodiments of the subject matter of the present disclosure are described with reference to the figures.

Fig. 1 is a schematic and perspective view of a tray according to an embodiment of the present disclosure.

Fig. 2 is a schematic and perspective view of a tray according to an embodiment of the present disclosure.

Fig. 3 is a top view of a tray according to an embodiment of the present disclosure.

Fig. 4A is a cross-sectional view of a part of a tray according to an embodiment of the present disclosure.

Fig. 4B is a cross-sectional view of a part of a tray according to an embodiment of the present disclosure.

sure.

Fig. 4C is a cross-sectional view of a part of a tray according to an embodiment of the present disclosure.

Fig. 5 is a top view of a tray according to an embodiment of the present disclosure.

Fig. 6 is a schematic and perspective view of a tray according to an embodiment of the present disclosure.

Fig. 7 is a schematic and perspective view of a tray according to an embodiment of the present disclosure.

Fig. 8A is a schematic and perspective view of a part of a tray according to an embodiment of the present disclosure.

Fig. 8B is a schematic and perspective view of a part of a tray according to an embodiment of the present disclosure.

Fig. 9 is a schematic and perspective view of a tray according to an embodiment of the present disclosure.

Fig. 10A is a schematic and perspective view of a tray according to an embodiment of the present disclosure.

Fig. 10B is a schematic and perspective view of a tray according to an embodiment of the present disclosure.

Fig. 11A is a schematic and perspective view of a tray according to an embodiment of the present disclosure.

Fig. 11B is a schematic and perspective view of a tray according to an embodiment of the present disclosure.

[0047] Fig. 1 is a schematic and perspective view of a tray according to an embodiment of the present disclosure. The tray 1 illustrated in Fig. 1 is designed for holding items 100, specifically jars, as depicted in the figure. The tray 1 comprises a main body 3, which exhibits a plate-like shape, providing a flat surface upon which the jars 100 are positioned. The main body 3 serves as the foundational structure of the tray 1, ensuring stability and support for the items 100 placed upon it.

[0048] Arranged at the edge 5 of the main body 3 is at least one flap 4, which is visible in the figure. The flap 4 is connected to the main body 3 via a transition element 6, although the transition element itself is not explicitly shown in this figure. The flap 4 is configured to be movable between a holding position and a retracted position, allowing for flexibility in securing the items on the tray 1. In the holding position, the flap 4 encloses the items, providing a barrier that prevents them from falling off the tray 1. The retracted position would involve the flap 4 being bent toward the main body 3, although this position is not depicted in the current figure. In fig. 1 the tray 1 is in the holding position so as to hold the items in place.

[0049] The flap 4 is shown to extend along the edge 5 of the main body 3, suggesting that it is designed to encompass the perimeter of the tray, thereby offering comprehensive coverage and protection for the items 100. The flap 4 is substantially inflexible, ensuring that once it is positioned, it maintains its shape and does not easily deform under pressure. This rigidity is crucial for maintaining the integrity of the tray's structure and ensuring the security of the items held within. Inflexible means in this context that during the movement between the holding position and the retracted position the at least one flap maintains in an unchanged manner or form (e.g. the flap is not bent or kinked).

[0050] Additionally, in Fig. 1 a folding line 41 on the flap 4 is depicted, which defines as a connection element 7. This folding line 41 facilitates the movement of the flap 4 between its holding and retracted positions, providing a pivot point that enhances the functionality of the tray 1. The folding line 41 may also contribute to the coupling of adjacent flaps, although this specific interaction is not visible in the current figure. In more detail, due to the folding line 41, two adjacent flaps may stay connected when moved between the retracted position and the holding position.

[0051] Fig. 2 is a schematic and perspective view of a tray according to an embodiment of the present disclosure. In Fig. 2 two trays 1 stacked on top of each other, holding items 100. The trays 1 are positioned on a pallet. The tray 1 is the same as depicted in Fig. 1 and described above. Accordingly, the tray 1 may be used as an intermediate layer between a layer of items 100 as depicted. Further, the tray 100 may be used as a top cap which is placed on top of a stack of items.

[0052] Fig. 3 is a top view of a tray according to an embodiment of the present disclosure. First, the position of the tray 1 as depicted in Fig. 3 (i.e., the flap orientation of all features of the tray in one plane) is not intended to be realized during use of the tray 1. The visualization is merely used to describe the features of the tray 1. In Fig. 3 the tray 1 includes a main body 3 with a plate-like configuration. The main body 3 is substantially rectangular. In the present embodiment the tray has a length of 1495.5 mm and a width of 1097.5 mm. The tray 1 includes flaps 4 positioned at the edges 5 of the main body 3. These flaps 4 are connected to the main body via transition elements 6, which are configured to allow movement of the flaps 4 between a holding position and a retracted position. The transition elements 6 are defined as first transition elements 61 and second transition elements 62 having two distinct configurations. The first transition elements 61 may allow the flap 4 a bigger movement relative to the main body 3 as compared to the second transition elements 62. That is, the first transition elements have an extension of 12 mm whereas the second transition elements 62 have an extension of 4 mm.

[0053] The flaps 4 extend along the edges 5 of the main body 3, and the transition elements 6 allows the

movement of these flaps. Without the transition elements 6, the flaps 4 would not be movable in relation to the main body 3 (i.e. they could not be moved to another stable or permanent position). The transition elements 6 are shown to have a smaller extension perpendicular to the edge 5 than the flap 4, which is particularly noted to be five times smaller, indicating a design consideration for flexibility and movement. The flaps 4 are inflexible, as suggested by the figure, ensuring that they maintain their shape during operation.

[0054] Fig. 3 also highlights the presence of connection elements 7 on the flaps 4, which are configured to connect adjacent flaps. These connection elements 7 are created by folding lines 41, which are strategically placed to enable coupling between flaps. The connection elements 7 may be moveable relative to the flaps 4 at which they are provided. Therefore, the two adjacent flaps 4 can be connected to each other even when they are moved between the holding position and the retracted position. That is, the connection element 7 is configured to follow and allow a relative movement of two connected flaps. The connection elements 7 may include retaining elements, although these are not explicitly labeled in the figure. Additionally, the flaps 4 feature cut-outs 11, allowing parts of adjacent flaps to be inserted, thereby facilitating the coupling of two adjacent flaps.

[0055] Further, the tray 1 includes drain holes 9, positioned at each corner of the main body 3. These drain holes 9 are intended to manage liquid drainage, ensuring that the tray 1 can be used in environments where liquid accumulation might be a concern. The material composition of the tray is not explicitly detailed in the figure, but it is suggested that the tray is made of plastic or corrugated material, with channels extending parallel to the surface, enhancing structural integrity and functionality. It may avoid accumulation of material when folding.

[0056] Fig. 4A is a cross-sectional view of a part of a tray according to an embodiment of the present disclosure. In more detail, fig. 4A is a sectional view along the line A:A of fig. 3. In fig. 4A the transition element 6 connects the flap 4 to main body 3, allowing the flap 4 to be movable between the holding position and the retracted position. The position shown in Fig. 4A is not intended to be adopted while the tray is in use. As in Fig. 3, it is for explanatory purposes only. Normally, the transition element 6 is configured such that flap 4 encloses an angle in the range of 80° to 100°, preferably 85° to 95°, with main body 3 in the holding position. In fig. 4A it is visible, that the transition element 6 has a smaller thickness than the main body 3.

[0057] Fig. 4B is a cross-sectional view of a part of a tray according to an embodiment of the present disclosure. Fig 4B shows the same part of the tray 1 as fig. 4A, but in the retracted position. Transition element 6 facilitates the movement between the holding position and the retracted position by providing a flexibility. Due

to the configuration of the transition element 6 (e.g., the extension of the transition element 6), the flap 4 may be placed on top of the main body 3.

[0058] Fig. 4C is a cross-sectional view of a part of a tray according to an embodiment of the present disclosure. Fig 4C shows the same part of the tray 1 as fig. 4A and 4B, but with a differently designed transition element 6. Generally, fig. 4C shows tray 1 with flap 4 in the retracted position. In this position, flap 4 is bent toward main body 3 and contacts it. The transition element 6 ensures that flap 4 encloses an angle in the range of 0° to 10°, preferably 0° to 5°, with main body 3. This configuration allows flap 4 to be retained in the retracted position once it is reached. The transition element 6 is designed as a double hinge, specifically a film hinge, which provides the necessary flexibility for flap 4 to move between the holding and retracted positions.

[0059] The figures collectively demonstrate the functionality and versatility of tray 1, highlighting the movement and positioning of flap 4 facilitated by transition element 6.

[0060] Fig. 5 is a top view of a tray according to an embodiment of the present disclosure. Fig 5 shows the tray 1 depicted in fig. 1 in the retracted position. The flaps 4 may be connected in this position. However, it is also possible that the flaps 4 are not connected and are only connected after reaching the holding position.

[0061] Fig. 6 is a schematic and perspective view of a tray according to an embodiment of the present disclosure. Fig. 6 shows a tray 1 in the holding position. In the holding position, the flaps 4 encloses an angle in a range of 80° to 100°, preferably 85° to 95°, with the main body 3. In the fig. 6 the tray 1 is automatically brought in the holding position. In more detail, the flaps 4 may be gripped by suction devices, for example, and the tray may thus be transferred from the retracted position in the holding position. Therefore, an automated handling of the tray 1 is possible.

[0062] Fig. 7 is a schematic and perspective view of a tray 1 according to an embodiment of the present disclosure. Fig. 7 shows tray 1 in its holding position. The tray 1 correspond to one of the above described trays 1. The tray 1 is designed to hold a plurality of trays 1 stacked on the main body 3. The trays 1 positioned within another tray 1 are in the retracted position. The tray which receives the plurality of other trays 1 is in the holding position. Due to the viability of the transition element 6, the retracted trays 1 may be placed within the tray 1 in the holding position.

[0063] Fig. 8A is a schematic and perspective view of a part of a tray 1 according to an embodiment of the present disclosure. In fig. 8A, the flap 4 is shown in the holding position, where it is oriented perpendicular to the main body 3. This orientation is facilitated by transition element 6, which connects flap 4 to the main body 3. Transition element 6 is configured to allow flap 4 to move between a holding position and a retracted position, as shown in fig. 8B. In fig. 8B, flap 4 is bent toward

main body 3, indicating its retracted position.

[0064] Transition element 6 is a crucial component, allowing the movement of flap 4. It is depicted in both views as a thinner section compared to the main body 3, which suggests its role in providing flexibility for the movement of flap 4. The transition element 6 may have multiple axes of rotation, although this is not explicitly shown in the figure. The material thickness of transition element 6 is smaller compared to the main body 3, facilitating the bending motion required for flap 4 to transition between positions.

[0065] In fig. 8A, connection element 7 is visible, which is configured to connect flap 4 with another adjacent flap 4. This connection element 7 is created by folding line 41, which is visible in the figure. The folding line 41 is a predetermined crease that allows flap 4 to bend and connect with adjacent flaps, enhancing the structural integrity of the tray when in the holding position. Additionally, the drain hole 9 is shown in fig. 8A, which allows water to be discharged from the tray 1.

[0066] The tray 1 is made of a material that includes a plurality of channels extending parallel to its surface, as evidenced by the visible texture on main body 3 and flap 4. This design feature may contribute to the tray's strength and rigidity while maintaining a lightweight structure. The edges of the main body 3 and flap 4 may be sealed, which could be achieved through methods such as ultrasound sealing, although this is not explicitly shown in the figure.

[0067] Fig. 8B shows a state in the transition between the holding position and the retracted position. Fig. 8B shows how the flaps and the connecting elements 7 bend and fold during the movement between the holding position and the retracted position.

[0068] Fig. 9 is a schematic and perspective view of a tray according to an embodiment of the present disclosure. Fig. 9 illustrates tray 1 designed for holding items, showing its structural components and features. The main body 3 of the tray is depicted with a plate-like shape, providing a flat surface for item placement. Flaps 4 are arranged at the edges of the main body, demonstrating their ability to move between a holding position and a retracted position. In this figure, the flaps are shown in a position that suggests they are bent toward the main body, indicating a retracted state.

[0069] The transition elements, although not explicitly numbered in this figure, are implied through the positioning and movement of flaps 4. These elements facilitate the movement of the flaps, allowing them to transition between positions. The flaps are depicted as inflexible, maintaining their shape and structure during movement. The connection elements 7 are visible, suggesting a configuration that enables adjacent flaps to connect with one another, enhancing the structural integrity of the tray when in use.

[0070] Drain holes 9 are strategically placed at each corner of the main body 3 such that a water flow can easily reach the drain hole 9, as indicated by the dro-

plet symbols and the arrows. These holes serve a functional purpose, allowing for the drainage of liquids, which is particularly useful when the tray is employed in environments where moisture accumulation is a concern. The presence of these drain holes highlights the tray's suitability for applications where liquid exposure is anticipated.

[0071] The arrows in the Fig. 9 indicate the flow of liquid towards the drain holes. This directional guidance is crucial for understanding how the tray operates in practical scenarios, ensuring efficient liquid management.

[0072] Fig. 10A is a schematic and perspective view of a tray according to an embodiment of the present disclosure. Fig. 10A shows detailed views of the tray 1, specifically illustrating the connection elements and the interaction between adjacent flaps 4. In fig. 10A, the main body 3 of the tray 1 is depicted along with the transition element 6, which connects the flap 4 to the main body 3. The connection element 7 is visible, demonstrating how it facilitates the coupling of adjacent flaps 4. The retaining element 8 is shown inserted into the cut out 11, securing the connection between the flaps 4. The retaining element 8 in the present case is a magnet. In fig. 10A the retaining element of two connecting elements 7 is connected. In Fig. 10B the retaining element 8 of two connection elements 7 is not connected.

[0073] Both fig. highlight the structural design of the tray 1, where the transition element 6 allows the flap 4 to move between the holding position and the retracted position. The interaction between the retaining elements 8 ensures that the flaps 4 remain securely connected, providing stability to the tray 1 when in use.

[0074] Fig. 11A is a schematic and perspective view of a tray according to an embodiment of the present disclosure. Fig. 11A shows detailed views of the tray 1, specifically focusing on the connection elements 7, the folding lines 41 and the cut out 11. In view A, the tray 1 is depicted with the flap 4 in a position where the connection element 7 is visible. The main body 3 is shown with a drain hole 9, which is positioned near the edge of the flap 4. The folding line 41 is clearly illustrated, indicating the area where the material bends to form the connection element 7. This folding line 41 facilitates the movement of the flap 4 between the holding position and the retracted position. The cut out or recess 11 makes it possible to insert a part of the connecting element 7 of another flap 4 into the recess and fasten it in this way.

[0075] Fig. 11B provides another perspective of the tray 1, emphasizing the connection element 7, the folding line 41 and the cut out 11. The flap 4 is shown in a different angle, demonstrating how the connection element 7 interacts with the adjacent flap 4. In more detail, the connection element 7 interacts with the cut out 11 so as to couple two adjacent flaps 4 to each other. The folding line 41 is again visible, highlighting its role in the

structural integrity and functionality of the tray 1. The main body 3 is partially visible, indicating the relative positioning of the components.

[0076] Both fig. 11A and 11B illustrate the corrugated material of the tray 1, which is characterized by pluralities of channels extending parallel to the surface. This material choice contributes to the durability and flexibility of the tray 1, allowing it to maintain its shape and functionality under various conditions. The edges of the flaps 4 and the main body 3 are sealed, ensuring the structural stability and preventing fraying of the material.

[0077] The connection elements 7, as shown in both views, are designed to couple adjacent flaps 4 with one another, enhancing the overall stability of the tray 1 when in use. The folding lines 41 play a crucial role in this coupling mechanism, providing the necessary flexibility for the flaps 4 to move and connect securely. The drain hole 9, visible in view A, serves as a functional feature for liquid drainage, which is particularly useful in applications where the tray 1 may be exposed to moisture or liquids.

References

[0078]

1	trays
3	main body
4	flap
5	edge
6	transition element
7	connection element
8	retaining element
9	drain hole
11	cut out
41	folding line
61	first transition elements
62	second transition elements
100	items

Claims

1. Tray (1) for holding items (2), comprising:

a main body (3) having a plate like shape, at least one flap (4) being arranged at an edge (5) of the main body (3), at least one transition element (6) which connects the at least one flap (4) with the main body (3) and which is configured such that the at least one flap (4) is moveable between a holding position and a retracted position, wherein in the retracted position the at least one flap (4) is bent toward the main body (3).

2. Tray (1) according to claim 1, wherein the transition element (6) has at least two axes of rotation.

3. Tray (1) according to any one of the preceding claims, wherein the transition element (6) has a smaller material thickness as compared to the main body (3).
4. Tray (1) according to any one of the preceding claims, wherein in the retracted position the at least one flap (4) contacts the main body (3).
5. Tray (1) according to any one of the preceding claims, wherein the transition element (6) has a smaller extension perpendicular to the edge (5) than the flap (4), in particular a five times smaller extension.
6. Tray (1) according to any one of the preceding claims, wherein first transition elements (61) provided on opposing edges (5) of the main body (3) differ from second opposing elements (62) provided at the other opposing edges (5) of the main body (3).
7. Tray (1) according to any one of the preceding claims, wherein the at least one flap (4) has at least one connection element (7) configured to be connected with another adjacent flap (4).
8. Tray (1) according to claim 7, wherein the connection element (7) is created by a folding line (41).
9. Tray (1) according to claim 7 or 8, wherein the connection element (7) comprises a retaining element (8) configured to couple two adjacent flaps (4) with one another.
10. Tray (1) according to any one of the preceding claims, wherein at least two adjacent flaps (4) are connected to each other in the retracted position and in the holding position.
11. Tray (1) according to any one of the preceding claims, wherein the tray (1) includes at least one drain hole (9).
12. Tray (1) according to any one of the preceding claims, wherein the tray (1) is configured such that in the holding position of one tray (1) a plurality of other trays (1) being in the retracted position may be stacked inside the one tray (1) being in the holding position.
13. Tray (1) according to any one of the preceding claims, wherein the transition element (6) is configured as a double hinge, in particular as a film hinge.
14. Method of producing a tray (1), in particular according to one of the preceding claims, comprising:

providing a sheet material
defining a main body (3) and at least one flap (4)
generating a transition element (6) between the main body (3) and the at least one flap (4), wherein the transition element (6) is configured such that the at least one flap (4) is moveable between a holding position and a retracted position, wherein in the retracted position the at least one flap (4) is bent toward the main body (3).

15. Method according to claim 14, further including: sealing edges of the at least one flap (4) and/or the main body (3) by ultrasound sealing.

Amended claims in accordance with Rule 137(2) EPC.

1. Tray (1) for holding items (2), comprising:

a main body (3) having a plate like shape, at least one flap (4) being arranged at an edge (5) of the main body (3), at least one transition element (6) which connects the at least one flap (4) with the main body (3) and which is configured such that the at least one flap (4) is moveable between a holding position and a retracted position, wherein in the retracted position the at least one flap (4) is bent toward the main body (3), wherein first transition elements (61) provided on opposing edges (5) of the main body (3) differ from second opposing elements (62) provided at the other opposing edges (5) of the main body (3).
2. Tray (1) according to claim 1, wherein the transition element (6) has at least two axes of rotation.
3. Tray (1) according to any one of the preceding claims, wherein the transition element (6) has a smaller material thickness as compared to the main body (3).
4. Tray (1) according to any one of the preceding claims, wherein in the retracted position the at least one flap (4) contacts the main body (3).
5. Tray (1) according to any one of the preceding claims, wherein the transition element (6) has a smaller extension perpendicular to the edge (5) than the flap (4), in particular a five times smaller extension.
6. Tray (1) according to any one of the preceding claims, wherein the at least one flap (4) has at least one connection element (7) configured to be connected with another adjacent flap (4).

nected with another adjacent flap (4).

7. Tray (1) according to claim 7, wherein the connection element (7) is created by a folding line (41). 5
8. Tray (1) according to claim 7 or 8, wherein the connection element (7) comprises a retaining element (8) configured to couple two adjacent flaps (4) with one another. 10
9. Tray (1) according to any one of the preceding claims, wherein at least two adjacent flaps (4) are connected to each other in the retracted position and in the holding position. 15
10. Tray (1) according to any one of the preceding claims, wherein the transition element (6) is configured as a double hinge, in particular as a film hinge. 20
11. Method of producing a tray (1) according one of the preceding claims, comprising:

providing a sheet material

defining a main body (3) and at least one flap (4) 25

generating a transition element (6) between the main body (3) and the at least one flap (4), wherein the transition element (6) is configured such that the at least one flap (4) is moveable between a holding position and a retracted position, 30

wherein in the retracted position the at least one flap (4) is bent toward the main body (3). 35
12. Method according to claim 11, further including:

sealing edges of the at least one flap (4) and/or the main body (3) by ultrasound sealing. 40

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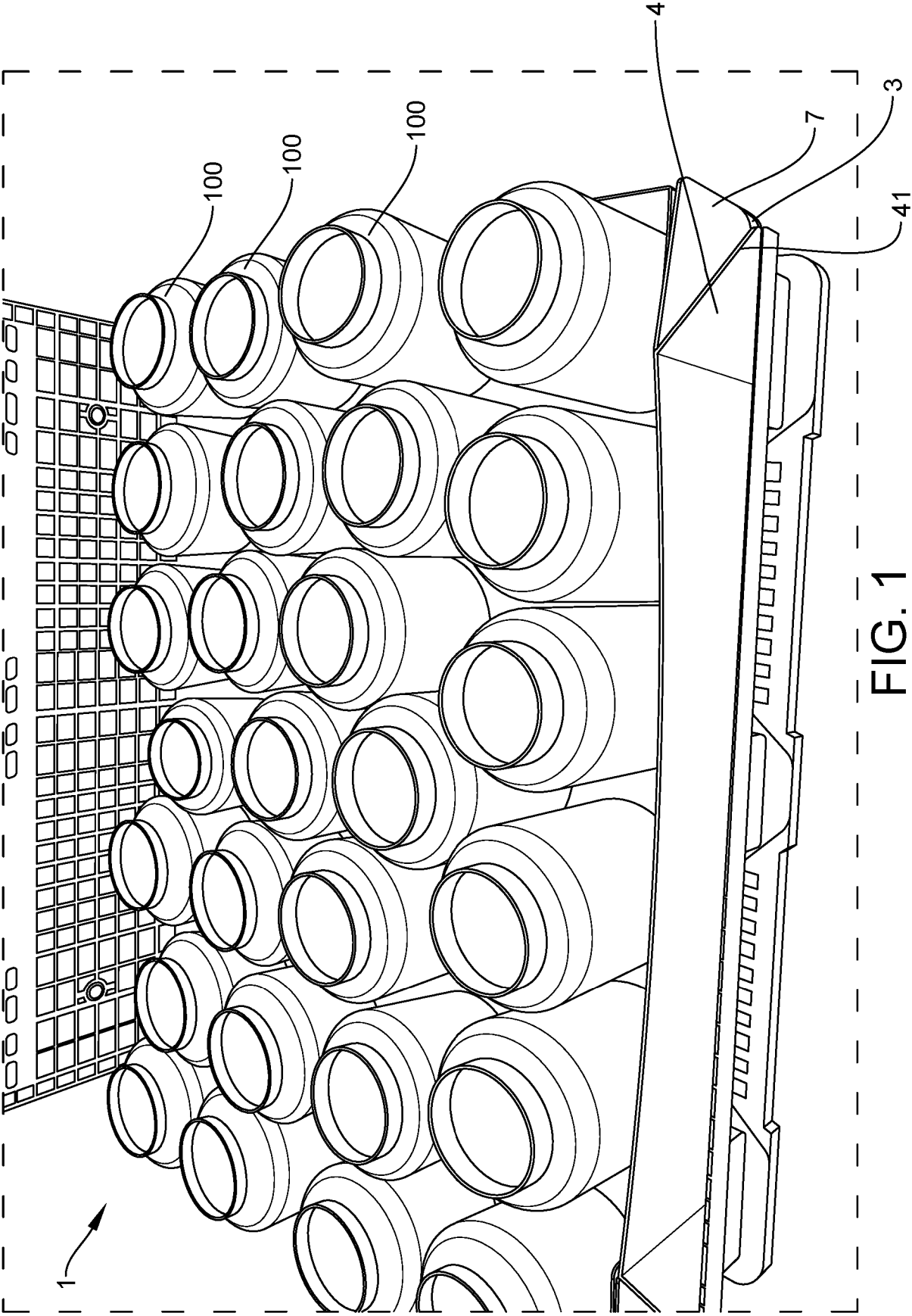


FIG. 1

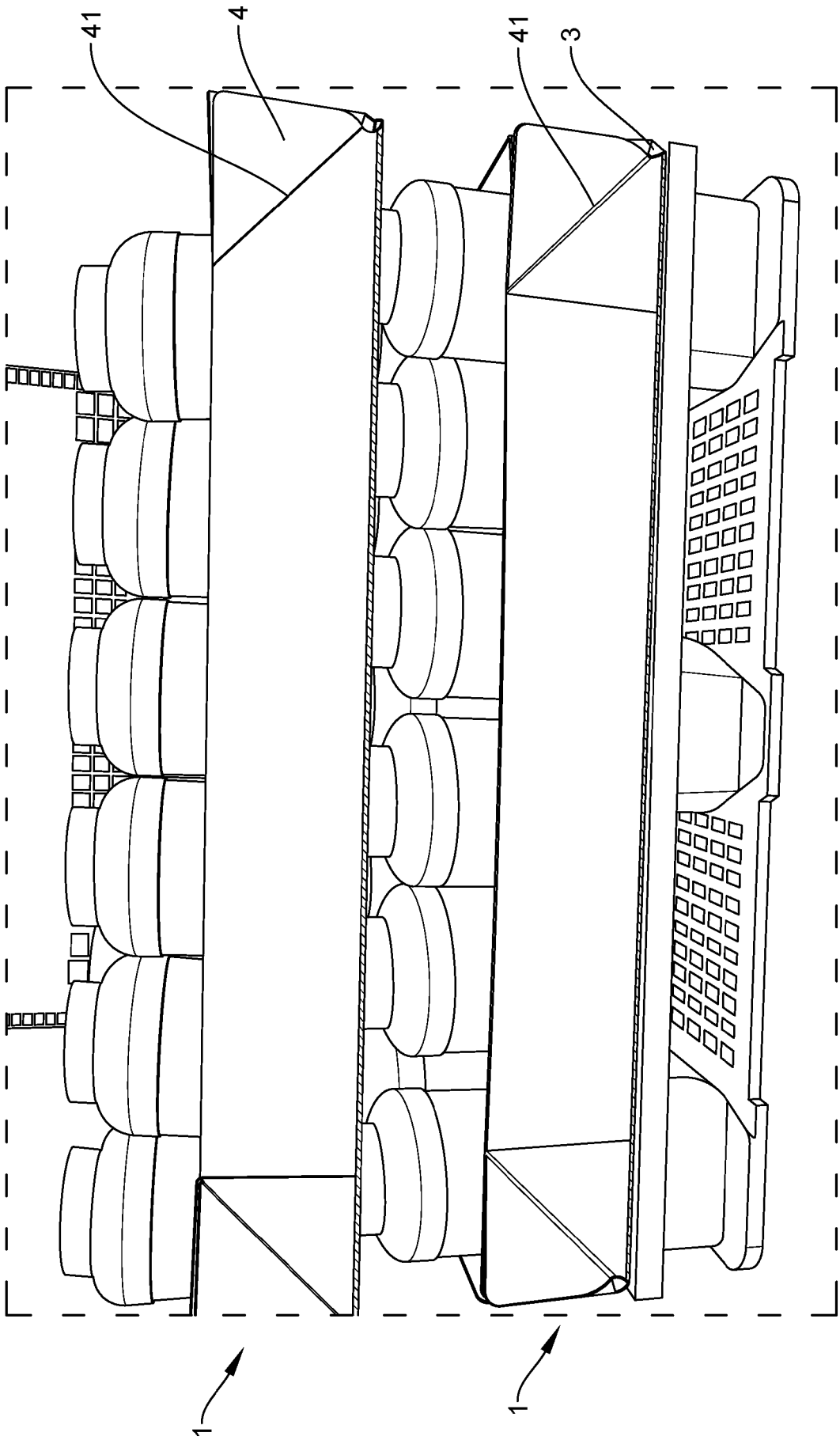
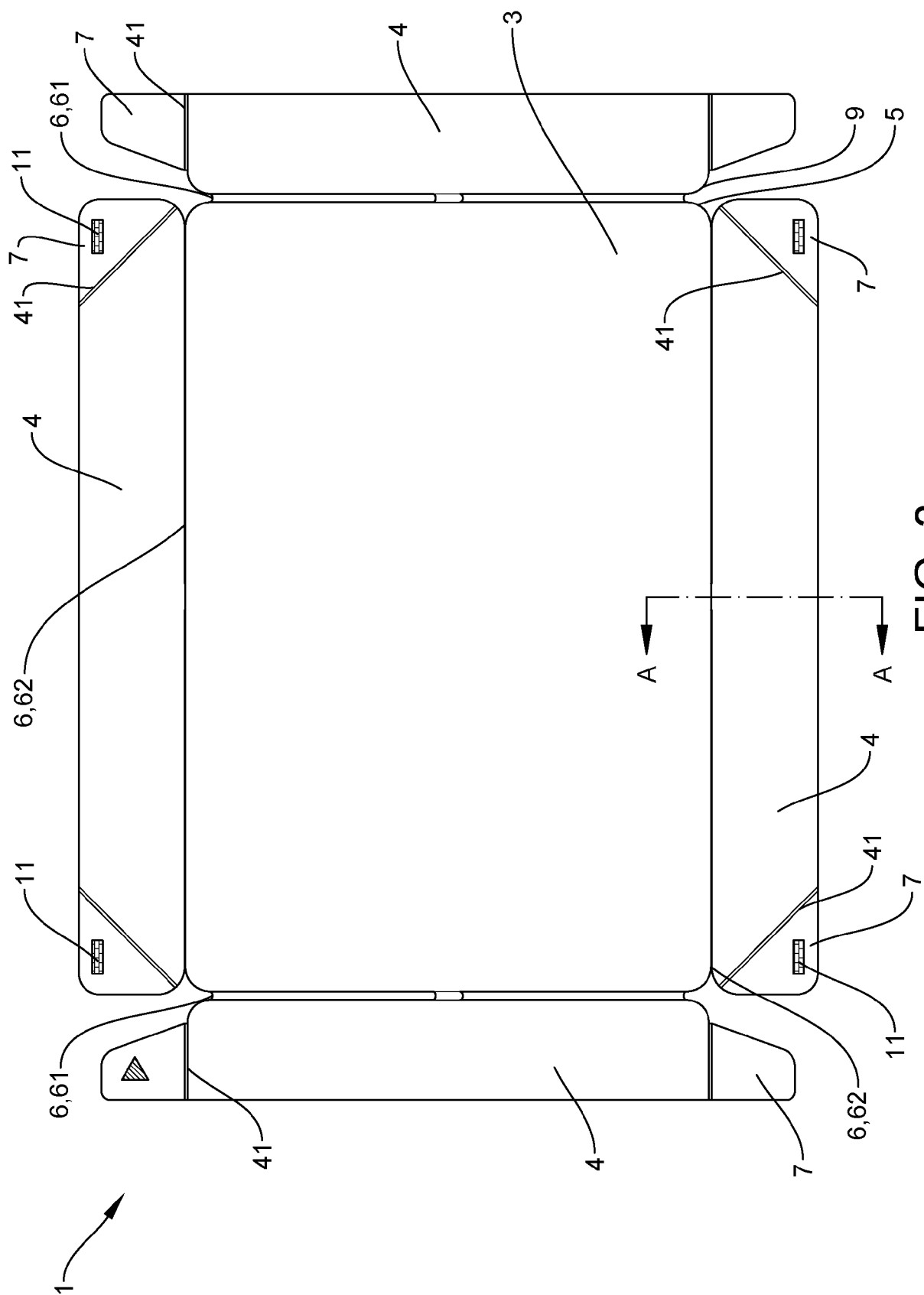


FIG. 2



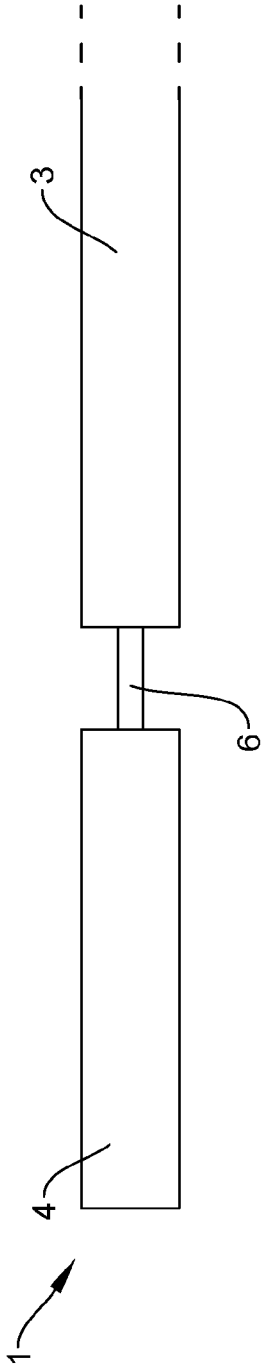


FIG. 4A

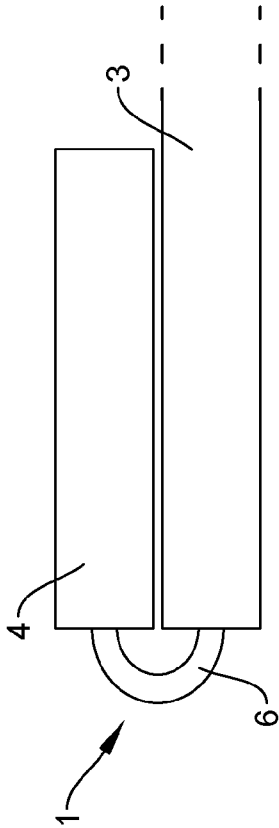


FIG. 4B

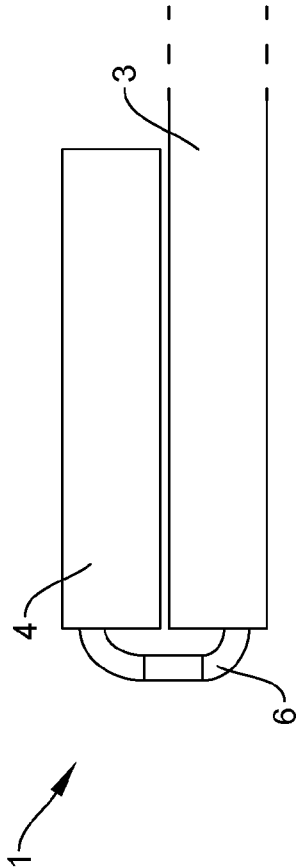


FIG. 4C

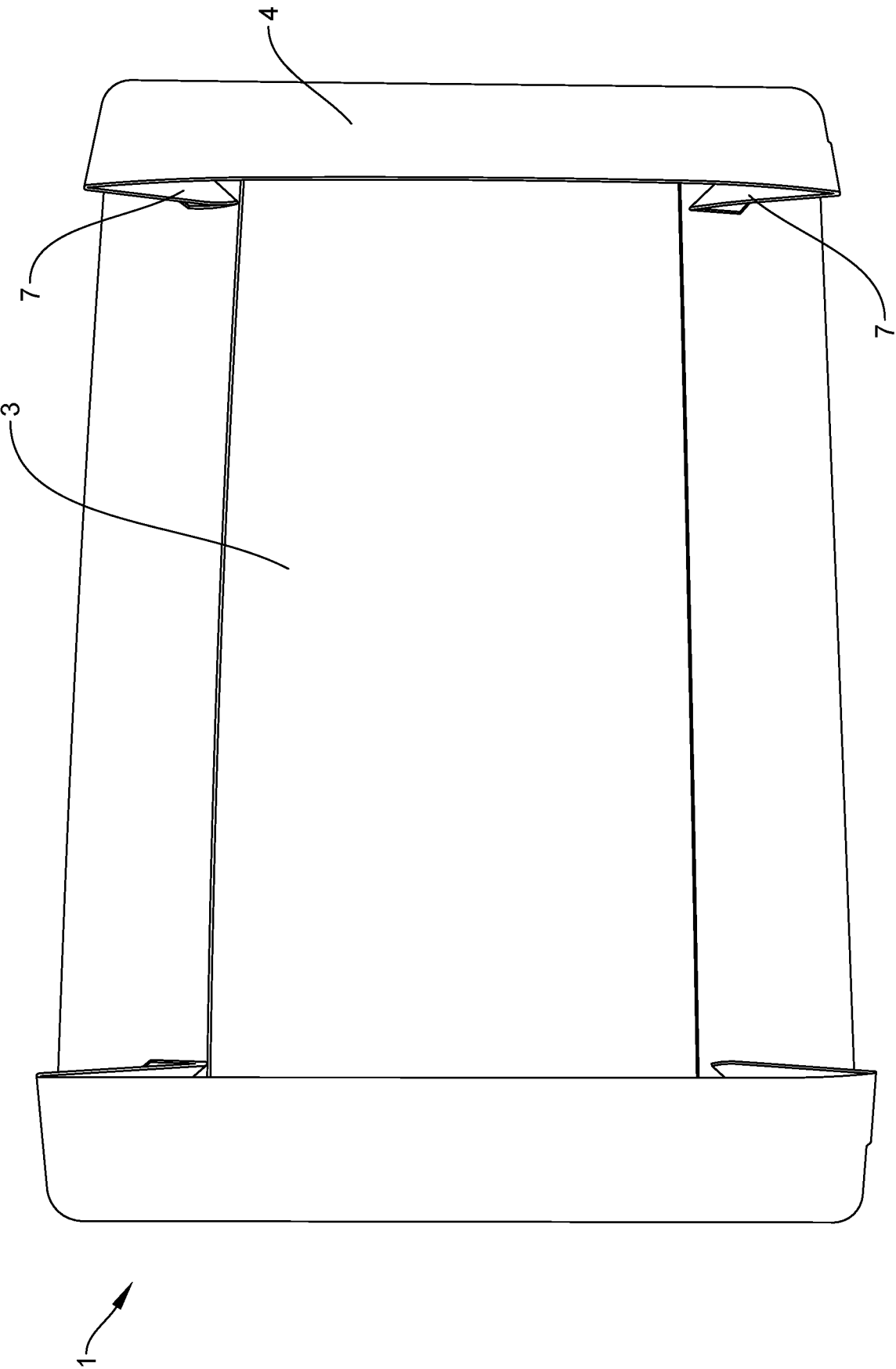


FIG. 5

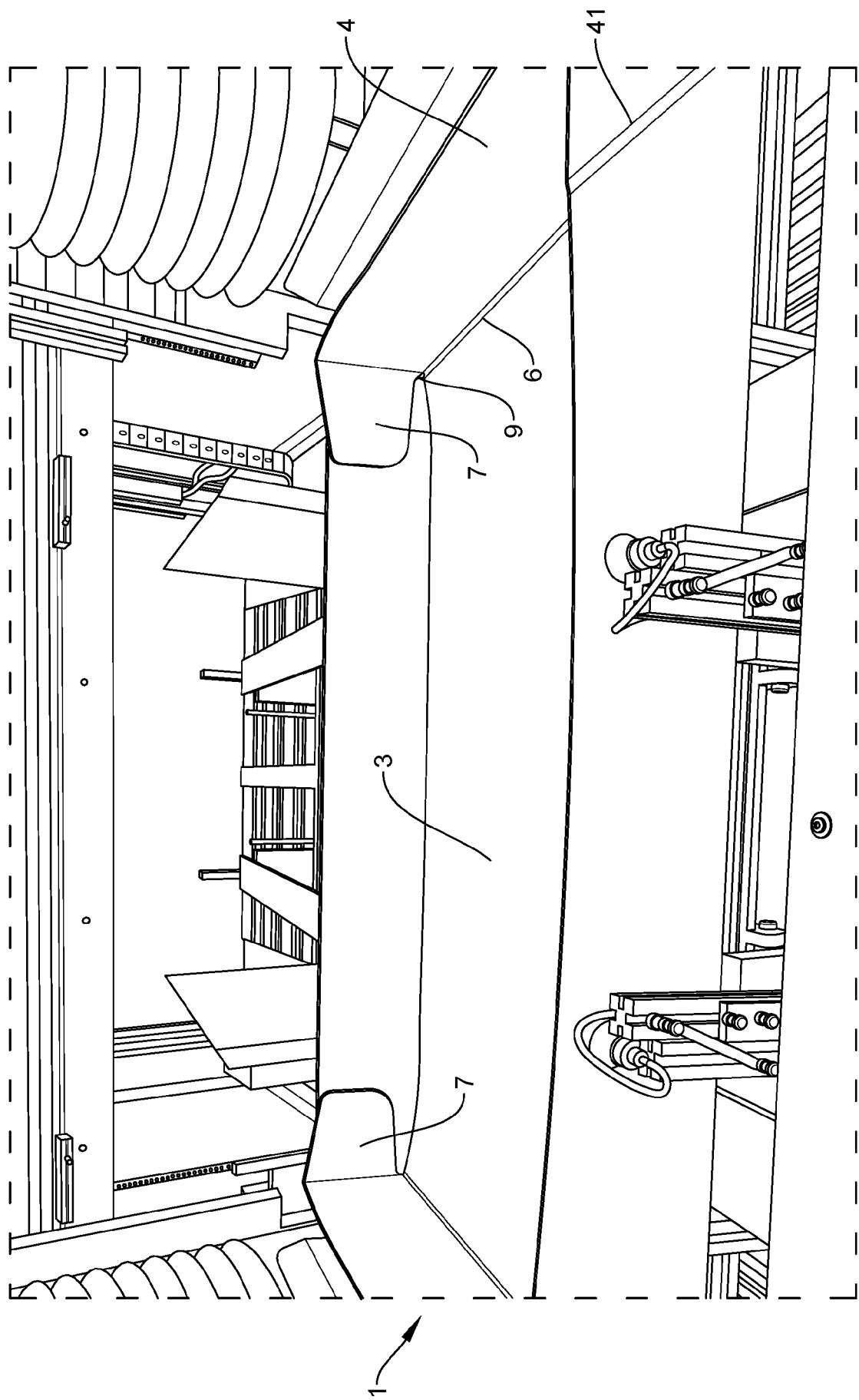


FIG. 6

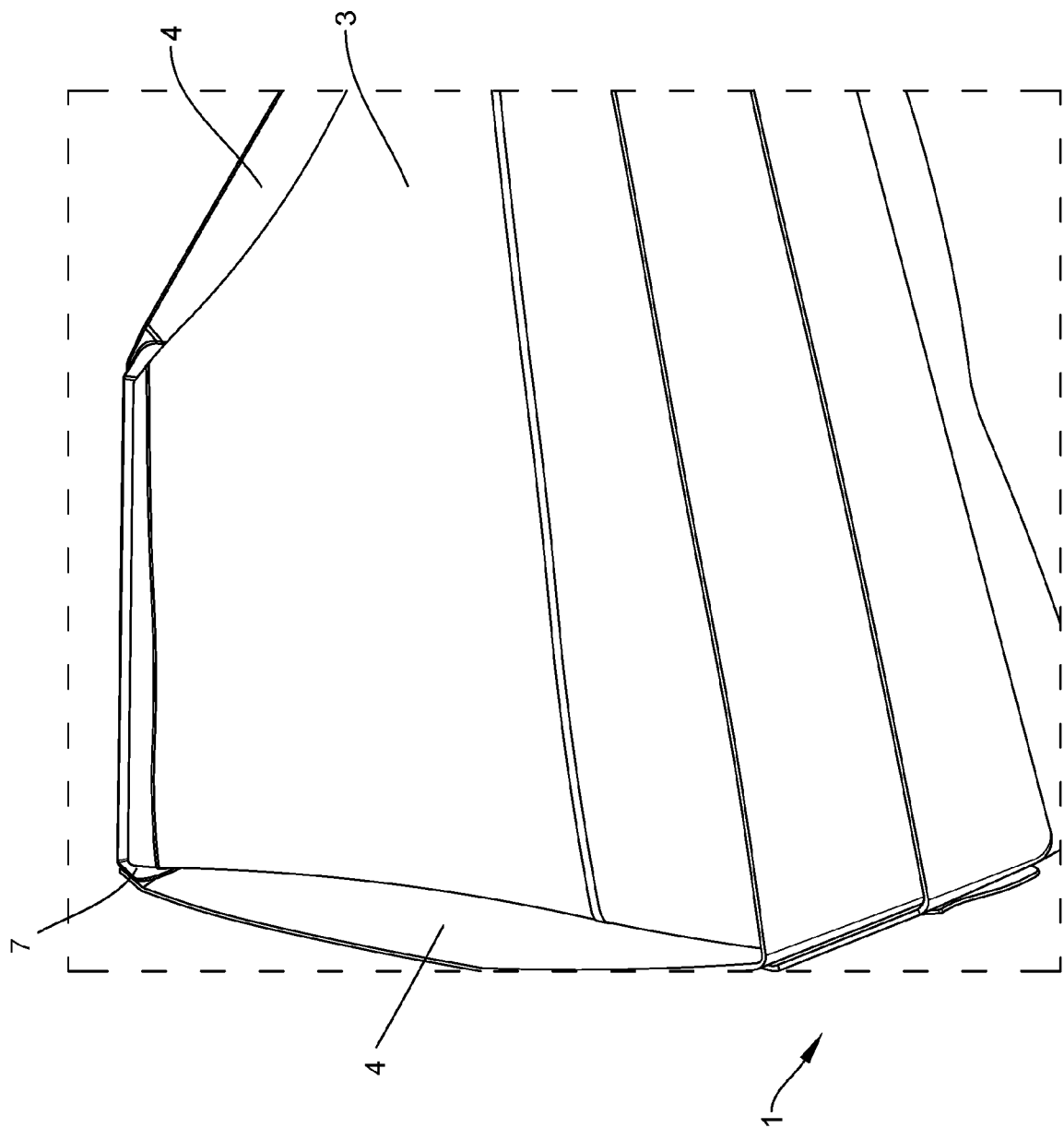


FIG. 7

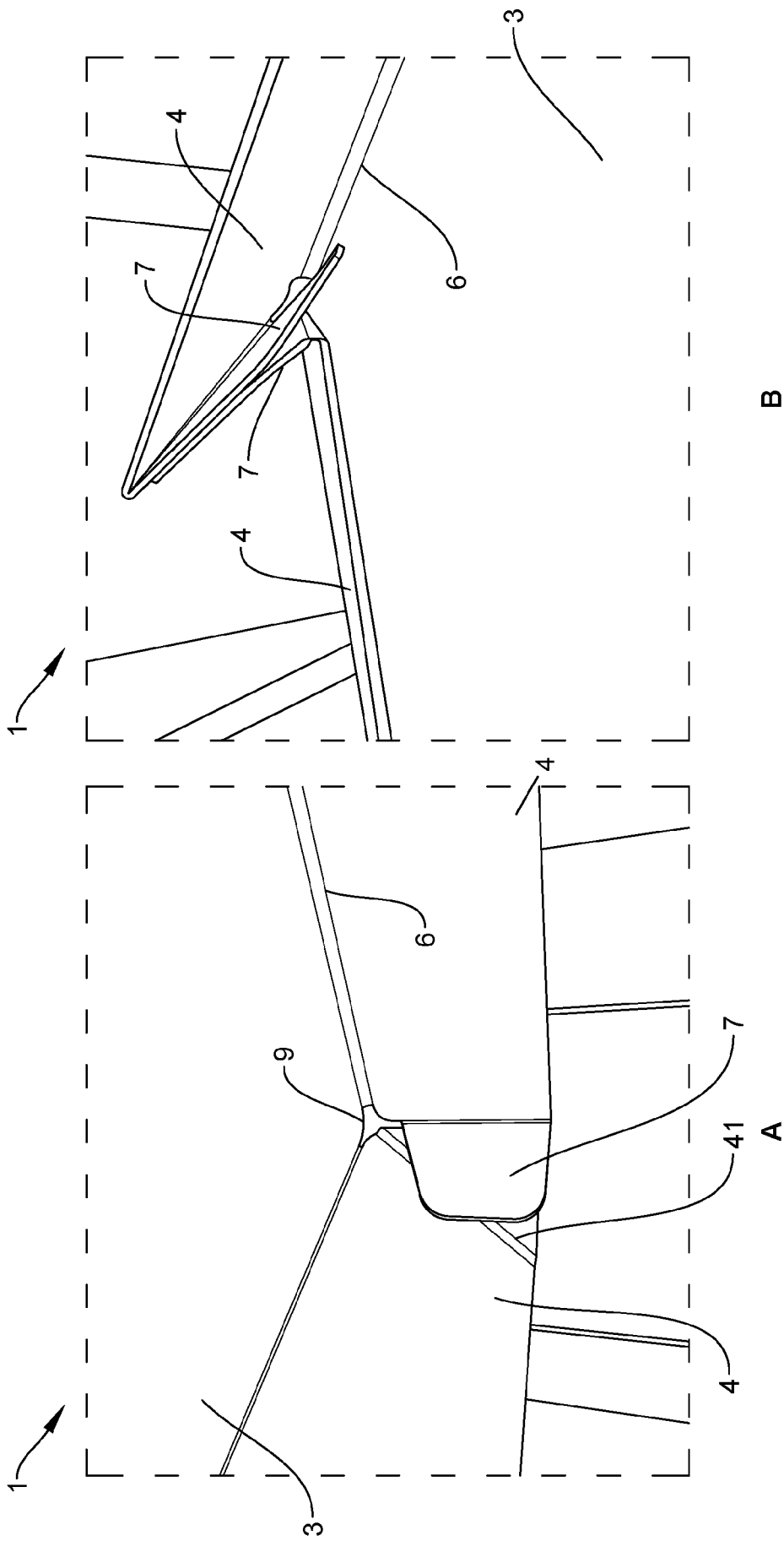


FIG. 8

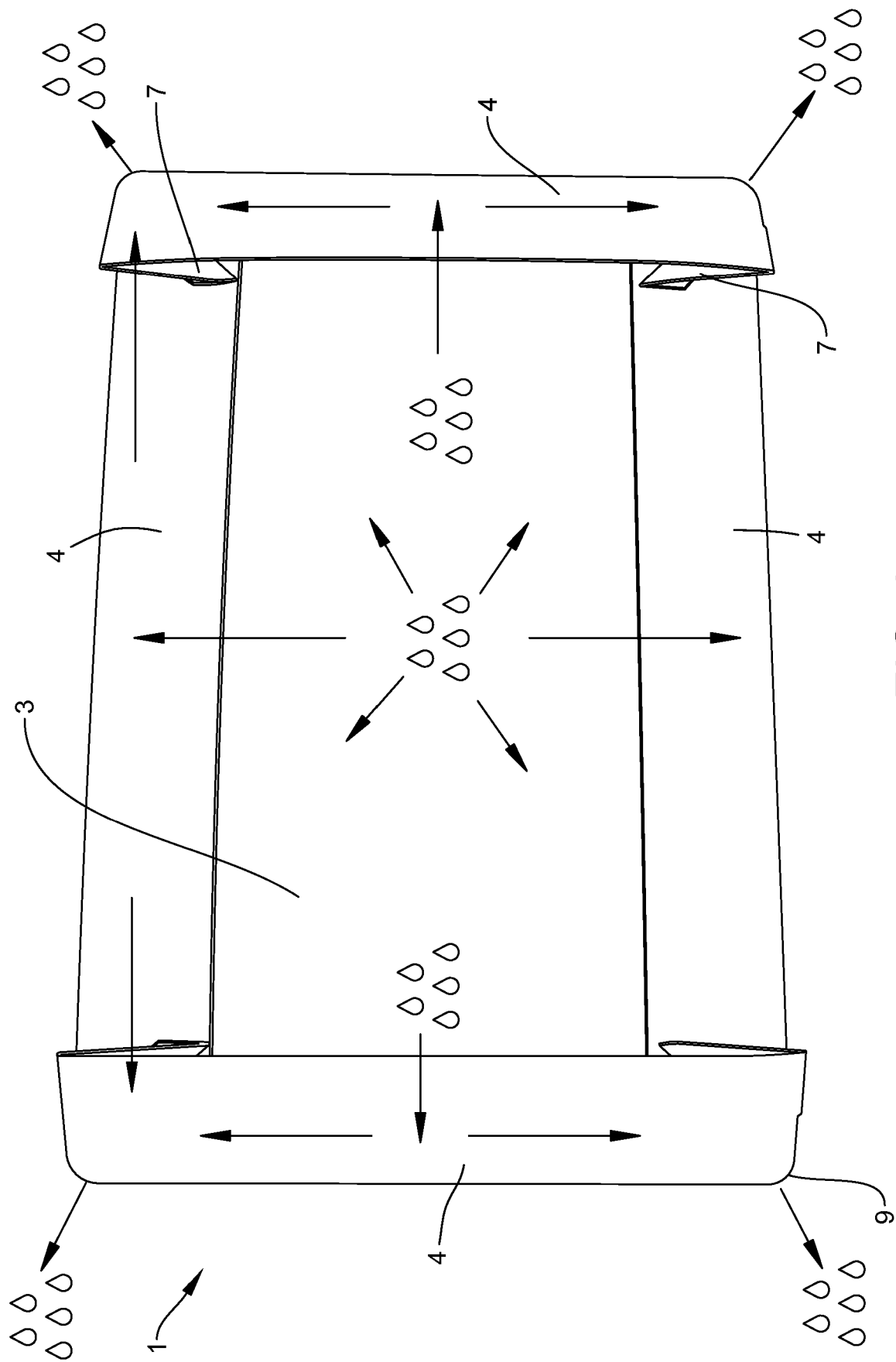


FIG. 9

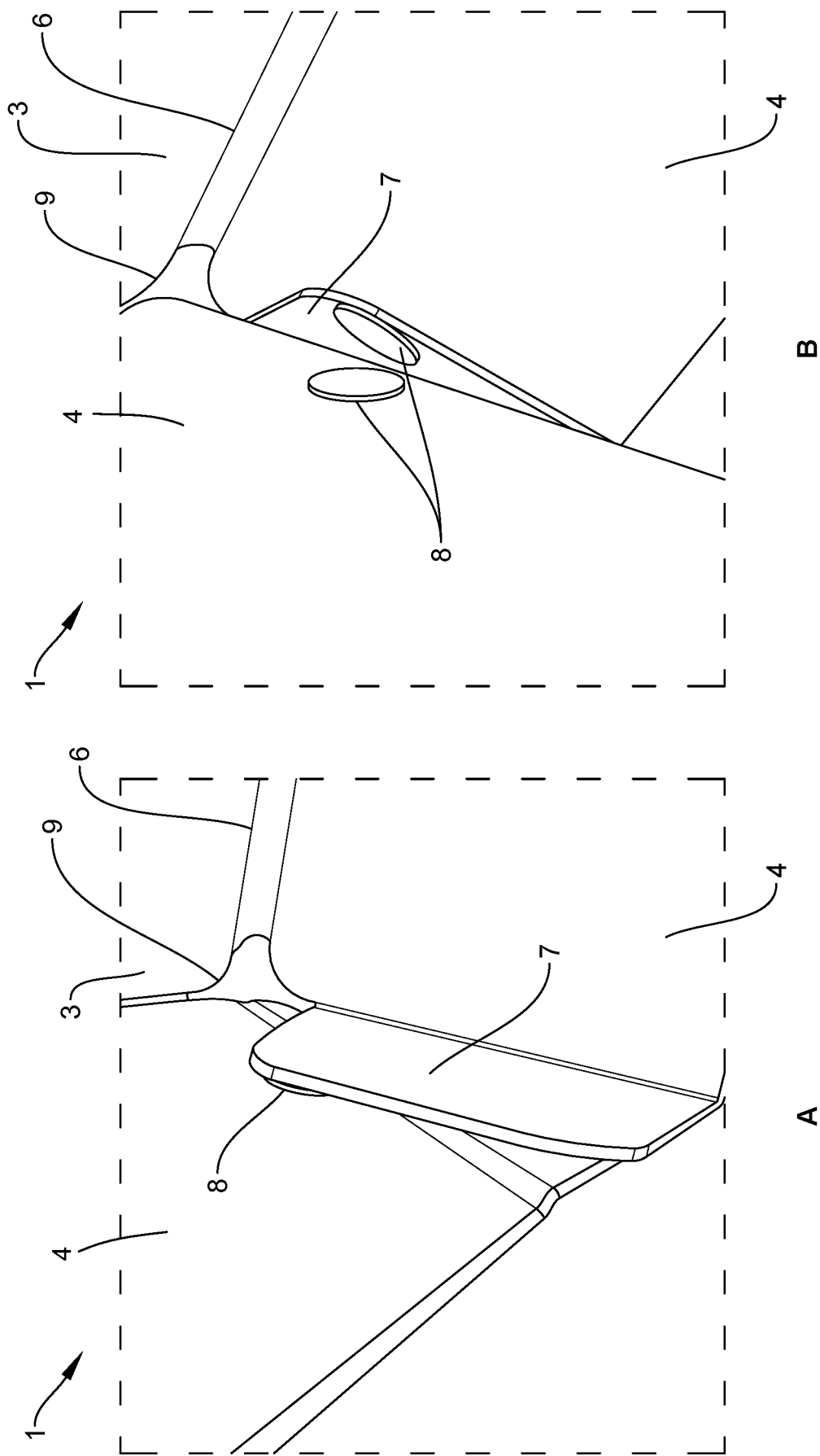


FIG. 10

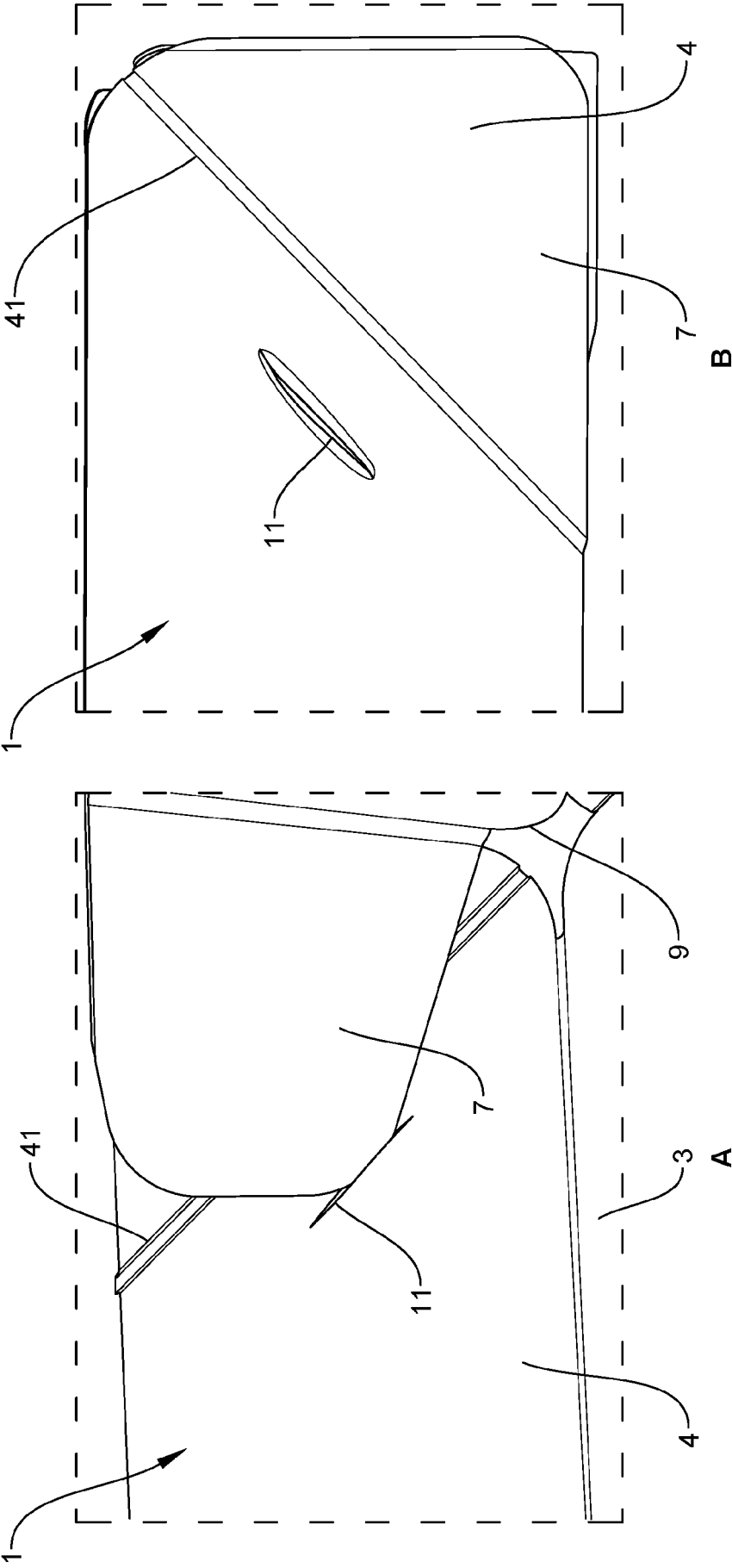


FIG. 11



EUROPEAN SEARCH REPORT

Application Number

EP 25 16 7663

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	WO 2017/046609 A1 (THE BENJAMIN GROUP LTD [GB]) 23 March 2017 (2017-03-23) * page 5, line 33 - page 17, line 9; figures 1-6 *	1-10,13, 14	INV. B65D5/36
Y	US 2023/331434 A1 (CHAN LI-CHUN [TW]) 19 October 2023 (2023-10-19) * paragraphs [0003], [0010], [0011]; figures 1-3 *	1-10, 13-15	
Y	US 2018/127151 A1 (PANTELLERIA JOSEPH A [US]) 10 May 2018 (2018-05-10) * paragraphs [0032] - [0043]; figures 1-8 *	1-10,13, 14	
Y	US 3 409 204 A (CARLE ROBERT A) 5 November 1968 (1968-11-05) * column 3, line 42 - column 4, line 47; figures 4-6 *	1-10, 13-15	
Y	US 10 829 265 B2 (ORBIS CORP [US]) 10 November 2020 (2020-11-10) * column 11, lines 34-45; figures 21-22 *	15	TECHNICAL FIELDS SEARCHED (IPC)
A	FR 2 840 883 A1 (CARTONNAGES GUILLAUME [FR]) 19 December 2003 (2003-12-19) * abstract; figures 1-4 *	1	B65D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 8 September 2025	Examiner Leijten, René
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P24C01)



Application Number

EP 25 16 7663

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-10, 13-15-----

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 25 16 7663

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-10, 13-15

Tray for holding items and method of producing a tray.

2. claim: 11

Tray including a drain hole.

3. claim: 12

Tray configured to be nestable in a further tray when the tray is in the retracted position and the further tray is in the holding position.

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

EP 25 16 7663

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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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08-09-2025

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