METHOD AND APPARATUS FOR FORMING BAGS

Inventor: Corey T. Hook, Jr., Green Bay, Wis.
Assignee: FMC Corporation, San Jose, Calif.
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ABSTRACT

A bag forming method, and a bag forming machine including a fixed plow having guide and folding surfaces for a moving web to symmetrically fold the sides of the web and product all the folds necessary to form, when the web is later sealed and severed, two side by side lanes of finished bags.

10 Claims, 8 Drawing Figures

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Primary Examiner—Wayne A. Morse, Jr.
Attorney—F. W. Anderson and C. E. Tripp
METHOD AND APPARATUS FOR FORMING BAGS

BACKGROUND OF THE INVENTION

The field of invention is in bag forming machines of the type which produce film bags, such as those intended for household use in storing food products. The Hoeppner U.S. Pat. No. 2,700,677 discloses this general type of bag. More particularly, the present invention concerns a bag forming method, and a side weld bag machine including a plow type of web folding apparatus comprising fixed guide and folding panels which, by relative movement with a single traveling web, form all of the folds necessary to produce two side by side lanes of bags when the folded web is longitudinally severed and transversely sealed.

The prior art bag forming machines for the above outlined use are at the present time characterized by somewhat complex devices to fold the web. One known type of bag forming machine which achieves a similar end result with only a single lane output employs four separate elements to produce the necessary folding operations for the single lane of bags, and the characteristics of the elements are such that they cannot be integrated into a compact unit. Further, the folding operation requires that the path of the incoming web has a 90° turn, and while the folding operation is rapid and efficient, the turning not only tends to limit the web speed as compared to a linear-path folding operation, but makes it difficult, if not impossible, to provide another set of folding elements to produce a double lane output from only a single supply roll. Double lane outputs are achieved in some present bag machines by providing a second supply roll and another set of folding elements.

SUMMARY OF THE INVENTION

A feature and object of the present invention is the provision of a bag forming machine including a web forming plow which transversely curls the edge portions of an initially flat moving web to form the web at each side of its median line that the web requires only longitudinal severance into two strips along the median line, and transverse welding and severing across the two strips at spaced intervals to form a dual lane output of side welded bags from a single web input.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagramatic side elevation of the bag forming machine of the present invention.

FIG. 2 is an enlarged fragmentary isometric of a section of the web showing the folds effected in the machine shown in FIG. 1.

FIG. 3 is an enlarged isometric of a completed bag formed by the machine.

FIG. 3A is an enlarged fragmentary view of one edge portion of the bag shown in FIG. 3.

FIG. 4 is a diagramatic isometric illustrating the web feeding, folding, severing and sealing operations performed to produce a dual lane output of finished bags from a single web input.

FIG. 5 is an enlarged isometric of the web former shown in FIG. 1, and illustrates the folding and longitudinal severing of an initially flat web into two portions which are later transversely sealed and severed to produce a two lane output of finished bags.

FIG. 6 is a section, taken along lines 6--6 on FIG. 1, showing the downstream face of the web former.

FIG. 7 is a section taken along lines 7--7 on FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates the overall bag forming machine 10 which includes a conventional unwind stand 12 for supporting a supply roll R of thin film material, and a web former 14 which folds a web W of the film material into a particular symmetrical shape, which when sealed in a bag sealing machine 16 provides a dual lane output of finished bags that are collected within a stop plate enclosure 17 on a stacking table 18 at the discharge end of the bag sealing machine 16. The bag sealing machine 16 is disclosed in the pending U.S. Pat. application of Robert J. Wech, Ser. No. 760,048, which is assigned to the assignee of the present invention, and which is incorporated by reference into the present disclosure.

For the purpose of this disclosure, it may be noted that the details of the bag sealing machine 16 are not critical to the invention, and that the machine is merely representative of a type of side weld bag machine which has special utility with the web former 14. This type of bag machine is conventionally provided, in place of the web former 14, with a V-shaped web folder intermediate the unwind stand 12 and the inlet end of the sealing machine. The folder produces a longitudinal fold that doubles the web on itself. The web is then transversely sealed and severed in the conventional bag sealing machine 16 to produce a single lane output of side weld bags. In order to produce a double lane output, it is customary to provide another V-shaped web folder of mirror image construction to the other web folder, and another unwind stand to feed the added web folder.

According to the present invention, the V-shaped folders are eliminated, and replaced by the web former 14 which folds a single web into a particular symmetrical shape which is longitudinally severed along its centerline, and is then transversely sealed and severed to produce pairs of individual bags. The end result is thus a double lane output of finished bags produced from a single web and a single web former.

With continued reference to FIG. 1, the bag sealing machine 16, as fully disclosed in the aforementioned patent application, includes an infeed frame 20 provided with infeed rolls 21 that grip and feed the web at a constant speed to a spring biased dancer frame 22. The web moves continuously through the web former 14, but is drawn intermittently at a downstream location by driven draw rolls 24. The dancer frame 22 removes the slack caused by the web being continuously driven by the infeed rolls 21 and intermittently driven by the draw rolls 24. Downstream of the draw rolls 24 is a vertically reciprocating sealing mechanism 26 which cooperates with an intermittently rotating seal roll 30 to transversely seal and sever the folded web to produce two lanes of finished bags. Belt conveyors, not shown, grip and convey the bags from the sealing mechanism into the stop plate enclosure 17 on the stacking table 18.

FIG. 4 illustrates the successive folding operations performed upon the web W after it is drawn from the supply roll R. Passing under rolls 34 of the unwind stand 12, the web W extends upward over guide rollers 36 and 38, and is then trained downward over the upstream face of a guide panel 40 which is a part of the web former 14.

Later described in more detail with its associated parts as to structure and function, the guide panel 40 is provided with a downwardly converging upper planar section 42 (see also FIG. 5), and a rectangular lower planar section 44. The web also contacts the upstream face of the lower section 44, and the upper and lower sections 42 and 44 incline forward from a central bend line to draw the sides of the web into generally triangular flange portions 46 and 48. The side portions of the lower panel section 44 are associated with triangular folding panels 50 and 52 which are each spaced forward and parallel to the lower panel section. The sides of the web extend around the side edges of the lower panel section 44 as shown, between the folding panels 50, 52 and the lower panel section 44.

The panels 50 and 52 are so spaced, relative to the width of the web, that the free edges of the web recurve outwardly over the outer faces of the panels 50 and 52. This completes the folding of the web, and the folds are maintained while the folded web passes under a guide roller 54 and around a roller 56 having a central peripheral groove, not shown, which cooperates with a conventional cutting disc or slitter 58 to centrally sever the folded web. Following this longitudinal sitting operation, the two folded web sections extend between the infeed rolls 21 and are trained around rollers 60 of the
3,656,415 3 dancer frame 22. Above the dancer frame, the web sections have a horizontal run 61 from an idler roller 62 to the draw rolls 24.

The horizontal run 61 of the web has the folded form illustrated in FIG. 2, where the initially one piece web has been centrally sever ed by the cutting disc 58 to form two symmetrical lanes L1 and L2 of folded bag stock. Thus folded, each lane of bag stock comprises a bottom panel 64, a recurved fold 66, an upper panel 68, and a cuff 70. The sealing mechanism 26 (FIG. 4) transversely seals and severs the lanes L1 and L2 of bag stock along the lines 72 (FIG. 2) to complete the bags 8.

By referring to FIGS. 3 and 3A it will be seen that the bottom panel 64 forms the rear panel and top of the finished bag B, the fold 66 forms the bottom of the bag, the upper panel 68 forms the front panel of the bag, and the cuff 70 forms a downwardly opening sealing chamber which in use is usually turned inside out over the open end of the bag and over part of the top of the bag.

Further structural and functional details of the web former 14 are pointed out with reference to FIGS. 5-7. The frame of the web former includes upright side posts 74 and 76 which are secured to the infeed frame 20 (FIG. 1) and are interconnected by cross bars 78, 80 and 82. Five threaded studs 84 rigidly support the guide panel 40 from the cross bars, with each of its sections 42 and 44 planar. Edge flanges 43 keep the panel section rigid. The fold forming panels 50 and 52 are rigidified by edge-mounted angle bars 53, and are each rigidly supported by two threaded studs 86 from the cross bars 80 and 82, with their inner, concealed faces spaced from the confronting face of the panel section 44 about one-sixteenth of an inch for web clearance.

In order to promote a gentle folding action on the cuff portion 70 of the web, the lateral surfaces 90 (FIG. 6) of the flanges 43 of the guide panel section 42 are in alignment with the inner edges 92 of the folding panels 50 and 52, and each cuff portion 70 of the web is held against the outer face of the folding panel 50 or 52 by a spring biased roller 94.

Mounting means for each roller may include a bracket 96, on the inner face of the cross bar 82, which slidably mounts a post 98 having an axle bracket 100. The bracket 100 is provided with an aperture having a fixed guide post 102 extending therethrough to maintain the orientation of the roller. A compression spring 104 between the axle bracket 100 and the bracket 96 maintains a predetermined pressure of the roller on the web material.

It will be noted that the axes of the rollers decline toward the center of the web former 14, and that the point of contact of the rollers is at 106 of the web. The angular relation of the rollers 94 with the moving web W tends to draw the terminal edges 106 apart, and thus keep the remainder of the web closely contoured to the guide panel section 44 and folding panels 50 and 52, as shown in FIG. 7. The rollers 94 also prevent lateral drift of the web to keep it centered relative to the web former 14 and the cutting disc 58. When the bag sealing machine 10 is placed in operation, the web W is manually pulled from the supply roll 8 and threaded through the web former 14, the infeed rolls 21, the dancer frame rollers 60, and its free end is placed between the draw rolls 24. When the bag sealing machine is energized, the web folding and bag forming operation is continuous and automatic, and in contrast to machines of the same general type, two lanes of finished bags are produced from only a single web and web former instead of the conventional two web input with individual web formers. If the bag sealing machine 10 is fed with a single web and a conventional folding apparatus, the increased production attained by using the web former 14 is in the order of 3,000 bags per hour, for one commonly used size of bag. Further, the web former 14 is substantially less complicated and costly than the conventional web former, and even higher production speeds might be realized with faster sealing and severing apparatus.

From the preceding description, it will be evident that an important aspect of the present invention is the method of folding and longitudinally severing a single input web to form a double lane input of bag stock to the sealing and severing mechanism. Therefore, if a conventional single lane output type of bag machine is provided with the web former 14, the output of the machine can be approximately doubled while it operates at its usual speed. Thus, the web former 14 is basic to the apparatus and is believed to be an important contribution to the present state of the art.

Although the best mode contemplated for carrying out the present invention has been herein shown and described, it will be apparent that modification and variation may be made in the absence of from what is regarded to be the subject matter of the invention.

I claim:

1. A bag forming machine comprising means for advancing an initially unfolded web along a predetermined path, means for folding opposed edge areas of the moving web inwardly toward the longitudinal centerline on one side of the web to define bag upper panel portions and substantially concurrently for reversely folding the confronting edge portions of the web outwardly and away from the centerline to overlie in part said bag upper panel portion and to form a longitudinal narrow cuff at each side of the centerline on the one same side of the thus folded web, means for longitudinally severing the unfolded web into said longitudinal narrow cuffs and said longitudinal separate the web, and means for transversely simultaneously severing and sealing the two web portions at longitudinally spaced intervals to form a double lane output of finished bags having a double thickness cuff thereon for use as a closure.

2. A bag forming method comprising the steps of advancing a web along a predetermined path, simultaneously progressively folding opposed edge areas of the moving web inwardly toward the longitudinal centerline to form bag upper panel portions, simultaneously progressively reversely folding the now confronting edge portions of the moving web outwardly and away from the centerline to overlie in part said bag upper panel portion and form a longitudinal narrow cuff at each side of said centerline, said second mentioned folding occurring substantially concurrently with said first mentioned folding, longitudinally severing the web between said cuffs during advance of the web, and transversely sealing and severing the two longitudinally separated folded web portions at spaced intervals to form two lanes of finished bags having a double thickness cuff thereon for use as a closure.

3. A bag forming machine comprising means for continually advancing an initially unfolded web along a predetermined path, means for progressively folding the opposed edges of the moving web inwardly toward the longitudinal centerline of the web to form bag upper panel portions and substantially concurrently folding the confronting edge portions of the web outwardly and away from the centerline to overlie in part said upper panel portions and form a cuff at each side of the centerline, means for longitudinally severing the web between said cuffs, and means for transversely sealing and severing the two web portions at longitudinally spaced intervals to form a double lane output of finished bags having a double thickness cuff thereon for use as a closure.

4. A bag forming method comprising the steps of advancing an initially unfolded web along a predetermined path, folding the opposed side portions of the moving web inwardly toward the longitudinal centerline of the web to partially overlie a substantially flat mid-portion of the web thereby to form upper bag panel portions while leaving the inside terminal edge portions of said folded side portions upstanding, picking up and folding the upstanding terminal edge portions of the web outwardly away from the centerline substantially concurrently with said first mentioned folding to form longitudinal narrow cuffs that overlie the associated inwardly folded side portions of the web but which are narrower than said side portions and which leave an exposed, central unfolded web por-
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tion, longitudinally severing the exposed unfolded web portion lying between said cuffs to longitudinally separate the web, and simultaneously transversely sealing and severing the two web portions at longitudinally spaced intervals to form bags wherein the cuffs are also sealed at their ends for use as a closure.

5. The machine of claim 1 wherein the web folding means includes a guide panel which narrows in the direction of web movement, said guide panel being formed of two planar sections in coextensive contact with the web and inclining away from the web as an intermediate bend line so as to slacken the edge portions of the web, and a folding panel overlying each side of the downstream guide panel section with the otherwise slack edge portions of the web between the folding panels and the guide panel, said folding panels having converging confronting edges with the edge portions of the web recurved outwardly over said edges to draw the web recurves into outwardly open cuffs.

6. Apparatus according to claim 5 and a spring biased roller pressing each lateral edge of the web cuff against the associated folding panel, the axes of said rollers converging in a downstream direction toward the longitudinal centerline of said web folding means so as to draw the terminal edges of the web apart and maintain the folded web taut about the downstream guide panel.

7. The machine of claim 3 wherein the web folding means includes a guide panel having lateral edges converging in the direction of web movement to slacken the edge portions of the web, and a folding panel overlying each side of the guide panel with the slack edge portions of the web between the folding panels and the guide panel, said folding panels having converging confronting edges, the edge portions of the web being recurved outwardly over said edges to draw the web recurves into outwardly open cuffs.

8. In a bag forming machine including means for advancing a web along a predetermined path, means for folding the web, and means for transversely sealing and severing the web to form a series of individual side weld bags, the improvement wherein said folding means comprises a guide panel having a portion which tapers in the direction of web movement to slacken both edge portions of the web, and a folding panel overlying each side of the guide panel and the slack edge portions of the web, the edge portions of the web being folded inwardly by said folding panels and recurved outwardly over the confronting edges of said folding panels so that the cross section of the folded web intermediate said folding means and said sealing and severing means includes an edge to edge back panel, inwardly directed front panels folded back over the back panel at each of said edges, and outwardly directed cuffs folded back over each of the front panels and spaced from each other adjacent the centerline of the web.

9. A bag forming machine comprising means for advancing an initially unfolded web along a predetermined path; means for folding the moving web including fixed means for making the edge portions of the web slack, fixed means for folding the slack edge portions of the web inward toward the median line of the web, fixed means for folding a longitudinal narrow portion of each edge outward so that the cross section of one side of the web from said median line is in the general shape of a Z and the other side of the web is of mirror image Z configuration; means for longitudinally severing the web along said median line to form two web strips, and means for transversely sealing the two web strips at longitudinally spaced intervals to form a double lane output of bags.

10. A bag forming machine comprising means for advancing an initially unfolded web along a predetermined path; fixed means for folding the moving web including first and second fixed flat panel sections extending angularly from a transverse bend line at the juncture of said sections, said first section having lateral edges converging toward said bend line to slacken the edge portions of a web trained over the bend line portion of said first section, said second section having substantially parallel lateral edges merging with the edges of said first section, a generally triangular planar folding panel fixed along each lateral edge of said second section and on the side opposite the web, the confronting edges of said folding panels converging in the direction of web movement and the planar surfaces being substantially parallel to said second section, the slack edges of the web being curved inwardly between said folding panels and said second section and recurved outwardly over the wide terminal end portions of said folding panels; means for longitudinally severing the web along said median line to form two web strips, and means for transversely sealing the two web strips at longitudinally spaced intervals to form a double lane output of bags.

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