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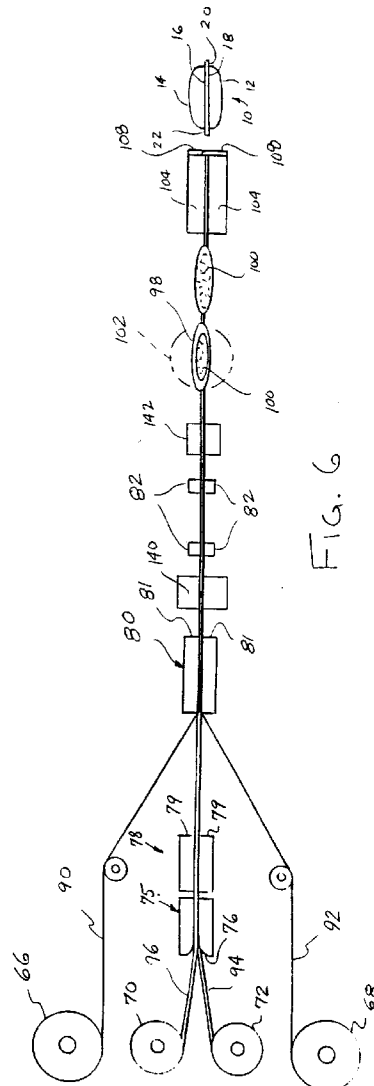
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Reclosable pouch and method and apparatus for forming, filling and sealing the same.

A pouch for containing a food product such as shredded cheese, and a novel method and apparatus for forming, filling and sealing the pouch. The method involves providing one or more webs of material to define a pair of walls for the pouch, orienting the web material so that the walls are substantially vertical, with the web having a horizontal longitudinal axis; providing interengageable strips of reclosable fastener material along the web adjacent the lower edges of the walls; forming vertical side seals; filling the pouches through their open bottoms while in inverted orientation; and sealing the bottoms of the pouches. Each of the strips of reclosable fastener material has one or more fastener members thereon. A peelable seal is provided between the product contained in the interior of the pouch and the reclosable fastener members. The peelable seal is preferably formed on the fastener strip material. The peelable seal is sealed prior to filling of the pouches so that product cannot contact the fastener members, and the fastener members are outside of the hermetic seal area. The pouch is preferably provided with a hole above the fastener members to receive a display hanger, and has a line of perforation above the fastener members and above the hole to facilitate removal of the upper portion of the pouch.



Background of the Invention

Technical Field

The invention relates generally to packaging for food products, and more particularly to reclosable pouches and methods and apparatus for forming, filling and sealing such pouches.

Background Information

It is well known in the art that, for certain food products, efficiency in packaging and acceptable shelf life can be obtained by hermetically sealing the product in a package in a form/fill/seal (FFS) operation.

In providing a commercially viable package through FFS operations, several considerations must be addressed. One consideration is that the package must be capable of being opened by the consumer without undue difficulty. Another consideration is that the package must be economical to produce, and should be capable of being formed, filled and sealed at relatively high rates. It is also desirable that the package be durable so as to withstand the stresses of the FFS operation and subsequent shipping and handling without damage and without deterioration of appearance.

In recent years, there has been increased demand for zippers or other means to provide reclosability. One particular package configuration that has been used commercially in recent years has a generally rectangular configuration with a reclosable zipper extending within a fold along one edge, as illustrated in, e.g., U.S. Patent No. 4,589,145. To open the package, the package material may be slit along the folded edge to gain access to the zipper, and the zipper is then opened to provide access to the product. The disposition of the zipper along a long edge of the package improves access to the package interior as compared with disposition of the zipper along one of the short edges. Where each package is to contain a stack of sliced product or a relatively large item such as a block of cheese, the stack or block may be placed on a horizontally-oriented web and the web can be wrapped around the item to form the package as described in the above-referenced Patent No. 4,589,145.

When handling products comprised of numerous small pieces such as shredded cheese, cereal, etc., it is generally desirable to have the package partly formed into a pouch which is open at one end, or along one side, with the pouch oriented so that the open end or side is at the top of the partially-formed pouch, and to dispense product into the partially-formed pouch through the open top or side.

Vertical FFS operations such as that described in U.S. Patent No. 4,874,257 represent one approach to

addressing the aforementioned considerations in packaging food products comprised of numerous small pieces. In the method of Patent No. 4,874,257, the zipper is disposed vertically along one side of the package being formed, and the pouch is filled by gravity-induced flow of product downward from a filling spout.

Another approach is illustrated by Patent No. 4,945,714, in which the pouches travel horizontally as they are formed, filled and sealed. In Patent No. 4,945,714, the pouch is formed in an inverted orientation from a single web which has a fold at its lower end and a zipper within the fold. Two potential problems with this approach are that penetration of product into the zipper may occur, and that if the upper end of the pouch is perforated to facilitate opening, or punched to receive a display hanger, loss of hermeticity would result.

One problem that must be addressed in any zipper-equipped package such as those mentioned above is that, where the ends of the zippers extend into seal areas, difficulty may be encountered in providing hermeticity at high throughput rates, due to the increased thickness of the seal area at the ends of the zipper.

There is a continuing need for improved packages of the type described above, and for improved FFS operations for such packages which address the aforementioned considerations while avoiding the disadvantages of the prior art discussed above.

Summary of the Invention

The invention provides a novel pouch for containing food product, and a novel method and apparatus for forming, filling and sealing the pouch in an inverted orientation. The method involves providing one or more webs of material to define a pair of walls for the pouch, orienting the wall material so that the walls are substantially vertical, with the web having a horizontal longitudinal axis; providing interengageable strips of reclosable fastener material along the web adjacent the lower edges of the walls; forming vertical side seals; partially separating the pouches from one another by vertical slitting the web(s); filling the pouches through their open bottoms while in inverted orientation; and sealing the bottoms of the inverted pouches. Each of the strips of reclosable fastener material has one or more fastener members thereon.

In accordance with one aspect of the invention, a hermetic peelable seal is provided between the product contained in the interior of the pouch and the reclosable fastener members. The peelable seal is preferably formed as a relatively narrow band on the fastener strip material, rather than on the wall material. This provides a saving of material cost as compared with coating the entire interior surface of the pouch walls with materials suitable for formation of a peel-

able seal. The peelable seal is sealed prior to filling of the pouches so that product cannot contact the fastener members during or after the form, fill, seal operation.

The sealing of the peelable seal may be carried out prior to or simultaneously with sealing of the fastener strip material to the wall material. The sealing may be accomplished by a pair of reciprocable sealing bars which provide predetermined sealing pressure to the seal area while transferring heat thereto. Gas flush techniques may be employed to flush the pouch with N₂ gas during the form, fill, seal operation.

The pouch is preferably provided with a line of perforation adjacent its top end to provide easy-open access to the reclosable fastener material, and a hole to receive a display hanger above the fastener members and beneath the perforations. Referring to the completed pouch in an upright position, the interengageable fastener members are spaced a short distance beneath the top of the pouch.

Further aspects of the invention are disclosed below and in the accompanying drawings.

Brief Description of the Drawings

FIG. 1 is an elevational view of a pouch in accordance with a first embodiment of the invention.

FIG. 2 is a perspective view of the pouch of FIG. 1, showing a removable portion of the pouch being torn away to permit access to the interior thereof.

FIG. 3 is a sectional view taken substantially along line 3-3 in FIG. 1.

FIG. 4 is a sectional view similar to that of FIG. 3, showing the pouch in an opened configuration.

FIG. 5 is a sectional view similar to that of FIG. 3, illustrating a pouch in accordance with a second embodiment of the invention.

FIG. 6 is a diagrammatical plan view of apparatus for forming, filling and sealing pouches in accordance with the invention.

FIG. 7 is an elevational view of the apparatus of FIG. 6.

FIG. 8 is a fragmentary diagrammatical plan view of apparatus in accordance with an alternate embodiment of the invention.

Detailed Description of Preferred Embodiments

The invention is generally embodied in a reclosable pouch and a method and apparatus for forming, filling, and sealing the pouch.

FIGS. 1-4 illustrate a first embodiment of the invention, comprising a pouch 10 which has first and second generally rectangular walls 12, 14 sealed to one another along their bottom edges 16, 18 and side edges 20, 22. Extending across upper portions of the respective walls are closure members 24, 26.

Each closure member 24, 26 has a substantially

planar outer surface 28, 30 which is sealed to its respective associated wall. On their inner surfaces the closure members have complementary interlocking zipper profiles 32, 34 extending horizontally along their entire lengths to provide reclosability for the pouch 10. A non-peelable upper seal 36 is provided along the upper edge of the pouch between upper portions 35, 37 of the closure members 24 and 26. A plurality of gripper beads 38 extend longitudinally above the zipper profiles 32, 34 on the respective closure members 24 and 26 between the zipper profiles and the upper seal 36. In the illustrated embodiments, each closure member has a single pair of gripper beads 38 formed thereon to facilitate manual gripping and separation of the fastener profiles 32 and 34.

Extending longitudinally beneath the zipper profiles and parallel thereto is a hermetic peelable seal 39. The peelable seal is comprised of strips of polymeric material 39a, 39b on the respective closure members 24 and 26. The strength of the seal 39 is such that it can be readily opened by application of manual outward force to the closure members 24 and 26 by the consumer, but is not susceptible to accidental opening due to normal stresses associated with product containment during the FFS operation, and subsequent shipping, handling, and display. The seal preferably has an opening force of from about 1.5 to about 6.0 lbs., and more preferably from about 2.5 to about 3.5 lbs. The peelable seal 39 is substantially impermeable to air, as well as to liquids which may be present in the pouch. Accordingly, the location of the peelable seal interiorly of the zipper profiles 32 and 34 prevents any contents of the pouch from leaking into the zipper profiles and excludes the interlocking members of the zipper from the hermetic seal area.

The strips of polymeric material 39a, 39b which form the peelable seal preferably comprise polymeric materials which are known in the art to be suitable for this purpose, such as one or more of the following: polyethylene/EVA with a VA content of between 4% and 22%; polybutylene; Surllyn; Bynel; Saran (PVDC) copolymer; ethylene acrylic acid copolymer; or methacrylic acid copolymer. As disclosed in, e.g., U.S. Patent No. 4,782,951, the disclosure of which is incorporated herein by reference, a hermetic peelable seal may be formed between a Saran copolymer lamina and an EVA lamina.

Each of the pouch walls 12 and 14 is preferably made of a suitable laminated material having barrier properties which, when sealed as described herein, provide hermeticity for the pouch. For purposes of example, a suitable film for cheese shreds may comprise a linear low-density polyethylene inner layer in combination with a polyester or nylon outer layer, and a middle adhesive layer of polyethylene. A nylon outer layer is particularly useful in connection with Swiss cheese, where a degree of CO₂ gas permeability is desirable in the packaging. The closure members 24

and 26 are preferably made of a low EVA content polyethylene. The closure members may be attached to the walls by, e.g., a thin layer of Surlyn on each of the closure members and the walls.

To facilitate support of the pouch 10 on a display hanger, a hole 86 is provided in an upper portion of the pouch. The hole extends through upper portions of the walls 12, 14 and through the closure members 24 and 26, which provide a relatively tough and strong periphery for the hole to support the weight of the pouch. As shown in FIG. 1, one or more of the ribs or beads 38 may extend over the hole to further increase the ability of the pouch to resist tearing at the hole 86 when subjected to rough handling during placement on a retail display rack and/or removal therefrom. Disposition of the hole above the peelable seal 39 enables hermeticity to be maintained. Lines of weakness 88 are formed through the walls 12, 14 and closure members 24, 26 immediately beneath the upper portions 35, 37 of the closure members to enable the upper portion of the pouch to be torn off, enabling easy manual access to the gripper beads 38 for separation of the zipper profiles 32, 34 and peelable seal strips 39a, 39b. The lines of weakness 88 in the illustrated embodiment take the form of perforations formed opposite one another through the respective walls and closure members. The placement of the perforations 88 above the hole 86 enables the pouch to be supported by a display rack without subjecting the line of perforations 88 to transverse tensile stresses which might cause accidental tearing thereof.

FIG. 5 illustrates a pouch 41 in accordance with a second embodiment of the invention. The pouch of FIG. 5 is generally similar to that of FIGS. 1-4, in that it comprises a pair of generally rectangular walls 40 and 42, in combination with a pair of closure members 44 and 46 having interlocking zipper profiles 48 and 50 thereon. Gripper beads 52 are provided above the zipper profiles and a peelable seal 54 extends therebelow. The walls 40 and 42 are sealed to one another along their bottom edges 56, 58 and side edges. However, the pouch of FIG. 5 differs from that of FIGS. 1-4 in that its upper seal 64 is formed directly between the walls 40 and 42 of the pouch, rather than between the closure members. To this end, the closure members 44 and 46 are spaced beneath the upper edges of the walls 40 and 42, leaving a peripheral area along the top of each wall for the upper seal 42. As in the embodiment of FIGS. 1-4, a hole for receiving a display hanger is punched through an upper portion of the pouch, and lines of weakness, e.g., perforations 65, are provided opposite one another in the walls immediately beneath the seal area 64.

In accordance with a third embodiment of the invention (not shown) the walls of the pouch may be constructed of a single web, rather than two separate webs. The pouch in accordance with this embodiment is substantially similar to that of FIG. 5, except that the

pouch material is continuous along its upper edge, rather than comprising two separate walls joined by a seal, and the pouch material provides a snug fit around the upper edges of the closure members 44 and 46. As in the other embodiments, a hole for receiving a display hanger is disposed adjacent the top of the pouch, with lines of perforation therebeneath.

FIGS. 6 and 7 illustrate a method and apparatus for forming, filling and sealing pouches in accordance with a preferred embodiment of the invention. As described below, the pouches are formed, filled and sealed in an inverted configuration. The method will be described with reference to the pouch 10 described above with reference to FIGS. 1-4, by describing the successive steps involved in the formation, filling and sealing of the pouch 10 in its inverted configuration.

In the embodiment of FIGS. 6 and 7, the material for the walls is provided by first and second rolls 66 and 68 of suitable laminated film in web form. The material for the closure members is provided by first and second rolls 70 and 72 of closure strip material. The wall material as supplied by rolls 66 and 68 comprises webs 90 and 92 of laminated polymeric material. The closure strip material comprises a first continuous strip 94 having a female zipper profile thereon, and a second strip 96 having a male profile thereon.

The first step in the method of FIGS. 6 and 7 is mating the complementary zipper profiles 32 and 34, i.e., pressing the zipper profiles into interlocking engagement with one another. This step is carried out at a zipper-assembly station 74 which comprises a shoe 75 having an internal surface 76 configured to maintain the opposite profiles in alignment relative to one another, and to cam the closure strips 94 and 96 into interlocking engagement as they advance through the shoe.

The next step is to form the peelable seal 39 between the closure members 24 and 26 at a sealing station 78. At the sealing station 78, a pair of horizontally oriented, reciprocable heat seal bars 79 are advanced toward one another to apply pressure and heat to the lower portions of the closure members which are to form the peelable seal 39. The advancement of the closure strip material is intermittent, so that the strip material is at rest while the heat seal bars 79 are closed.

The next step comprises sealing of the outer surfaces of the closure strips 94 and 96 to the inner surfaces of their respective associated wall webs 90 and 92. This is accomplished at an assembly/sealing station 80 at which a second pair of horizontal heat sealing bars 82 are employed to effect the desired sealing. The closure strips are positioned along the lower edges of the wall webs as the pouch is formed in its inverted configuration, so that they will extend across the top of the finished pouch in its upright configuration.

The line of weakness 88 is then formed by a conventional notched perforation wheel on the line at a perforation station 140. Next, the side margins of the pouches are sealed by vertical sealing bars 82. In forming the side seals, the sealing bars 82 crush the closure strips at the areas 84 which correspond to the ends of the closure members 24 and 26 in the finished pouch. The sealing bars provide an impermeable marginal seal area on each side of the pouch being formed, along the entire vertical dimension of the pouch, or at least from the bottom edges 16, 18 of the walls through the peelable seal 54. The vertical sealing bars 82 preferably include cutting elements to form vertical slits 139 in the wall webs 90 and 92, extending upward from the bottom edges of the respective wall webs to a predetermined level, leaving links 141 of wall material intact along the upper edges of the wall webs, while partially separating the pouches from one another.

The peelable seal 39 having been formed between the closure members, the formation of the side seals enables product 100 to be retained in each of the pouches being formed. The as-yet-unsealed bottom 98 of the inverted pouch is held open to provide an opening to receive the product, and the pocket is filled to a desired level through a dispensing spout 102, with the peelable seal 29 preventing the product from reaching the zipper. The inverted pouch is then gas flushed with N₂ or CO₂, closed, and sealed along its horizontal top and bottom edges by additional horizontally-oriented sealing bars 104 and 106. The pouch 10 is cut from the preceding and succeeding pouches by vertically oriented knives 108 which sever the links 141 and trim the side edges of the pouches, to complete the FFS operation.

Where a punched hole 86 is desired, punch apparatus 142 may be provided at a convenient location on the line. In the apparatus of FIGS. 6 and 7, the punching operation takes place immediately after sealing of the vertical seals of the pouch, and prior to filling. In other embodiments of the invention, the order of the steps may be varied. For example, in the embodiment of FIG. 8, first and second webs 110, 112 of wall material are provided by first and second rolls 114 and 116, which are supported for rotation about vertical axes. Material for closure members is provided by first and second rolls 118 and 120 of closure strip material. One roll supplies closure strip 122 having a female profile, while the other provides material 124 having a male profile.

In the embodiment of FIG. 8, the lengths of closure strip material 122 and 124 are joined to their respective associated webs of wall material 110 and 112 at two parallel heat sealing stations 126 and 128. The resulting composite webs of wall and fastener material 130 and 132 then advance over vertical guide rollers 134 and 136 to a sealing assembly station 138 where the zipper profiles of the closure ma-

terial are interlocked, and the peelable seal formed in a manner similar to that described above with reference to the embodiment of FIGS. 6 and 7. The remaining steps of forming the side seal, filling, forming top and bottom seals, and separating the finished pouches are carried out as described in the embodiment of FIGS. 6 and 7.

In another embodiment of the invention (not shown) the formation of the peelable seal is combined with the operation of sealing the fastener strips to the webs of wall material. This method is similar to that of FIGS. 6 and 7, except that the sealing station 78 may be eliminated, and the assembly/sealing station 80 adapted to provide heat and pressure to effect both sealing operations simultaneously.

From the foregoing, it will be appreciated that the invention provides a novel pouch and method and apparatus for forming, filling and sealing the pouch. The invention is not limited to the embodiments described above or to any particular embodiments. The invention is more particularly pointed out in the following claims.

Claims

1. A method of forming, filling and sealing a hermetic pouch in an inverted orientation, said method comprising:
 - providing wall material for defining a pair of walls for the pouch;
 - orienting said wall material so that said walls are substantially vertical;
 - positioning first and second lengths of fastener strip material between said walls, said lengths of fastener strip material having complementary mechanically interengageable fastener members thereon, and having means for forming a linear horizontal peelable seal above said fastener members in a sealing area coextensive with said fastener members;
 - forcing said fastener members into interlocking engagement with one another;
 - applying heat and pressure to said sealing areas to form a peelable seal binding together said lengths of fastener strip material;
 - sealing said lengths of fastener strip material to said walls, with each length of fastener strip material being joined to a respective one of said pair of walls;
 - forming a pair of substantially vertical seals joining said walls, so as to define a pocket having a width determined by the distance between said vertical seals;
 - dispensing product downward into said pocket to fill said pocket to a predetermined level;
 - forming a horizontal seal generally between said walls above said predetermined level;

- and
separating said pouch from said wall material.
2. A method in accordance with Claim 1 wherein the step of applying heat and pressure to said sealing areas is carried out simultaneously with the step of sealing said lengths of fastener strip material to said walls.
 3. A method in accordance with Claim 2 wherein the step of applying heat and pressure to said sealing areas and the step of sealing said lengths of fastener strip material to said walls are carried out by a pair of horizontal sealing bars which are reciprocable inward and outward to apply heat and pressure to said walls and said fastener strip material.
 4. A method in accordance with Claim 3 further comprising the step of flushing the pouch with N₂ gas.
 5. A method in accordance with Claim 1 further comprising:
 - sealing together said lengths of fastener strip material beneath said fastener members, to form an additional seal between said lengths of fastener strip material; and
 - providing one or more lines of weakness between said additional seal and said fastener members to facilitate removal of said additional seal from said pouch without removal of said fastener members from said pouch.
 6. A method in accordance with Claim 5 further comprising:
 - forming a hole through said pouch beneath said fastener members.
 7. A method in accordance with Claim 1 further comprising forming an additional seal between said walls beneath said first and second lengths of fastener strip material, and providing one or more lines of weakness between said additional seal and said lengths of fastener strip material.
 8. A method in accordance with Claim 7 further comprising providing a hole through said pouch beneath said fastener members.
 9. Apparatus for forming, filling and sealing a hermetic pouch in an inverted orientation, said apparatus comprising:
 - means for supplying wall material for defining a pair of walls for the pouch;
 - means for orienting said wall material so that said walls are substantially vertical;
 - means for positioning first and second lengths of fastener strip material between said walls, said lengths of fastener material having complementary mechanically-interengageable fastener members thereon, and having means for forming a linear horizontal peelable seal above said fastener members in a sealing area coextensive with said fastener members;
 - means for forcing said fastener members into interlocking engagement with one another;
 - means for applying heat and pressure to said sealing areas to form a peelable seal binding together said lengths of fastener strip material;
 - means for sealing said lengths of fastener strip material to said walls, with each length of fastener strip material being joined to a respective one of said pair of walls;
 - means for forming a pair of substantially vertical seals joining said walls, so as to define a pocket having a width determined by the distance between said vertical seals;
 - means for dispensing product downward into said pocket to fill said pocket to a predetermined level;
 - means for forming a generally horizontal seal between said walls above said predetermined level; and
 - means for separating said pouch from said wall material.
 10. Apparatus in accordance with Claim 9 further comprising means for sealing together said lengths of fastener strip material beneath said fastener members, to form an additional seal between said lengths of fastener strip material, and means for providing one or more lines of weakness between said additional seal and said fastener members to facilitate removal of said additional seal from said pouch without removal of said fastener members from said pouch.
 11. Apparatus in accordance with Claim 10 further comprising means for forming a hole through said pouch beneath said fastener members.
 12. Apparatus in accordance with Claim 9 further comprising means for forming an additional seal between said walls beneath said first and second lengths of fastener strip material, and providing one or more lines of weakness between said additional seal and said lengths of fastener strip material.
 13. Apparatus in accordance with Claim 12 further comprising means for providing a hole through said pouch beneath said fastener members.
 14. A generally rectangular pouch for containing shredded cheese comprising:
 - a pair of generally rectangular walls, each

wall having a top edge, a bottom edge, and a pair of side edges;

said walls being joined by heat seals along their bottom and side edges;

said pouch having a pair of fastener strips attached to opposite inner surfaces of upper portions of said walls and extending the width of the pouch between the side edges of said generally rectangular walls; 5

said fastener strips having complementary mechanically interengageable fastener members thereon; 10

said fastener further having a peelable seal extending the length of said fastener strips beneath said fastener members; 15

said pouch further comprising means defining a hole through said pouch above said fastener members, and means defining a line of weakness above said hole to facilitate opening of the pouch by tearing away an upper portion thereof. 20

15. A pouch in accordance with Claim 14 further comprising a horizontal top seal disposed above said line of weakness. 25

16. A pouch in accordance with Claim 15 wherein at least one of said fastener strips has at least one horizontal bead extending therealong above said complementary mechanically interengageable fastener members and above said hole, below said line of weakness. 30

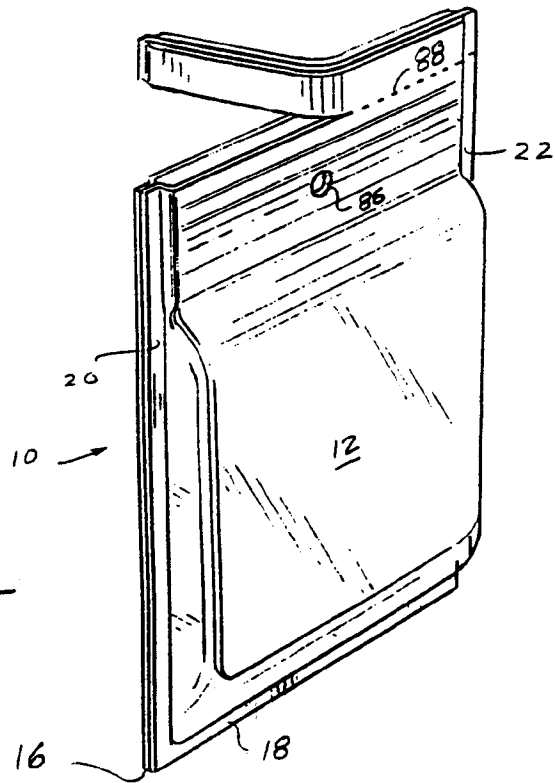
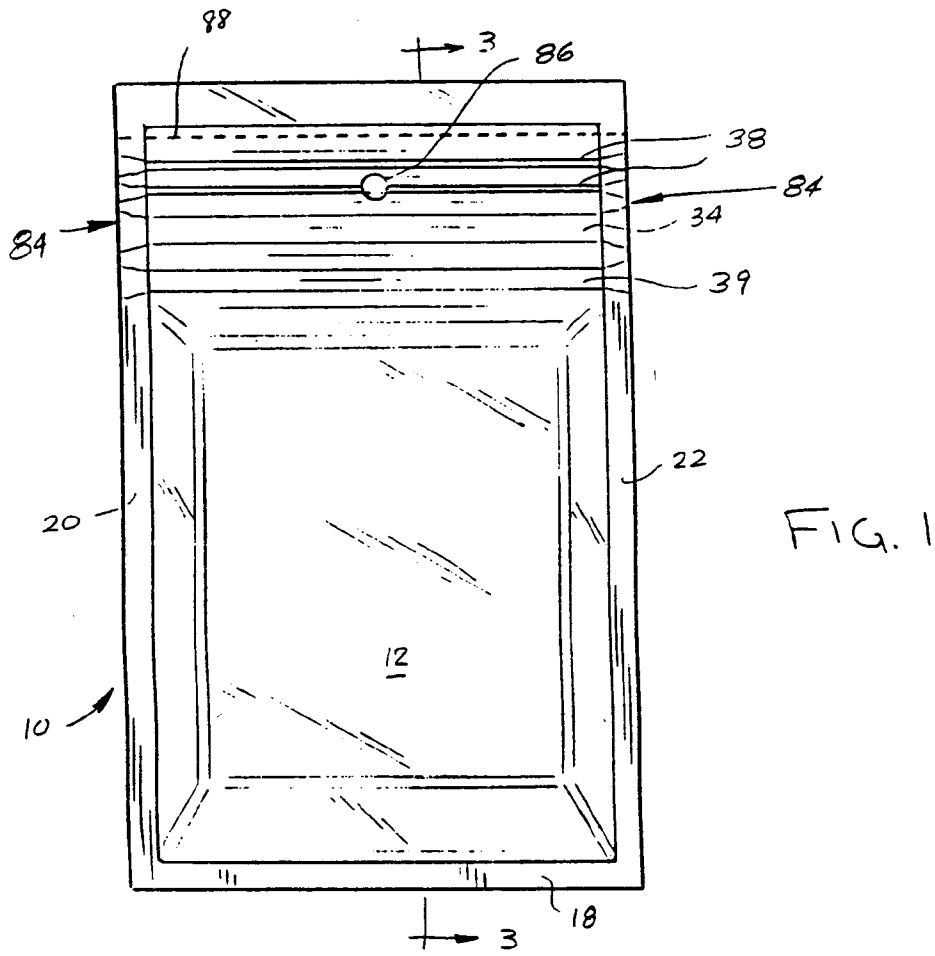
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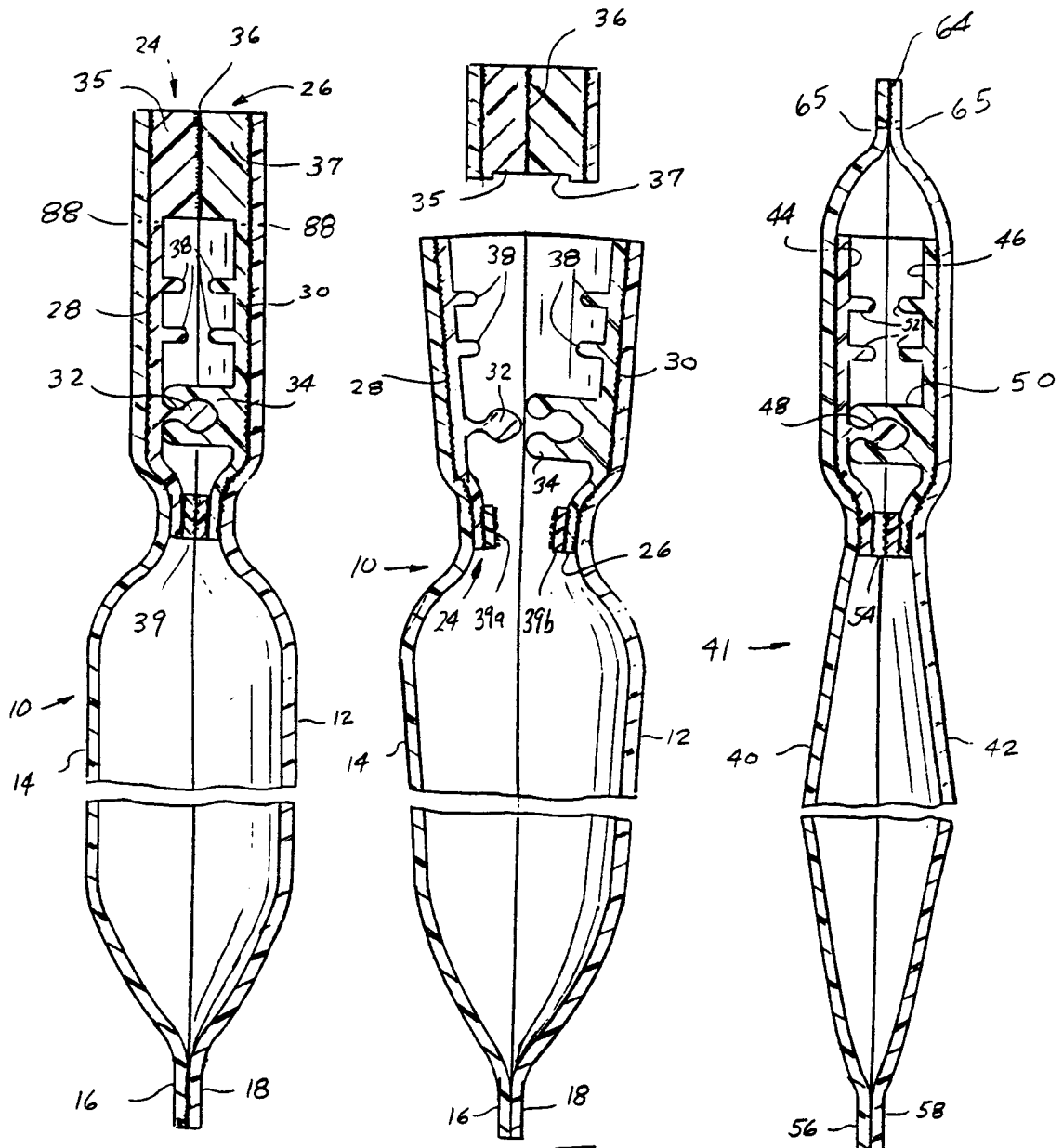


FIG. 3

FIG. 4

FIG. 5

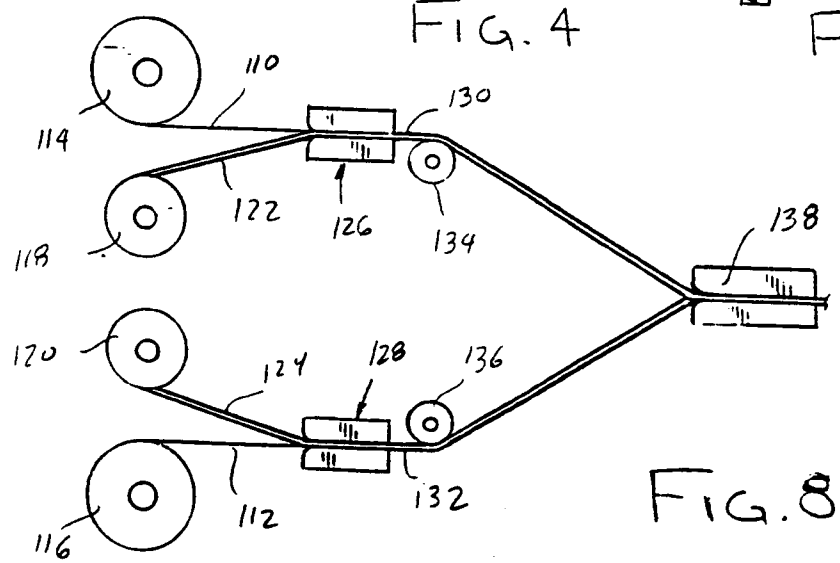


FIG. 8

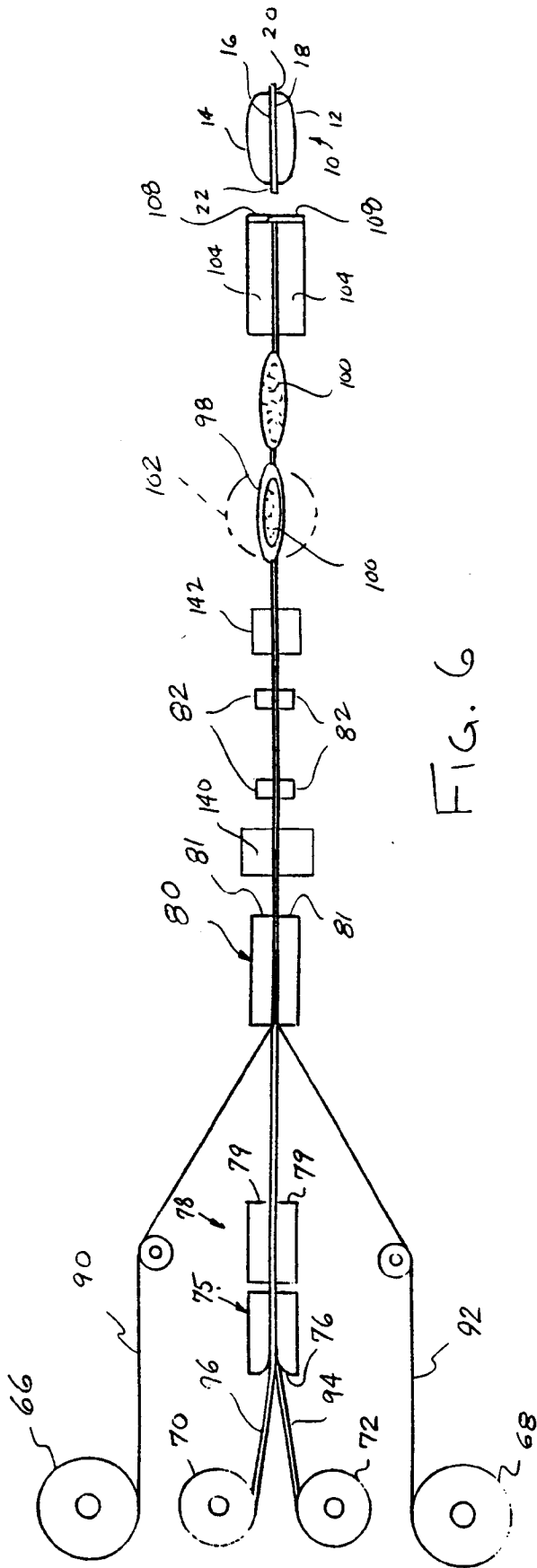


FIG. 6

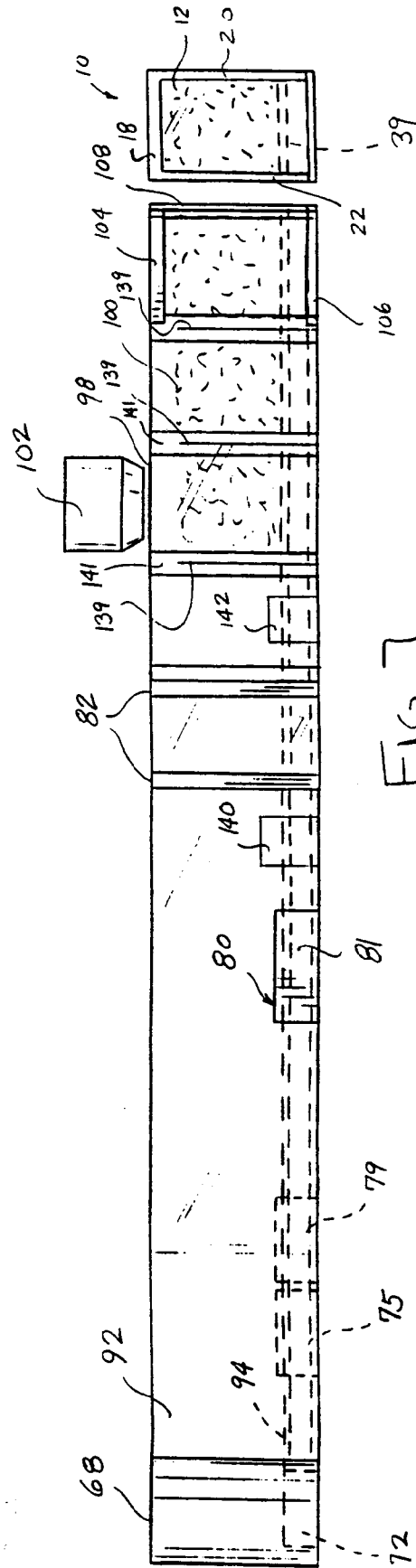


FIG. 7



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 30 4792

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A, D	US-A-4 945 714 (BODOLAY) * column 3, line 19 - column 4, line 5 * * column 5, line 31 - line 56 * * figures 1-3 * ---	1, 9	B65B61/18 B65D35/22 B65D33/25
A	US-A-4 894 975 (MINIGRIP) * column 3, line 24 - column 5, line 23 * * figures 1-5 * ---	1, 3, 5, 9, 10	
A, P	EP-A-0 456 277 (MINIGRIP) * column 2, line 56 - column 3, line 22 * * figure 1 * ---	1, 14	
A	EP-A-0 423 456 (ZIP-PACK) * claims 1, 42 * * figures 5-7 * ---	6, 14	
A	EP-A-0 395 362 (REYNOLDS CONSUMER PROD.) * column 4, line 21 - line 32 * * figure 2 * -----	16	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65B B65D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21 AUGUST 1992	Examiner CLAEYS H. C. M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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