System and method for assembly of packettes having closures

Abstract: A method of automatically manufacturing a filled packette having a closure where a film is advanced from a feed roller to a punch that produces a series of holes in the film. Individual closures are then positioned into each punched hole and ultrasonically welded into place. The film is folded and oriented vertically so that heat sealing may be used to form the side and bottom edges of individual pockets. The film is then clipped to form individual pockets and filed with the appropriate amount of desired material from a bulk feeder. The filled pockets may be sealed along the top edge to form a closed packette and die cut to form the final packette shape.
TITLE
System and Method for Assembly of Packettes having Closures

CROSS-REFERENCE TO RELATED APPLICATIONS
[0001] The present application claims priority to U.S. Application No. 12/768,786, filed on April 28, 2010.

BACKGROUND OF THE INVENTION
1. FIELD OF THE INVENTION
[0002] The present invention relates to systems and methods for forming packaging and, more particularly, to a system and method for automatically manufacturing packettes having individual resealable closures.

2. DESCRIPTION OF THE RELATED ART
[0003] The conventional method for forming and filling packettes having closures involves hand loading, orienting, and manually filling and sealing individual packettes. While horizontal conventional feed filling machines are able to automatically fill and seal pre-formed pouches or pockets, there is no known method or system for automatically creating forming packettes having individual closures or, more specifically, forming such packettes as part of the filling and sealing process. Instead, conventional systems require the separate manual formation of the packets apart from the filling and sealing process. Additionally, convention feed systems route the film material through rollers and sharp angles that will tear any inflexible attachments off of the film due to the inability of the attachments to turn in the same radius as the film. As a result, such systems are prone to human error, very labor intensive, and more expensive than a fully automated system, and incapable of handling attachments to the film.

BRIEF SUMMARY OF THE INVENTION
[0004] It is therefore a principal object and advantage of the present invention to provide a system and method for automatically creating and filling packettes having closures.
[0005] It is an additional object and advantage of the present invention to provide a system and method for creating and filling packettes having closures that improves the ease of inspection.
[0006] It is an additional object and advantage of the present invention to provide a system and method for creating and filling packettes having closures that improves the quality of the finished packette.
[0007] In accordance with the foregoing objects and advantages, the present invention provides an automated system for manufacturing packettes having closures and filling the
packettes with bulk materials. First, the desired film for forming the packette is loaded onto a feed roller and advanced horizontally before a punch. As the film is advanced, the punch forms holes in the film dimensioned to correspond to the closure. Individual closures are then positioned into each punched hole and ultrasonically welded into place. The film containing the welded closures is then folded and oriented vertically and then heat sealed to define the side and bottom edges of each individual pocket that will include one of the welded closures. The film is then clipped to form individual pockets and filed with the appropriate amount of desired material from a bulk feeder. The filled pockets may be sealed along the top edge to form a closed packette and die cut, if required, to form the final packette shape. Automated or manual inspection stations may be positioned at critical locations in the process, such as after the welding of the closure to the film.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0008] The present invention will be more fully understood and appreciated by reading the following Detailed Description in conjunction with the accompanying drawings, in which:

[0009] Figure 1 is a top view schematic of a manufacturing process according to the present invention.

[0010] Figure 2 is a side view schematic of a manufacturing process according to the present invention.

[0011] Figure 3 is a perspective view of a packette according to the present invention.

[0012] Figure 4 is a top view of a guide according to the present invention.

[0013] Figure 5 is a side view of a guide according to the present invention.

[0014] Figure 6 is an end view of a guide according to the present invention as seen from the downstream side.

DETAILED DESCRIPTION OF THE INVENTION

[0015] Referring now to the drawings, wherein like reference numerals refer to like parts throughout, there is seen in Figure 1 a system 10 according to the present invention for automatically manufacturing and filling packettes with bulk materials. System 10 comprises feed roll 12 for supplying a film 14 of a packette substrate in a horizontal direction (Position A). Packette substrate may comprise various plastics, laminates and other know packaging materials. System 10 further includes a pair of rollers 16 or support guides for advancing film 14 from feed roll 12. A hole punch 18 is positioned downstream of rollers 16 and adapted to punch a series of holes in film 14 as it is advanced along.
System 10 further comprises a feeder bowl 20 positioned downstream of punch 18 and including a pick and place device 22 for positioning a packette closure, such as a resealable closure 40 shown in Figure 3, in each hole that is punched in film 14. Feeder bowl 20 further includes an ultrasonic welder 24 for attaching the closures when positioned in an associated weld nest 26 located inline or downstream from the location of the placement of the closure on film 14. If welder 24 is located downstream, a mechanism for temporarily holding the closure to the film while it travels to the weld station may be used, such as a vacuum, belt, linear conveyor or the like. Welder 24 preferably comprises a 20,000 Hz ultrasonic welder, such as a Model 910W available from Branson Ultrasonics Corp. of Danbury, CT. An inspection station 28 may be located downstream of weld nest 26 for automatic or manual verification that the closures have been properly located and welded to film 14.

System 10 further comprises adjustable guide rods 30 or a formed sheet of metal or smooth material positioned downstream of inspection station 28 for folding film 14 and reorienting film 14 vertically for filling and sealing operations. Guides 30 are preferably of sufficient length, angle, and initial starting height to evenly transition film 14 from a horizontal orientation to a vertical orientation (Position B). Referring to Figure 2, film 14 comprises a series of closures 31 welded along a given length of film 14 at this point. Drive rollers 32 may be positioned proximately to guides 30 for further advancing film 14.

System 10 additionally comprises seal bars 34 are also positioned downstream of guides 30 to form a pocket in film 14 by seal forming side and bottom edges around each closure welded to film 14. Cutting knives 36 are then positioned to cut film 14 to form individual pockets in film 14, each of which is associated with a welded closure. Cut pockets may be advanced by a clipped chain 38 and located before a second inspection station 40, to automatically or manually ensure that the closure is properly in place prior to filling.

A filling station 42 is positioned downstream of clipped chain 38 for filing each pocket with whatever bulk supplies are desired. Another visual inspection station 44 may be positioned after filling station 42. Preferably, inspection station 44 employs a vision camera for automatically checking the filled pocket to verify that it has been properly formed and filled. A Model 3G7 or 3G1 vision sensor system available from Cognex of Natick, MA.

Finally, a sealing device 46 for sealing the top of the pockets is used to form a sealed packette. A die cutter 48 is positioned downstream from sealing device 46 to cut the packettes into the final, desired shape. Completed packets may be collected or dropped onto
an offload conveyor for transportation elsewhere, such as to a location for packing multiple packets for shipment to consumers.

[0021] It should be recognized by those of skill in the art that a conventional horizontal pouch packaging machine, such as a Bartelt® IM Fill and Seal Machine may be adapted for transferring the formed pockets once the film is oriented horizontally by guides 30, placing the pockets within the leading and trailing clamps of chain 38, and opening, filling and sealing the pockets to form the closed packettes.

[0022] As seen in Figure 3, finished packette 40 includes a closure 42 welded to one major side surface thereof for selectively permitting access to an internal cavity 44 of packette 40. Closure 42 preferably comprises a body 46 that provides a point of adherence to film 14 and a cover 48 pivotally mounted to body 48 for movement between a open position, where cover 46 allows communication with cavity 44, and a closed position, where cover 46 prohibits communication with cavity 44.

[0023] The method of the present invention involves loading a desired film onto a feed roller and advancing the film horizontally before a punch. As the film is advanced, the punch produces a series of holes in the film that are dimensioned to correspond to the packette closure device to be used. Individual closures are then positioned into each punched hole and ultrasonically welded into place by fusing the closure to the film. After optional inspection, the film is folded and oriented vertically so that heat sealing may be used to form the side and bottom edges of individual pockets around each welded closure. The film is then clipped to form individual pockets, optionally inspected and filed with the appropriate amount of desired material from a bulk feeder. After another optional inspection step, the filled pockets may be sealed along the top edge to form a closed packette, die cut to form the final packette shape, and offloaded onto a conveyor for further handling and shipment.

[0024] There is seen in Figures 4-6 a preferred embodiment of guide 30 for reorienting film 14 from a horizontal position, where closure 40 was attached, to a vertical position for filling and sealing operations. Guide 30 comprises a formed sheet of metal or smooth material that gradually transitions at line A-A from a horizontal orientation to a vertical orientation over its length. In general, guide 30 comprises a drop down step to lower film 14, a smooth face compound curve plow with no sharp angles that will catch closure 40 and maintain steady film travel during the transition, and adjustability to ensure registration of film 14. The curved surface of guide 30 provides a continuous surface contact on film 14 through both the horizontal and vertical positions to help alignment of film 14. As seen in Figure 6, guide may be configured to reorient film 14 while, at the same time, folding film 14
in half by having two opposing surfaces 50 and 52 that correspondingly reorient one half of film 14 from a horizontal orientation in one direction while reorienting the other half of film 14 in the opposing direction.

[0025] As an example, guide 30 may have an overall length X-X of about thirty-seven inches, a width Y-Y of about nine inches, and descent Z-Z of about five feet. Those of skill in the art will recognize that the absolute distances may vary depending on the particular upstream and downstream equipment, while keeping the relative proportions substantially constant. Those of skill in the art will also recognize that the value may be modified depending on the physical properties of closure 40 and, in particular, how the physical properties affect how quickly that closure 40 can be transitioned from a vertical orientation to a horizontal orientation without adverse consequences.

[0026] The particular design of guide 30 makes it possible to pull film 14 with an attached fitment, such as closure 40 through a horizontal form fill machine, such as a Bartlett machine. Without guide 30, the attachments would rip out of film 14 as film 14 moved through the conventional plow of a horizontal form fill machine as any sharp angle made by film 14 would normally detach the film from closure 40 by pulling the sealed material from the closure 40 because closure 40 cannot bend a corner as readily as film 14. Guide 30 having the described plow design thus allows for marriage of upstream operations requiring fixed attachments to conventional horizontal form fill and seal systems.
CLAIMS

What is claimed is:

1. An apparatus for making a packette, comprising:
   a feed roll for supplying a substrate;
   at least one roller for advancing said substrate provided by said feed roll in a horizontal orientation;
   a punch positioned to form a hole in said substrate as said substrate is advance passed said punch.
   a feeder bowl having a weld nest and a pick and place mechanism for positioning a closure in said substrate in alignment with said hole formed in said substrate;
   a welder for adhering said closure to said substrate;
   a guide for orienting said substrate and said closure vertically;
   a first sealing mechanism positioned to form side and bottom seals in said substrate around said closure, thereby defining a pocket in said substrate;
   a filling station positioned to fill said pocket with a predetermined amount of material from a bulk source;
   a second sealing mechanism positioned to form a top seal in said substrate, thereby forming a closed pocket; and
   cutting knives for cutting said substrate in a predetermined location to sever said pocket from said substrate.

2. The apparatus of claim 1, further comprises a roller positioned to grasp said substrate on said feed roll and advance said substrate to said punch.

3. The apparatus of claim 1, wherein said welder is an ultrasonic welder.

4. The apparatus of claim 1, further comprising an inspection station positioned downstream of said filling station.

5. The apparatus of claim 4, wherein said vision inspection system comprises an vision camera aligned to capture images of said pocket after filling with said material and verify that said pocket has been properly filled.

6. The apparatus of claim 1, wherein said guide comprises a plurality of adjustable guide rods.

7. The apparatus of claim 6, wherein said guide rods are positioned to fold said substrate and reorient said substrate from a horizontal to a vertical alignment.

8. A method of forming a packette, comprising the steps of:
   advancing a film of substrate;
punching a hole in said substrate;
attaching a closure to said substrate so that said closure is aligned with said hole;
folding said substrate;
forming first and second side seams and a bottom seam in said substrate around said closure and said hole to form a pocket in said substrate;
filling said pocket with material from a bulk source; and
forming a top seam in said filled pocket.

9. The method of claim 8, further comprising the step of clipping said substrate to isolate said pocket from any adjacent substrate.

10. The method of claim 9, further comprising the step of inspecting said filled pocket.

11. The method of claim 10, wherein the step of inspecting said filled pocket comprising capturing a digital image of said filled pocket and analyzing the captured image to verify that the step of filling said pocket with material was performed correctly.

12. The method of claim 10, wherein said step of forming comprises heat sealing,

13. The method of claim 12, where said step of attaching said closure to said substrate comprises the step of ultrasonically welding said closure to said substrate.

14. The method of claim 13, wherein said step of ultrasonically welding said closure to said substrate comprises ultrasonically welding said closure to said substrate with 20,000 Hz.

15. The method of claim 9, further comprising the step of die cutting said filled pocket after forming the top seam.