

BAG FORMING APPARATUS AND METHOD

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a bag forming apparatus and method wherein a web from a web roll is allowed to hang down while being formed around a bag forming cylinder into a tubular shape by intermittent operation of a delivery mechanism which is located at an opposed position to an outer surface of the bag forming cylinder. The web is then sealed in a transverse direction by a closing motion of a transverse sealing machine to form a bag. The interior of the bag is then filled with material to be packed.

2. Description of Background and Relevant Information

A known bag forming/filling system is disclosed, for example, in Japanese Patent Laid-Open Application No 158630/87. According to this conventional bag forming/filling system, a predelivery mechanism, which includes a predelivery roller and a tension lever, is pivotally positioned on a downstream side of the predelivery roller in a delivery path extending from a web roll up to a bag forming cylinder. A web is passed onto both of a plurality of rotatable tension rollers which are journaled to the tension lever and onto a plurality of guide rollers disposed in an opposed relation to those tension rollers, so that constant tension is applied to the web by the weight of the tension lever and the tension rollers. Furthermore, two delivery belts, which act as delivery portions, are disposed on the outer peripheral portions and on both opposed sides of the bag forming cylinder so as to be in abutment with both transverse side portions of the web. Both delivery belts are adapted to

perform an intermittent operation, whereby the web is delivered intermittently by a predetermined length at a time. Pivotal movement of the tension lever is detected by a detector and the predelivery roller is rotated, whereby the web is pulled out from the web roll and the tension lever is brought back into its initial position, so that the force of pulling out the web from the web roll is diminished and the web is kept under tension.

In such a known bag forming/filling system, however, since the web is delivered intermittently by the delivery portions while being kept under constant tension, the delivery resistance of the web is high, and unless the delivery force of each delivery portion is large, it is impossible to ensure the intermittent delivery of the web, thus resulting in increase of the cost. In the event a force is generated which in a transverse direction relative to the delivery direction of the web being delivered, for example due to a defective setting of the web roll or a dimensional error of the web itself, a positional deviation of the web will occur, and the web will easily move over side guides which project therefrom with the result that the product obtained is defective.

The two delivery belts operate at the same speed to intermittently deliver both transverse side portions of the web by the same length at a time. If a difference in frictional resistance occurs between both delivery belts, which are in abutment with both transverse side portions of the web, due to a minor problem (for example, a surface stain on one delivery belt or the difference in quality between the two belts), one delivery belt will slip with respect to one side portion of the web. Accordingly, the other side portion of the web is forcibly pulled by only the other delivery belt, resulting in the web being skewed in the transverse direction, and the delivery resistance of the other web side

portion being forcibly delivered increases, so that the other delivery belt, which is in abutment therewith easily slips. Repetition of such slippage results in meandering of the web and defective products.

To lower the occurrence of such defects stopping the operation and re-adjustment at every start of the transverse movement of the web are required, but this is not only troublesome but also lowers the operating efficiency.

Further, since it is necessary to provide a drive source for the predelivery mechanism which is separate from the drive source for the delivery belts and the transverse sealing machine, the structure is complicated and the cost becomes high.

SUMMARY OF THE INVENTION

The present invention has been formed to solve such known problems, and it is an object of the invention to intermittently deliver a web with low tension of such web.

According to the present invention there is provided a bag forming apparatus which comprises means for supporting a roll of web so that the web can be unwound therefrom, a bag forming cylinder along which and from which the web is adapted to be fed as it is wrapped into tubular form, a sealing machine for sealing the web transversely when it is in said tubular form and after it has left the forming cylinder, the operational condition of the apparatus providing that the web in extending from the roll to the sealing machine defines a loop, an intermittently operable delivery mechanism by operation of which the web is drawn from the loop and is fed along the cylinder by a predetermined length, and an intermittently operable pre-

delivery mechanism by operation of which a length of web corresponding to said predetermined length is fed from said roll by unwinding the roll.

Preferably, the predelivery mechanism includes a pivotable tension lever which operates in conjunction with the transverse sealing machine, and preferably at the time of a closing motion of the transverse sealing machine. The tension lever is pivotally moved in a web stretching direction and the web roll is rotated in a pull-out direction in steps by a predetermined amount, while at the time of an opening motion of the transverse sealing machine, the tension lever is pivotally moved in the direction opposite to the web stretching direction to loosen the web pulled out from the web roll. ~~And feed said loop.~~ A brake for stopping the rotation of the web roll operates in conjunction with the transverse sealing machine and it is operated only at the end of the closing motion of the transverse sealing machine.

The predelivery mechanism may include a drive portion for rotating the web roll in an unwinding direction and a detector for detecting the loop length of the web in the delivery path. The operation of the drive portion is controlled in response to an output provided from the detector to thereby maintain the loop length of the web at a fixed length. Preferably, a web rewinding preventing portion for preventing the rewinding of the web unwound from the web roll is provided near the web roll.

The present invention is further characterised in that one delivery portion is in abutment with a transversely central part of the web.

In the operation of the present invention, as the predelivery mechanism operates, it feeds the web into the loop by a

length substantially corresponding to the delivery length of the delivery portion at the time of start of the intermittent operation of the delivery mechanism.

Since the transversely central part of the web is delivered by one delivery mechanism, both transverse side portions of the web are delivered equally in an essentially non-contact manner.

According to another preferred feature of the invention, a brake stops rotation of the web roll. The brake is operably connected to the sealing machine, whereby the brake stops rotation of the web roll when the closing motion of the sealing machine is completed.

According to another preferred feature of the invention, a web rewinding preventing element prevents rewinding of the web unwound from the web roll. The web rewinding preventing element may include a plate having one portion adapted to abut an outer peripheral surface of the web roll. The plate includes means, such as a weight, for urging the one portion into abutment with the outer surface of the web roll.

According to a further preferred feature of the invention, a guide bar is located in a delivery path between the predelivery mechanism and the bag forming cylinder, and a weight adapted to rest on the guide bar. The weight and guide bar impart a predetermined tension to a portion of the web on the downstream side of the guide bar.

A web bending element may also be located in a delivery path between the predelivery mechanism and the bag forming cylinder for strengthening the web. The web element includes guide means for contacting both transverse side edges of the web.

According to another embodiment of the invention, the predelivery mechanism includes a drive means for rotating the web roll in an unwinding direction to feed the loop, and a detector for detecting the length of the loop of the web. The drive means is controlled in response to an output signal from the detector ^{with the objective of maintaining} ~~to thereby maintain~~ the loop length of the web at a fixed length.

The delivery mechanism may include an endless belt located adjacent the bag forming cylinder.

The present invention also provides a method of forming a bag which comprises supporting a roll of web and unwinding the web therefrom to provide a loop therein, ^{intermittently} drawing the web from the loop by a first mechanism so as to feed the web along and from a bag forming cylinder to wrap it into tubular form, sealing the web transversely, when in said tubular form, after it has left the cylinder, including feeding the web along the cylinder and in predetermined lengths, and ^{intermittently} predelivering the web by a second mechanism by unwinding ^{from} ~~the~~ the roll to feed ^{said predetermined lengths of} the web into the loop. ~~While the feeding of the web along the cylinder is stopped,~~

The preferred method for forming a bag also includes the steps of sealing the web by a closing motion of the sealing machine, and moving a tension lever of the second mechanism in a web unwinding direction to place a portion of the web under tension and to rotate the web roll in an unwinding direction at substantially the same time as the closing motion of the sealing machine. The tension lever is moved in a direction opposite to the unwinding direction to increase the loop of the web at substantially the same time as an opening motion of the sealing machine.

The method preferably also includes the steps of stopping rotation of the web roll upon completion of the closing motion of the sealing machine, and providing a web rewinding preventing element to prevent rewinding of the web unwound from the web roll.

The second embodiment of the invention includes the steps of rotating the web roll in an unwinding direction by a drive means of the second mechanism, and detecting the loop length of the loop of the web and outputting a signal, and controlling the drive means to response to the output signal ~~to thereby maintain~~ ^{with the objective of maintaining} the loop length of the web at a fixed length.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is further explained in the description which follows with reference to the drawings illustrating, by way of non-limiting examples, embodiments of the invention wherein:-

Fig. 1 is a front view in longitudinal section of a bag forming apparatus according to an embodiment of the present invention, showing completed closing motion by the transverse sealing machines;

Fig. 2 is a partially enlarged plan view in transverse section taken along the line (2) - (2) in Fig. 1;

Fig. 3 is a partially enlarged plan view of a web bending portion;

Fig. 4 is a front view in longitudinal section showing the opening motion of the transverse sealing machines;

Fig. 5 is a front view in longitudinal section showing an intermittent operation of a delivery portion; and

Fig. 6 is a front view in longitudinal section of a bag forming apparatus according to another embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

According to a first embodiment, as shown in Fig. 1, a tension lever 1 acts as a predelivery mechanism B, which is interlocked with or acts in conjunction with a pair of transverse sealing machines F, F. Tension lever 1 is disposed vertically below a web roll A and is pivotally mounted. Web W is drawn out from web roll A and passes through a guide roller C1 onto a tension roller 1a, which is positioned at a front end of the tension lever 1 below guide roller C1. The web W then passes through a guide bar C2 which is disposed above tension roller 1a, and passes horizontally toward the upper portion of a bag forming cylinder D, to thereby form a delivery path C.

Tension roller 1a is connected to tension lever 1 so as to be horizontally rotatable about a shaft, the tension roller 1a being longer than the width of web W. Tension lever 1 horizontally supports, at an intermediate part thereof, a transverse support shaft and thereby supports tension roller 1a for vertical movement. A base end side 1c of the tension lever is interlocked with the paired transverse sealing machines F, F.

The transverse sealing machines F, F are of a known structure and are disposed for horizontal opening and closing motions below the bag forming cylinder D. That is, the transverse sealing machines reciprocate once for opening and closing

after an intermittent operation of a delivery portion E, which is disposed in an opposed relation to an outer surface of the bag forming cylinder D. In the present embodiment, the transverse sealing machines F, F perform the opening and closing motions by a reciprocating motion of an air cylinder F1, which is connected to a crank F2.

A toggle lever 2 is integral or integrally projects from crank F2, and is pivotally moved vertically by the operation of the crank F2, and by a roller 2a which is rotatably disposed at a front end of toggle lever 2 and is brought into abutment with an upper surface of the base end side 1c of tension lever 1, and is thereby interlocked therewith, thus causing the base end side 1c of the ~~tension~~ lever to pivotally move vertically with the vertical pivotal movement of toggle lever 2.

A resilient member 3 (e.g. a spring) is disposed from the front end side (indicated at 1d) of tension lever 1 and extends downwardly to just under the front end side 1d to urge the base end side 1c of the tension lever upwards at all times into abutment with roller 2a, which is disposed at the front end of toggle lever 2.

Furthermore, a brake 4 for controlling the rotation of the web roll A is provided near the web roll A and is interlocked with the transverse sealing machines F, F.

In the present embodiment, a brake disk A2 is integrally mounted on a core shaft A1 of the web roll A. A brake lever 4a is disposed so as to be movable into contact with and away from brake disk A2. A brake 4, made of a material such as rubber, is fixed to brake lever 4a in opposed relation to the brake disk A2. An elongated hole 4b is formed in a base end of brake lever 4a and a pin 1e projects from the support

shaft 1b of the tension lever 1 and engages hole 4b. As tension lever 1 pivotally moves vertically, brake lever 4a is moved so that only when tension roller 1a has reached its lower limit position, brake 4 is brought into pressure contact with brake disk A2 to stop the rotation of web roll A.

On the downstream side of the tension roller 1a in the deliver path C, a web bending portion 5 is provided to bend the web W which is being delivered. Side guides 6, 6 for abutment with both transverse side edges of web W project from the web bending portion 5 and are spaced from each other by a distance substantially equal to the width of web W.

In the present embodiment, web bending portion 5 comprises two round rods 5a, 5a, which are mounted transversely of the web and in parallel with each other. A square rod 5b is mounted between both round rods 5a and 5a transversely of the web. By passing web W through these rods, the web is bent generally in a U-shape and is thereby strengthened in the width direction. As shown in Fig. 3, guides 6 are annular and abut both transverse side edges W2, W2 of the web W. The guides project from the round rods 5a, 5a and have a diameter larger than the outside diameter of each round rod 5a. The annular guides 6 are movable to correspond with a change in width of web W.

A weight 7 rests on guide bar C2 and is vertically movably, if necessary. Weight 7 is utilized to impart a predetermined tension to the portion of web W, which is located on the downstream side of guide bar C2, and thereby prevents the web from becoming loose, even when the web is light in weight and therefore liable to become loose.

In the delivery portion E, a delivery belt 8 or a delivery

roll is located opposite to the outer surface of bag forming cylinder D, with the web W being positioned therebetween in such a manner that delivery belt 8 comes into abutment with a transversely central part W1 of the web. In the present embodiment, delivery belt 8 is wound in the delivery direction, that is, in the vertical direction, along the transversely central part W1 of the web.

The operation of the bag forming apparatus constructed as described above will now be described.

First, as shown in Fig. 1, when the intermittent operation of delivery portion E is completed, and transverse sealing machines F, F are in a closed condition, toggle lever 2 moves upward, and the front end side 1d of the tension lever 1 pivotally moves downward, that is, in the web stretching direction. Tension roller 1a reaches its lower limit position, whereby constant tension is applied to web W in delivery path C. At the same time, brake 4 comes into pressure contact with brake disk A2 on core shaft A1 of web roll A to stop the rotation of the web roll.

In this condition, when transverse sealing machines F, F start opening under the operation of air cylinder F1, toggle lever 2 moves downward and the base end side 1c of tension lever 1 pivotally moves downward, so that brake 4 moves away from core shaft A1 of web roll A, thus permitting the rotation of web roll A. At the same time, the front end side 1d of tension lever 1 pivotally moves upward, that is, in the direction opposite to the web stretching direction, and tension roller 1a moves upward.

As a result, as shown in Fig. 4, the portion of web W, which is positioned on the upstream side of guide bar C2 in the delivery path C, becomes less tense and more slack or loose

to form a loop, while the portion of web W, which is positioned on the downstream side of guide bar C2 is prevented by the weight 7 from becoming extremely loose.

After completion of the opening motion of transverse sealing machines F, F, delivery portion E starts the intermittent operation and delivers the transversely central part W1 of web W downward by a predetermined length, whereby, as shown in Fig. 5, the slackened loop of web W in delivery path C is delivered toward bag forming cylinder D and thus the slack of the web is gradually decreased.

Also, web W is bent by web bending portion 5 and so becomes stronger in the transverse direction. By abutment of both transverse side edges W2, W2 of the web with side guides 6 and because of small delivery resistance of the web, the web is guided by side guides 6. Even if a force is generated which causes the web W being delivered to move in the transverse direction (for example, due to a defective setting of a web roll A or a dimensional error of the web itself), the web is prevented from deviating and moving over side guides 6.

When the intermittent operation of delivery portion E is over and transverse sealing machines F, F start the closing motion under the operation of air cylinder F1, toggle lever 2 moves upward and the base end side 1c of tension lever 1 pivotally moves upward, so that the front end side 1d of tension lever 1 pivotally moves downward (that is, in the web stretching direction) and tension roller 1a moves downward. At the same time, brake 4 approaches core shaft A1 of web roll A.

As a result, web W, whose looseness or slack has been reduced, becomes more tense and the core shaft A1 of web roll A is rotated in the web pull-out direction, whereby web W is

drawn out from the web roll A by a required length, more specifically, a length substantially corresponding to the length of the web delivered by a single intermittent operation of delivery portion E. At substantially the same time that tension roller 1a reaches its lower limit position and the pull-out of the web W is completed, the closing motion of transverse sealing machines F, F is also completed, and again, as shown in Fig. 1, brake 4 comes into pressure contact with brake disk A2 of web roll A to stop the rotation of the web roll, so that web is not drawn out any further. Subsequently, the above-described operations are repeated.

In the present embodiment, as compared with known bag forming/filling systems, which require a drive source for the predelivery mechanism which is separate from the drive source for the delivery portion E and the transverse sealing machines F, F, the drive source for the predelivery mechanism B is the drive source for the transverse sealing machines F, F. Thus, any special drive source for predelivery mechanism B is not necessary, so that the structure can be made simpler and the cost reduced.

Referring now to Fig. 6, another embodiment of the present invention is illustrated, in which a predelivery mechanism B includes drive portion 11, which is interlocked with core shaft A1 of web roll A, and a detector 12 for detecting the slack length of web W which is unwound from web roll A. The web which is unwound from the web roll A is downwardly slackened in a U-shape, and then passes through guide bar C2, which is disposed in a position higher than web roll A, and horizontally toward the upper portion of bag forming cylinder D, thereby forming a delivery path C.

Drive portion 11 includes a motor, for example, having an output shaft 11a thereof being connected to core shaft A1 of

web roll A through transmission member 11b, such as a belt or a chain, or is connected directly to core shaft A1. Web roll A is rotated in the web unwinding direction in accordance with a drive signal provided from detector 12, and upon the stop of input of the drive signal, the rotation of web roll A is stopped.

Detector 12, which includes a photo sensor, for example, is in electrical communication with drive portion 11 and detects a lower end position W3 of web W, which is in a downwardly slackened condition in a U-shaped loop. When the lower end position W3 of the web loop shifts to a position higher than a preset position by an intermittent operation of a delivery portion E, detector 12 outputs a drive signal to the drive portion 11. When the web lower end position W3 of the web loop shifts to a position lower than the preset position, detector 12 stops the output of the drive signal for the drive portion 11.

The preset position indicates the lower end position W3 of the U-shaped loop of slackened web W when it is unwound from web roll A into delivery path C by a length substantially corresponding to the length of the web delivered by a single intermittent operation of delivery portion E.

A rewinding preventing element 13 is provided adjacent the web roll for preventing contact of a portion of web W unwound from web roll A with the outer peripheral surface of the web roll.

In this embodiment, rewinding preventing element 13 includes a rocking plate which is rockably supported in contacting and non-contacting directions with respect to web roll A in opposed relation to the outer peripheral surface of the web roll. Front end 13a of the rocking plate is inserted between

unwound web W and the outer peripheral surface of web roll A, and weight 13b is fixed to a base end of the rocking plate. Front end 13a of the rocking plate is kept in abutment with the outer peripheral surface of the web roll A by the weight 13b.

Other elements of this embodiment, including web bending portion 5, delivery portion E and transverse sealing machines F, F, which are not referred to above are substantially the same as described in the embodiment of Figs. 1 - 5.

The following describes operation of the bag forming apparatus as illustrated in Fig. 6.

First, the operation of drive portion 11 is controlled by detector 12, and web W is unwound from web roll A by a length substantially corresponding to the length of the web delivered by a single intermittent operation of delivery portion E and assumes a U-shaped slackened condition loop.

In this condition, when the opening motion of transverse sealing machines F, F is completed, delivery portion E starts an intermittent operation, and web W is delivered by a predetermined length. The web loop which is in delivery path C is delivered toward bag forming cylinder D, so that the looseness or slack of the web is gradually decreased and the lower end position W3 of the U-shaped slackened web loop shifts upward.

When lower end position W3 of the U-shaped loop of slackened W shifts to a position higher than the preset position, drive portion 11 operates in accordance with the output of detector 12 and causes core shaft A1 of web roll A to rotate in the unwinding direction, whereby web W is unwound from web roll A and its lower end position W3 shifts to a position lower than

the preset position, whereupon the operation of drive portion 11 stops.

However, if the portion of web W, which is unwound from web roll A, contacts the outer peripheral surface of web roll A, it may be rewound on web roll A in the web unwinding direction of the web roll upon rotation of web roll. But there is no such likelihood because the rewinding preventing element 13 is present to prevent such rewinding as illustrated in Fig. 6.

In the bag forming apparatus illustrated in Fig. 6, therefore, web W is unwound from the web roll A independently of the opening and closing motions of transverse sealing machines F, F, and even if the opening/closing speed of sealing machines F, F is increased to increase the processing speed, noise will not be generated.

Although in the previously described embodiments, tension lever 1 of predelivery mechanism B is disposed vertically and pivotally below web roll A, the position of tension lever 1 is not so limited. Tension lever 1 may be located anywhere in the vicinity of web roll A. The shape of delivery path C and the structures of brake 4 and web bending portion 5 are also not limited to those described above. Other structures may be used if only the respective functions described above are attained.

Furthermore, the rewinding preventing element 13 need not only be a rocking plate. For example, a U-shaped slackened web W may be sucked downward, or air or the like may be blown towards the portion of web W which has been unwound from the web roll A, in a direction away from web roll A, or the portion of web W which is unwound from web roll A may be conducted in a direction away from the web roll and then

loosened in a U-shape. Also, other elements such as a spring, can be used instead of weight 13b, to keep the rocking plate in abutment with web roll A.

The following advantages are present in the present invention as described above.

With the operation of the predelivery mechanism, the web in the delivery path is loosened by a length substantially corresponding to the delivery length of the delivery portion at the time of the start of the intermittent operation of the delivery portion. The slackened web is delivered toward the bag forming cylinder by the subsequent intermittent operation of the delivery portion, so it is possible to intermittently deliver the web in a condition of low web tension.

Therefore, as compared with known bag forming/filling systems, wherein a web portion which is kept under constant tension is intermittently delivered by a delivery portion, the web delivery resistance is low and the delivery force of the delivery portion can be reduced, thus leading to reduction in the cost. Furthermore, even if a force is generated which causes the web being delivered to move its width direction transverse to the web delivery direction, for example, due to a defective setting of the web roll or due to a dimensional error of the web itself, since the delivery resistance is low, the function of the projecting side guides prevent positional deviation of the web so that the web cannot easily move over the side guides. As a result, there will be no defective products and it is not necessary to stop the operation for adjustment of the web, that is, adjusting operations can be omitted, and operating efficiency can be improved.

Since the transversely central part of the web is delivered

by a single delivery portion, both transverse side portions of the web are equally delivered in a noncontact manner, so the web can be delivered without alternate slipping of both transverse side portions of the web.

Therefore, as compared with known bag forming/filling systems wherein two delivery portions operate at the same speed to deliver both transverse side portions of the web by the same length at a time, it is possible to prevent meandering of the web and hence prevent the occurrence of defective products even when the surface of the delivery portion is stained or there is a difference in quality, for example. Thus, it is not necessary to stop the operation of the system to correct meandering of the web, so that not only the adjustment operations can be omitted, but also the operating efficiency is improved.

Although the invention has been described with reference to particular means, materials and embodiments, it is to be understood that the invention is not limited to the particulars disclosed and extends to all equivalents within the scope of the claims.



What is claimed is:

1. A bag forming apparatus which comprises means for supporting a roll of web so that the web can be unwound therefrom, a bag forming cylinder along which and from which the web is adapted to be fed as it is wrapped into tubular form, a sealing machine for sealing the web transversely when it is in said tubular form and after it has left the forming cylinder, the operational condition of the apparatus providing that the web in extending from the roll to the sealing machine defines a loop, an intermittently operable delivery mechanism by operation of which the web is drawn from the loop and is fed along the cylinder by a predetermined length, and an intermittently operable pre-delivery mechanism by operation of which a length of web corresponding to said predetermined length is fed from said roll by unwinding the roll.
2. A bag forming apparatus according to claim 1, wherein said delivery mechanism is located oppositely to said bag forming cylinder.
3. A bag forming apparatus according to claim 1, wherein said pre-delivery mechanism includes a pivotally movable tension lever, said tension lever being pivotally movable in a web unwinding direction to place a portion of the web under tension and to rotate said web roll in an unwinding direction.
4. A bag forming apparatus according to claim 1, wherein said web is sealed by a closing motion of said sealing machine.
5. A bag forming apparatus according to claim 4, wherein



said predelivery mechanism includes a pivotally movable tension lever, said tension lever being pivotally movable in a web unwinding direction to place a portion of the web under tension and to rotate said web roll in an unwinding direction at substantially the same time as the closing motion of said sealing machine.

6. A bag forming apparatus according to claim 5, wherein said tension lever is pivotally movable in a direction opposite to said unwinding direction to loosen said portion of the web substantially during an opening motion of said sealing machine.

7. A bag forming apparatus according to claim 6, wherein said tension lever is operably connected to said sealing machine, and said tension lever is pivotally movable during said opening and closing motions of said sealing machine.

8. A bag forming apparatus according to claim 1, comprising a brake for stopping rotation of said web roll.

9. A bag forming apparatus according to claim 4, comprising a brake for stopping rotation of said web roll, said brake being operably connected to said sealing machine, whereby said brake stops rotation of said web roll when said closing motion of said sealing machine is completed.

10. A bag forming apparatus according to claim 1, comprising a web rewinding preventing element to prevent rewinding of the web unwound from said web roll.

11. A bag forming apparatus according to claim 10, wherein said web rewinding preventing element comprises a plate, said plate including one portion adapted to abut an outer peripheral surface of said web roll.



12. A bag forming apparatus according to claim 11, wherein said plate includes means for urging said one portion into abutment with said outer surface of said web roll.

13. A bag forming apparatus according to claim 12, wherein said means for urging includes a weight.

14. A bag forming apparatus according to claim 1, comprising a guide bar located in a delivery path between said predelivery mechanism and said bag forming cylinder, and a weight adapted to rest on said guide bar, said weight and guide bar imparting a predetermined tension to a portion of said web on the downstream side of said guide bar.

15. A bag forming apparatus according to claim 1, comprising a web bending element located in a delivery path between said predelivery mechanism and said bag forming cylinder, said web bending element strengthening said web.

16. A bag forming apparatus according to claim 15, wherein said web bending element includes guide means for contacting both transverse side edges of said web.

17. A bag forming apparatus according to claim 1, wherein said predelivery mechanism comprises a drive means for rotating said web roll in an unwinding direction, and a detector for detecting the length of said loop, said drive means being controlled in response to an output signal from said detector ^{with the objective of maintaining} ~~to thereby maintain~~ a fixed slackened length of said web in said loop.

18. A method of forming a bag which comprises supporting a roll of web and unwinding the web therefrom to provide a loop therein, ^{intermittently} drawing the web from the loop by a first mechanism



so as to feed the web along and from a bag forming cylinder to wrap it into tubular form, sealing the web transversely, when in said tubular form, after it has left the cylinder, including feeding the web along the cylinder and in predetermined lengths, ^{intermittently} and ^{from} predelivering the web by a second mechanism by unwinding ^{said predetermined lengths of} the roll to feed the web into the loop in the web. ~~while the feeding of the web along the cylinder is stopped.~~

19. A method for forming a bag according to claim 18, comprising the step of sealing said web by a closing motion of said sealing machine.

20. A method for forming a bag according to claim 19, wherein operation of the second mechanism comprises the step of moving a pivotally movable tension lever in web unwinding direction to place a portion of the web under tension and to rotate said web roll in an unwinding direction at substantially the same time as the closing motion of said sealing machine.

21. A method for forming a bag according to claim 20, comprising moving said tension lever in a direction opposite to said unwinding direction at substantially the same time as an opening motion of said sealing machine.

22. A method for forming a bag according to claim 19, comprising stopping rotation of said web roll, upon completion of said closing motion of said sealing machine.

23. A method for forming a bag according to claim 18, comprising providing a web rewinding preventing element to prevent rewinding of the web unwound from said web roll.

24. A method for forming a bag according to claim 18, where



operation of the second mechanism comprises the steps of rotating said web roll in an unwinding direction by a drive means to feed the web to said loop, and detecting the length of said loop of said web and outputting a signal, controlling said drive means in response to said output signal ~~to thereby~~ ^{with the objective of maintaining} maintain the length of said web in said loop at a fixed length.

25. A bag forming machine substantially as hereinbefore described with reference to Figs. 1 to 5 or Fig. 6 of the accompanying drawings.

26. A method of forming a bag substantially as hereinbefore described with reference to Figs. 1 to 5 or Fig. 6 of the accompanying drawings.