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(54) **VERTICAL STAND-UP POUCH**

(76) Inventors: **Lawrence Joseph Bartel**, Pilot Point, TX (US); **Anthony Robert Knoerzer**, Plano, TX (US); **Garrett William Kohl**, Allen, TX (US); **Steven Kenneth Tucker**, Hurst, TX (US)

Correspondence Address:
Carstens, Yee & Cahoon, LLP
Suite 900
13760 Noel Road
Dallas, TX 75240 (US)

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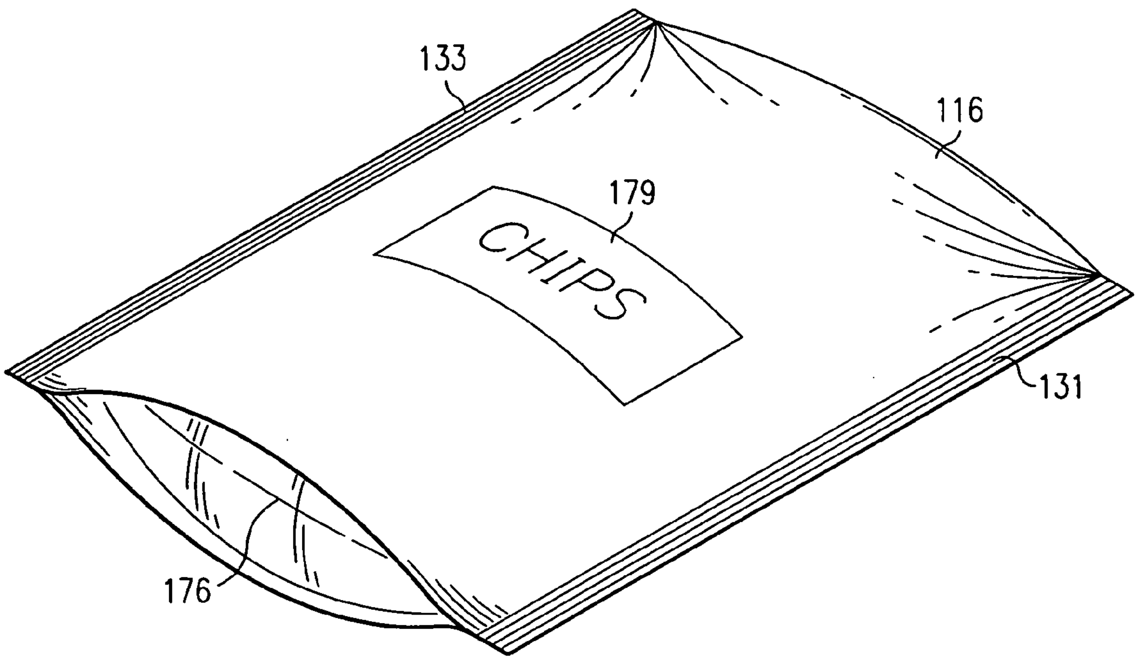
(57) **ABSTRACT**

A vertical stand-up pouch or flexible package, and method for manufacturing same, constructed by modification to existing vertical form and fill packaging machines. The invention involves producing a vertical stand-up pouch from a single sheet of packaging film by creating a vertical crease along one edge of a packaging film tube prior to forming a transverse seal on the tube. Said vertical crease is formed using a stationary tucker bar positioned outside the packaging film tube and between two forming plates positioned inside the packaging film tube.



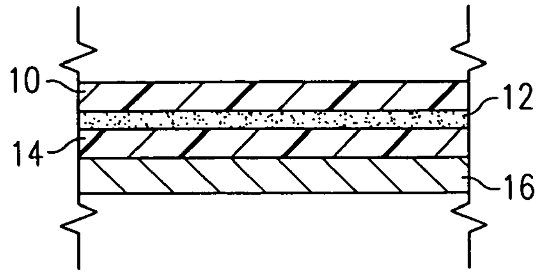


FIG. 1
(PRIOR ART)

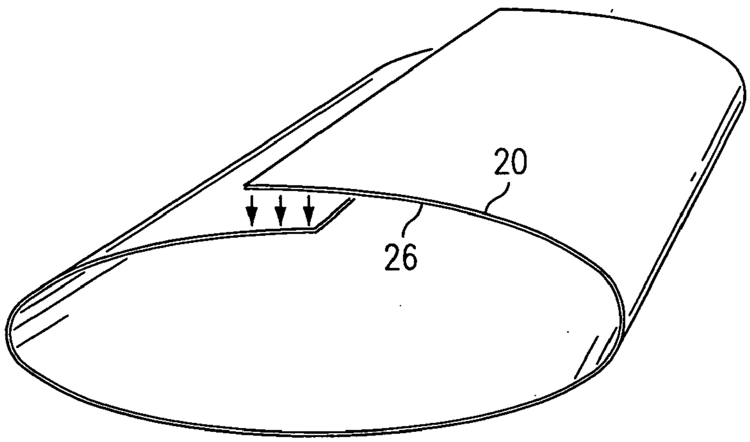


FIG. 2a
(PRIOR ART)

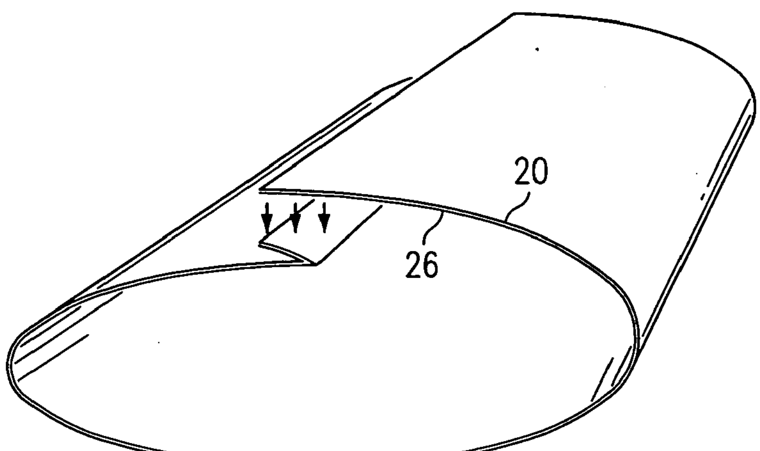
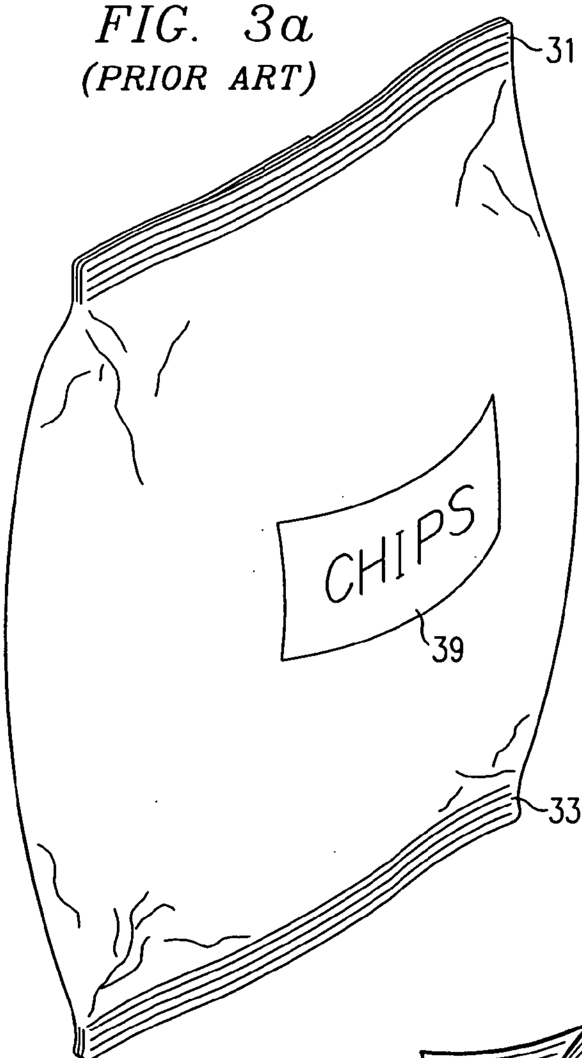


FIG. 2b
(PRIOR ART)

FIG. 3a
(PRIOR ART)



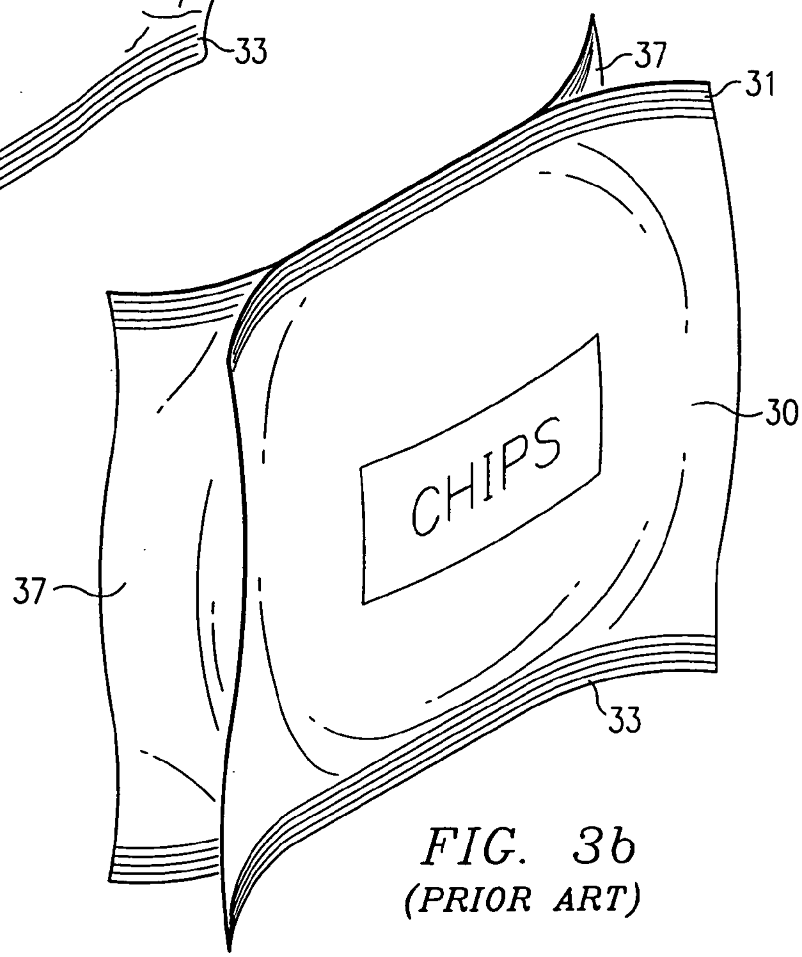


FIG. 3b
(PRIOR ART)

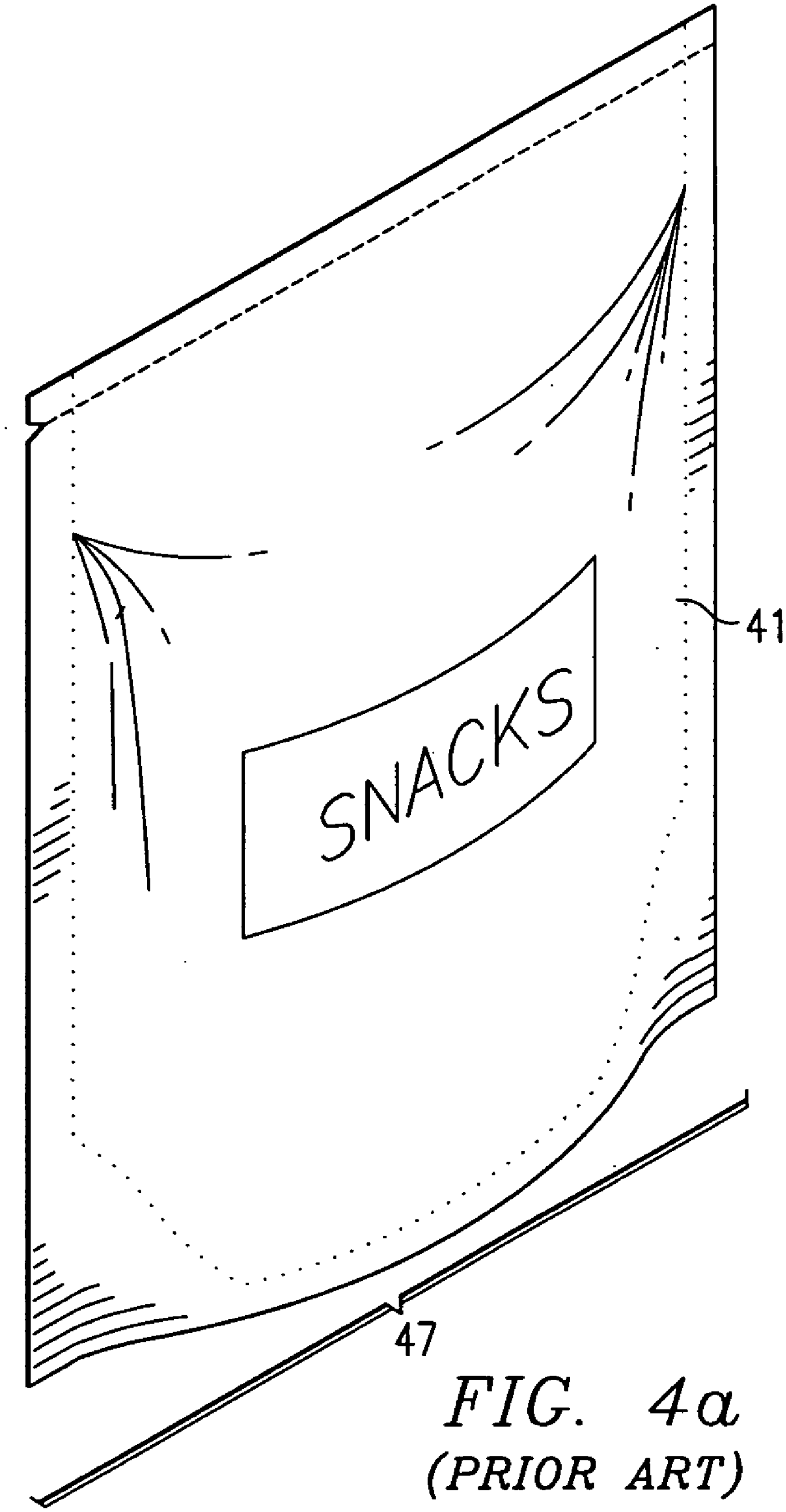


FIG. 4a
(PRIOR ART)

FIG. 4b
(PRIOR ART)

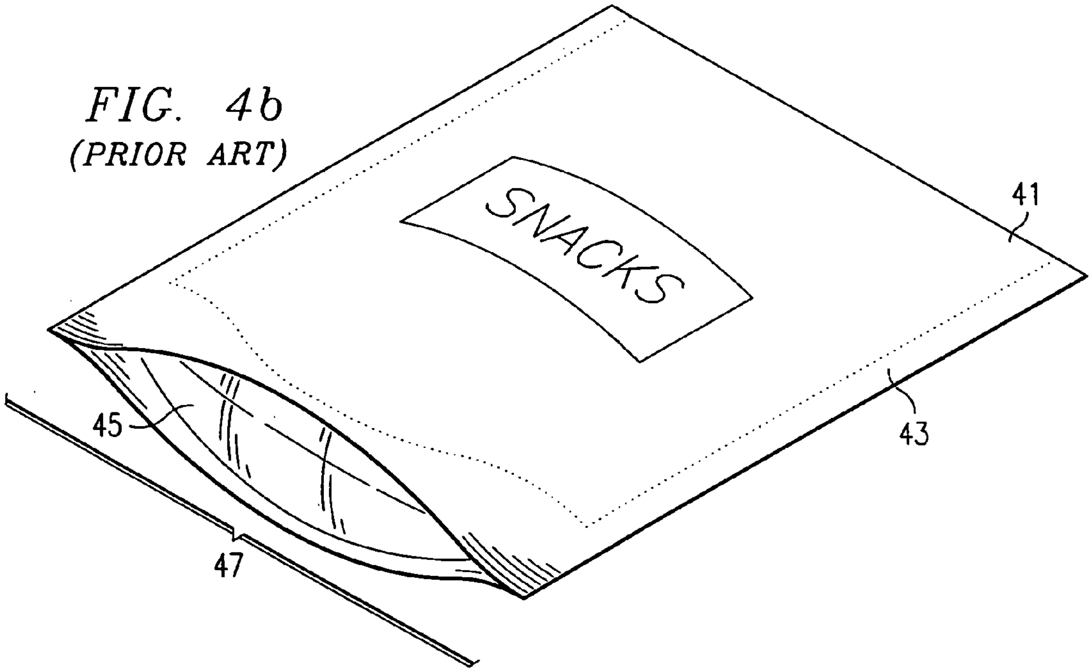
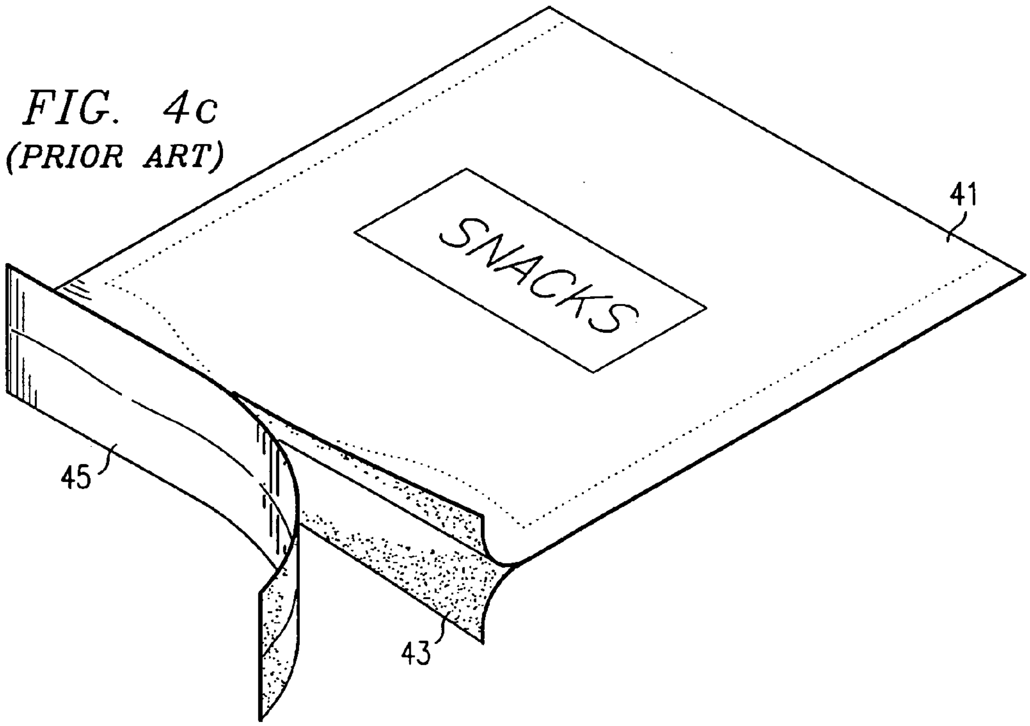


FIG. 4c
(PRIOR ART)



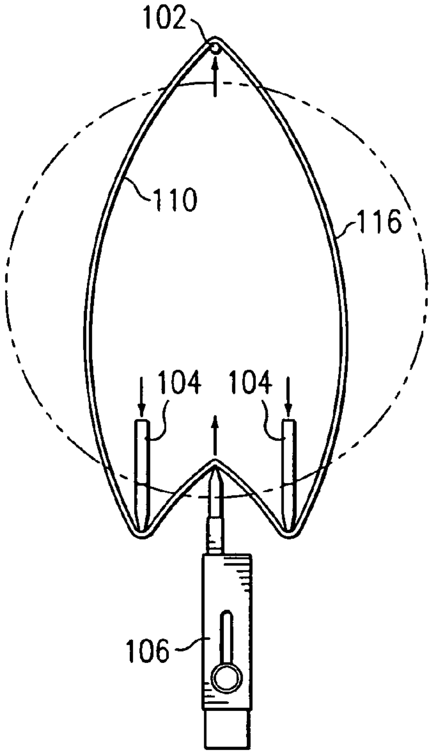


FIG. 5

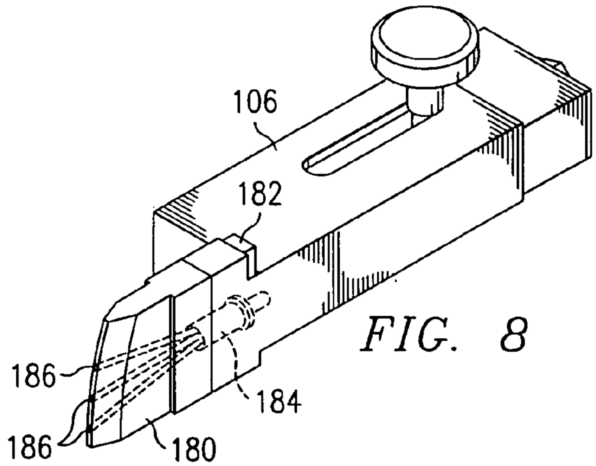


FIG. 8

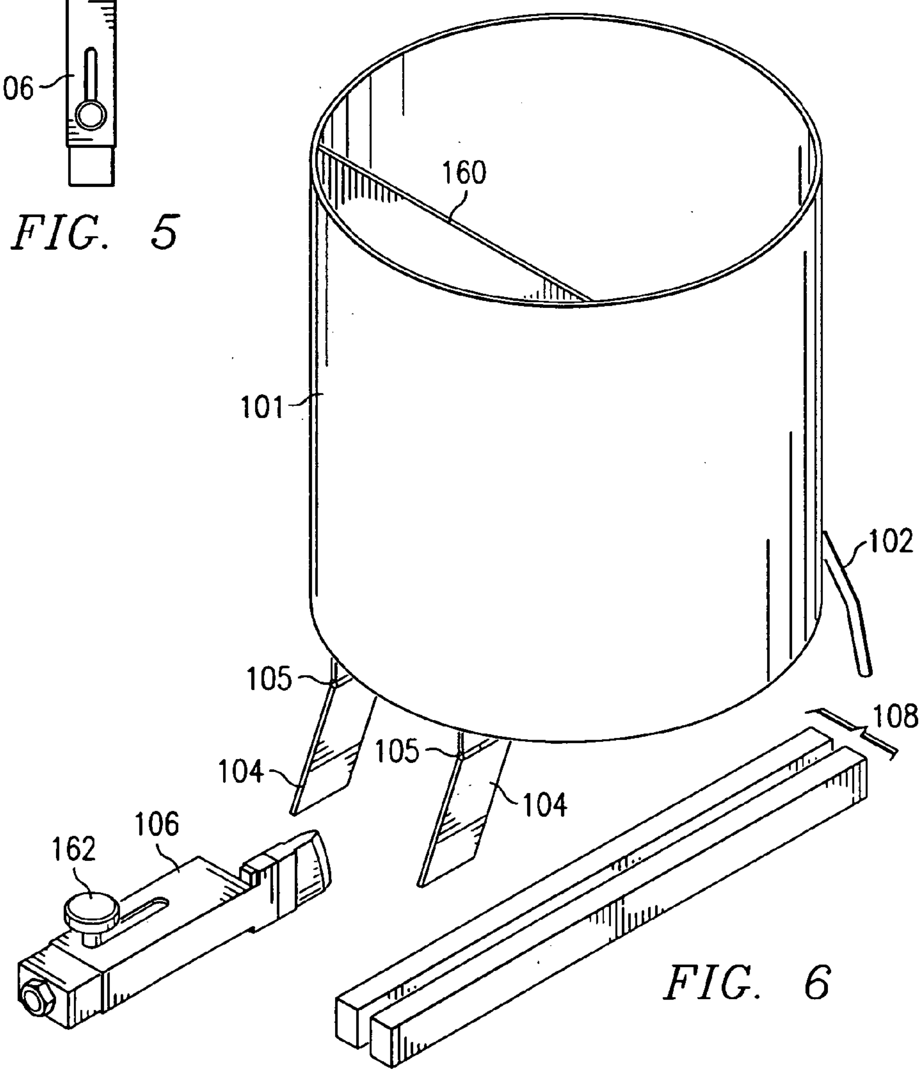
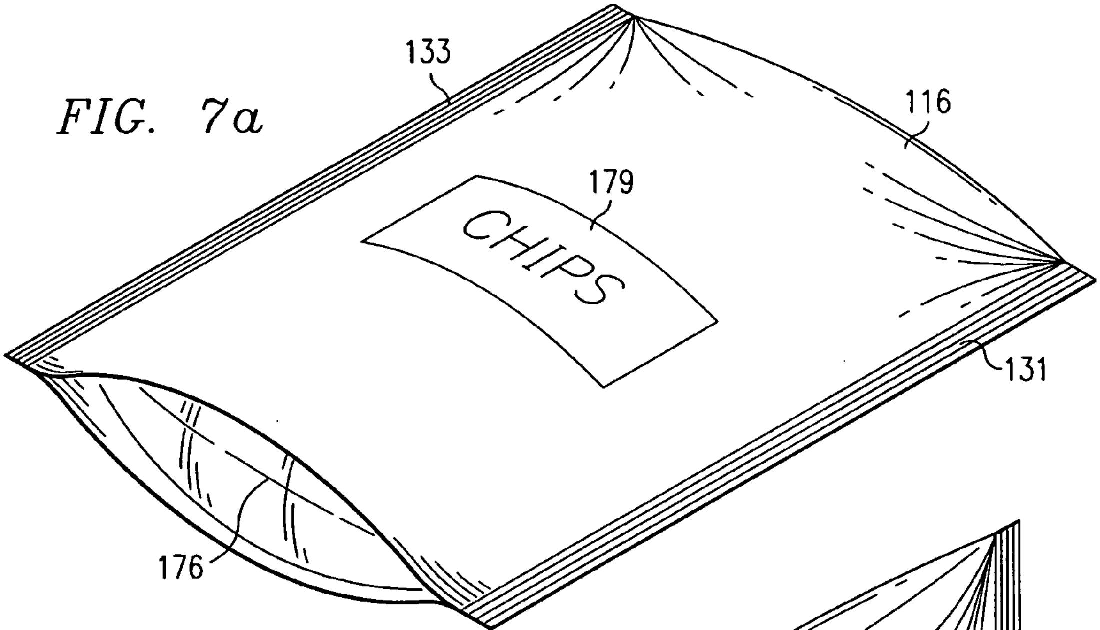


FIG. 6

FIG. 7a



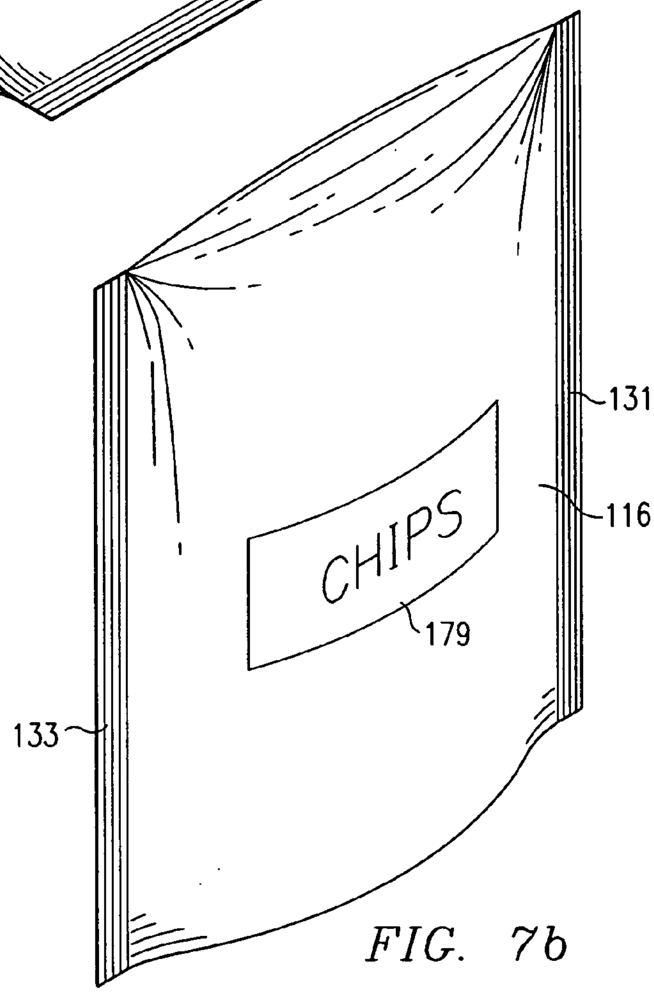


FIG. 7b

VERTICAL STAND-UP POUCH

BACKGROUND OF THE INVENTION

[0001] 1. Technical Field

[0002] The present invention relates to a vertical stand-up pouch constructed using a modified vertical form and fill packaging machine, and the method for making same, that provides for a single piece construction of a vertical stand-up bag suitable for retail snack food distribution. The invention allows for use of existing film converter and packaging technology to produce a stand-up package with minimal increased costs and minimal modification.

[0003] 2. Description of Related Art

[0004] Vertical form, fill, and seal packaging machines are commonly used in the snack food industry for forming, filling, and sealing bags of chips and other like products. Such packaging machines take a packaging film from a sheet roll and forms the film into a vertical tube around a product delivery cylinder. The vertical tube is vertically sealed along its length to form a back seal. The machine applies a pair of heat-sealing jaws or facings against the tube to form a transverse seal. This transverse seal acts as the top seal on the bag below and the bottom seal on the package being filled and formed above. The product to be packaged, such as potato chips, is dropped through the product delivery cylinder and formed tube and is held within the tube above the bottom transverse seal. After the package has been filled, the film tube is pushed downward to draw out another package length. A transverse seal is formed above the product, thus sealing it within the film tube and forming a package of product. The package below said transverse seal is separated from the rest of the film tube by cutting across the sealed area.

[0005] The packaging film used in such process is typically a composite polymer material produced by a film converter. For example, one prior art composite film used for §packaging potato chips and like products is illustrated in **FIG. 1**, which is a schematic of a cross-section of the film illustrating each individual substantive layer. **FIG. 1** shows a sealable inside, or product side, layer **16** which typically comprises metalized oriented polypropylene ("OPP") or metalized polyethylene terephtalate ("PET"). This is followed by a laminate layer **14**, typically a polyethylene extrusion, and an ink or graphics layer **12**. The ink layer **12** is typically used for the presentation of graphics that can be viewed through a transparent outside layer **10**, which layer **10** is typically OPP or PET.

[0006] The prior art film composition shown in **FIG. 1** is ideally suited for use on vertical form and fill machines for the packaging of food products. The metalized inside layer **16**, which is usually metalized with a thin layer of aluminum, provides excellent barrier properties. The use of OPP or PET for the outside layer **10** and the inside layer **16** further makes it possible to heat seal any surface of the film to any other surface in forming either the transverse seals or back seal of a package.

[0007] Typical back seals formed using the film composition shown in **FIG. 1** are illustrated in **FIGS. 2***a* and **2***b*. **FIG. 2***a* is a schematic of a "lap seal" embodiment of a back seal being formed on a tube of film. **FIG. 2***b* illustrates a "fin seal" embodiment of a back seal being formed on a tube of film.

[0008] With reference to **FIG. 2***a*, a portion of the inside metalized layer **26** is mated with a portion of the outside layer **20** in the area indicated by the arrows to form a lap seal. The seal in this area is accomplished by applying heat and pressure to the film in such area. The lap seal design shown in **FIG. 2***a* insures that the product to be placed inside the formed package will be protected from the ink layer by the metalized inside layer **26**.

[0009] The fin seal variation shown in **FIG. 2***b* also provides that the product to be placed in the formed package will be protected from the ink layer by the metalized inside layer **26**. Again, the outside layer **20** does not contact any product. In the embodiment shown in **FIG. 2***b*, however, the inside layer **26** is folded over and then sealed on itself in the area indicated by the arrows. Again, this seal is accomplished by the application of heat and pressure to the film in the area illustrated.

[0010] Regardless of whether a lap seal or fin seal is used for constructing a standard package using a vertical form and fill packaging machine, the end result is a package as shown in **FIG. 3***a* with horizontally oriented top and bottom transverse seals **31, 33**. Such package is referred to in the art as a "vertical flex bag" or "pillow pouch," and is commonly used for packaging snack foods such as potato chips, tortilla chips, and other various sheeted and extruded products. The back seal discussed with reference to **FIGS. 2***a* and **2***b* runs vertically along the bag and is typically centered on the back of the package shown in **FIG. 3***a*, thus not visible in **FIG. 3***a*. Because of the narrow, single edge base on the package shown in **FIG. 3***a* formed by the bottom transverse seal **33**, such prior art packages are not particularly stable when standing on one end. This shortcoming has been addressed in the packaging industry by the development of a horizontal stand-up pouch such as the embodiment illustrated in **FIGS. 4***a*, **4***b*, and **4***c*. As can be seen by reference to said figures, such horizontal stand-up pouch has a relatively broad and flat base **47** having two contact edges. This allows for the pouch to rest on this base **47** in a vertical presentation. Manufacture of such horizontal stand-up pouches, however, does not involve the use of standard vertical form, fill, and seal machines but, rather, involves an expensive and relatively slow 3-piece construction using a pouch form, fill, and seal machine.

[0011] Referring to **FIGS. 4***b* and **4***c*, the horizontal stand-up pouch of the prior art is constructed of three separate pieces of film that are mated together, namely, a front sheet **41**, a rear sheet **43**, and a base sheet **45**. The front sheet **41** and rear sheet **43** are sealed against each other around their edges, typically by heat sealing. The base sheet **45** is, however, first secured along its outer edges to the outer edges of the bottom of the front sheet **41** and rear sheet **43**, as is best illustrated in **FIG. 4***c*. Likewise, the mating of the base sheet **45** to the front sheet **41** and the rear sheet **43** is also accomplished typically by a heat seal. The requirement that such horizontal stand-up pouch be constructed of three pieces results in a package that is significantly more expensive to construct than a standard form and fill vertical flex bag.

[0012] Further disadvantages of using horizontal stand-up pouches include the initial capital expense of the horizontal stand-up pouch machines, the additional gas flush volume required during packaging as compared to a vertical flex bag, increased down time to change the bag size, slower bag forming speed, and a decreased bag size range. For example, a Polaris model vertical form, fill, and seal machine manufactured by Klick Lock Woodman of Georgia, USA, with a volume capacity of 60-100 bags per minute costs in the range of $75,000.00 per machine. A typical horizontal stand-up pouch manufacturing machine manufactured by Roberts Packaging of Battle Creek, Mich., with a bag capacity of 40-60 bags per minute typically costs $500, 000.00. The film cost for a standard vertical form, fill, and seal package is approximately $0.04 per bag with a comparable horizontal stand-up pouch costing roughly twice as much. Horizontal stand-up pouches further require more than twice the oxygen or nitrogen gas flush. Changing the bag size on a horizontal stand-up pouch further takes in excess of two hours, typically, while a vertical form and fill machine bag size can be changed in a matter of minutes. Also, the typical bag size range on a horizontal stand-up pouch machine is from 4 oz. to 10 oz., while a vertical form and fill machine can typically make bags in the size range of 1 oz. to 24 oz.

[0013] One advantage of a horizontal stand-up pouch machine over a vertical form and fill machine, however, is the relatively simple additional step of adding a zipper seal at the top of the bag for reclosing of the bag. Vertical form and fill machines typically require substantial modification and/or the use of zipper seals premounted on the film oriented horizontally to the seal facings used to seal the horizontal transverse seals.

[0014] An alternative approach taken in the prior art to producing a bag with more of a stand-up presentation is the construction of a flat bottom bag such as illustrated in **FIG. 3***b*. Such bag is constructed in a method very similar to that described above with regard to prior art pillow pouches. However, in order to form the vertical gussets **37** on either side of the bag, the vertical form, fill, and seal machine must be substantially modified by the addition of two movable devices on opposite sides of the sealing carriage that move in and out to make contact with the packaging film tube in order to form the tuck that becomes the gussets **37** shown in **FIG. 3***b*. Specifically, when a tube is pushed down to form the next bag, two triangular shaped devices are moved horizontally towards the packaging film tube until two vertical tucks are formed on the packaging film tube above the transverse seals by virtue of contact with these moving triangular shaped devices. While the two triangular shaped devices are thus in contact with the packaging tube, the bottom transverse seal is formed. The package is constructed with an outer layer **30** that is non-sealable, such as paper. This causes the formation of a V-shaped gusset **37** along each vertical edge of the package when the transverse seals **31**, **33** are formed. While the triangular shaped devices are still in contact with the tube of packaging material, the product is dropped through the forming tube into the tube of packaging film that is sealed at one end by virtue of the lower transverse seal **33**. The triangular shaped devices are then removed from contact with the tube of packaging film and the film is pushed down for the formation of the next package. The process is repeated such that the lower transverse seal **33** of the package above and upper transverse seal **31** of the package below are then formed. This transverse seal is then cut, thereby releasing a formed and filled package from the machine having the distinctive vertical gussets **37** shown in **FIG. 3***b*.

[0015] The prior art method described above forms a package with a relatively broad base due to the V-shaped vertical gussets **37**. Consequently, it is commonly referred to in the art as a flat bottom bag. Such flat bottom bag is advantageous over the previously described horizontal stand-up pouch in that it is formed on a vertical form, fill, and seal machine, albeit with major modifications. However, the prior art method of making a flat bottom bag has a number of significant drawbacks. For example, the capital expense for modifying the vertical form, fill, and seal machine to include the moving triangular-shaped devices is approximately $30,000.00 per machine. The changeover time to convert a vertical form, fill, and seal machine from a standard pillow pouch configuration to a stand-up bag configuration can be substantial, and generally in the neighborhood of one-quarter man hours. The addition of all of the moving parts required for the triangular-shaped devices to move in and out of position during each package formation cycle also adds complexity to the vertical form, fill, and seal machine, inevitably resulting in maintenance issues. Importantly, the vertical form, fill, and seal machine modified to include the moving triangular-shaped devices is significantly slower than a vertical form, fill, and seal machine without such devices because of these moving components that form the vertical gussets. For example, in the formation of a six inch by nine inch bag, the maximum run speed for a modified vertical form, fill, and seal machine using the triangular-shaped moving devices is in the range of 15 to 20 bags per minute. A standard vertical form, fill, and seal machine without such modification can construct a similarly sized pillow pouch at the rate of approximately 40 bags per minute.

[0016] Consequently, a need exists for a method to form a stand-up pouch, similar in appearance and functionality to the prior art horizontal stand-up pouches, using vertical form, fill, and seal machine technology and a single sheet of packaging film. This method should allow for reduced film cost per bag as compared to horizontal stand-up pouches, ease in size change, little capital outlay, and the ability to easily add a zipper seal to the bags, all while maintaining bag forming speeds typical of vertical form, fill, and seal machine pillow pouch production. Such method should ideally produce a vertical stand-up pouch constructed of material commonly used to form standard vertical flex bags.

SUMMARY OF THE INVENTION

[0017] The proposed invention involves producing a vertical stand-up pouch constructed of a single sheet of material using a vertical form, fill, and seal machine slightly modified with a tension bar and forming plates located below the forming tube and a stationary but adjustable tucker mechanism mounted to the frame of the machine which, when positioned between the two forming plates, creates a vertical tuck along the length of the bag while it is being formed. The graphics on the bag are oriented 90° from a standard presentation such that the tuck forms the bottom of the bag. The transverse seals on the formed bag are therefore oriented vertically when the bag is placed on display. A zipper seal or reclose seal can be easily added to the construction of such a vertical stand-up bag since the zipper seal can accompany the single sheet of film in a continuous strip along one edge of the film.

[0018] The method disclosed and the bag formed as a consequence is a substantial improvement over prior art horizontal stand-up pouches and flat bottom bags. The method works on existing vertical form and fill machines requiring very little modification. There are no moving parts or jaw carriage modifications involved. The bag makers can be easily converted back to a pillow pouch configuration with a simple former change. The same metalized or clear laminations used as materials in pillow pouches can also be used with the invention therefore saving in per bag cost. The invention allows for the formation of bags that emulate a horizontal stand-up pouch using a completely different method that takes advantage of the economics of vertical form and fill machine technology.

[0019] The above as well as additional features and advantages of the present invention will become apparent in the following written detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will be best understood by reference to the following detailed description of illustrative embodiments when read in conjunction with the accompanying drawings, wherein:

[0021] **FIG. 1** is a schematic cross-section views of prior art packaging films;

[0022] **FIG. 2*a*** is a schematic cross-section view-of a tube of packaging film illustrating the formation of a prior art lap seal;

[0023] **FIG. 2*b*** is a schematic cross-section of a tube of packaging film illustrating the formation of a prior art fin seal;

[0024] **FIG. 3*a*** is a perspective view of a prior art vertical flex bag;

[0025] **FIG. 3*b*** is a perspective view of a prior art flat bottom bag;

[0026] **FIGS. 4*a***, **4*b***, and **4*c*** are perspective views in elevation of a prior art horizontal stand-up pouch;

[0027] **FIG. 5** is a schematic cross-section of a tube of packaging film formed by the present invention methods;

[0028] **FIG. 6** is a perspective view of the tucker mechanism, forming plates, and tension bar in elevation of the present invention in relation to a forming tube and sealing jaws of a vertical form and fill machine;

[0029] **FIGS. 7*a*** and **7*b*** are perspective views of the vertical stand-up bag of the present invention; and

[0030] **FIG. 8** is a perspective view of one embodiment of the tucker mechanism of the present invention.

DETAILED DESCRIPTION

[0031] **FIGS. 5 and 6** illustrate the basic components used with the method of the proposed invention. The same reference numbers are used to identify the same corresponding elements throughout all drawings unless otherwise noted. **FIG. 5** is a schematic cross-section of a tube of packaging material (film) formed by the present invention method. The tube of packaging film shown in **FIG. 5** is illustrated as a cross-sectional area immediately below the forming tube **101** of **FIG. 6**. The tube of packaging film comprises an outer layer **116** and an inner layer **110**, and can comprise material typically used in the field of art for making a standard vertical flex bag, such as discussed in relation to **FIG. 1**. The tube in **FIG. 5** has been formed by sealing one sheet of film with a vertical back seal, as previously described with regard to discussions of prior art vertical form and fill machine methods.

[0032] **FIG. 6** shows a forming tube **101** typical in most respects to those used with prior art vertical form, fill, and seal machines. This forming tube **101** can be a cylinder, have a rectangular cross section, or any number of shapes, but is preferably cylindrical as illustrated. The film illustrated in **FIG. 5** is initially formed around the forming tube **101** of **FIG. 6**. This forming tube **101** is shown in elevation but would normally be integrally attached to the vertical form, fill, and seal machine. Also shown in **FIG. 6** are a pair of prior art sealing jaws **108** likewise illustrated in elevation. Not shown in **FIG. 6** is the sealing jaw carriage on which such sealing jaws **108** would be mounted below the forming tube **101**.

[0033] As previously described, the practice in the prior art in the manufacture of a vertical flex bag involves feeding a continuous packaging film directed around the forming tube **101**. A back seal is formed on a single layer of film in order to create a tube of film around the forming tube **101**. The seal jaws **108** close on the thus formed tube of packaging film, thereby forming a bottom transverse seal. Product is then dropped through the forming tube **101** into the tube of packaging film. The tube is then driven downward by friction against rotating belts (not shown), and the seal jaws **108** are used to form another transverse seal above the level of the product found inside the tube. This seal is subsequently cut horizontally such that a top transverse seal is formed at the top of the filled bag below and a bottom transverse seal is formed on the tube of packaging film above. The packaging film during the prior art operation described above is oriented to be readable by an operator of the machine as the film travels down the forming tube **101**. This orientation provides graphics **39** on the formed prior art bag that are readable by a consumer when the formed bag is placed on a retail display shelf while resting on its bottom transverse seal **33** as seen in **FIG. 3*a***. As will be described in further detail below, the orientation of the graphics on the film packaging for Applicants' invention is 90° off of the prior art orientation, such that the graphics appear sideways as viewed by the operator of the vertical form and fill machine as the film is pulled down the forming tube **101** of **FIG. 6**. In other words, the graphics on the packaging film are oriented perpendicular to the direction of film travel.

[0034] The invention adds three basic components to a prior art vertical form, fill, and seal machine. Two forming plates **104** and one tension bar **102** are used to hold the packaging film tube in tension from inside the tube, as indicated by the arrows illustrated on **FIG. 5**. As shown in **FIG. 6**, the forming plates **104** and tension bar **102** can be attached directly to the forming tube **101** or, alternatively, to any supporting structure on the vertical form, fill, and seal machine, as long as the forming plates **104** and tension bar **102** are positioned within the tube of packaging material, below the bottom of the forming tube **101**, and above the heat sealing jaws **108**.

[0035] Tension is applied on the outside of the film and in the opposite direction of the tension provided by the forming plates **104** by a fixed or stationary tucker mechanism **106**, alternatively referred to herein as a tucker bar **106**, positioned between said forming plates **104**. The tucker bar **106** is preferably attached to the sealing carriage for the vertical form, fill, and seal machine and is adjustable along all three axes (in/out, up/down, and front/back). Alternatively, the tucker bar **106** can be attached to the frame of the vertical form, fill, and seal machine or any other point that can supports its function outside the film tube. These adjustments in all three axes allow for the tucker bar **106** to be easily moved out of the way to convert the vertical form and fill machine back to standard operation and is accomplished, in the embodiment shown in **FIG. 6**, by a tension screw **162** that can lock the tucker bar **106** in place when tightened. While the tucker bar **106** is adjustable, unlike in the prior art, it is fixed or stationary during operation. Therefore, the present invention is a substantial improvement over the art in that there are no moving parts to the tucker mechanism during bag making. This improvement is what Applicants intend to describe when referring to the tucker bar **106** as "stationary" or "fixed." Because of this stationary tucker bar feature, bag making speeds can match typical pillow pouch manufacturing rates.

[0036] When moved forward into position (toward the forming plates **104**), the tucker bar **106** provides a crease or fold in the tube of the packaging film between the two forming plates **104**. This crease is formed prior to formation of the transverse seal by the seal jaws **108**. Consequently, once the transverse seal is formed, the crease becomes an integral feature of one side of the package. The vertical form and fill machine thereafter operates basically as previously described in the prior art, with the sealing jaws **108** forming a lower transverse seal, product being introduced through the forming tube **101** into the sealed tube of packaging film (which now has a crease on one side), and the upper transverse seal being formed, thereby completing the package. The major differences between a prior art package and Applicants' package, however, are that a crease is formed on one side (which later becomes the bottom of the formed package) using the fixed mechanism described and that the graphics on the packaging film used by the invention are oriented such that when the formed package is stood onto the end with the crease, the graphics are readable by a consumer.

[0037] An example of the formed package of the instant invention is shown in **FIGS. 7*a*** and **7*b***, which show the outside layer of the packaging film **116** with the graphics **179** oriented as previously described. As can be seen from **FIGS. 7*a*** and **7*b***, the construction of the invention's vertical stand-up pouch shares characteristics with the prior art vertical flex bags shown in **FIG. 3*a***. However, the transverse seals **131**, **133** of the vertical stand-up bag of the invention are oriented vertically once the bag stands up on one end, as shown in **FIG. 7*b***. **FIG. 7*a*** shows the crease **176** that was formed by the tucker bar **106** and forming plates **104** discussed in relation to **FIGS. 5 and 6**.

[0038] Returning to **FIG. 6**, another optional feature that can be incorporated into this invention is the use of a diversion plate **160** within the forming tube **101**. This diversion plate **160**, in the embodiment illustrated, is a flat plate welded vertically inside the forming tube **101** that extends from the bottom of the forming tube **101** to some distance above (for example, at least two or three inches) the bottom of the forming tube **101**, where it then is sealed against the inside of the forming tube **101**.

[0039] The diversion plate **160** in a preferred embodiment accomplishes two functions. First, the diversion plate **160** keeps product that is dropped down the forming tube **101** away from the area where the crease is being formed on the tube of packaging film. Second, the diversion plate **160**, can be used as a channel for a gas or nitrogen flush. In such instance, the diversion plate **160** at some point above the bottom of the forming tube **101** seals at the top of the plate **160** against the forming tube **101**. Below such seal (not shown) an orifice can be drilled into the forming tube **101** in order to provide gas communication between an exterior gas (for example, nitrogen or oxygen) source and the cavity formed between the diversion plate **160** and the interior of the forming tube **101**. The diversion plate **160** as shown in **FIG. 6** is a flat plate, but it should be understood that it can be of any variety of shapes, for example, having a curved surface, provided that it accomplishes the functionality of diverting the product away from the area where the tuck is formed on the tube of film.

[0040] By using the diversion plate **160** as a channel for the gas flush, the present invention eliminates the need for a separate gas tube to be placed inside the forming tube **101** that normally accomplishes the same function in the prior art. The added benefit of providing a relatively large volume channel formed by the diversion plate **160** and the interior of the forming tube **101** is that a relatively large volume of flushing gas can be introduced into a filled and partially formed package at a significantly lower gas velocity compared to prior art gas tubes. This allows for the filling of packages using this embodiment of the present invention that may contain low weight product that might otherwise be blown back into the forming tube by prior art flushing tubes.

[0041] **FIG. 8** illustrates a preferred embodiment of the tucker bar **106**. This embodiment of the tucker bar **106** comprises a head **180** attached to a support **182**. Drilled within the support **182** and head **180** is a gas channel **184** shown in phantom on **FIG. 8**. This gas channel **184** provides a gas communication from an exterior gas source (not shown) through the support **182**, through the head **180**, and out three orifices **186**. The gas channel **184** allows for a metered burst of pressurized gas (typically air) that helps keep the tuck illustrated in **FIG. 5** taut throughout the forming and sealing operation without the necessity of moving the tucker bar in and out during bag formation. It should be noted that during operation (bag making) the tucker bar **106** is always stationary. It should further be noted that the head **180** necessarily cannot extend along the entire length of the crease formed by the tucker bar **106** and forming plates **104**. Further, it should be understood that when the sealing jaws **108** close onto the tube of film, the lateral dimensions of the tube of film change. All of these facts are compensated for by the use of the pressurized air bursting from the orifices **186**. The pressurized air keeps an even amount of pressure on the tuck as it is being formed in the various stages of the forming and sealing process. The air burst can be continuous, but is preferably metered to start as the film for the next bag is being pulled down through the completion of the transverse seal.

[0042] The head **180** can comprise any non-stick material but is preferably teflon. In an alternative embodiment, the tucker bar **106** can comprise one integral piece of metal with the head portion **180** being teflon coated. The curved contact area of the head **180** allows for the continuous formation of the tuck illustrated in **FIG. 5** without tearing the packaging film as it is pushed down below the forming tube. While shown with three orifices **186**, the head **180** can comprise any number of orifices from one on.

[**0043**] To further compensate for the change in the width of the film tube as the transverse seal is formed by the seal jaws **108** of **FIG. 6**, it should be noted that the tension bar **102** bends outwardly away from the center of said tube of film along the length of the tension bar **102** and the forming plates **104** are hinged by a horizontal hinge **105**. If the tension bar **102** is designed otherwise (strictly vertical) excess slack occurs in the area of the film tube near the transverse seal. The forming plates **104** comprise horizontal hinges **105** that allow the forming plates to fold inward (toward each other) slightly while the lower transverse seal is formed. Otherwise, the tube of packaging film would be ripped by the tips of the forming plates **104** during this step.

[**0044**] The present invention offers an economic method of producing a stand-up pouch with numerous advantages over prior art horizontal stand-up pouches and methods for making them. Examples of these advantages are illustrated in Table 1 below.

TABLE 1

	Current Vertical Flex Bag	Commercially Available Horizontal Stand-Up Pouches	Applicants' Vertical Stand-Up Bag
Machine Type	Standard Vertical FFS	Pouch Form, Fill, Seal	Standard Vertical FFS
Machine Cost	$75,000.00	$500,000.00	$75,000.00
Film Cost	$0.04/bag	$0.08/bag	$0.04/bag
Gas Flush	Less than 2% O_2	Only to 5% O_2	Less than 2% O_2
Size Change	Easy, change former	2 hours	Easy, change former
Format Change	Flex Bag Only	Stand-Up Pouch Only	Both, simple change
Continuous Feed Zipper Option	No	Yes	Yes
Bag Size Range in Inches	(Width/Height) 5/5 through 14/24	(Width/Height) 5/5 through 10/12	(Width/Height) 5/5 through 24/11

[**0045**] As noted above, a continuous feed zipper option is available on Applicants' invention, which is not available using current vertical form, fill, and seal machine technology. This is because of the orientation of the film graphics used on the packaging film of the present invention. Since the graphics are oriented 90° from the prior art, a zipper seal can be run continuously in a vertical line down the forming tube along with the packaging film as it is being formed into a tube and subsequent package. This is not possible with the prior art, because such orientation of a continuous vertical strip of a zipper seal would place such seal in a vertical orientation once the package is formed and stood up for display.

[**0046**] The invention is further an improvement over methods for manufacturing prior art flat bottom bags. Since the tucker mechanism of Applicants' invention is stationary during bag formation, the present invention eliminates the need for moving parts that push against the film tube for the formation of a gusset. This elimination of moving parts allows for increased bag production rates, significantly lower changeover times to pillow pouch production, and significantly fewer maintenance issues.

[**0047**] While the invention has been particularly shown and described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A method for making a flexible package, said method comprising the steps of:

a) forming a tube of packaging film on a vertical form, fill, and seal machine;

b) forming a vertical crease in said tube of packaging film prior to sealing said tube horizontally;

c) forming a first horizontal seal on said tube, wherein said first horizontal seal includes a portion of said vertical crease;

d) forming a second horizontal seal on said tube, wherein said second horizontal seal includes a portion of said vertical crease; and

e) cutting said tube segment from the remainder of said tube at said second horizontal seal, thus forming a flexible package having a crease along one edge.

2. The method of claim 1 wherein the crease of step b) is formed by at least one stationary tucker bar positioned between a pair of forming plates.

3. The method of claim 2 wherein said tucker bar comprises teflon.

4. The method of claim 2 wherein said tucker bar comprises one or more gas ports and wherein further a metered blast of gas from said ports is used during the forming step b).

5. The method of claim 1 wherein the forming of step b) further comprises holding said tube in tension with at least three extensions below the bottom of a forming tube on said vertical form, fill, and seal machine, wherein said extensions apply said tension on said tube from inside said tube pressing outwards on said tube and, wherein further, said vertical crease is formed by tension applied on the outside of said tube by a stationary device pressing inwardly on said tube at a point between two of said at least three extensions.

6. The method of claim 5 wherein said device pressing inwardly on said tube comprises a tucker bar.

7. The method of claim 6 wherein said tucker bar comprises teflon.

8. The method of claim 6 wherein said device comprises at least one pressurized gas port.

9. The method of claim 1 wherein the tube of packaging film comprises graphics on the exterior of said tube, wherein said graphics are oriented perpendicular to the direction of film travel on the vertical form, fill, and seal machine.

10. A vertical stand-up pouch formed by the method of claim 1.

11. A flexible package formed by a form, fill, and seal packaging machine from a sheet of composite polymer film, said package comprising after formation:

a single sheet, composite film body, said film comprising a graphics layer;

two vertical transverse seals on opposite vertical edges of said package; and

a horizontal crease at the bottom of said package, said crease being substantially perpendicular to said vertical transverse seals.

12. The flexible package of claim 11 wherein said graphics layer is oriented for viewing by a consumer when said package is stood on its bottom, crease end.

13. The flexible package of claim 11 wherein said package is formed on a vertical form, fill, and seal machine.

14. An improved vertical form, fill, and seal machine having a forming tube, said improvement comprising:

two forming plates attached to and extending below said forming tube;

at least one tension bar attached to and extending below said forming tube at a location approximately opposite from said forming plates; and

at least one stationary tucker bar positioned between said forming plates.

15. The improved vertical form, fill, and seal machine of claim 14 further comprising a means for blowing a pressurized gas against packaging film formed in a tube around said forming tube, wherein said gas is blown against the exterior of said tube of packaging film at a point between said forming plates.

16. The improved vertical form, fill, and seal machine of claim 14 wherein said means for blowing a pressurized gas comprises gas ports in said tucker bar in communication with a pressurized gas source.

17. The improved vertical form, fill, and seal machine of claim 14 wherein said tucker bar comprises teflon.

18. The improved vertical form, fill, and seal machine of claim 14 wherein said two forming plates further comprise horizontal hinges between the forming plates and said forming tube.

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