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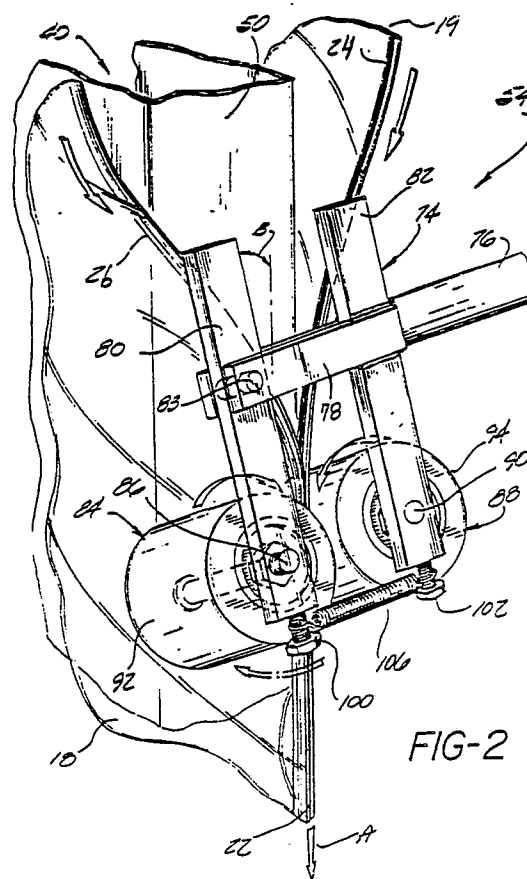
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54 **Steering, joining and guiding mechanism for zippered film.**

57 A steering, joining and guiding mechanism is disclosed for joining together opposing rib and groove fastener elements on a traveling continuous bag film. The steering, joining and guiding mechanism includes a pair of opposing press rolls (84, 88). The longitudinal axis of each of the press rolls is offset from the direction of travel of the bag film. The press rolls are offset at an angle of from 2° to 30° from a line perpendicular to the direction of travel of the bag film.



STEERING, JOINING AND GUIDING MECHANISM FOR ZIPPERED FILM

This invention relates to machine for forming, filling and sealing reclosable bags from a continuous web of bag material, and more particularly to a steering, joining and guiding mechanism for such a forming, filling and sealing machine.

Bags of various types have been used for packaging a wide variety of products such as, for example, cereals, cookies and potato chips. These bags can serve as the external package for the products or can be inserted into boxes as a liner for the boxes. When packaging perishable materials such as cereal, cookies and potato chips, the bags should be sealed to preserve the product contained therein by preventing the co-mingling of outside air and moisture with the product in the bags.

Conventional sealed bags (such as most cereal bags and potato chip bags) have seals which are formed by gluing together or heat sealing together a pair of opposed edges of the bags. One problem with such conventional sealed bags is that they cannot be resealed after being opened. Thus, once the bag is opened, the user cannot prevent the unwanted intrusion of outside air and moisture into the bags.

Usually, reclosable bags include a pair of fastener elements (such as a pair of rib and groove profiles), which the user fastens together after opening to thereby effectively seal the contents of the bag from the intrusion of unwanted air and moisture. One example of such a reclosable bag is the ZIPLOC® brand food storage bag manufactured by The Dow Chemical Company.

Both conventional and reclosable bags share a common feature in that they are usually formed from a continuous roll of bag film. This bag film web is folded over to form a pair of opposing plies forming a generally tubular structure which can be filled with the product. The tubular web is then subdivided into a plurality of individual bags. Machines for forming and filling bags from a continuous web of bag material are known.

U.S. Patent No. 3,815,317 (Toss) relates to an apparatus for forming, filling and sealing zippered plastic bags. A continuous bag film web is provided on a roll with the fastener elements interlocked. The fastener elements are opened and the film spread out to remove any wrinkles or folds from the web. The film is then folded and the fastener elements are reengaged. The web is then cross-sealed, filled with the product through the remaining open side which is then sealed to form the final bag assembly. In the Toss apparatus a pin unlocks the interlocked fastener elements. A guide device

holds the fastener elements apart. The guide device includes guide wheels which engage the edges of the film. The fastener elements are reengaged through the use of closure rolls.

U.S. Patent No. 4,355,494 (Tillman) relates to a machine for making reclosable bags. The Tillman device is not a true form, fill and seal machine but rather a forming machine only. Tillman forms zippered bags by applying the fastener elements to a traveling web. The bag film is then formed into a tube over a forming shoulder. The fastener elements are joined by a guide means which is best shown in detail in Figures 4 and 5 of the Tillman patent. Tillman's guide means includes multiple roller pairs which are utilized to guide the fastener elements into engagement between a pair of press rolls.

U.S. Patent No. 2,146,308 (Maxfield) relates to a vertical form, fill and seal operation. A plastic film web is formed around a tube and then a capping strip is applied over the edges of the tube. This capping strip is positioned by a pair of heated rollers. The tube is filled and then laterally sealed and served to produce the packaged product. The Maxfield device does not utilize a zippered bag film. Rather, Maxfield utilizes a capped bag.

U.S. Patent No. 3,807,118 (Pike) also relates to a non-zippered form, fill and seal system. In the Pike device, a heat sealable minor web is applied to one edge of the web. A tear element is applied to the opposite edges. The two edges are aligned and heat sealed as part of the formation of the bag.

One difficulty encountered in both conventional and reclosable bag forming, filling and sealing operations is maintaining the bag film from which the bags are cut in a proper alignment as the bag film travels through the forming, filling and sealing machine. This problem is especially acute in the forming, filling and sealing of zipper-type reclosable bags provided with fastener elements on opposing plies of the film web, because the opposing fastener elements need to be aligned properly in order to be closed properly.

It is therefore an object of this invention to provide an improved zipper type closure and bag film aligning means for a packaging machine.

In accordance with the present invention, a steering, joining and guiding mechanism is provided for joining together opposing rib and groove fastener elements on a traveling, continuous bag film, the mechanism comprises a pair of opposed press rolls. The longitudinal axis of each of the press rolls is offset from 2° to 30° from the direction of travel of the bag film.

Preferably, the press rolls are offset at about

5° from the direction of travel of the bag film, and the press rolls are used in conjunction with a forming, filling and sealing machine having a filling chute which includes a portion disposed interiorly of the bag film at the same point in the direction of travel of the bag film as the press rolls.

Thus, a feature of the present invention is that the press rolls of the present invention, having longitudinal axes which are offset from the direction of travel of the bag film, exert an outwardly directed force on the bag film as the fastener elements of the bag film pass through the rollers. This outwardly directed force pulls the bag film taut against a portion of the filling chute to maintain the bag film in a proper lateral orientation. By maintaining the bag film in a proper lateral orientation, the fastener elements are aligned to facilitate interlocking of the fastener elements.

Another feature of the present invention is that at least one of the press rolls is mounted to a pivoting bracket to permit the one press roll to be moved relative to the other press roll. This movable feature has the advantage of permitting the press rolls to be moved between a fastener elements engaging and a fastener elements releasing position. The placement of the press rolls in the releasing position (wherein the press rolls are separated) facilitates "threading" of the bag film through the press rolls.

Another feature of the present invention resides in the use of rubber press rolls which frictionally engage the bag film to grip the bag film securely and pull it outwardly, while permitting a sufficient amount of "slippage" to permit the bag film to travel in a path offset from the axes of the rolls.

Additional features and advantages of the present invention will become apparent to those skilled in the art upon consideration of the following detailed description of a preferred embodiment exemplifying the best mode of carrying out the invention as presently perceived.

Figure 1 is a perspective view of the form, fill and seal packaging apparatus of the present invention;

Figure 2 is a perspective view of the steering, joining and closing mechanism of the present invention;

Figure 3 is a side view of the steering, joining and closing mechanism of the present invention; and

Figure 4 is a greatly enlarged sectional view taken generally along the lines of 4-4 of Figure 3.

A form, fill and seal packaging apparatus 8 is shown in Figure 1. A roll of bag film 10 for supplying a continuous web 16 of the bag film is supported on a spindle 12 which is rotatably journaled on a rack 14 for maintaining the roll 10 above

the ground. The continuous web 16 of bag film is unwound from the roll 10 and is fed into the packaging apparatus 8.

The web 16 is helically wound onto the roll 10, and as drawn from the roll 10 has a pair of opposed film plies 18, 19. The opposed plies 18, 19 are continuous with each other at the bottom edge 20 (of a finished bag 21), and are interlocked at the top edge 22 (of the finished bag 21) by zipper-like fastener elements comprising a female fastener element or profile 24 which is formed as a part of ply 19 and a male fastener element or profile 26 which is formed as a part of ply 18. The fastener elements 24, 26 can be similar to the fastener elements found on ZIPLOC® brand food storage bags manufactured by The Dow Chemical Company. The fastener elements 24, 26 permit the food storage bag to be reclosed after opening.

From the roll 10, the web 16 is drawn upwardly over a roller 28 by a feed mechanism (not shown) which is disposed downstream in the path of travel of the web 16. Although the roller 28 is shown as a single roller, it preferably comprises a "dancer roll" system. The web 16 is then drawn through a guide mechanism 30 which includes means for laterally aligning the web 16 and a zipper-splitting edge 32 for disengaging the interlocked fastener elements 24, 26.

An idler roller 36 is disposed directly downstream in the bag film web's 16 path of travel from the guide mechanism 30. The idler roller 36 is positioned at about the same vertical height as the guide mechanism 30 and is rotatably journaled on a spindle 38. After the fastener elements 24, 26 have been disengaged by the splitting edge 32, both plies 18, 19 of the web 16 pass over the idler roller 36 and generally vertically downwardly as indicated by arrow A. Due to the action of the splitting edge 32, the fastener elements 24, 26 are disengaged as the web 16 passes over the idler roller 36 and begins its downward travel.

A side arm filling station comprising a filling chute 40 is provided for directing product, such as cereal flakes or pellets 42, into the interior of the bag web 16. The feed chute 40 includes a generally vertically extending upper portion 44, an angled median portion 46 and a generally vertically extending lower portion 50. The angled portion 46 passes between the disengaged fastener elements 24, 26 and into the interior of the web 16. The lower portion 50 is disposed between the plies 18, 19 of the web 16.

A steering, joining and closing mechanism 54 for pressing together and reinterlocking the fastener elements 24, 26 of the opposed plies 18, 19 is disposed in the path of travel of the web 16 and is positioned directly downstream of the angled portion 46. More particularly, the mechanism 54 is

disposed downstream of that portion of the angled portion 46 of the filling chute 40 which passes between the fastener elements 24, 26. Although the mechanism 54 is disposed downstream of the angled portion 46, it is also disposed at the same general point in the direction of travel of the web 16 as a portion of the lower portion 50 of the feed chute 40.

A reciprocally moving, generally vertically extending seal forming bar 56 is disposed downstream of the mechanism 54. The bar 56 is provided for forming a temporary "peel seal" 58. In a finished bag, the peel seal 58 is formed interiorly of and generally parallel to the fastener elements 24, 26. The peel seal 58 can be unsealed by the user without destroying the integrity of the finished bag. The peel seal 58 helps to make the finished bag more tamper resistant. Preferably, the length of the bar 56 is approximately equal to the width of a finished bag.

A reciprocally moving, generally horizontally disposed seal forming means 60 having sealing bars 60a, 60b is disposed below the open lower end 62 of the feed chute 40. Preferably, the seal forming means 60 is disposed at a distance from the open lower end 62 of the feed chute 40 which is approximately equal to the width of one finished bag 21. Sealing bars 60a, 60b are provided for laterally sealing together the first and second plies 18, 19 of the film web to form the side seals of the finished bag.

A severing means 66 is disposed between the sealing bars 60a, 60b and is provided for severing the intermittently sealed continuous web 16 into individual, finished bags 21.

The steering, joining and closing mechanism 54 of the present invention is best shown in detail in Figures 2 to 4. The mechanism 54 includes an H-shaped bracket 74 which is supported by a side arm 76. The bracket 74 includes a cross brace member 78, a first, generally vertically extending leg 80 and a second, generally vertically extending leg 82. The first leg 80 is pivotally coupled to the cross-brace member 78 by a pivot pin 83. The second leg 82 is fixed to the cross brace member 78.

A first press roll 84 is rotatably journaled to the first leg 80 on an axle 86. A second press roll 88 is rotatably journaled to the second leg 82 on an axle 90 and is placed in an opposed relation to the first press roll 84. The press rolls 84, 88 are preferably made of a rubber material having a durometer hardness of from 20 to 70 shore A. The press rolls 84, 88 each have a generally smooth, cylindrical surface 92, 94 to engage and interlock the fastener elements 26, 24, respectively, by pressing the fastener elements 26, 24 into engagement with each other.

Axles 86, 90 define the longitudinal axes about which the press rolls 84, 88 rotate. These axes are parallel axes, and are offset from the direction of travel A of the web 16. The angle at which the axes are offset from a line perpendicular to the direction of travel can be from 2° to 30° . Preferably the axes are offset about 5° . The press rolls 84, 88 exert a generally outwardly directed force against the web 16, which pulls the web 16 taut against the side of the lower portion 50 of the feed chute 40 so that the rolls maintain the proper lateral alignment of the web 16 in the area of the lower portion 50 of the feed chute 40. This laterally and outwardly directed force exerted by the press rolls 84, 88 also maintains the proper relative alignment of the fastener elements 24, 26, which facilitates the interlocking of the fastener elements 24, 26 by the press rolls 84, 88.

It has been found by applicants that if the axes of the press rolls 84, 88 are offset from a line perpendicular to the direction of travel A of the film web 16 by less than 2° , the press rolls 84, 88 generally do not exert a sufficient outwardly directed force against the web to pull the web taut against the lower portion 50 of the feed chute 40. Thus, at an angle of less than 2° , the press rolls 84, 88 do not serve to maintain the proper lateral alignment of the web 16. It has also been found that if the longitudinal axes of the press rolls 84, 88 are offset by greater than about 30° , the cross brace member 78 tends to interfere with the operation of the press rolls 84, 86.

A first post 100 is mounted to the bottom of the first leg 80 and a second post 102 is mounted to the bottom of the second leg 82. A biasing means such as an expansion spring 106 is stretched between the posts 100, 102 to pull the press rolls 84, 86 toward each other.

Since the first leg 80 is pivotally coupled to cross brace member 78 by a pivot pin 83, this pivotal coupling permits the first leg 80, and hence the first press roll 84, to move in an arc defined by the axis of the pivot pin 83 to permit the first press roll 84 to be moved between a fastener element engaging position (as shown in the figures) and a fastener element releasing position. In the fastener element engaging position, the first press roll 84 is adjacent to the second press roll 88 to engage the fastener elements 26, 24 respectively, and interlock them. In the fastener element releasing position, the first press roll 84 is spatially separated from the second press roll 88 to facilitate threading of the fastener elements 24, 26 between the press rolls 84, 88. Absent this ability to move the press rolls 84, 88 between a fastener element engaging and a fastener element releasing position, the fastener elements 24, 26 would be difficult to thread through the press rolls 84, 88.

A spring 106 preferably exerts a sufficient compressive force to bias the press rolls 84, 88 into the fastener element engaging position while still permitting an operator to spread apart the press rolls 84, 88 into the fastener element releasing position. Preferably, a set of press rolls 84, 88 and a spring 106 are chosen which will exert approximately a one pound force against the fastener elements 24, 26.

In this manner, it is possible to reclose the fastener elements while at the same time accurately guiding the bag web into the sealing mechanism. It has been found that such a system provides an efficient forming, filling and sealing machine for zippered bags.

Having described the invention in detail and by reference to preferred embodiments thereof, it will be apparent that modifications and variations are possible without departing from the scope of the invention defined in the appended claims.

Claims

1. A steering, joining and guiding mechanism for joining together opposing rib and groove fastener elements on a traveling continuous bag film comprising a pair of opposing press rolls, the longitudinal axis of each of said rolls being offset from 2° to 30° from a line perpendicular to the direction of travel of said bag film.

2. The mechanism of Claim 1, wherein said press rolls are offset about 5° from the direction of travel of said bag film.

3. The mechanism of Claims 1 or 2, wherein said press rolls comprise a pair of rubber material press rolls having a durometer hardness of from 20 to 70, shore A.

4. The mechanism of Claims 1, 2 or 3, including first and second brackets for supporting said pair of press rolls, said brackets comprising a first bracket for supporting one of the pair of press rolls and a second bracket for supporting the other of the pair of press rolls, at least one of said brackets being movable to permit at least one of said pair of press rolls to be moved between a fastener element engaging position and a fastener element releasing position, and means for biasing said pair of press rolls into the fastener element engaging position.

5. A form, fill and seal packaging apparatus, comprising means for supplying a continuous plastic bag film having interlocked reclosable fastener elements on respective opposing plies of said film, means for feeding said film through a filling station for filling said film with product, means preceding said filling station for separating said fastener elements and for guiding said film through said filling

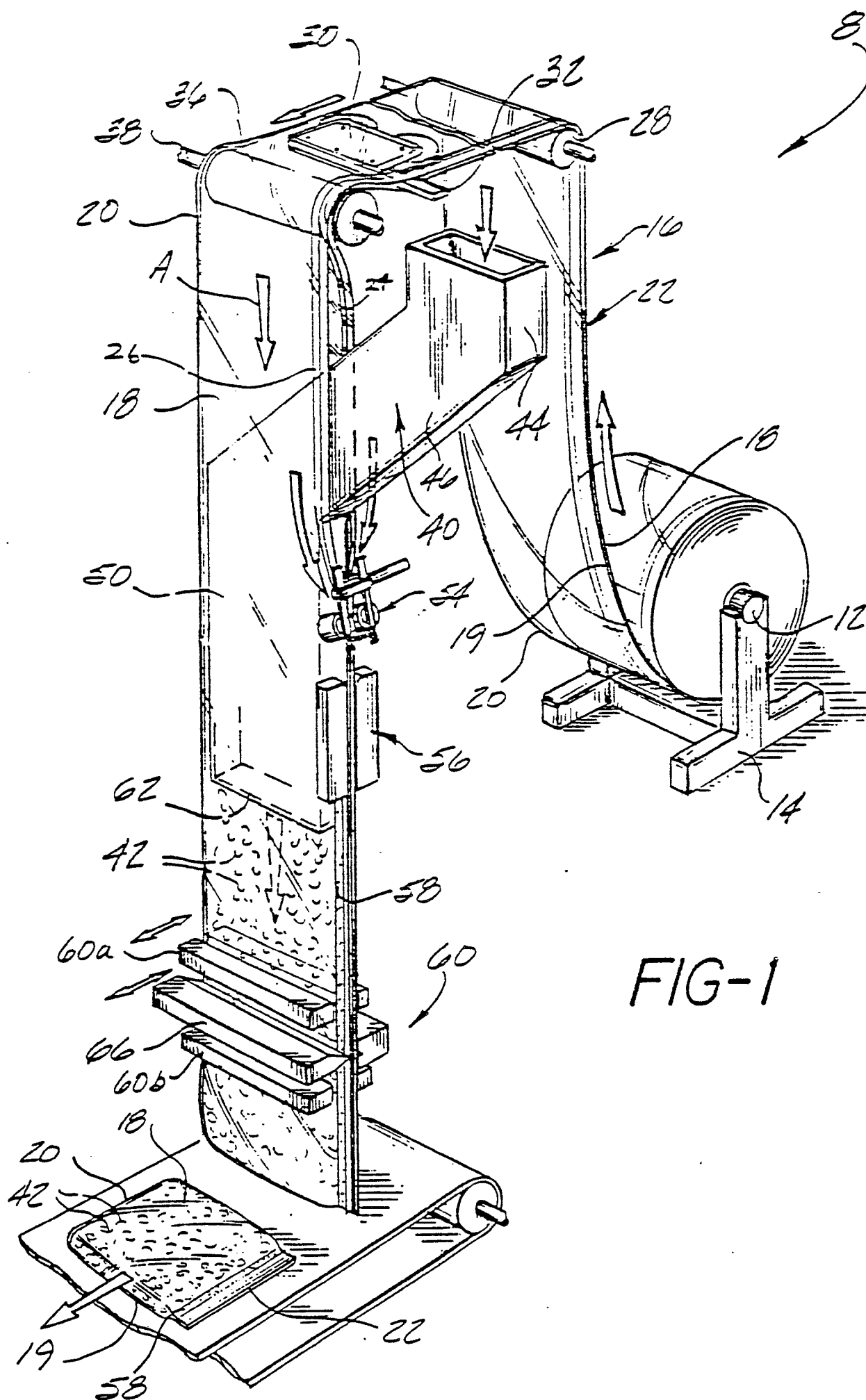
station, means for pressing said fastener elements together in an interlocking relationship, means for laterally sealing said bag film to form a bag assembly having first and second side seams, and means for severing said bag assembly from said bag film, characterized by the feature that said means for pressing said fastener elements together in an interlocking relationship includes a pair of opposing press rolls, the longitudinal axis of each of said rolls being offset by an angle of from 2° to 30° from a line perpendicular to the direction of travel of said bag film.

6. The apparatus of Claim 5, wherein said press rolls are offset at an angle of about 5° from a line perpendicular to the direction of travel of said bag film.

7. The apparatus of Claims 5 or 6, wherein said press rolls comprise a pair of rubber material press rolls having a durometer hardness of from 20 to 70, shore A.

8. The apparatus of Claims 5, 6 or 7, including a first bracket for supporting one of said pair of press rolls and a second bracket for supporting the other of said pair of press rolls, at least one of said brackets being movable to permit at least one of said pair of press rolls to be moved between a fastener element engaging position and a fastener element releasing position, and means for biasing said pair of press rolls into the fastener element engaging position.

9. The apparatus of Claim 5, wherein said filling station includes a portion disposed interiorly of said opposing plies of said bag film at generally the same point in the direction of travel of the bag film as said opposing press rolls.



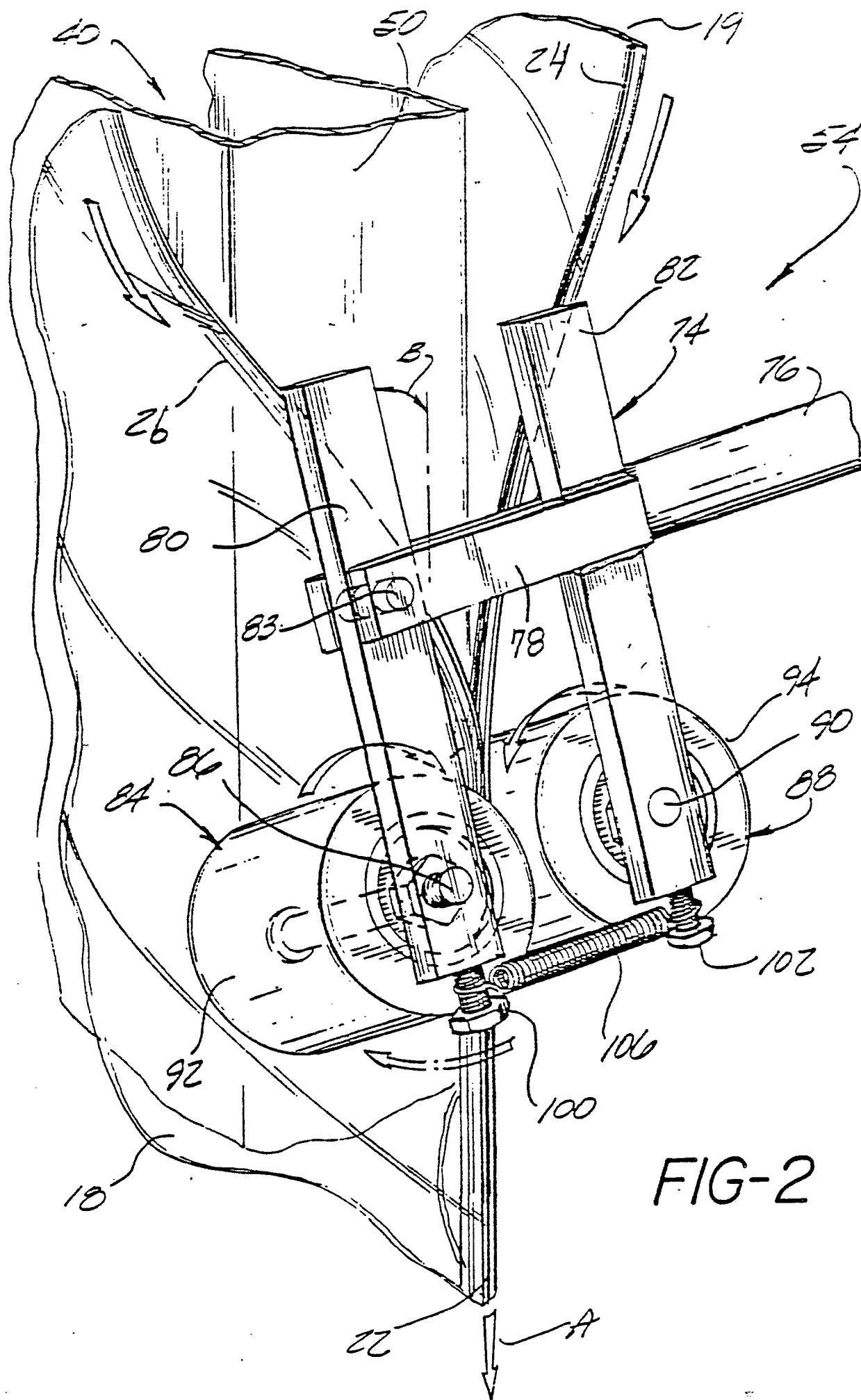


FIG-3

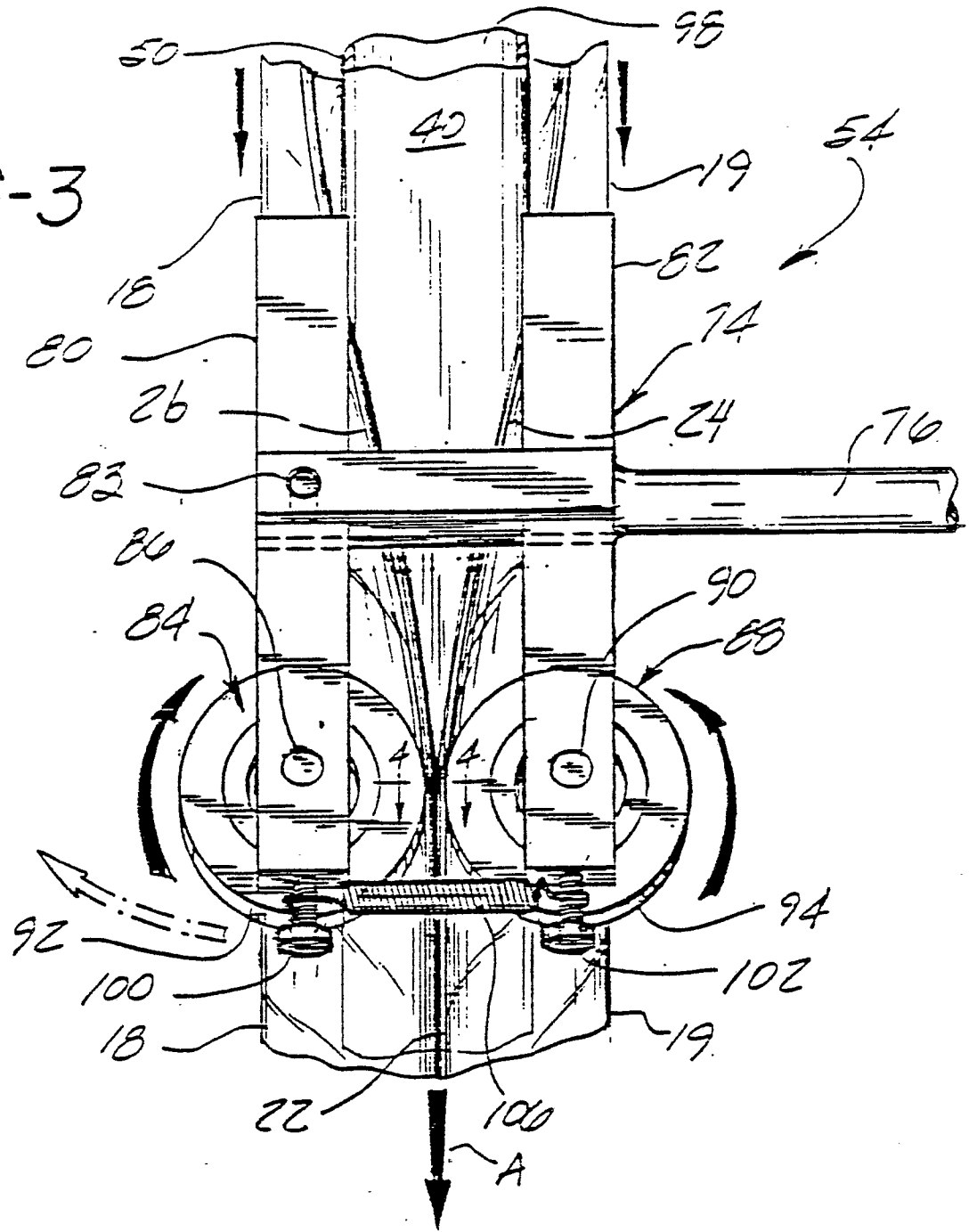
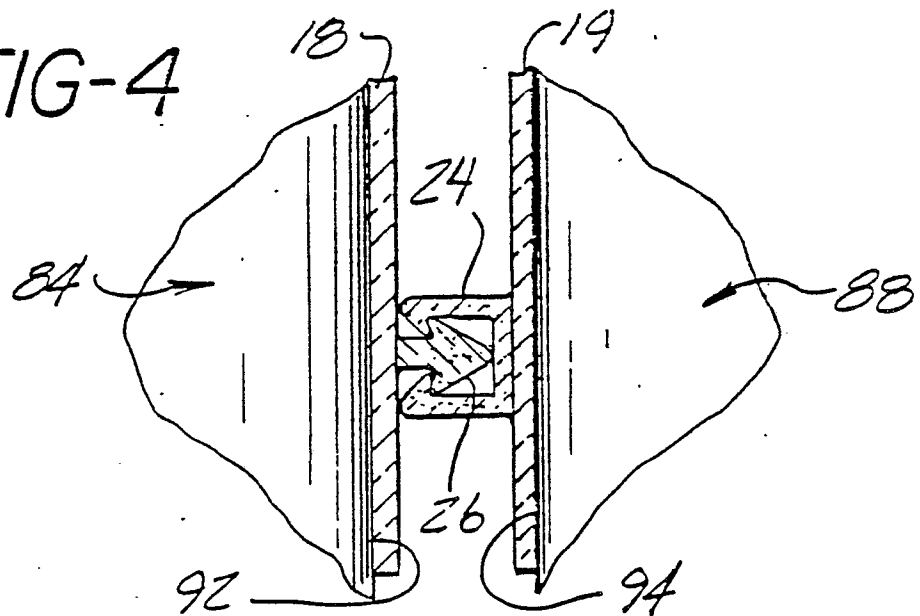


FIG-4





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 87 40 2379

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. 4)
X	US-A-4 698 954 (DOW CHEMICAL) * Column 3, line 48 - column 4, line 59; figure 1 * ---	1,5,9	B 65 B 9/13
A	US-A-3 328 938 (MACK) * Column 2, line 65 - column 3, line 50; figures 1-3 * ---	1	
E	US-A-4 727 709 (ZIEKE) * Whole document * -----	1-9	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 65 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22-06-1988	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	