METHOD AND APPARATUS FOR PACKAGING WITH A MOBILE MANDREL

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ABSTRACT OF THE DISCLOSURE

A method and an apparatus for packaging including a mandrel movable within a tubular length of material (a) for assisting in forming an additional length of tubular material from a former and (b) for assisting in flattening the end of the tubular length of material remote from the former.

BACKGROUND—FIELD OF THE INVENTION

This invention relates to packaging and in particular it relates to a method and apparatus employing a movable mandrel in the production of a package on form fill and seal type packaging machinery.

BACKGROUND—DESCRIPTION OF THE PRIOR ART

In known procedures using a former for forming a length of tubular material from a continuous web of material, advancement of the material over the former has been achieved (a) by holding the former stationary and either moving the sealing means as in the Zworer Pat. No. 1,986,422 or having separate external gripping means as in the Murray Pat. No. 3,221,469 or (b) by moving the former while preventing the sealing means from moving in the direction of movement of the length of tubular material as shown in the Leasure Pat. No. 2,969,627. While these previously known procedures have not proved unsatisfactory, the fact remains that any one of them is limited in its application to certain packaging situations. Thus, there exists a continuing need for providing new and varied procedures for use in forming a tubular length of material from a continuous web of material.

It is also known to close the ends of the tubular package by forming transverse seals across the top and bottom of the package thereby forming a “pillow” type package. At least one disadvantage of this type of package is its inability to stand upright.

SUMMARY OF THE INVENTION

The purpose of the present invention is to provide a new procedure concerning a packaging method and apparatus including a mandrel movable within a tubular length of packaging material for assisting in forming additional lengths of tubular material by causing the material to advance over the former and for assisting in forming a flat bottom on the package.

According to the present invention there is provided a mandrel having a rectangular cross-sectional area of the proper geometry to form a flat bottom bag with or without gussets from the tubular length of material. Preferably, the mandrel extends from a point above the former, through the former to a point substantially below the former. Suitable means are provided for reciprocating the mandrel relative to the former. This hollow mandrel is especially useful for filling the package with solid particles, granular, fine powder or liquid product.

One feature of the invention is the use of the movable mandrel for advancing the tubular length of material, for this purpose the mandrel is moved downwardly relative to the stationary former and stationary sealing jaws to engage a closed lower end of the tubular length of material and urge the same downwardly away from the former. After the product has been received in the lower end of the tubular length of material, the mandrel is withdrawn to a point above the sealing jaws and an upper seal is formed to close the package. The mandrel is then moved downwardly again forcing an additional length of sheet material over the former to form the additional length of tubular material. This arrangement, which uses the mandrel to assist in forming an additional length of material, could also be carried out moving either the sealing jaws and/or the former. The essential feature is to provide the relative movement between these members for forcing the additional material over the former.

Another feature of the present invention includes the use of the movable mandrel to assist in forming a flat bottom on the package. For this purpose the mandrel is moved downwardly relative to the former and stationary sealing jaws. The bottom of the mandrel engages the bottom of the tubular length of material and urges the same outwardly thereby forming a flat bottom with this flat bottom taking the shape of the cross-section of the mandrel. However, to complete the formation of the flat bottom it is necessary to fold upwardly the lower transverse seal. For this purpose the present invention includes a suitable means for placing a flat surface in the path of the downwardly moving mandrel so that the closed bottom end of the tubular material is pressed between the lower end of the mandrel and the flat surface whereby the said lower transverse seal is folded upwardly and shaped to complete the flat bottom.

The filling of the flat bottom package may occur at any time after the package bottom has been formed.

Thus, it is an object of this invention to provide a new and improved method and apparatus for packaging.

It is still another object of this invention to provide a new method and apparatus for forming a flat bottom on a package formed on a form, fill and seal type packaging machine.

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Other objects and the attendant advantages of the present invention will become apparent from the detailed description to follow together with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

There follows a detailed description of the preferred embodiments of the present invention together with the accompanying drawings. However, it is to be understood that the invention is capable of numerous modifications and variations apparent to those skilled in the art without departing from the spirit and scope of the invention.

In the drawings:

FIGS. 1 through 6, inclusive, are diagrammatic drawings showing the sequence of operation of the present invention in connection with the formation of a package and the packaging of a product.

FIG. 1A is a sectional view taken along line 1A—1A of FIG. 1.
DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the accompanying drawings like numerals are employed to designate like parts in different views. Referring to Fig. 1, a flat, continuous web of packaging material 10 passes over a guide roll 11 and thence over a former 12 where a sealing member 13 connects the opposite edges of the web to form a longitudinal seal and forms the web into a continuous tubular length of packaging material 14. The former 12 may be of the type shown in Fig. 13 and 14 of the Leasure Pat. No. 2,969,627.

A pair of sealing jaws 15a and 15b are provided for forming a transverse seal across the tubular length 14. These sealing jaws further include a cooperating knife and slot means 16a and 16b of a construction well known in the art, for severing a completed package after the seal has been formed.

The apparatus further includes a hollow mandrel 20 having an upper end with a funnel 21 formed thereon for receiving a product and a lower end 19. The upper end of portion 19 of the mandrel adjacent the funnel 21 and extending through the former 12 is of greater diameter so that it prevents the former with clearance and does not interfere with the reciprocatory movement of the former. The end portion 19 of the mandrel is generally rectangular and of a shape to give the package the desired configuration. The sides of the end portion 19 include a pair of V-shaped indentations to form gussets in the tubular shaped packaging film.

The mandrel cross-section may be of shapes dependent upon the desired configuration of the finished package. The peripheral distance around the mandrel is the same as the width of the packaging film less the width of film used in making the longitudinal seal. For example, if one desired a round rod 23 with an 80° flat bottom, then one would employ a round mandrel. However, in a preferred embodiment of the invention the mandrel will have a generally rectangular cross-section with two opposing sides having slightly indented V-shaped grooves for cooperating with gusseting bars 33 in a manner to be described in greater detail below, for forming a gusseted package.

For providing vertical reciprocation of the mandrel there is provided a collar 22 fixed to the mandrel and connected to a connecting rod 23 by a pin and slot connection 24, the rod 23 being connected to stationary pivot 25. Connecting link 26 is pivotally connected at one of its ends to the rod 23 and at its other end to a lever 27 which is in turn pivotally connected to stationary pivot 31. This lever 27 includes a cam follower 28 affixed thereto, which follower is received in an eccentric groove 29 in a cam plate 30 thereby causing oscillating movement of the rod 23. Thus rotating movement of the cam plate 30 causes reciprocating movement of the mandrel 20.

At the lower end of the apparatus there is provided a platens 40 including a connecting rod 41 rigidly connected thereto, the combination of platens 40 and connecting rod 41 being mounted for pivotal movement about stationary pivot 42. Connecting rod 41 is in turn pivotally connected at 43 to a piston rod 44 which is in turn connected to a double acting piston in the cylinder 45. Thus, by moving the piston to the right or left the platens 40 can be raised or lowered respectively.

The operation of the invention is as follows. In Fig. 1 the completed package A has just been severed by blade and slot means 16a and 16b and the mandrel 20 is shown in increased view. Next, the mandrel 20 is lowered, the lower end 19 thereof engaging the end of the tubular material 14 remote from the former 12. Continued downward movement of the mandrel 20 carries the tubular material 14 with it thereby causing additional sheet material 10 to pass over the former 12 and formed into the tubular length of material 14 to form packages B and C. As the mandrel 20 continues its downward movement, the lower end 19 thereof will flatten the bottom of the tubular length 14 as shown in Fig. 2. Product may be introduced into the package as soon as this flattening of the bottom-end of the tubular material 14 has been achieved.

In Fig. 3, the length of material to form package B is passed beneath the level of the sealing jaws 15a and 15b with the length of material for package C immediately above the jaws and the newly formed length of tubular material for package D above the material for package C.

Although the lower end 19 of the mandrel 20 has effectively flattened the lower end of the length of material 14 in order to shape the bottom the lower transverse seal 32 at the very bottom of the tubular length 14 should be flattened against the package bottom. For this purpose, the piston in cylinder 45 is moved to the right thereby raising the platens 40 to meet the downward moving tubular length 14. If desired, suitable means may be provided for applying an adhesive to the lower transverse seal 32 before it reaches the platens 40 so that engagement with the platens 40 will cause the transverse seal 32 to fold upward and be held firmly against the flat bottom of the tubular length 14 thereby forming the flat bottom of package B. For certain types of packaging material it may be desirable to provide a heated plate to utilize the heat sealable coating on the packaging material.

As the product then reaches the bottom of the package the mandrel is moved upwardly as shown in Figs. 4 and 5. Finally, the seals 15a and 15b are moved inwardly to form the seal at the top of package B at the bottom of package C. The piston in cylinder 45 is then moved to the left thereby lowering the platens 40, cutting means 16a and 16b are operated to sever package B, and the sealing jaws 15a and 15b are separated, thereby attaining the position shown in Fig. 1 after which the cycle is repeated.

In the above description of the invention it has been assumed that both the former and the sealing jaws are prevented from moving vertically. However, it is also within the scope of the invention to move the former vertically according to the procedure shown in the Leasure Pat. No. 2,969,627, or by moving both the former and the sealing jaws as shown in the Leasure Pat. No. 3,027,696, or by moving the sealing jaws as shown in the Zworer Pat. No. 1,986,422.

The method and apparatus of the present invention may be employed in the production of either a pillow type package or a gusseted type package. In the production of a pillow type package the two ends of the lower seal would project laterally after the said lower seal has been folded up to the package. Subsequently (as shown) may be employed for folding these ends up to and attaching them against the sides of the package. Alternatively, means (not shown) may be employed for folding these ends under the package before the package engages the flat plate 40.

To form a gusseted type package gussetting bars 33 would engage the packaging film on the outer surface with the mandrel on the inner surface to urge the sides of the tubular length 14 into grooves 18 in the mandrel. If desired, rollers or other suitable means may be applied to the outer face of the packaging film at the corners of the mandrel to crease the film more precisely and give the package a more tailored appearance. Sealing jaws 15a and 15b then form the transverse seal closing the package and permanently forming the gussets with the longitudinal seal formed therein. One advantage of this arrangement is that the longitudinal seal is on the side of the package, leaving the front and back free for the advertising message. Furthermore, the gusseting bars 33 are shown in greater detail in Fig. 1A.

The arrangement shown in the figures may also be varied by changing the circumferential orientation of the former and/or the sealing jaws. For example, when forming a gusseted package with the longitudinal seal in the gusset, the sealing jaws 15a and 15b must be used in the positions shown to form the gussets. However, the former 12 and the longitudinal sealing means 13 could be turned...
90° to place the longitudinal seal on the front or back of the package rather than in the gusset. Further, when producing a pillow type package with a mandrel which does not include the grooves 18, the sealing jaws may be employed in the positions shown to place the longitudinal seal on the side, or the sealing jaws may be turned 90° about the axis of the tubular length 14, to place the longitudinal seal on the front or back of the package.

Although preferred embodiments of the invention have been illustrated and described in considerable detail, it should be understood that the invention is capable of numerous modifications and variations apparent to those skilled in the art without departing from the spirit and scope of the invention as defined in the claims.

I claim:

1. A method of packaging in which a former shapes a continuous web of material into a substantially tubular length of material, a mandrel tube extends through the former end into the tubular length of material and is movable relative to the former, and wherein flat seals are formed across the entire width of the tubular length of material to form flat, closed package end seals, the improvement comprising the step of forming an additional length of tubular material by lowering the mandrel relative to the former so that the lower end of the mandrel engages the inside of a first sealed closed end of the tubular length of material in the vicinity of the first formed seal so that the force of the downwardly moving mandrel moves the tubular length of material downwardly to pull an additional length of material over the former to form said additional length of material, flattening the complete remote end of the length of material in the vicinity of the first sealed closed end such that all of said end, including the flat seal at that end, is flat and lies substantially in a common horizontal plane, said flattening being accomplished in part by the said engagement of the said lower end of the mandrel when the mandrel moves during the step of forming the additional length of material, raising the mandrel and forming a second sealed closed end above the first sealed closed end to form the package.

2. The method of claim 1 wherein a sealing means is provided for forming said end seals, and wherein during the step of forming the additional length of material the said sealing means is prevented from moving in the direction of movement of the mandrel.

3. The method of claim 2 wherein the sealing means comprises a pair of sealing jaws reciprocal towards each other to form the said seal and away from each other to an inoperative position, and wherein the step of forming the additional length of material comprises moving the mandrel between the sealing jaws while the latter are in the inoperative position to place a length of tubular material, at least as long as the length of the package to be formed, on the side of the sealing jaws away from the former.

4. The method of claim 1 wherein the sealing means includes a pair of sealing jaws reciprocal towards each other to form the seal and movable away from each other to an inoperative position, said sealing jaws being prevented from movement in the direction of movement of the mandrel, and wherein the step of forming the additional length of material comprises moving the remote end of the tubular length of material between the sealing jaws while the latter are in the inoperative position to place a length of tubular material at least as great as that of a package to be formed on the side of the sealing jaws away from the former.

5. The method of claim 1 wherein the step of flattening the remote end of the tubular length of material further includes pressing the said remote end between the said end of the mandrel and the flat surface of a platen placed across the path of movement of the mandrel.

6. The method of claim 1 wherein the step of flattening the remote end of the tubular length of material further includes attaching the last formed seal to the bottom of the tubular length of material formed by operation of the mandrel against the said remote end while the material is being pressed between the said end of the mandrel and the platen.

7. The method of claim 1 wherein the said end seals are formed by sealing means comprising a pair of opposing sealing jaws reciprocal towards each other to form the seal, and away from each other to an inoperative position, the sealing jaws being restrained against movement in the direction of movement of the mandrel, and wherein the step of moving the mandrel comprises moving the said end of the mandrel to a point on the side of the sealing jaws away from the former, a flat platen being adapted to be located at said point.

8. The method of claim 7 wherein the former is prevented from moving in the direction of movement of the mandrel.

9. A packaging apparatus including a former, means for directing a web of sheet material over the former to form the same into a length of tubular material, sealing means for forming flat seals across the entire width of the tubular length of material to form flat package end seals, advancing means for moving the tubular length of material relative to the former to form an additional length of tubular material, said advancing means comprising a mandrel tube extending through and movable vertically relative to the former and having a lower end located inside the tubular length of material and positioned to engage the inside of the sealed closed end of the tubular length of material in the vicinity of the last formed seal so that the force of the downwardly moving mandrel will move the tubular length of material downwardly to pull an additional length of web material over the former to form said additional length of tubular material, moving means for moving the mandrel downwardly to cause the said engagement of the mandrel and the tubular length of material, and including a platen mounted to be placed in the path of movement of the mandrel, and wherein the lower end of the mandrel is movable against the platen to press the entire end of the tubular length of material therebetween to flatten the complete remote end of the tubular length of material such that all of said end, including said flat seal at that end, is flat and lies in a common horizontal plane between the mandrel and the platen.

10. The invention of claim 9 wherein the moving means engages the portion of the mandrel on the side of the former away from the sealing means.

11. The apparatus of claim 10 wherein said mandrel is a hollow tube, the said lower end of which has a cross-sectional area slightly less than the cross-sectional area of the tubular length of material.

12. The apparatus of claim 9 wherein said former and said sealing means are prevented from moving in the direction of movement of the mandrel.

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THERON E. CONDON, Primary Examiner
E. F. DESMOND, Assistant Examiner

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