

PACKAGING SYSTEM AND METHOD FOR EXPANDABLE PADDED MAILERS

Field of the Invention

The present invention relates generally to the field of postal packaging, and
5 more particularly to a system and method for packing a padded packaging envelope
for shipping an article.

Background

Padded mailers, such as padded envelopes, are often used to ship items,
10 particularly fragile items. Padded mailers are typically made with plastic air-bubble
material lining the inside of the mailer, however, alternatives such as foam, recycled
fiber fluff, and paper-based cushioning material may be used. Padded mailers are
provided to packers in a ready-to-use state. The packer typically retrieves a mailer
from a supply, opens the mailer and inserts a product to be shipped without any
15 assistance. The envelope is then closed before being ready for shipment.

Summary

The present disclosure describes packaging systems and methods that make
it easier for a packer to open a packaging envelope with just one hand and then
20 insert an item to be packaged before closing the packaging envelope for shipment.

Both a manual system and method for opening a packaging envelope and a
semi-automated system and method for presenting and opening a packaging
envelope are shown and described. In both cases, the packaging envelope can be
opened with one hand, leaving the other hand free to insert the item being packaged.
25 This facilitates inserting the item to be packaged into the packaging envelope and
increases the speed of the packaging operation, and can be accomplished at
relatively low cost compared to a fully automated system for automatically opening an
envelope and automatically inserting the item.

An exemplary packaging system for supplying packaging envelopes for packaging an item for shipment includes an envelope support assembly configured to support an upright stack of a plurality of packaging envelopes, and a capture mechanism configured to engage and hold the top edge of the front sheet of a
5 bottom envelope in the upright stack so that the top edge of the rear sheet can be moved downward and away from the front sheet to open the pouch for insertion of the item to be shipped. Each envelope has a front sheet and a rear sheet, and each of the front sheet and the rear sheet include a bottom edge, a top edge, and opposing side edges. The front sheet and the rear sheet are connected together
10 along the bottom edge and along respective side edges to form a pouch. Each of the front sheet and the rear sheet may have multiple layers, which may include a liner formed of cushioning materials.

In one or more embodiments, the envelope support assembly defines a rectangular volume configured to receive and support a plurality of packaging
15 envelopes in an upright stack, and may include a singulating mechanism toward a bottom of the envelope support assembly configured to pass one envelope at a time downward from a bottom of the stack past the singulating mechanism, and an advancing mechanism below a top of the singulating mechanism that engages a bottom edge of an envelope and advances the envelope in bottom-to-top direction
20 from a rest position to a ready-to-package position. The capture mechanism in such an embodiment is configured to engage and hold the front sheet as the envelope moves to the ready-to-package position. The advancing mechanism may include a conveyor belt with a protruding element secured to the conveyor belt that is configured to engage the bottom edge of the packaging envelope.

25 In one or more embodiments, the capture mechanism may include a horizontally-extending portion configured to pass between the top edge of the front sheet and the rear sheet as the advancing mechanism moves the packaging envelope to the ready-to-package position. The horizontally-extending element may include a pair of planar, laterally-spaced forks.

In one or more embodiments, the singulating mechanism may include a sensor that detects removal of the bottom packaging envelope. The singulating mechanism also or alternatively may include an upper singulating tab and a lower singulating tab below the upper singulating tab, with each mounted for separate
5 rotation about an axis, and with each tab being rotatable between an engagement position in engagement with the stack and a removed position removed from the stack. The upper singulating tab may be configured to rotate from the removed position to the engagement position before the lower singulating tab rotates from the engagement position to the removed position. The vertical separation between the
10 upper singulating tab and the lower singulating tab may be approximately the thickness of a single one of the plurality of packaging envelopes.

In one or more embodiments, the capture mechanism may move upward following engagement with the front sheet to hold or clamp the front sheet to a surface of the frame of the packaging system. The surface of the frame may include
15 a padded surface.

In one or more embodiments, the envelope support assembly may include a plurality of packaging envelopes arranged in a stack in a common orientation. The envelope support assembly may include a container having a top wall, a bottom wall, and side walls connecting the top wall and the bottom wall to define a rectangular
20 volume sized to receive the plurality of envelopes. One of the side walls may have an opening adjacent the bottom wall between adjacent side walls that is configured to facilitate withdrawing a bottom packaging envelope from the container. Additionally, the capture mechanism may include an elongate member secured to the container within the rectangular volume and adjacent the top wall, with the elongate member
25 passing through the front sheet of each packaging envelope in the stack in sequence, and the elongate member having a capture element with a larger diameter than the elongate member. The capture element may be positioned within the container adjacent an edge of the opening.

In one or more embodiments, the capture element is spaced from the bottom wall of the container at a predetermined distance sufficient to open the bottom packaging envelope in the stack without removing the bottom packaging envelope from the container.

- 5 An exemplary packaging method includes the following steps: (i) providing a plurality of packaging envelopes, (ii) providing a container having a top wall, a bottom wall, and side walls connecting the top wall and the bottom wall to define a rectangular volume sized to receive the plurality of envelopes, one of the side walls having an opening adjacent the bottom wall between adjacent side walls, and the
10 opening is configured to facilitate withdrawing an envelope from the internal volume; (iii) capturing a bottom packaging envelope of the plurality of packaging envelopes with a capture mechanism that includes an elongate member that passes through the front sheet of each packaging envelope in sequence, a lower end of the elongate member having a capture element with a larger diameter than the elongate member,
15 and an upper end of the elongate member being secured to the container inside the rectangular volume near the side wall having the opening, the capture element positioned near a top side of the opening, (iv) pulling the rear sheet of the bottom packaging envelope downward and over the capture element to open the pouch, (v) inserting the item to be shipped into the pouch, and (vi) pulling the bottom packaging
20 envelope out of the opening and causing the capture element to pass through the front sheet to release the packaging envelope from the elongate member.

- Another exemplary packaging method includes the steps of (i) providing a plurality of packaging envelopes, and (ii) engaging and holding the top edge of the front sheet of a bottom envelope in the upright stack so that the top edge of the rear
25 sheet can be moved downward and away from the front sheet to open the pouch for insertion of the item to be shipped.

In one or more embodiments, the packaging method may include the steps of after the engaging and holding step, moving the top edge of the rear sheet of the

bottom packaging envelope downward and away from the front sheet to open the pouch, and then inserting the item to be shipped into the pouch.

In one or more embodiments, the packaging method may include the steps of after the inserting step, of pushing the packaging envelope inward to disengage the top edge of the front sheet, and then pulling the packaging envelope outward to
5 remove the packaging envelope.

In one or more embodiments, the packaging method may include the steps of folding the top edge of the rear sheet over the top edge of the front sheet and securing the rear sheet to an outer surface of the front sheet.

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Brief Description of the Drawings

FIG. 1 is a perspective view of an open packaging envelope, as known in the prior art.

FIG. 2 is a schematic perspective view of a manual packaging system with a plurality of packaging envelopes in a container.
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FIG. 3 is a cross-sectional elevation view of the manual packaging system of FIG. 2 with an item being inserted into a packaging envelope.

FIG. 4 is a schematic front elevation view of an alternative manual packaging system for a plurality of packaging envelopes in a container.

FIG. 5 is a schematic front perspective view of a semi-automatic packaging system with a plurality of packaging envelopes.
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FIG. 6 is an enlarged rear perspective view of the packaging system of FIG. 5.

FIG. 7 is an enlarged front perspective view of the packaging system of FIG. 5.

FIG. 8 is an enlarged rear perspective view of an exemplary capture mechanism of the packaging system of FIG. 5 engaging a packaging envelope.
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FIG. 9 is an enlarged perspective view of an exemplary capture mechanism of the packaging system of FIG. 5 engaging a packaging envelope.

FIGS. 10-12 are schematic sequential front views of the packaging system of FIG. 5 illustrating operation of a singulating assembly for advancing a bottom envelope from a stack of the plurality of packaging envelopes.

FIGS. 13-17 are schematic sequential side views of the packaging system of FIG. 5 illustrating operation of a capture mechanism.

FIG. 18 is a schematic front bottom perspective view of the packaging system of FIG. 5.

FIG. 19 is a schematic front perspective view of a semi-automatic packaging system with a box containing a plurality of packaging envelopes.

FIG. 20 is an isometric view of a tilted-back semi-automatic packaging system without a box.

FIG. 21 is a front view of semi-automatic packaging system without a box.

Detailed Description

Turning now to the drawings, an exemplary packaging system enables a packer to open a packaging envelope and insert an item to be packaged before removing the packaging envelope and closing the packaging envelope for shipment. Packaging envelopes are commonly referred to as mailers, and often have cushioning properties that help to protect the items therein during shipment.

An exemplary packaging envelope or mailer 10 is shown in FIG. 1 and includes a pouch 12 formed by at least a front sheet 14 and a rear sheet 16. Each of the front sheet 14 and the rear sheet 16 are formed of a laminated construction, with at least two cover sheets sandwiching at least one cushioning liner 18 between the cover sheets. Each of the front sheet 14 and the rear sheet 16 include a bottom edge 14a and 16a, respectively, a top edge 14b and 16b, respectively, and opposing side edges 14c and 16c, respectively. A direction from the bottom edges 14a, 16a to the top edges 14b, 16b, is referred to herein as a bottom-to-top direction 20 relative to the pouch 12 and a direction from a face of the front sheet 14 to a face of the rear

sheet 16 is referred to herein as a thickness direction 21 (See FIG. 4). Each of the front sheet 14 and the rear sheet 16 include a hole 26 that passes through the mailer 10. The hole 26 is an aperture through the thickness of the mailer 10 and alternatively can be shaped as a cross or slot.

5 The bottom edge 14a and the opposing side edges 14c of the front sheet 14 are affixed to the bottom edge 16a and the opposing side edges 16c of the rear sheet 16, respectively, to form an interior space 22 of the assembled pouch 12. The bottom edges 14a, 16a and opposing side edges 14c, 16c may be affixed to each other with, for example, an adhesive, a mechanical fastener, or a fold line. The pouch 12
10 optionally may include at least one gusset where the front sheet 14 is affixed to the rear sheet 16 along their respective bottom edges 14a, 16a and each of their respective opposing side edges 14c, 16c for reinforcing the pouch 12. The top edge 14b of the front sheet 14 and the top edge 16b of the rear sheet 16 remain unconnected from each other to form an opening 24 into the interior space 22 of the
15 pouch 12 for inserting an article to be packaged therein.

Each of the front sheet 14 and the rear sheet 16 may have a multi-layer composition with the cushioning liner 18 and one or more planar sheets facing or bounding the cushioning liner 18. One or more layers may be coated with materials that improve properties for the desired application, including insulation, cushioning,
20 moisture resistance, etc. To facilitate description, references to the front sheet 14 or the rear sheet 16 are used to mean a single sheet, a multi-sheet, or a multi-layer construction with one or more layers of cushioning materials.

As shown in FIG. 1, the rear sheet 16 of the pouch 12 may have a greater length in the bottom-to-top direction 20 than the front sheet 14 such that when the
25 bottom edges 14a, 16a of the front sheet 14 and rear sheet 16 are aligned with each other and affixed, the top edge 16b of the rear sheet 16 extends beyond the top edge 14b of the front sheet 14 in the bottom-to-top direction 20 to form a pouch flap 30. The pouch flap 30 may be folded over the top edge 14b of the front sheet 14 to close the opening 24 of the pouch 12. The pouch flap 30 may be secured to the front sheet

14 to seal the mailer 10 for shipment. The rear sheet 16 may include a fold line adjacent the top edge 14b of the front sheet 14, on the pouch flap 30, to facilitate folding the pouch flap 30 over the top edge 14b of the front sheet 14 to close the opening 24 after an item to be shipped has been inserted into the pouch 12.

5 The pouch flap 30 may include a pouch flap adhesive layer 32 adjacent the top edge 16b of the rear sheet 16 on an inner surface of the rear sheet 16 (the inner surface of the top sheet 14 facing the interior space 22 of the pouch 12) for sealing the padded mailer 10 for shipment. When the pouch flap 30 is folded over the top edge 14b of the front sheet 14, the pouch flap 30 can adhere to the exterior (outside
10 face) of the front sheet 14, thereby closing the opening 24 and sealing the padded mailer 10. The pouch flap adhesive layer 32 may be covered by a removable release liner 34 to prevent adherence of the pouch flap 30 to anything prior to removal of the release liner 34, whereupon the pouch flap 30 may be folded over and adhered to the front sheet 14. The adhesive layer 32 is pre-applied and may be applied to either of
15 an inwardly-facing face of the pouch flap 30 or the outside face of the front sheet 14.

 The front sheet 14 includes an adhesive layer 32 adjacent the top edge 14b of the front sheet 14 on an outer surface of the front sheet 14 (the outer surface of the front sheet 14 facing an exterior of the pouch 12) for sealing the mailer 10 for shipment. Thus, when the pouch flap 30 is folded over the top edge 14b of the front
20 sheet 14, the exterior of the front sheet 14 can adhere to the pouch flap 30, thereby closing the opening 24 and sealing the padded mailer 10.

 In addition to or in place of the adhesive layer 32, the pouch 12 may include a mechanical fastener adjacent the respective top edges 14b, 16b of the front sheet 14 and the rear sheet 16, for example on the pouch flap 30, for closing the opening 24.
25 The pouch 12 may also or alternatively include a gum seal adjacent the respective top edges 14b, 16b of the front sheet 14 and the rear sheet 16, for example, on the pouch flap 30, for closing the opening of the pouch 12.

 The front sheet 14 and rear sheet 16 are made of mailer material, which preferably is recyclable, and more preferably the entire mailer is made of recyclable

material, preferably curbside-recyclable such that no disassembly and separation of materials is necessary for recycling. Paper is an exemplary mailer material. The mailer material may be any type and grade of paper, depending on the particular application or environment in which the mailer 10 is to be used, such as kraft paper.

- 5 The mailer material may have any of various basis weights and may be made of zero to 100% recycled material. In some embodiments, the mailer material may be laminated or may include any other suitable material such as another paper, plastic sheets, metal foil, or any other combination thereof. Wax or other coatings and chemical treatments may be added to the mailer material to add or improve desired
- 10 properties such as moisture resistance or thermal resistance for cold chain applications. The mailer used in the systems and methods discussed herein is not limited to a mailer having a particular material, the described mailer is just one example of a mailer that could be used in the following systems and methods.

- Turning now to FIGS. 2 and 3, an exemplary packaging system 40 is shown
- 15 for supplying packaging envelopes 10 for packaging an item for shipping. The system 40 includes a plurality of packaging envelopes 10. As described above, each packaging envelope 10 has a front sheet 14 and a rear sheet 16, and each of the front sheet 14 and the rear sheet 16 include a bottom edge 14a and 16a, a top edge 14b and 16b, and opposing side edges 14c and 16c. The front sheet 14 and the rear
- 20 sheet 16 are connected together along the bottom edge 14a and 16a and along respective side edges 14c and 16c to form a pouch 12 such that the top edge 16b of the rear sheet 16 extends beyond the top edge 14b of the front sheet 14; and each of the front sheet 14 and the rear sheet 16 typically include a multi-layer construction with a cushioning liner with cushioning properties. Each of the front sheet 14 and the
- 25 rear sheet 16 include a hole 26 that passes through the mailer 10. The hole 26 is an aperture through the thickness of the mailer 10 and alternatively can be shaped as a cross or slot as mentioned above.

The system 40 further includes an envelope support assembly 42 configured to support a stack 44 of the plurality of packaging envelopes 10. In the illustrated

system, the envelope support assembly 42 includes a rectangular container 46, such as a cardboard box, with an interior volume sized to receive the plurality of packaging envelopes 10. The packaging envelopes 10 making up the stack 44 are provided in a common orientation, such as with the opening 24 facing in a common direction, and the rear sheet 16 of each envelope 10 facing in a common direction, such as toward a bottom of the stack 44.

In use, the container 46 is oriented with its major axis upright, such as vertical. In this orientation, the container 46 has a top wall 48, a bottom wall 50, and a plurality of side walls 52 connecting the top wall 48 and the bottom wall 50. The container 46 also has an opening 54 toward a bottom of one side wall 52. The opening 54 may be closed during storage and transportation of the container 46 and opened or removed for use. The opening 54 is configured to allow a user to open a packaging envelope 10 at the bottom of the stack 44 and insert an item to be shipped into the envelope 10 and then to remove the envelope 10 and its contents from the container 46.

The system 40 further includes a capture mechanism 60 configured to engage and hold the top edge 14b of the front sheet 14 of the bottom envelope in the stack 44 so that the top edge 16b of the rear sheet 16 can be moved downward and away from the front sheet 14 to open the pouch 12 for insertion of the item to be shipped. The capture mechanism 60 is provided by an elongate member 62, such as a thread, a string, a wire, or other flexible or rigid filament. The elongate member 62 is secured to a top of the container 46 and threaded through the hole 26 in the front sheet 14 of every packaging envelope 10 in the stack 44. The front sheet 14 of a bottom packaging envelope 10 in the stack 44 is supported by a capture element 64 with an enlarged diameter relative to the diameter of the elongate member 62, such as a nut or a bead (or a knot, if the elongate member 62 is sufficiently flexible). The capture element 64 has a diameter that is larger than the diameter of the elongate member 62. The capture element 64 may have a particular shape designed to facilitate the functions described below.

When the largest dimension of the rectangular container 46 is oriented to be substantially vertical, the opening 54 is located toward a bottom of one side wall 52 of the container 46. The opening 54 can be opened or formed by removing a portion of the side wall 52. The capture element 64 is secured to an opposite, top side of the container 46 near the side of the container 46 having the opening 54. The capture element 64 also is positioned adjacent a top of the opening 54 to hold the bottom mailer 10 at a location spaced from the bottom wall 50 of the container 46. This spacing allows a packer to open the bottom mailer 10 inside the container 46 sufficiently to insert the item to be packaged into the pouch 12. Accordingly, the capture element 64 typically is positioned toward a top of the opening 54 in the container 46.

In use, a packer will manually pull down the rear sheet 16 of the bottom packaging envelope 10, opening the opening 24 of the pouch 12. This can be done with one hand, because the upper, front sheet 14 of the packaging envelope 10 is held by the capture element 64. The packer will insert the item to be shipped 66 through the opening 24 and into the pouch 12. The packer can then withdraw the packaging envelope 10 through the opening 54 in the side wall 52 of the container 46. In the process, the packer will pull the front sheet 14 of the packaging envelope 10 off of the capture element 64. This will enlarge a hole 26 in the front sheet 14 of the packaging envelope 10 through which the elongate member 62 was threaded. The hole 26 may have any shape, and may become larger after the packaging envelope 10 is removed, or the material may elastically return to its original shape or close to it after the packaging envelope 10 is removed. Alternatively, a pre-cut "cross" or slot may be formed in the front sheet 14 of the packaging envelope 10 in place of the hole 26. The packer will then fold the pouch flap 30 portion of the rear sheet 16 over the top edge 14b of the front sheet 14 and secure the pouch flap 30 to an outer face of the front sheet 14. The securing step may include removing a release liner 34 to expose a pre-applied adhesive layer 32, and pressing the pouch flap 30 against

the outer face of the front sheet 14 to engage the adhesive layer 32 in between and thereby sealing the packaging envelope 10.

FIG. 4 shows an alternative packaging system 70 that includes a similar envelope support assembly 42, a plurality of packaging envelopes 10 in a stack 44, and a filament-type capture mechanism 60 as described above. In this packaging system 70, the envelope support assembly 42 includes a rectangular container 72, such as a cardboard box. In contrast to the previous embodiment, however, the container 72 lacks the opening in a side wall and instead has an opening 74 at a bottom end. The bottom wall of the container 72 is openable or removable to define the opening 74. The envelope support assembly 42 further includes a stand 76 configured to support the container 72 in an upright orientation spaced from a bottom 78 of the stand 76. The stand 76 has an opening 80 in a side thereof that replaces the opening 54 in the side wall 52 of the container 46 of the previous embodiment (see FIG. 2). The capture element 64 is positioned on the capture filament (elongate member) 62 such that it will be located near the top of the opening 80 in the stand 76.

The stand 76 is reusable and may be secured in place or include friction elements on the bottom 78 to hold the stand 76 in place. The stand 76 may include a ledge 82 to support lower ends of two or more side walls 84 of the container 72, and may include upright support walls 86 that extend above the ledge 82 to retain the container 72 on the ledge 82. This configuration is advantageous in that the container 72 can be completely filled with packaging envelopes 10 for more efficient storage and transportation, and the stand 76 is reusable and can be made of a more durable material than cardboard. The stand 76 may be tilted at an angle from vertical to improve ergonomics, and the degree of tilt may be variable.

In use, the container 72 is opened, if necessary, and the container 72 is placed on the stand 76 in the upright orientation with the opening 74 at the bottom with the ends of the side walls forming the opening 74 supported on the ledge 82 of the stand 76. The elongate member 62 typically is approximately the same length, or

slightly shorter, than the container 72. As a result, the capture element 64 is positioned toward the top of the opening 80 in the stand 76, facilitating ready access to and opening of the bottom packaging envelope 10. The use of the packaging system 70 then proceeds in the same manner as described above, with the bottom packaging envelope 10 accessed through the opening 80 in the stand 76 rather than through the opening 54 in the side wall 54 of the container 46 (FIG. 2). When the stack 44 of packaging envelopes 10 in the container 72 is exhausted, a new container 72 with a new stack 44 of packaging envelopes 10 can replace the empty container. This packaging system 70 has an advantage of employing a reusable stand 76 that can accommodate replaceable containers 72 with packaging envelopes 10. No special containers 46 with side wall openings 54 are needed.

Both of these embodiments provide manually-operated packaging systems 40 and 70 that require no power, which facilitates portability and provides a more affordable packaging system compared to powered packaging systems. Both of these packaging systems 40 and 70 also facilitate one-handed operation for opening packaging envelopes 10, making manual packaging operations faster and easier for packers.

In summary, a method of using either manually-operated packaging system 40 or 70 is substantially similar. The differences are only in the setup. In the case of the packaging system 40, a portion of the side wall 52 is removed to form the opening 54, if the opening is not already present, and the container 46 is placed in its upright orientation with the opening 54 at the bottom. In the case of the packaging system 70, the bottom wall 50 of the container 46 is opened and the container 46 is mounted on the stand 76. From there, the methods of using either packaging system 40 or 70 are essentially the same.

The method includes the step of providing a plurality of packaging envelopes 10 arranged in a stack 44 in an envelope support assembly 42. As shown in FIG. 1, each envelope has a front sheet 14 and a rear sheet 16, and each of the front sheet 14 and the rear sheet 16 include a bottom edge 14a and 16a, a top edge 14b and

16b, and opposing side edges 14c and 16c, as shown in FIG. 1. The front sheet 14 and the rear sheet 16 are connected together along the bottom edge 14a and 16a and along respective side edges 14c and 16c to form a pouch 12 such that the top edge 16b of the rear sheet 16 extends beyond the top edge 14b of the front sheet 14.

5 Each of the top sheet 14 and the rear sheet 16 may include a multi-layer construction that includes a cushioning liner 18 with cushioning properties. The stack 44 of packaging envelopes 10 are connected together by an elongate member threaded through a hole 26 through each of the front sheet 14 and the rear sheet 16 near the top edge 14b of the front sheet 14. A capture element or bead 64 holds the bottom

10 packaging envelope 10 in the stack 44.

The method further includes providing the envelope support assembly 42, which defines a rectangular volume sized to receive the plurality of envelopes 10 in the stack 44. An exemplary envelope support assembly 42 includes the container 46. The elongate member 62 of the capture mechanism 60 is secured near a top wall 48

15 of the container 46. The method then includes capturing the top edge of the front sheet 14 on the capture element 64 and pulling the rear sheet 16 downward, away from the front sheet 14, to open the opening 24 of the pouch 12 and in the process pulling the capture element 64 through the rear sheet 16. After opening the opening 24, the method includes the step of inserting the item 66 to be packaged through the

20 opening 24 and into the pouch 12, and removing the packaging envelope 10 from the capture mechanism 60. In other words, pulling the packaging envelope 10 off of the capture element 64, and pulling the capture element 64 through the front sheet 14. This frees the packaging envelope 10 and allows the packer to remove the packaging envelope 10 from the packaging system 40 or 70.

25 The packer can then fold the top edge 16b of the rear sheet 16, the pouch flap 30 that extends past the top edge 14b of the front sheet 14, over the top edge 14b of the front sheet 14 to secure the top edge 16b of the rear sheet 16 to an outer surface of the front sheet 14. The securing step can include removing a release liner 34 to expose an adhesive layer 32 and pressing the rear sheet 16 against the front sheet

14 with the adhesive layer 32 in between. The adhesive layer 32 and the release liner can be attached to the pouch flap 30 on the rear sheet 16.

In contrast to the manual systems described above, a powered packaging system automatically presents packaging envelopes, ready for the packer to open and insert an item to be shipped. An exemplary powered packaging system 100 is shown in FIGS. 5-7.

In the unpowered packaging systems 40 and 70, the elongate member 62 must be threaded through the hole 26 of every packaging envelope 10, and then the packer must force the packaging envelope over the capture element 64 which can lead to an unsightly hole through the front sheet 14 or the rear sheet 16, although a small hole likely does not limit or prevent shipping performance. The powered packaging system 100 described here facilitates opening packaging envelopes 10 for inserting items to be shipped without requiring special handling of the packaging envelopes 10 prior to use, and without requiring a hole 22 or otherwise altering the structure of the packaging envelopes 10 during use.

As in the unpowered packaging systems 40 and 70 described above, the powered packaging system 100 for supplying packaging envelopes for packaging an item for shipping also includes an envelope support assembly 102 configured to support the stack 44 of a plurality of packaging envelopes 10, and a capture mechanism 104 configured to engage and hold the top edge 14b of the front sheet 14 of the bottom envelope 10 in the stack 44 so that the top edge 16b of the rear sheet 16 can be moved downward and away from the front sheet 14 to open the pouch 12 for insertion of the item to be shipped.

The envelope support assembly 102 includes a frame 106 configured to define a volume sized to receive the stack 44 of packaging envelopes 10 in an upright orientation, similar to the unpowered packaging systems 40 and 70. The upright orientation may be vertical, or tilted or angled a few degrees from vertical. The frame 106 typically is formed of rigid members with sufficient stiffness and durability to support the stack 44 and keep the upright stack 44 of the packaging envelopes 10

aligned in a common orientation in the stack 44, and to be regularly resupplied with fresh stacks 44. The upright stack 44 may be tilted at an angle from vertical to improve ergonomics, and the degree of tilt may be variable. The frame 106 can bound corners of the stack 44, sides of the stack 44, or completely surround the stack 44.

The support assembly 102 is configured to allow quick and easy replenishment of packaging envelopes 10. In one embodiment, a box of packaging envelopes is provided, the box is opened, and the open end is faced downward and set into the frame 106. The frame 106 can include shorter members to make it easier to replenish boxes of packaging envelopes. (See FIGS. 19-21). The frame 106 members can also include angled flanges to further aid in installing a fresh box of packaging envelopes (See FIGS. 20, 21). The packaging envelopes 10 are oriented in a common direction within in the box, and the box is formed with a designated end to open so that when inserted into the system 100, the packaging mailers will be dispensed to properly engage with the system 100 as described above.

In another embodiment, a box of packaging envelopes is provided. The box is opened, and the opened flaps are removed along a perforation. The box is turned upside-down and inserted between the corner profiles of the frame 106. The box may contain a mailer lock (or locking member) that is used to keep mailers in place during transport/storage. If present, the mailer lock is removed. The mailer lock can take many different forms, and can include but is not limited to a piece of corrugate kept in place by punctures or handles set in the side of the box that help with handling and keeps the lock fixed to the box; or one or more straps around the box that can be cut and pulled out. If one or more straps are used, the box flaps can be omitted.

In another embodiment, the box is formed of four side walls and a single end wall. The remaining end is open and the packaging envelopes are exposed. A strap or band is secured around the box, such that the strap spans the open end and retains the packaging envelopes within the box. The strap is designed to be removed or cut easily so that the box can be inserted into the system 100 with the open end

facing down. The strap is then removed, allowing the packaging envelopes to feed into the system.

The box 108 (FIG. 19) also may have an opening or window 116 along a side or corner to show the number of packaging envelopes remaining in the box. The window could be formed from a strip that is removed or pulled away from the box when ready to use.

In another contrast with the unpowered packaging systems 40 and 70, the capture mechanism 104 in this powered packaging system 100 does not support the entire stack 44. Rather than threading a filament through the packaging envelopes before loading them into the envelope support assembly 102, the capture mechanism 104 uses a singulating assembly 110 to support the bottom of the stack 44 and separate one packaging envelope 10 at a time from the bottom of the stack 44 to a packer. The illustrated singulating assembly 110 includes a pair of vertically-spaced singulating plates or tabs 112 and 114 (See FIG. 10). These rotatable singulating tabs 112 and 114 are selectively controllable and to singulate individual packaging envelopes 10 from the stack 44, and thereby advance the bottom packaging envelope, and only the bottom packaging envelope, from the stack 44.

Turning to FIGS. 10-12, the singulating tabs 112 and 114 include an upper singulating tab 112 and a lower singulating tab 114 below the upper singulating tab 112. The pair of singulating tabs 112 and 114 can be mounted on one side of the envelope support assembly 102, or duplicated on respective sides of the envelope support assembly 102 and synchronized to work together to advance the bottom packaging envelope 10 from the stack 44. The singulating tabs 112 and 114 are spaced by approximately the thickness of a single packaging envelope 10. Each is mounted for separate rotation about an axis between an engagement position in engagement with the stack 44 and a removed position removed from the stack 44. The upper singulating tab 112 can be rotated about a vertical axis out of engagement with the stack 44, allowing the entire stack 44 to drop down to the lower singulating tab 114. The upper singulating tab 112 can then rotate back into engagement with

the stack 44, sliding between the bottom packaging envelope 10 and a next-lowest packaging envelope in the stack 44. In other words, the singulating mechanism performs a cycle comprising: (1) starting with the upper singulating tab 112 in the engagement position and lower singulating tab 114 in the removed position; (2) the lower singulating tab moves to the engagement position and the upper singulating tab moves to the removed position and back to the engagement position; (3) the lower singulating tab moves to the removed position. The sensor 144 detects the removal of the envelope 10, and the cycle repeats.

With a packaging envelope 10 supported on the lower singulating tab 114 and separated from other packaging envelopes in the stack 44 by the upper singulating tab 112, the lower singulating tab 114 can be rotated about a vertical axis, or pivoted about a horizontal axis, to release the bottom packaging envelope 10. The upper singulating tab 112 will continue to support the stack 44. The lower singulating tab 114 can then rotate or pivot back to its starting position to await the next bottom packaging envelope 10. Other types of singulating assembly can be used in place of the illustrated singulating assembly to advance one packaging envelope at a time from the bottom of the stack 44. The singulating assembly facilitates removing the bottom packaging envelope 10 without the weight of the stack of packaging envelopes 10 above it.

In addition, or alternatively, the lower singulating tab 114 may operate in two steps. In the first step, before the upper singulating tab 112 is retracted, the lower singulating tab 114 is pivoted upward to maximize friction between the bottom packaging envelope 10 and lower singulating tab 114. This prevents the packaging envelope stack 44 from moving when retracting the upper singulation tab 112. After the lower singulation tab 114 has pivoted upward, the upper singulating tab 112 is retracted. In the second step, the lower singulating tab pivots down slightly to allow for separation between bottom packaging envelope 10 and the stack 44. This allows reinsertion of the upper singulation tab 112 with minimal friction. After the upper singulation tab 112 is reinserted, the lower singulation tab 114 is fully pivoted to

release the bottom packaging envelope 10, allowing the bottom packaging envelope 10 to advance as further described below.

The packaging envelope 10 released by the lower singulating tab 114 advances by falling to a packaging station 120 below the lower singulating tab 114.

5 The packaging station 120 is at an elevated location that, like the spacing provided by the stand in the previous embodiment (FIG. 4), allows the packer to insert an item to be shipped into the packaging envelope 10 before removing the packaging envelope 10 from the packaging system 100. The packaging station 120 includes peripheral supports or ledges 122 and 124 (FIGS. 6, 13 and 14) that temporarily
10 support the packaging envelope 10 on lateral sides and at a bottom edge. As the packaging envelope 10 moves from the stack 44 and through the singulating assembly 110, the packaging envelope maintains its orientation and alignment with other packaging envelopes in the stack 44 before arriving at the packaging station 120.

15 In the packaging station 120, one or more lateral supports 122 support the lateral sides of the packaging envelope 10. A back ledge 124 supports the bottom of the packaging envelope 10 and may include an advancing mechanism 130 that is configured to advance the packaging envelope 10 in a forward or bottom-to-top direction from a rest position aligned with the stack 44 to a ready-to-package position
20 removed from the rest position. In the illustrated exemplary embodiment this advancing mechanism 130 includes a pair of envelope pushers 132 for moving the packaging envelope forward in the bottom-to-top direction 20. Each envelope pusher 132 includes a conveyor belt with a protruding element secured to the conveyor belt that is configured to engage the bottom edge of the packaging envelope 10. Moving
25 the packaging envelope 10 forward moves the top of the packaging envelope 10 out from under the stack 44 and positions the packaging envelope 10 in a ready-to-package position that is easily engaged by the packer. Exemplary envelope pushers 132 include synchronized, laterally-spaced driven belts with protrusions that engage the bottom edge 14a of the packaging envelope 10 to move it forward.

Referring to FIGS. 8 and 9, the capture mechanism 104 further includes a movable hook 140 to capture the top edge 14b of the front sheet 14 when the advancing mechanism 130 advances the packaging envelope 10. The movable hook 140 typically has an L-shape (as viewed from the side), with a horizontally-extending portion 142 configured to engage the front sheet 14 of the packaging envelope 10.

The horizontally-extending portion 142 of the movable hook 140 may be a single flat plate, but as shown in the illustrated embodiment (FIG. 9) the horizontally-extending portion 142 preferably has two coplanar, laterally-spaced forks 146 or prongs, like the forks of a utility lift vehicle. The top sheet 14 of packaging envelopes 10 tends to bend or fold in the middle, and the separated forks 146 more reliably move underneath and capture the top sheet 14.

The movable hook 140 is movable vertically between a retracted clamping position and an extended capture position below the clamping position. As the envelope pushers 132 begin to move the packaging envelope 10 forward, the movable hook 140 is in the retracted clamping position (FIG. 13). An envelope sensor is positioned 144 adjacent the movable hook 140 to detect the top edge 16b of the rear sheet 16, specifically the pouch flap 30, as the packaging envelope 10 advances out from under the stack 44. The horizontally-extending portion 142 is oriented to generally extend in a direction parallel to the front sheet 14 and the rear sheet 16 and the bottom-to-top direction 20.

The movable hook 140 moves down to the capture position and engages the rear sheet 16 (FIG. 14). As the packaging envelope 10 continues to move forward, the front sheet 14 slides over the horizontally-extending portion 142 of the movable hook 140 (FIG. 15). The horizontally-extending portion 142 of the movable hook 140 thus is interleaved between the front sheet 14 and the rear sheet 16. The movable hook 140 then raises and returns to the retracted clamping position, and in the process clamps the top edge 14b of the front sheet 14 between the horizontally-extending portion 142 of the movable hook 140 and a portion of the frame 106 or other clamping surface, and the envelope pushers 132 retract, allowing the bottom

edge 14a and 16a of the packaging envelope to hang free (FIG. 16). In other words, the envelope pushers 132 and the movable hook 140 cooperate to catch and hold the top edge 14b of the front sheet 14 and secure that front sheet 14 in an upward location. This allows the packer to grasp the top edge 16b of the rear sheet 16 and
5 move it in a downward direction, away from the front sheet 14, as in the unpowered packaging systems 40 and 70 described above, to open the opening 24 into the pouch 12 for receipt of the item to be shipped 66 (FIG. 17). But unlike in the unpowered packaging systems 40 and 70 described above, the powered packaging system 100 does so without perforating the front sheet 14.

10 The capture mechanism 104 preferably grips the top sheet 14 with sufficient force to allow the packaging envelope 10 to be opened, but weak enough to allow the packer to easily push the top edge 14b of the front sheet 14 out of the grip of the movable hook 140 and clamping surface after the item to be shipped is inserted into the pouch 12.

15 Upon inserting the item 66 to be packaged into the pouch 12 of the packaging envelope 10, the packer also pushes the packaging envelope 10 downward and backward 68, opposite the bottom-to-top direction 20, to disengage the top edge 14b of the front sheet 14 from the movable hook 140, removing the packaging envelope 10 from the capture mechanism 104. The packer can then withdraw the packaging
20 envelope 10 and close the opening 24 and seal the packaging envelope 10 for shipping. Removal of the packaging envelope 10 can be detected by the envelope sensor 144 adjacent the movable hook 140, and a signal indicating same can be used to control the singulating assembly 110 to release the (next) bottom packaging envelope 10 from the stack 44.

25 Turning now to FIGS. 10-17, a method of packing an item for shipment using the powered packaging system 100 described above is depicted in sequential steps – many of which will be recognized as comparable to steps in the manually-operated packaging systems 40 and 70 described above. Starting with FIG. 10, the method includes the step of providing a plurality of packaging envelopes 10 arranged in a

stack 44 in an envelope support assembly 102. As shown in FIG. 1, each envelope has a front sheet 14 and a rear sheet 16, and each of the front sheet 14 and the rear sheet 16 include a bottom edge 14a and 16a, a top edge 14b and 16b, and opposing side edges 14c and 16c, as shown in FIG. 1. The front sheet 14 and the rear sheet 16 are connected together along the bottom edge 14a and 16a and along respective side edges 14c and 16c to form a pouch 12 such that the top edge 16b of the rear sheet 16 extends beyond the top edge 14a of the front sheet 14. Each of the top sheet 14 and the rear sheet 16 may include a multi-layer construction that includes a cushioning liner 18 with cushioning properties. (Note that unlike the manually-operated packaging systems 40 and 70, the envelope does not require a hole 26 through the front and rear sheets). The method further includes providing an envelope support assembly 102 that defines a rectangular volume sized to receive the plurality of envelopes 10 in the stack 44.

The method then includes capturing the top edge of the front sheet 14. The capturing step includes singulating the bottom packaging envelope 10 from the stack 44. The upper singulating tab 112 is rotated in between the bottom packaging envelope 10 and the next bottom packaging envelope in the stack 44 as shown in FIG. 11. The lower singulating tab 114 then pivots to release the bottom packaging envelope 10 from the stack 44 to the packaging station 120 (FIG. 12), where peripheral ledge portions support the packaging envelope 10.

The packaging steps following the packaging envelope's arrival at the packaging station 120 are shown in FIGS. 13-17. The next step includes advancing the packaging envelope 10, pushing it forward in the bottom-to-top direction 20; detecting the leading edge of the pouch flap 30 of the rear sheet 16, and moving the movable hook 140 downward to engage the rear sheet 16, as shown in FIGS. 13 and 14. As the packaging envelope 10 continues moving forward to engage the movable hook 140, the top edge 14b of the front sheet 14 moves over the horizontally-extending portion 142 of the movable hook 140 (FIG. 15). Then the movable hook 140 moves upward to capture the top edge 14b of the front sheet 14 between the

horizontally-extending portion 142 of the movable hook 140 and a portion of the frame 106 of the envelope support assembly 102 or other clamping surface as shown in FIG. 16.

After capturing the top edge 14b of the front sheet 14, the method includes
5 pulling the rear sheet 16 downward, and slightly toward the packer to keep tension on the envelope and prevent it from slipping off the hook, away from the front sheet 14, to open the opening 24 of the pouch 12, as illustrated in FIG. 17. After opening the opening 24, the method includes the step of inserting the item 66 to be packaged through the opening 24 and into the pouch 12, and removing the packaging envelope
10 10 from the capture mechanism 104. In other words, the capturing step can include engaging and holding the top edge 14b of the front sheet 14 of a bottom packaging envelope 10 from the stack 44 so that the top edge 16b of the rear sheet 16 can be moved downward and away from the front sheet 14 to open the pouch 12 for insertion of the item(s) to be shipped, and when the final item is inserted, also
15 moving the packaging envelope 10 in a backward direction 68, opposite the bottom-to-top direction 20, and thereby removing the top edge 14b of the front sheet 14 from the capture mechanism 104. This frees the packaging envelope 10 and allows the packer to remove the packaging envelope 10 from the packaging system 100.

The packer can then fold the top edge 16b of the rear sheet 16, the pouch flap
20 30 that extends past the top edge 14b of the front sheet 14, over the top edge 14b of the front sheet 14 to secure the top edge 16b of the rear sheet 16 to an outer surface of the front sheet 14. The securing step can include removing a release liner 34 to expose an adhesive layer 32 and pressing the rear sheet 16 against the front sheet 14 with the adhesive layer 32 in between. The adhesive layer 32 and the release
25 liner can be attached to the pouch flap 30 on the rear sheet 16.

In summary, the described packaging system 100 enables a packer to open a packaging envelope 10 with one hand and insert an item 66 to be packaged before removing the packaging envelope 10 and closing the packaging envelope 10 for shipment. The packaging system 100 includes an envelope support assembly 102

configured to support an upright stack 44 of a plurality of packaging envelopes, and a capture mechanism 104 configured to engage and hold a top edge 14b of a front sheet 14 of a bottom packaging envelope 10 in the stack so that a top edge 16b of a rear sheet 16 can be moved downward and away from the front sheet 14 to open the packaging envelope 10 with one hand for insertion of the item 66 to be shipped. Each
5 packaging envelope 10 has a front sheet 14 and a rear sheet 16 connected together along a bottom edge 14a and 16a and along respective side edges 14c and 16c to form a pouch 12 into which the item 66 to be shipped can be inserted.

Although the invention has been shown and described with respect to certain
10 embodiments, equivalent alterations and modifications will occur to others skilled in the art upon the reading and understanding of this specification and the annexed drawings. In particular regard to the various functions performed by the above described integers (components, assemblies, devices, compositions, etc.), the terms (including a reference to a "means") used to describe such integers are intended to
15 correspond, unless otherwise indicated, to any integer which performs the specified function of the described integer (i.e., that is functionally equivalent), even though not structurally equivalent to the disclosed structure which performs the function in the herein illustrated exemplary embodiment of the invention.

Claims

We claim:

1. A packaging system for supplying packaging envelopes for packaging an item
5 for shipment, each envelope having a front sheet and a rear sheet, and each of the front sheet and the rear sheet include a bottom edge, a top edge, and opposing side edges; and the front sheet and the rear sheet are connected together along the bottom edge and along respective side edges to form a pouch, the packaging system comprising:
10 an envelope support assembly configured to support an upright stack of a plurality of packaging envelopes; and
a capture mechanism configured to engage and hold the top edge of the front sheet of a bottom envelope in the upright stack so that the top edge of the rear sheet can be moved downward and away from the front sheet to open the pouch for
15 insertion of an item to be shipped.
2. The packaging system of claim 1, further comprising wherein the envelope support assembly defines a rectangular volume configured to receive and support a plurality of packaging envelopes in an upright stack;
20 a singulating mechanism toward a bottom of the envelope support assembly configured to pass one envelope at a time downward from a bottom of the stack past the singulating mechanism;
an advancing mechanism below a top of the singulating mechanism that engages a bottom edge of an envelope and advances the envelope in bottom-to-top
25 direction from a rest position to a ready-to-package position; and
the capture mechanism is configured to engage and hold the front sheet as the envelope moves to the ready-to-package position.

3. The packaging system of claim 2, wherein the capture mechanism includes a horizontally-extending portion configured to pass between the top edge of the front sheet and the rear sheet as the advancing mechanism moves the packaging envelope to the ready-to-package position.
- 5
4. The packaging system of claim 3, wherein the horizontally-extending element includes a pair of planar, laterally-spaced forks.
5. The packaging system of claim 2 or any of claims 2 to 4, wherein the
- 10 advancing mechanism includes a conveyor belt with a protruding element secured to the conveyor belt that is configured to engage the bottom edge of the packaging envelope.
6. The packaging system of claim 2 or any of claims 2 to 5, wherein the
- 15 singulating mechanism includes a sensor that detects removal of the bottom packaging envelope.
7. The packaging system of claim 2 or any of claims 2 to 6, wherein the singulating mechanism includes an upper singulating tab and a lower singulating tab
- 20 below the upper singulating tab, each mounted for separate rotation about an axis, and rotatable between an engagement position in engagement with the stack and a removed position removed from the stack,
- wherein the upper singulating tab defines a working plane of the upper singulating tab,
- 25 wherein the advancing mechanism is disposed below the working plane of the upper singulating tab.
8. The packaging system of claim 7, wherein the singulating mechanism performs a cycle comprising (1) starting with the upper singulating tab in the

engagement position and lower singulating tab in the removed position; (2) the lower singulating tab moves to the engagement position and the upper singulating tab moves to the removed position and back to the engagement position; (3) the lower singulating tab moves to the removed position;

5 wherein upon a sensor detecting a removal of the envelope, the cycle repeats.

9. The packaging system of any of claim 7 or claim 8, wherein the vertical separation between the upper singulating tab and the lower singulating tab is approximately the thickness of a single one of the plurality of packaging envelopes.

10

10. The packaging system of claim 1 or any preceding claim, wherein the capture mechanism moves upward following engagement with the front sheet.

11. The packaging system of claim 1 or any preceding claim, wherein the
15 envelope support assembly includes a plurality of packaging envelopes arranged in a stack in a common orientation.

12. The packaging system of claim 1, wherein the envelope support assembly is a container having a top wall, a bottom wall, and side walls connecting the top wall and
20 the bottom wall to define a rectangular volume sized to receive the plurality of envelopes, one of the side walls having an opening adjacent the bottom wall between adjacent side walls that is configured to facilitate withdrawing a bottom packaging envelope from the container; and the capture mechanism includes an elongate member secured to the container within the rectangular volume and adjacent the top
25 wall, the elongate member passing through the front sheet of each packaging envelope in the stack in sequence, and the elongate member having a capture element with a larger diameter than the elongate member, the capture element being positioned within the container adjacent an edge of the opening.

13. The packaging system of claim 12, wherein the capture element is spaced from the bottom wall of the container at a predetermined distance sufficient to open the bottom packaging envelope in the stack without removing the bottom packaging envelope from the container.

5

14. A packaging method, comprising the following steps:

providing a plurality of packaging envelopes, each envelope having a front sheet and a rear sheet, and each of the front sheet and the rear sheet include a bottom edge, a top edge, and opposing side edges; and the front sheet and the rear
10 sheet are connected together along the bottom edge and along respective side edges to form a pouch such that the top edge of the rear sheet extends beyond the top edge of the front sheet;

providing a container having a top wall, a bottom wall, and side walls connecting the top wall and the bottom wall to define a rectangular volume sized to
15 receive the plurality of envelopes, one of the side walls having an opening adjacent the bottom wall between adjacent side walls, and the opening is configured to facilitate withdrawing an envelope from the internal volume;

capturing a bottom packaging envelope of the plurality of packaging envelopes with a capture mechanism, the capture mechanism including an elongate member
20 that passes through the front sheet of each packaging envelope in sequence, a lower end of the elongate having a capture element with a larger diameter than the elongate member, and an upper end of the elongate member being secured to the container inside the rectangular volume near the side wall having the opening, the capture element positioned near a top side of the opening;

25 pulling the rear sheet of the bottom packaging envelope downward and over the capture element to open the pouch;

inserting an item to be shipped into the pouch; and

pulling the bottom packaging envelope out of the opening and causing the capture element to pass through the front sheet to release the packaging envelope from the elongate member.

5 15. A packaging method, comprising the following steps:

providing a plurality of packaging envelopes, each envelope having a front sheet and a rear sheet, and each of the front sheet and the rear sheet include a bottom edge, a top edge, and opposing side edges; and the front sheet and the rear sheet are connected together along the bottom edge and along respective side edges to form a pouch such that the top edge of the rear sheet extends beyond the top edge of the front sheet;

engaging and holding the top edge of the front sheet of a bottom envelope in the upright stack so that the top edge of the rear sheet can be moved downward and away from the front sheet to open the pouch for insertion of an item to be shipped.

15

16. The packaging method as set forth in claim 15, comprising the further steps of after the engaging and holding step, moving the top edge of the rear sheet of the bottom packaging envelope downward and away from the front sheet to open the pouch, and then inserting the item to be shipped into the pouch.

20

17. The packaging method as set forth in claim 16, comprising the further steps of after the inserting step, of pushing the packaging envelope inward to disengage the top edge of the front sheet, and then pulling the packaging envelope outward to remove the packaging envelope.

25

18. The packaging method as set forth in claim 17, comprising the further steps of folding the top edge of the rear sheet over the top edge of the front sheet and securing the rear sheet to an outer surface of the front sheet.

19. The packaging system of claim 2, wherein the plurality of packaging envelopes in an upright stack comprise a box of packaging envelopes oriented in a common direction.
- 5 20. A packaging method, comprising the following steps:
- providing a plurality of packaging envelopes, each envelope having a front sheet and a rear sheet, and each of the front sheet and the rear sheet include a bottom edge, a top edge, and opposing side edges; and the front sheet and the rear sheet are connected together along the bottom edge and along respective side
- 10 edges to form a pouch such that the top edge of the rear sheet extends beyond the top edge of the front sheet;
- providing an envelope support assembly to define a rectangular volume sized to receive the plurality of envelopes;
- providing a singulating mechanism toward a bottom of the envelope support
- 15 assembly configured to pass one envelope at a time downward from a bottom of the stack past the singulating mechanism to facilitate withdrawing an envelope from the rectangular volume;
- providing an advancing mechanism below a top of the singulating mechanism that engages a bottom edge of an envelope and advances the envelope in bottom-to-
- 20 top direction from a rest position to a ready-to-package position;
- capturing a bottom packaging envelope of the plurality of packaging envelopes with a capture mechanism positioned near a top side of an opening of the rectangular volume, the capture mechanism including a horizontally-extending portion configured to pass between the top edge of the front sheet and the rear sheet as the advancing
- 25 mechanism moves the packaging envelope to the ready-to-package position;
- pulling the rear sheet of the bottom packaging envelope downward to open the pouch;
- inserting an item to be shipped into the pouch; and

pushing the bottom packaging envelope forward to remove the bottom packaging envelope from the horizontally-extending portion of the capture mechanism, and pulling the bottom packaging envelope out of the opening.

- 5 21. The packaging method of claim 20, further comprising providing a box containing the plurality of packaging envelopes, the box comprising a locking member to keep the plurality of packaging envelopes in place during transport,
- opening the box to create an open end of the box,
- positioning the box so the open end of the box is facing downward and
- 10 inserting the box into the support assembly, and
- removing the locking member to free the plurality of packaging envelopes for removal from the box.