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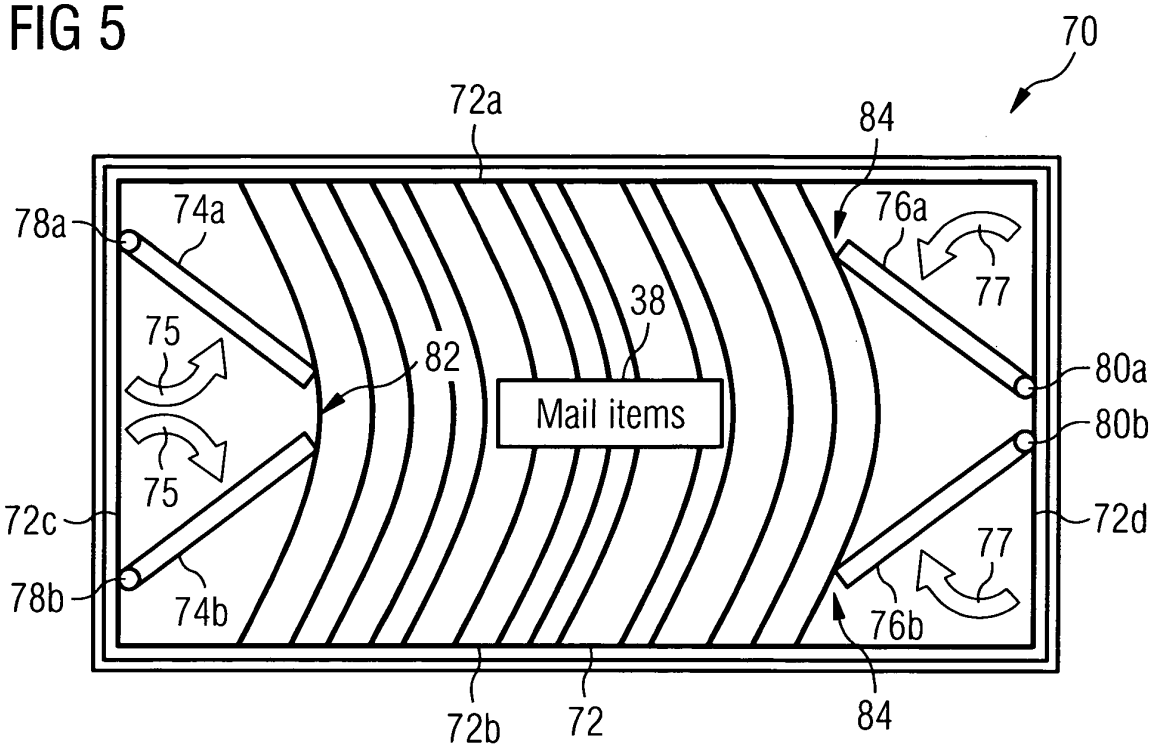
(54) Method and apparatus for stabilizing mail items

(57) An apparatus (70) for stabilizing mail items (38) in a mail container (54) has on opposite sides a first pair of flaps (74a, 74b) and a second pair of flaps (76a, 76b). The mail items (38) form a stack having a first mail item, a last mail item and a plurality of mail items between the first and last mail items. Each mail item stands on a small side, has a middle region (82) and two lateral regions (84), one on each side of the middle region (82). The first pair of flaps (74a, 74b) applies a first force against the middle region (82) of the first mail item, wherein the first force urges the first mail item towards the last mail item. The second pair of flaps (76a, 76b) applies second forces against the lateral regions (84) of the last mail item, wherein the second forces urge the last mail item towards the first mail item. These forces cause the mail items to curve, which stabilizes the mail items in the container.

FIG 5



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Description

Background of the Invention

[0001] The various embodiments described herein relate generally to a mail processing system. More particularly, these embodiments relate to a method and apparatus for stabilizing sorted mail items in such a system.

[0002] Each day postal services process mail items for delivery to millions of individual domestic addresses. As used throughout this application, mail items refer to letters, magazines, books and other such flat items. Before mail carriers begin to walk through or drive through their delivery routes, a mail processing system at a processing site sorts all mail items for the carriers and prepares the sorted articles for delivery to a multitude of domestic addresses. A carrier's responsibility includes putting all of these articles into an appropriate sequence for efficient delivery to the domestic addresses.

[0003] The mail processing system is highly automated to handle the amount of daily articles. Some mail processing systems may include a delivery point packaging (DPP) system that, for example, separates the articles, reads their destination addresses and groups the articles based upon their respective destination addresses. An exemplary DPP system is an automatic casing system which may comprise two u-shaped casing towers arranged side by side. Each tower carries, on a given number of levels, vertical oriented slots. The slots may be grouped in containers or pods wherein most or all mail for a delivery point is inserted. The insertion may be effected by autonomous moving vehicles. Each of the vehicles may carry one piece of mail. Each of the two casing towers may be further connected to two loading points. Each loading point may further be connected to one or more feeders via a conveyor system. After the mail is appropriately sorted, it is packaged. One form of packaging is polywrapping. Here, a select number of mail items are emptied directly into a polywrapper which envelopes the select number in a polywrap for easier handling. The polywrapper may be loaded either from the side or from the top. The process is repeated for each pocket, generally sequentially, until the pod is empty and ready to be resorted back into the casing tower.

[0004] U.S. Patent No. 6,715,614 describes a mail case system that is manually filled and facilitates sequence-sorting various types of mail into individual bags. Each bag represents a unique delivery point. The mail case uses multi-bag inserts so that the bags for several stops can be set up quickly for sorting. At the end of the sorting operation, the entire insert may be pulled down from the case as a single unit to maintain the established delivery point sequence. This eliminates the carrier's need to find separation points or to combine selections from multiple sequenced stacks of mail during the delivery operation. This results in improved delivery efficiency.

[0005] Generally, mail items, in particular magazines and other flimsy mail items tend to collapse when placed standing in a container. Similarly, bags filled with mail items tend to collapse in a container. The smooth surface of the bags increases the tendency to collapse. Collapsed mail items or bags, however, require additional effort and time to sort through and rearrange.

Summary of Certain Inventive Aspects

[0006] There is, therefore, a need for a technique for an improved handling of mail items and bags while in a container.

[0007] Accordingly, one aspect involves a method of stabilizing mail items in a mail container. The mail items form a stack having a first mail item, a last mail item and a plurality of intermediate mail items between the first and last mail items. Each mail item stands on a small side, has a middle region and two lateral regions, one on each side of the middle region. Each region extends from a container bottom upwards. A first force is applied against the middle region of the first mail item, wherein the first force urges the first mail item and the plurality of intermediate mail items towards the last mail item. Second forces are applied against the lateral regions of the last mail item, wherein the second forces urge the last mail item and the plurality of intermediate mail items towards the first mail item. The first and second forces cause the mail items to curve, which stabilizes the mail items in the container.

[0008] Another aspect involves an apparatus for stabilizing mail items in a mail container. The mail items form a stack having a first mail item, a last mail item and a plurality of mail items between the first and last mail items. Each mail item stands on a small side, has a middle region and two lateral regions, one on each side of the middle region. Each region extends from a container bottom upwards. The apparatus has a first pair of flaps on a first side of the container. The first pair of flaps is configured to apply a first force against the middle region of the first mail item, wherein the first force urges the first mail item and the plurality of intermediate mail items towards the last mail item. Further, the apparatus has a structure on a second side of the container. The second side is opposite to the first side. The structure is configured to apply second forces against the lateral regions of the last mail item, wherein the second forces urge the last mail item and the plurality of intermediate mail items towards the first mail item. These forces cause the mail items to curve, which stabilizes the mail items in the container.

Brief Description of the Drawings

[0009] These and other aspects, advantages and novel features of the embodiments described herein will become apparent upon reading the following detailed description and upon reference to the accompanying drawings. In the drawings, same elements have the same reference numerals. In the following list of figures:

Figure 1 depicts a schematic overview of one embodiment of a pocket;

Figure 2 depicts a cross sectional view of the pocket of Figure 1;

Figure 3 depicts an arrangement of partitions next to a mail container;

Figure 4 depicts the arrangement of partitions of Figure 3 lowered into the mail container; and

Figure 5 is a schematic illustration of a top view of one embodiment of an apparatus for stabilizing mail items in a mail container.

Detailed Description of Certain Inventive Embodiments

[0010] The various embodiments are described herein with respect to a mail processing system that sorts and packages mail items for a delivery point in a pocket. However, it is contemplated that the apparatus and method described hereinafter are not limited to such sorting and packaging in pockets, but can be equally used with mail items the are otherwise arranged, as long as the mail items are placed in a mail container, with or without bags, and a prone to collapsing.

[0011] One embodiment of a pocket 5 is described hereinafter with general reference to Figures 1 and 2. The pocket 5 is in one embodiment used in a mail processing system to receive mail items for a unique delivery point or only parts of it. However, it is contemplated that a bag may be filled according to other criteria, such as post codes or addressee names.

[0012] Figure 1 depicts the pocket 5 including a bag 10 arranged about a partition 14. The partition 14 is depicted as extending out of the bag 10 and including a pair of overhangs 26 and 36. The overhangs 26, 36 are arranged to interact with rods 30 so that the partition 14, and with it the depicted pocket 5, can selectively and laterally be positioned along the rods 30. The partition includes a pair of clamps 20 arranged to affix the bag 10 to the partition 14. The clamps 20 may be arranged to interact with a specially shaped rod which, as will be detailed below, when turned uncouples and/or couples the clamps 20.

[0013] As depicted in the side view of Figure 2, a separator sheet 32 is arranged within the bag 10 and attached to the partition 14 via a leaf spring 39. Mail items 38, to be stored in the bag 10, are located between the separator sheet 32 and the partition 14. The separator sheet 32 includes two parts, a first part 33 connected to the partition 14 and including a pair of opposing overhangs 37, a second part 35 running within the overhangs 37 in a lateral direction of the bag 10. A hook 28 (Figure 1), is attached to the second part 35. The separator sheet 32 further includes two posts 18 and 16 extending the approximate length of the bag 10 so as to assist in maintaining the bag's shape, as will be detailed below. Alternatively, the two posts 18, 16 may be arranged to slide within the partition 14.

[0014] A belt 12 is arranged to run freely about the length of the separator sheet 32, and between the mail items 38 and the separator sheet 32. Another belt (not shown) may be arranged about the partition 14 itself. As depicted, the belt 12 is affixed to the post 33 at a limited location; however, as indicated above, the belt 12 may be attached at other locations. Accordingly, when the hook 28 is pulled in a direction out of the bag 10, the relative motion of the separator sheet 32 is absorbed and otherwise displaced by the belt 12 so as not to disturb the mail items 38. In addition, the post 33 is translatable on the partition 14. Accordingly, additional overhangs 31 facilitate the translatable motion.

[0015] Figure 3 illustrates an arrangement of partitions 14 next to a mail container 54. For illustrative purposes only three partitions 14 are shown and only one partition 14 is provided with a bag 10. The partitions 14 hang from the rods 30. Hence, Figure 3 illustrates a situation after the aligned partitions 14 have been replenished with bags 10 following removal of filled bags 10.

[0016] Figure 4 illustrates the arrangement of partitions 14 of Figure 3 lowered into the mail container 54. In the illustrated state, the mail container 54 includes empty bags 10 that are available for receiving mail items.

[0017] It is contemplated that the bags 10 are separated from each other once placed in the mail container 54. The separation of the bags 10 may occur by separating them at stress risers with the partitions 14 being introduced, for example, by pulling the bags 10 apart or cutting them at these locations. Alternatively, the separation may occur prior to or after placing the rails with the partitions 14 into the mail container 54.

[0018] The bags 10 are in one embodiment as described in the above mentioned U.S. Patent No. 6,715,614. However, it is contemplated that other bags and items as envisioned by one skilled in the art may be used. The bags 10 are in one embodiment a series of thin HDPE bags. A plastic (polystyrene) strip has a series of tabs separated by spaced notches which penetrate part way through the width of each strip. The tabs are sized to fit into each respective mouth of a bag 10, and an outer margin of each bag 10 is secured to a strip by suitable means, such as an adhesive or weld. The bags 10 are not perforated, but instead can be readily torn away one at a time as needed along a line running from the outer edge of strip to the inner end of each notch. In this embodiment, the line represents a stress riser or weakest part of the strip in the tear-off direction, and does not need to be scored or otherwise weakened. Each strip should have a thickness and width sufficient to keep the bags intact until they are intentionally separated by the carrier.

[0019] Figure 5 shows a schematic illustration of a top view of one embodiment of an apparatus 70 for stabilizing mail items 38. The mail items 38 form a stack having a

first mail item, a last mail item and a plurality of mail items between the first and last mail items. Each mail item has in one embodiment a rectangular shape with front and back sides, at least one of which includes, e.g., address information, and four small sides. In the embodiments described herein, each mail item stands on one of the four small sides. Each mail item 38 has a middle region 82 and two lateral regions 84, one on each side of the middle region 82, wherein each region extends from a container bottom upwards.

[0020] The apparatus 70 may be an integral part of the mail container 54 or pod. In another embodiment, the apparatus 70 may be an inlay 72 configured to be positioned within a mail container 54 on an as-needed basis. Figure 5 depicts a top view of an embodiment having an inlay 72. It is contemplated that the structure and principle of operation of the inlay 72 apply correspondingly to an apparatus 70 that is an integral part of the mail container 54.

[0021] The inlay 72 has a rectangular frame that extends along the inner circumference of the container 54. In one embodiment, the frame extends between an upper rim of the mail container 54 and a bottom of the mail container 54. The frame has two parallel sides 72a, 72b, which determine the length of the frame, and two parallel sides 72c, 72d, which determine the width of the frame. Several curved lines that extend between the sides 72a, 72b represent standing mail items 38. The inlay 72 includes further a mechanism that causes the mail items 38 to curve with respect to the sides 72c, 72d of the frame.

[0022] The mechanism illustrated in the embodiment of Figure 5 includes two opposing pairs of flaps 74a, 74b, 76a, 76b. The flaps 74a, 74b are mounted to the side 72c, for example, by joints 78a, 78b that allow the flaps 74a, 74b to pivot. In one embodiment, each flap 74a, 74b may pivot about an axis that extends between the mail container's rim and bottom. The joint 78a is mounted to the side 72c in proximity of a corner formed by the sides 72a, 72c. Likewise, the joint 78b is mounted to the side 72c in proximity of a corner formed by the sides 72b, 72c. The flaps 74a, 74b are configured to pivot towards the respective side walls 72a, 72b. In one embodiment, the flaps 74a, 74b may be spring biased so as to urge the flaps 74a, 74b towards the side walls 72a, 72b, as indicated by arrows 75.

[0023] Similar to the joints 78a, 78b, joints 80a, 80b mount the flaps 76a, 76b to the side 72d so as to allow the flaps 76a, 76b to pivot about an axis. The axis may extend between the mail container's rim and bottom. The joints 80a, 80b are mounted to the side 72d in proximity of a center of the side 72d. The flaps 76a, 76b are configured to pivot away from the respective side walls 72a, 72b. In one embodiment, the flaps 76a, 76b may be spring biased so as to urge the flaps 76a, 76b away from the side walls 72a, 72b, as indicated by arrows 77.

[0024] In operation, the flaps 74a, 74b act upon the middle region 82 of the first mail item, and hence on essentially all mail items 38, and urge them away from the side 72c and towards the last mail item. The flaps 76a, 76b, however, act upon lateral regions 84 of the last mail item, and, hence, also on essentially all mail items, in proximity of the side walls 72a, 72b and urge them away from the side 72d. In sum, the mail items curve as a result of the flaps 74a, 74b, 76a, 76b acting upon them, as depicted in Figure 5. The curvature of each mail item 38 increases its resistance to collapsing and, hence, stabilizes the mail item 38 while in the mail container 54.

[0025] The flaps 74a, 74b, 76a, 76b may have constant lengths. In another embodiment, the lengths of the flaps 74a, 74b may be adjustable, for example, extensible. Advantageously, if the lengths of the flaps 74a, 74b extend end sections of the flaps 74a, 74b remain substantially in contact with the middle region 82 without moving outwards. For that purpose, each flap 74a, 74b may contain a spring or a telescopic mechanism that urge the end section towards the mail piece.

[0026] It is contemplated that the curvature of the mail items 38 may be achieved through other means as well, although the described embodiment using to pairs of flaps is preferred. In one embodiment, only one flap pair may be used that urges the mail items 38 against a structure that causes a desired counter force. For example, the flaps 74a, 74b may urge the mail items 38 against a static structure instead of the flaps 76a, 76b, such as a pair of elements that extend from the side 72d. In use, each element acts upon the mail items 38 in the lateral region 84.

[0027] Further, at least one pair of the flaps 74a, 74b, 76a, 76b may be configured as a pair of leaf springs fixed to the side 72c. When bent towards the side 72c the leaf springs cause a force directed away from the side 72c and towards the mail items 38. Joints 78a, 78b that are spring biased may be omitted in such an embodiment.

[0028] In use, an operator or a machine load mail items 38 into the mail container and urge at least one of the pairs of flaps (74a, 74b, 76a, 76b) towards a side 72c, 72d. Once the mail container is sufficiently filled and the flaps 74a, 74b, 76a, 76b are released, i.e., the flaps 74a, 74b, 76a, 76b act upon the mail items 38, as described above, the mail items 38 bend and, thereby, stabilize the mail items 38. Advantageously, the apparatus is independent of the fill factor of the mail container. That is, as long as the mail container is sufficiently filled, additional mail items may be added until a maximum load is reached due to the flexibility of the flaps 74a, 74b, 76a, 76b.

[0029] It is apparent that there has been disclosed an apparatus and method for stabilizing mail items in a mail container that fully satisfy the objects, means, and advantages set forth hereinbefore. For example, the embodiments stabilize the mail items while in a mail container. The risk of collapsing is thereby reduced, which improves the handling of the mail items. Advantageously, the overall capacity of the mail container is not decreased.

Claims

1. A method of stabilizing mail items (38) in a mail container (54), wherein the mail items (38) form a stack having a first mail item, a last mail item and a plurality of intermediate mail items between the first and last mail items, wherein each mail item stands on a small side, wherein each mail item has a middle region (82) and two lateral regions (84), one on each side of the middle region (82), wherein each region extends from a container bottom upwards, comprising:

   applying a first force against the middle region (82) of the first mail item, wherein the first force urges the first mail item and the plurality of intermediate mail items towards the last mail item; and
   applying second forces against the lateral regions (84) of the last mail item, wherein the second forces urge the last mail item and the plurality of intermediate mail items towards the first mail item, wherein the first and second forces cause the mail items (38) to curve, which stabilizes the mail items in the mail container (54).

2. The method of Claim 1, further comprising:

   placing a first pair of flaps (74a, 74b) in contact with the middle region (82) of the first mail item;
   placing a second pair of flaps (76a, 76b) in contact with the lateral regions (84) of the last mail item;
   moving each flap (74a, 74b) of the first pair from the middle region (82) towards the respective lateral region (84) along a surface of the first mail item; and
   moving each flap (76a, 76b) of the second pair from the respective lateral region (84) towards the middle region (82) along a surface of the last mail item.

3. The method of Claim 1, further comprising:

   placing a first pair of flaps (74a, 74b) in contact with the middle region (82) of the first mail item;
   moving each flap (74a, 74b) of the first pair from the middle region (82) towards the respective lateral region (84) along a surface of the first mail item.

4. An apparatus for stabilizing mail items (38) in a mail container (54), wherein the mail items (38) form a stack having a first mail item, a last mail item and a plurality of intermediate mail items between the first and last mail items, wherein each mail item stands on a small side, wherein each mail item has a middle region (82) and two lateral regions (84), one on each side of the middle region (82), wherein each region extends from a container bottom upwards, comprising:

   a first pair of flaps (74a, 74b) on a first side of the mail container (54), wherein the first pair of flaps (74a, 74b) is configured to apply a first force against the middle region (82) of the first mail item, wherein the first force urges the first mail item and the plurality of intermediate mail items towards the last mail item; a structure (76a, 76b) on a second side of the mail container (54), wherein the second side is opposite to the first side, wherein the structure (76a, 76b) is configured to apply second forces against the lateral regions (84) of the last mail item, wherein the second forces urge the last mail item and the plurality of intermediate mail items towards the first mail item, wherein the first and second forces cause the mail items (38) to curve, which stabilizes the mail items (38) in the mail container (54).

5. The apparatus of Claim 4, wherein the pairs of flaps (74a, 74b) and the structure (76a, 76b) are mounted to a frame (72) configured to be removably placed into the mail container (54).

6. The apparatus of Claim 4, wherein the pairs of flaps (74a, 74b) and the structure (76a, 76b) are an integral part of the mail container (54).

7. The apparatus of any one of Claims 4 - 6, wherein the structure (76a, 7b) includes a second pair of flaps (76a, 76b), wherein the second pair of flaps (76a, 76b) is configured to apply second forces against the lateral regions (84) of the last mail item.

8. The apparatus of any one of Claims 4 - 6, wherein the structure (76a, 7b) includes a pair of elements that extend from the second side, wherein the elements apply second forces against the lateral regions (84) of the last mail item.

9. The apparatus of any one of Claims 4 - 8, wherein the first pair of flaps (74a, 74b) is mounted by spring-biased joints (78a, 78b).

10. The apparatus of any one of Claims 4 - 8, wherein the flaps (74a, 74b) of the first pair of flaps (74a, 74b) include leaf springs.

11. The apparatus of any one of Claims 4 - 10, wherein the flaps (74a, 74b) of the first pair of flaps (74a, 74b) have lengths that are adjustable.

FIG 1

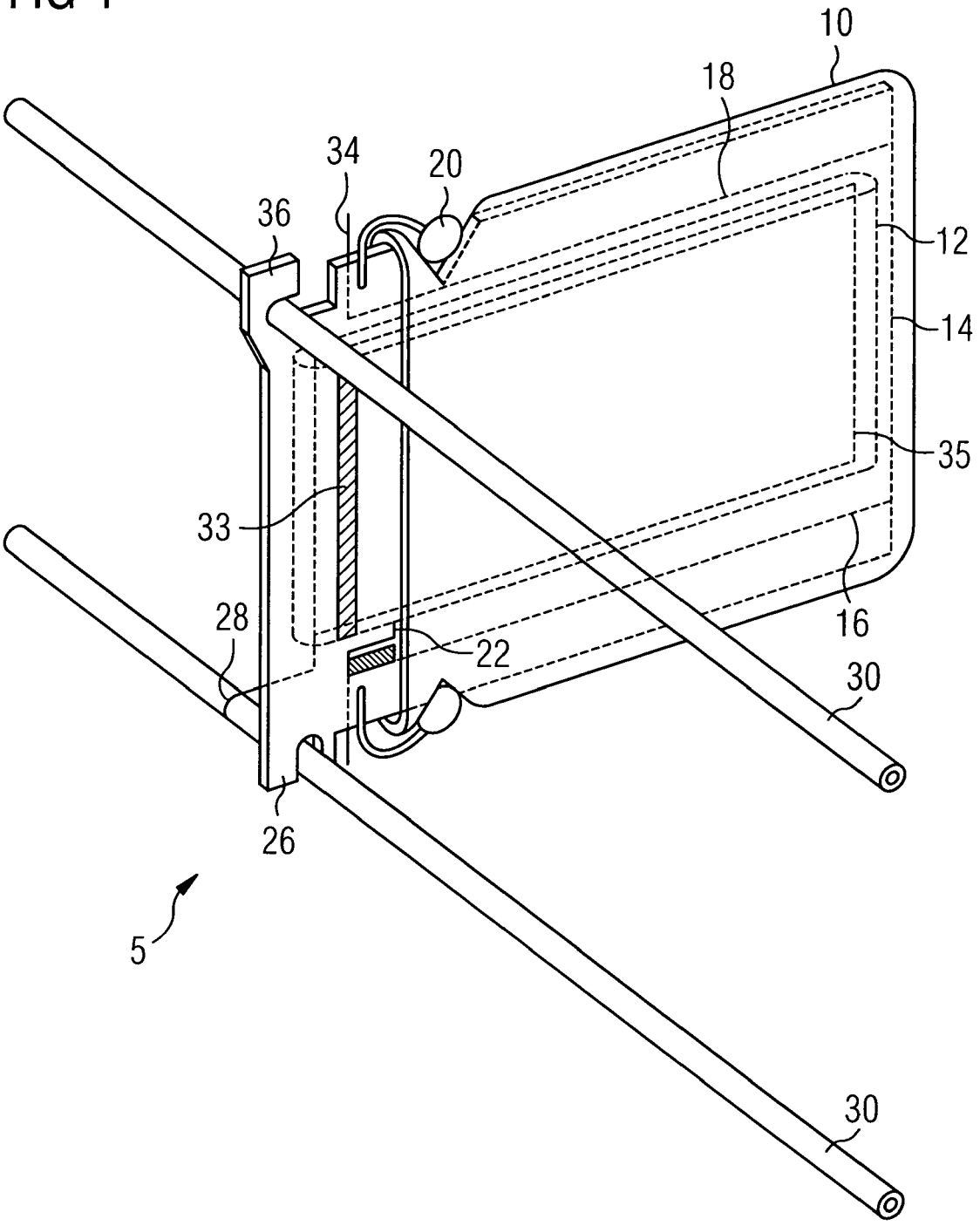


FIG 2

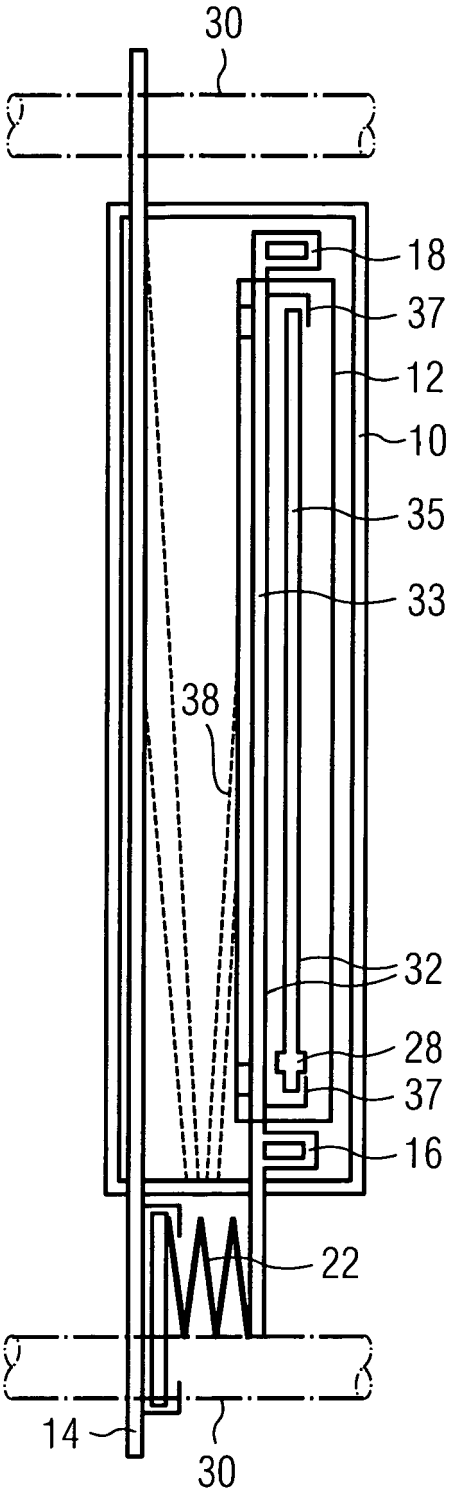


FIG 3

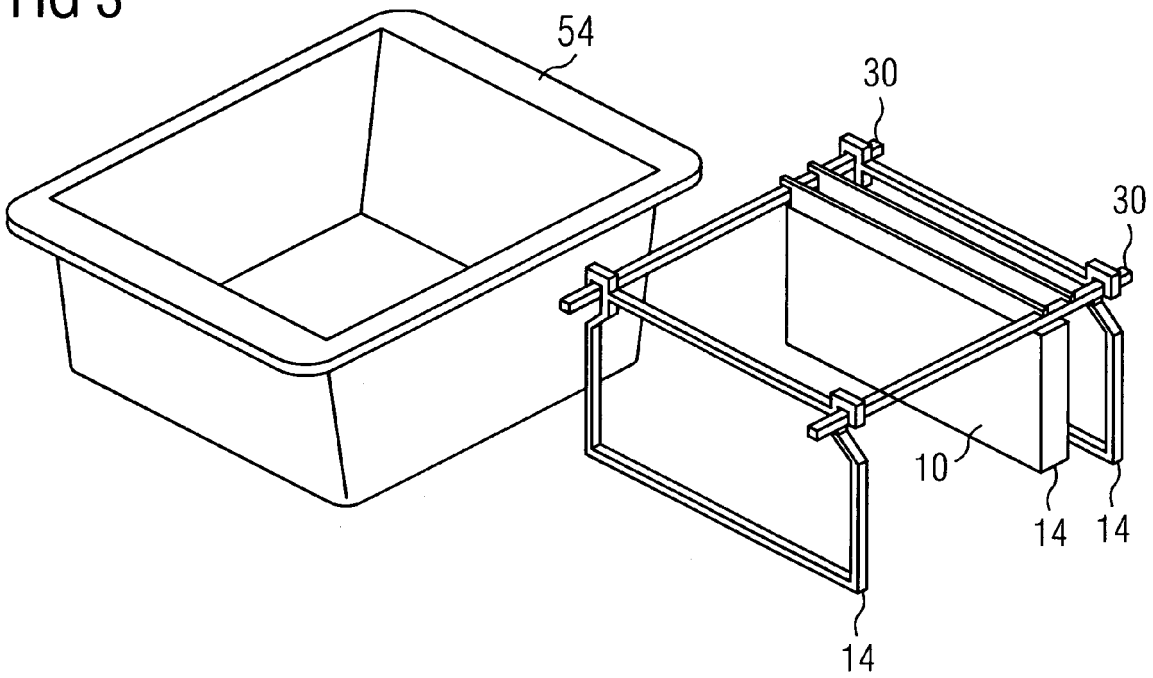


FIG 4

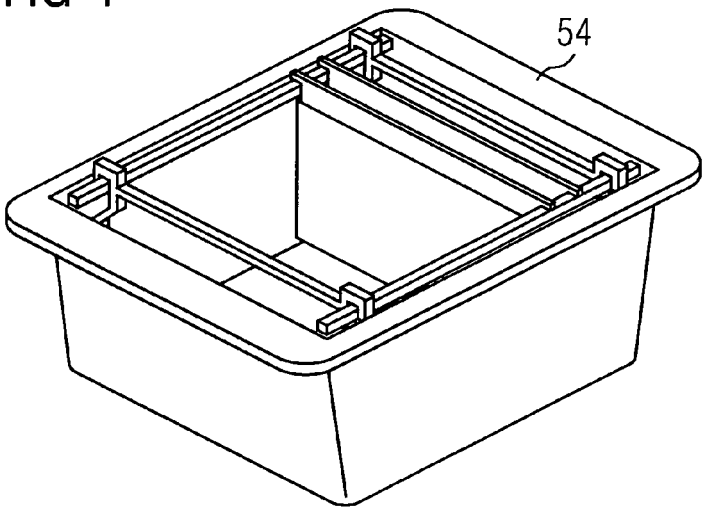
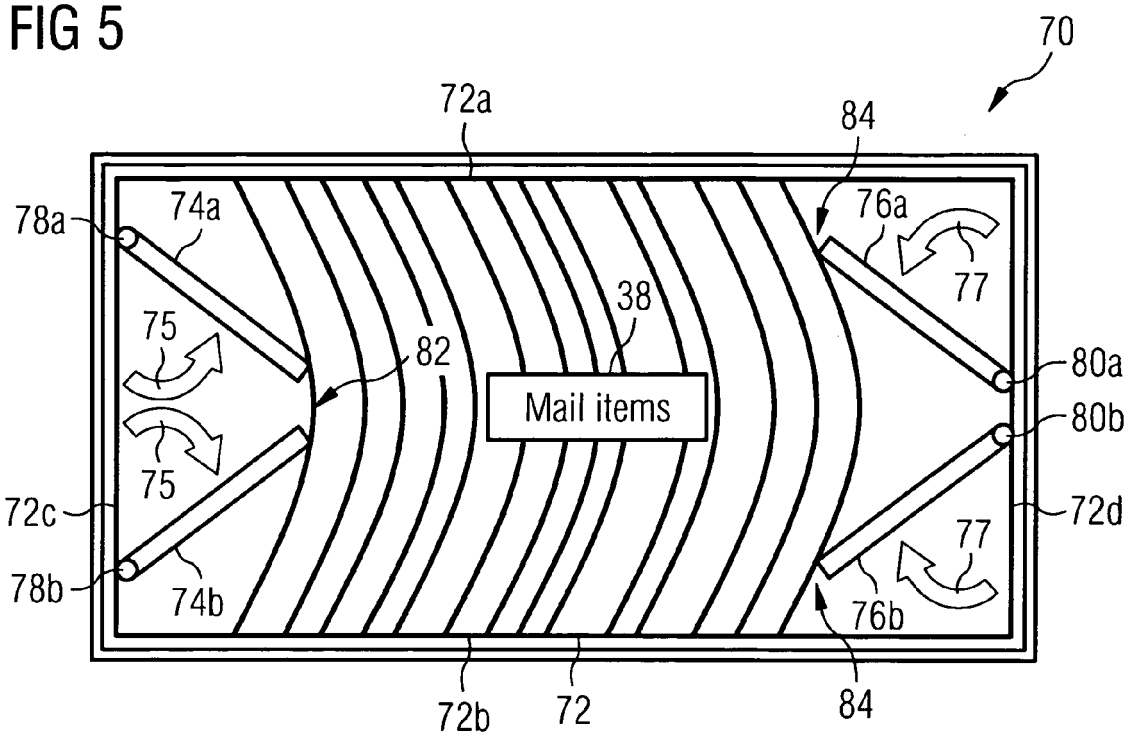


FIG 5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EUROPEAN SEARCH REPORT

Application Number
EP 06 01 3445

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
D,A	US 6 715 614 B2 (PIPPIN JAMES M [US] ET AL PIPPIN JAMES M [US] ET AL) 6 April 2004 (2004-04-06) * the whole document *	1-11	INV. B65H31/26
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TECHNICAL FIELDS SEARCHED (IPC)

B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	4 January 2007	Stroppa, Giovanni

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