Abstract: The presently disclosed subject matter relates generally to an apparatus that controls a film to allow various sized products to enter the film. The disclosed apparatus comprises a first arm, a second arm, and an upper member positioned between the first arm and the second arm. A system comprising the apparatus and components to wrap a product in film, such as, an end sealer, a conveyor, and a side sealer is also disclosed. Additionally disclosed is a method for controlling a film during a sealing process.
CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority from U.S. Non-Provisional Application Serial No. 14/701 584 filed May 1, 2015, which the application is hereby expressly incorporated by reference herein.

FIELD OF THE INVENTION

The presently disclosed subject matter relates generally to an apparatus that controls a film to allow various sized products to enter the film during a sealing process.

BACKGROUND

Wrapping machines are designed to wrap products in flexible sheets of plastic film, typically heat sealable thermoplastic shrink film, fully automated at speeds that can approach 200 linear feet per minute, depending upon the package and the application. Briefly, products to be packaged are continuously fed into a wrapping machine using an infeed such as a conveyor. A single sheet of flat or folded film is delivered to an inverting head from a film unwind. The size and shape of the inverting head depends upon the size and profile of the product to be packaged. As the film is drawn over the inverting head, it is inverted and forms a tube of film inside the inverting head into which the product is conveyed. The product enters this tube of film and the product itself serves to maintain the shape of the tube of film as the product and film then continues through the wrapping machine in unison. The two edges of the single web of film are overlapped on the bottom, side, or top of the product and are sealed together, such as with a static sealing system or a thermal sealing system. Sealing systems have an end sealer and a side sealer. The film is sealed on the side, and then the product passes through an end sealer that seals in between the products to create a package of a wrapped product and concurrently severs individual packages from the tube of film. The wrapped package then typically
proceeds to a shrink tunnel located at the discharge end of the wrapping machine, which shrinks the thermal film tightly around the product. Occasionally, the wrapping machines are used to perform containment bagging functions only without the use of a shrink tunnel. Wrapping machines that utilize two webs of material, one fed from above the product and one fed from below, that automatically wrap around the product and are sealed also are known.

A limitation of these wrapping machines is the ability to feed various size products while using the same film. Products that enter these wrapping machines are generally similar in size and machine set-up limits the operator from feeding randomly sized products. Usually the wrapping machine is setup to run a particular sized product. It would therefore be desirable to have a wrapping machine that accommodates a wide variety of product sizes to be packaged and maintain end and side seals without any defects.

The presently disclosed matter is an apparatus designed to improve a wrapping machine by controlling the film as it feeds through the wrapping machine and will allow the wrapping machine to handle the largest product the wrapping machine is designed to wrap, but also handle much smaller products without machine changeovers or adjustments. The apparatus maintains the shape of the film instead of the product itself as described earlier using the wrapping machines.

SUMMARY

The presently disclosed subject matter is directed to an apparatus for controlling a film during a sealing process. The apparatus controls a film to allow for various sized products to enter a film that is in the shape of a tube. The apparatus controls a single sheet of flat or folded film as it is fed onto the wrapping machine using an inverting head and then onto the apparatus as it is conveyed through the wrapping machine. The tube-shaped film that is controlled by the apparatus allows for different sized products to enter the film without displacing the film. The tube-shaped film can accommodate various shapes and sizes along with product configurations and multi-packs containing many different items. An additional advantage is the end seal does not have wrinkles or multiple layers of film, resulting in an end seal with fewer defects.
In some embodiments, the presently disclosed subject matter is directed to an apparatus for controlling a film during a sealing process. The apparatus may have a first arm, a second arm and an upper member. The second arm may be positioned opposite of the first arm. The upper member may be positioned between the first arm and the second arm. The first arm and the second arm may be arranged to spread the film.

In some embodiments, the presently disclosed subject matter is directed to a system for controlling a film during a sealing process using a film conveyance mechanism for conveying a film through the system in a machine direction. The system may have an apparatus as described above, an end sealer downstream from the first arm and the second arm of the apparatus; a conveyor upstream of the end sealer and positioned between the first arm and the second arm of the apparatus, and a side sealer upstream from the end sealer and positioned adjacent to the first arm of the apparatus.

In some embodiments, the presently disclosed subject matter is directed to a method of controlling a film during a sealing process. The method includes feeding a film onto the system described above, wherein the film comes into contact with the leading edge of the first arm and the leading edge of the second arm of the apparatus described above, transporting the film in a horizontal direction over the apparatus, wherein the film covers the apparatus, and creating an end seal on the film with the end sealer.

**BRIEF DESCRIPTION OF THE DRAWINGS**

**FIG. 1** is a perspective view of an embodiment of an apparatus for controlling a film during a sealing process.

**FIG. 2** is a perspective view of an embodiment of an apparatus for controlling a film during a sealing process with a film wrapped around the apparatus and a product entering the film.

**FIG. 3** is an alternative embodiment of an apparatus for controlling a film during a sealing process.

**FIG. 4** is a top-down view of an embodiment of an apparatus for controlling a film during a sealing process.
FIG. 5 is a perspective view of a system for controlling a film during a sealing process.

FIG. 6A illustrates an end seal on a film that has a seal with multiple layers and a wrinkled seal at the edge of the end seal.

FIG. 6B illustrates an end seal on a film that has no defects.

DETAILED DESCRIPTION

I. General Considerations

The presently disclosed subject matter is directed to an apparatus and a system with the apparatus for controlling a film during a sealing process using a film conveyance mechanism for conveying a film through the system in a machine direction. Additionally disclosed is a method for controlling a film during a sealing process.

II. Definitions

While the following terms are believed to be well understood by one of ordinary skill in the art, the following definitions are set forth to facilitate explanation of the presently disclosed subject matter.

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood to one of ordinary skill in the art to which the presently disclosed subject matter belongs.

Following long standing patent law convention, the terms "a", "an", and "the" refer to "one or more" when used in the subject application, including the claims. Thus, for example, reference to "a composition" includes a plurality of such compositions, and so forth.

Unless indicated otherwise, all numbers expressing quantities of components, reaction conditions, and so forth used in the specification and claims are to be understood as being modified in all instances by the term "about." Accordingly, unless indicated to the contrary, the numerical parameters set forth in the instant specification and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by the presently disclosed subject matter.
As used herein, the term "about", when referring to a value or to an amount of mass, weight, time, volume, concentration, percentage, and the like can encompass variations of, and in some embodiments, ±20%, in some embodiments ±10%, in some embodiments ±5%, in some embodiments ±1%, in some embodiments ±0.5%, and in some embodiments ±0.1%, from the specified amount, as such variations are appropriated in the disclosed package and methods.

Although the majority of the above definitions are substantially as understood by those of skill in the art, one or more of the above definitions can be defined hereinabove in a manner differing from the meaning as ordinarily understood by those of skill in the art, due to the particular description herein of the presently disclosed subject matter.

III. The Apparatus

A perspective view of an embodiment of an apparatus for controlling a film during a sealing process is shown in FIG. 1. In some embodiments, the apparatus may be used in a system for controlling a film during a sealing process using a film conveyance mechanism for conveying a film through the system in a machine direction. The apparatus may include three components as shown in FIG. 1; the first arm 101, the second arm 103, and the upper member 107. The second arm 103 may be positioned opposite of the first arm 101. The upper member 107 may be positioned between the first arm 101 and the second arm 103. The first arm 101 and the second arm 103 may be longer than the upper member 107. The first arm 101 and the second arm 103 may be arranged to spread a film.

The film may be a folded film, multiple layers of film, a tube-shaped film, a film-based cushioning material, and combinations thereof. The film may be any packaging medium well known in the art. In some embodiments, the film may be flexible and able to be sealed. In other embodiments, the film may be a heat sealable thermoplastic shrink film.

The first arm 101 may have a leading edge 125 and a trailing edge 105. The second arm 103 may have a leading edge 135 and a trailing edge 115. In some embodiments, the upper member 107 may be positioned near the leading edges 125, 135 of the first arm 101 and the second arm 103, respectively. In other
embodiments, the upper member 107 may be positioned near the trailing edges 105, 115 of the first arm 101 and the second arm 103, respectively. In further embodiments, the upper member 107 may be positioned in the middle of leading edges 125, 135 of the first arm 101 and the second arm 103, respectively, and the trailing edges 105, 115 of the first arm 101 and the second arm 103, respectively.

In some embodiments, the trailing edge 105 of the first arm 101 may be configured to have a tab 110 coupled on a side of the trailing edge 105 having contact with the film. Additionally, the trailing edge 115 of the second arm 103 may be configured to have a tab 120 coupled on a side of the trailing edge 115 having contact with the film. The tabs 110, 120 may be smaller in size than the arms 101, 103. The tabs 110, 120 may be coupled to the arms 101, 103, by any means known in the art. For example, the tabs 110, 120 may be welded, bolted, fastened or clamped to the arms 101, 103.

The upper member 107 may be positioned between the first arm 101 and the second arm 103. In some embodiments, the upper member 107 may be positioned horizontally between the first arm 101 and the second arm 103. In other embodiments, the upper member 107 may be positioned vertically between the first arm 101 and the second arm 103. In some embodiments, the upper member 107 may have a leading edge 102 and a trailing edge 108. The upper member 107 may be one member. The upper member 107 may be one member with a plurality of portions. In some embodiments, the upper member 107 may have a leading edge 102 with a plurality of portions. The leading edge 102 of the upper member 107 may have a first portion 104 and a second portion 106. The first portion 104 and the second portion 106 may be continuous. In some embodiments, the first portion 104 and the second portion 106 may be non-continuous. In other embodiments, the first portion 104 and the second portion 106 may be spaced apart. The first portion 104 may contact the film before the second portion 106 contacts the film.

The first portion 104 and the second portion 106 may be in any configuration. For example, the first portion 104 may be adjacent to the second portion 106. The first portion 104 may be perpendicular to the machine direction, may be parallel to the machine direction, or may be at an angle less than 90 degrees from the machine direction. The second portion 106 may be perpendicular to the machine direction,
may be parallel to the machine directions, or may be at an angle less than 90 degrees from the machine direction. In some embodiments, the first portion 104 may be perpendicular to the machine direction and the second portion 106 may be at an angle less than 90 degrees from the machine direction. In other embodiments, the first portion 104 may be at an angle less than 90 degrees from the machine direction and the second portion 106 may be perpendicular to the machine direction. In further embodiments, the first portion 104 may be parallel to the machine direction and the second portion 106 may be perpendicular to the machine direction. In yet further embodiments, the first portion 104 may be perpendicular to the machine direction and the second portion 106 may be parallel to the machine direction. In further embodiments, the first portion 104 may be at an angle less than 90 degrees from the machine direction and the second portion 106 may be at an angle less than 90 degrees from the machine direction.

The angle less than 90 degrees from the machine direction may be about 85 degrees, about 80 degrees, about 75 degrees, about 70 degrees, about 65 degrees, about 60 degrees, about 55 degrees, about 50 degrees, about 45 degrees, about 40 degrees, about 35 degrees, about 30 degrees, about 25 degrees, about 20 degrees, about 15 degrees, about 10 degrees, about 5 degrees, or any range between any of these values.

The first portion 104 of the leading edge 102 of the upper member 107 may have a raised lip 114. The raised lip 114 may be angled in an upward direction and away from the conveyor. In some embodiments, the raised lip 114 may have rounded edges to prevent catching the film and/or products as the film and/or products are used with the apparatus. In some embodiments, the raised lip 114 may cover all of the leading edge 102 of the upper member 107. In other embodiments, the raised lip 114 may cover a section of the leading edge 102. The section may be about 90% of the leading edge 102, about 80% of the leading edge 102, about 70% of the leading edge 102, about 60% of the leading edge 102, about 50% of the leading edge 102, about 40% of the leading edge 102, about 30% of the leading edge 102, about 20% of the leading edge 102, about 10% of the leading edge 102, about 5% of the leading edge 102, or any range between any of these values.
edge 102, about 20% of the leading edge 102, about 10% of the leading edge 102 or any range between any of these values.

The upper member 107 may also have at least one friction-reducing opening 112 to reduce the friction between the film and the upper member 107 as the film slides over the upper member 107. In some embodiments, the upper member 107 may have a plurality of friction-reducing openings 112. In some embodiments, the upper member 107 may have about 20 friction-reducing openings, about 15 friction-reducing openings, about 10 friction-reducing openings, about 5 friction-reducing openings, about 2 friction-reducing openings, about 1 friction-reducing openings or any range between any of these values. The friction-reducing openings 112 may be of any shape. For example, the friction-reducing opening 112 may be in the shape of a circle, a diamond, an oval, a square, a rectangle, a pentagon, a hexagon, a heptagon, an octagon or combinations thereof. In some embodiments, the friction-reducing openings 112 may be located on the first portion 104 of the upper member 107. In other embodiments, the friction-reducing openings 112 may be located on the second portion 106 of the upper member 107. In further embodiments, the friction-reducing openings 112 may be located on the first portion 104 of the upper member 107 and the second portion 106 of the upper member 107.

In some embodiments, the upper member 107 may reduce friction with a friction-reducing component. In some embodiments, the upper member 107 may reduce friction with a friction reducing component and at least one friction-reducing opening 112. The friction-reducing component may be an additional component added to the upper member 107. For example, the friction-reducing component may be a flat sheet of plastic to place on the top of the upper member 107. This friction-reducing component would provide a barrier between the film and the apparatus to aid in reducing the friction as the film is fed across the apparatus. In some embodiments, the friction-reducing component may be an ultra-high molecular weight plastic sheet, Teflon tape, moleskin tape, cotton fabric tape, linen tape, or combinations thereof.

FIG. 2 shows the apparatus with a film 201 being fed to cover the apparatus. The film 201 is fed onto the apparatus in a machine direction 203 at the end of the apparatus where the leading edge of the first arm 125 and the leading edge of the
second arm 135 are located. As the film 201 is fed over the apparatus it forms a tube-shaped film 201 into which a product 202 is conveyed. The apparatus allows for the film 201 to maintain the tube shape so that a plurality of products may be conveyed into the tube-shaped film 201 to be wrapped and later sealed. The products may be of any shape that may fit within the tube of film. Generally, the products are similar in size during the wrapping and sealing process, but this apparatus allows for various size products to use the same film 201 during the process without any defects.

FIG. 3 shows an alternative embodiment of an apparatus for controlling a film during a sealing process. With respect to the embodiment shown in FIG. 3, the apparatus may also have a filler plate 316 to increase the size of the apparatus. The filler plate 316 aids the apparatus to allow for a larger film and product to be used during the sealing process. The filler plate 316 may be coupled to the upper member 107 horizontally. The filler plate 316 may be coupled by any means well known in the art, such as, for example by welding, bolting, fastening, or clamping the filler plate 316 to the upper member 107. In some embodiments, the filler plate 316 may be coupled to the upper member 107 at the first portion 104. In other embodiments, the filler plate 316 may be coupled to the upper member 107 at the second portion 106. In further embodiments, the filler plate 316 may be coupled to the upper member 107 at the first portion 104 and at the second portion 106.

The filler plate 316 may be shaped to start at the lower section of the first portion 104 of the upper member 107 and may extend to the first arm 101. The filler plate 316 may be coupled to the first arm 101 by any means well known in the art, such as, for example by welding, bolting, fastening, or clamping the filler plate 316 to the first arm 101.

In some embodiments, the filler plate 316 may be angled where there is an angle less than 90 degrees from the coupled section starting at the first portion 104 of the upper member 107 to the first arm 101. In other embodiments, the filler plate 316 may have an angle about 85 degrees, about 80 degrees, about 75 degrees, about 70 degrees, about 65 degrees, about 60 degrees, about 55 degrees, about 50 degrees, about 45 degrees, about 40 degrees, about 35 degrees, about 30 degrees, about 25 degrees, about 20 degrees, about 15 degrees, about 10 degrees, about 5
degrees or any range between any of these values. The angle may allow the film to relax and prevent or lessen film tension before the film is sealed.

In some embodiments, the filler plate 316 may offer additional support for the film as it conveys over the upper member 107 where the products may be of a larger size. Additionally, the filler plate 316 may also have openings, raised edges, friction-reducing components or combinations thereof.

**FIG. 4** shows a top-down view of the apparatus with a filler plate 316. As shown in **FIG. 4**, the upper member 107 and the filler plate 316 may be positioned so that both the upper member 107 and the filler plate 316 may be flat and may be adjacent to each other. In some embodiments, the first arm 101 and the second arm 103 are positioned to be perpendicular to the upper member 107 and the filler plate 316 and may be coupled to the upper member 107 and the filler plate 316 at the edges. The first arm 101 and the second arm 103 may be coupled by any means well known in the art, such as, for example by welding, bolting, fastening, or clamping to the upper member 107 and the filler plate 316.

**IV. The System**

Wrapping machines designed to wrap and seal products in film, creating a package with a product wrapped in film, are well known in the art. U.S. 4,219,988, which is hereby incorporated by reference in its entirety, describes an automatic high-speed wrapping machine for wrapping packages in heat sealable thermoplastic film. The film is sealed at the side and ends of the packages at a high rate of speed as the packages travel through the wrapping machine. The packages travel continuously in a straight line through the wrapping machine and are delivered at the input end of the wrapping machine by an infeed conveyor into an inverting head where the packages are surrounded by the film. A film conveyance mechanism for conveying a film through the system in a machine direction may be a side sealer. The side sealer may have nip rollers and internal belts that convey the film through the wrapping machine. The side sealer forms a side seal while severing the excess film from the packages, and then the packages are conveyed into an end sealer where both ends of the packages are sealed and the film connecting succeeding packages is severed. The wrapping machine produces packages which have a
sealed film wrap around the entire product which is then in condition for subsequent shrinking of the film if desired to provide a package having a tight film overwrap.

FIG. 5 shows a typical side-sealing configuration with the apparatus connected to a wrapping machine. The configuration in FIG. 5 depicts a system for controlling a film during a sealing process using a film conveyance mechanism for conveying a film through the system in a machine direction.

The first arm 101 may be attached to a first attachment arm 520 of the wrapping machine and the second arm 103 may be attached to a second attachment arm 525 of the wrapping machine. In some embodiments, the first and second attachment arms 520, 525 may have rails to slide the first and second arms 101, 103 of the apparatus so that the first and second arms 101, 103 are supported by the first and second attachment arms 520, 525. The first and second arms 101, 103 may by partially attached to the wrapping machine by having a portion of the first and second arms 101, 103 positioned on the rails of the first and second attachment arms 520, 525. In some embodiments, the first and second arms 101, 103 may be mechanically attached to the wrapping machine.

In some embodiments, the upper member 107 of the apparatus may be positioned so that it is adjacent to a side sealer 515. In some embodiments, the trailing edge 105 of the first arm 101 and the trailing edge 115 of the second arm 103 may end after a conveyor 510 but before an end sealer 505. The end sealer 505 may be downstream from the first arm 101 and the second arm 103. The conveyor 510 may be upstream of the end sealer 505. The conveyor 510 may extend the entire length of the apparatus. In some embodiments, the conveyor 510 may be shorter in length than the apparatus. The conveyor 510 may be horizontally positioned between the first arm 101 and the second arm 103. The side sealer 515 may be upstream from the end sealer 505. Such embodiments allow for a product 202 to convey through the entire apparatus while on the conveyor 510 and as the product 202 leaves the conveyor 510, the tabs 110, 120 will extend the film 201 even further than the dimensions of the apparatus to allow for the end sealer 505 to seal the film 201 surrounding the product with less defects. The tabs 110, 120 may also provide extension of the film to the widest width by extending the film 201 even further than the dimensions of the apparatus.
Methods of Using the Disclosed System

A film 201 may be controlled during a sealing process using the previously disclosed system. In some embodiments, a film 201 may be fed onto the system. The film 201 may come into contact with the leading edge 125 of the first arm 101 and the leading edge 135 of the second arm 103. In some embodiments, the film 201 may come into contact with the leading edges 125, 135 at the location of where a film dispenser 530 has been positioned on the wrapping machine. The film dispenser 530 may be positioned at any location on the wrapping machine downstream of the side sealer 515. In some embodiments, the film dispenser 530 may be positioned adjacent to the second arm 103, downstream of the upper member 107 and upstream of the leading edge of the second arm 135.

A product 202 or set of products may be transported toward the wrapping machine as a film 201 may be fed from a direction which is preferably perpendicular to the direction of the conveyor 510. The direction may be in the machine direction 203 of the system. In some embodiments, the film 201 may be a sheet of centerfolded plastic film with two layers. In some embodiments, the two layers of the film are then separated such that the product 202 may be placed between the lower layer and the upper layer as shown in FIG. 2. In some embodiments, the product may be transported on a conveyor 510 and may be surrounded by the film 201 controlled by the previously disclosed system. On one side of the product 202 may be the centerfold, while on the other side, there may be an open edge where the two layers are not attached. In some embodiments, the open edge where the two layers of the film are not attached may be located opposite of the side of the system where the film dispenser 530 may be located.

The film 201 may be transported in a direction over the previously disclosed apparatus and the film 201 may then cover the previously disclosed apparatus. In some embodiments, the film 201 may completely cover the apparatus as shown in FIG. 2. In other embodiments, the film 201 may cover only a portion of the first arm 101 and the second arm 103. Such embodiments may only have film 201 covering the first arm 101 and the second arm 103 once the film 201 comes into contact with
the first arm 101 and the second arm 103 after leaving the film dispenser 530 and may be fed onto the system.

In some embodiments, a side seal may be created on the film with a side sealer 515. A side sealer 515 may have several sets of belts (belts not shown) to hold and guide the film, a heating/sealing element that fuses or welds the two free layers of the film together and a cutting element that removes the excess film after the side seal has been created. The side sealer 515 may have nip rollers 516 located before the main component of the side sealer 515 to help guide the film 201 into the side sealer 515. In some embodiments, the side sealer 515 is a film conveyance mechanism to convey the film through the system in the machine direction 203. In other embodiments, a film conveyance mechanism may include the inverting head, the nip rollers 516, and the side sealer 515. In further embodiments, a film conveyance mechanism is any part of the system that moves, manipulates, and/or controls the direction of the film. As the film 201 and product 202 is conveyed by the side sealer 515, the open edge of the film 201 may be sealed by welding the two layers together, the film 201 is cut and the excess film is removed and discarded away from the system. In some embodiments, the upper member 107 may have a filler plate 316 and the filler plate 316 may have an angle to allow the film 201 to relax at the side sealer 515 before the side seal is created. After the side seal, the film 201 may resemble a tube with openings at both the leading and trailing ends of the product 202.

An end seal may be created on the film 201 with an end sealer 505. An end sealer may have several sets of belts (belts not shown) to hold and guide the film 201 and a heating/sealing element that fuses or welds the two free layers of the film together. In some embodiments, the film 201 may be transported over the apparatus and then the film 201 may be fed through an end sealer 505. As the film 201 travels through the end sealer 505, the film 201 may be sealed at the leading end of the product 202 and at the trailing end of the product 202. Once the film 201 has been sealed at the leading end and the trailing end of the product 202, the result will be a package. The package may be the product 202 wrapped in the film 201. In some embodiments, the package may be a plurality of products wrapped in the film 201 that is sealed at the leading end of the plurality of products and the trailing end of the
plurality of products. In some embodiments, the end seal may be substantially free of wrinkles and multiple layers at the seal. Such embodiments may utilize the tab of the first arm 110 and the tab of the second arm 120 to position the film 201 before the end seal such that the end seal may be substantially free of wrinkles and multiple layers at the seal.

These applications are for illustrative purposes only and are not intended as a limitation on the scope of the presently disclosed subject matter. The presently disclosed subject matter has been described in connection with what is presently considered to be the most practical and preferred embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and the scope of the appended claims.
What is claimed is:

1. A system for controlling a film during a sealing process using a film conveyance mechanism for conveying a film through the system in a machine direction, the system comprising:
   - an apparatus, the apparatus comprising:
     - a first arm;
     - a second arm, wherein:
       - the second arm is positioned opposite of the first arm, and
       - the first arm and the second arm are arranged to spread the film;
     - an upper member positioned between the first arm and the second arm;
     - an end sealer downstream from the first arm and the second arm;
   - a conveyor upstream of the end sealer and positioned between the first arm and the second arm; and
   - a side sealer upstream from the end sealer and positioned adjacent to the first arm.

2. The system of claim 1, wherein the first arm and the second arm of the apparatus are configured to have a leading edge and a trailing edge.

3. The system of claim 2, wherein the trailing edge of the first arm of the apparatus and the trailing edge of the second arm of the apparatus are configured to have a tab coupled on a side of the trailing edge having contact with the film.

4. The system as in any of the preceding claims, wherein the upper member of the apparatus further comprises at least one friction-reducing opening to reduce the friction between the film and the upper member as the film slides over the upper member.

5. The system as in any of the preceding claims, wherein the upper member further comprises a leading edge and a trailing edge, wherein the leading edge comprises a first portion and a second portion that are continuous.
6. The system of claim 5, wherein the first portion of the leading edge of the upper member is perpendicular to the machine direction and the second portion is at an angle less than 90 degrees from the machine direction.

7. The system as in claim 5 or 6, wherein the first portion of the leading edge of the upper membrane has a raised lip positioned wherein the raised lip is extending away from the conveyor.

8. The system as in any of the preceding claims, wherein the apparatus further comprises a filler plate that is coupled to the upper portion horizontally.

9. An apparatus for controlling a film during a sealing process, the apparatus comprising:
   a first arm;
   a second arm, wherein:
   the second arm is positioned opposite of the first arm, and
   the first arm and the second arm are arranged to spread the film;
   an upper member horizontally positioned between the first arm and the second arm.

10. The apparatus of claim 9, wherein the film is selected from the group comprising a folded film, multiple layers of film, tube-shaped film, a film-based cushioning material and combinations thereof.

11. The apparatus as in claim 9 or 10, wherein the first arm and the second arm are configured to have a leading edge and a trailing edge.

12. The apparatus as in any of claims 9-11, wherein the trailing edge of the first arm and the trailing edge of the second arm are configured to have a tab coupled on a side of the trailing edge having contact with the film.

13. The apparatus as in any of claims 9-12, wherein the upper member further comprises at least one friction-reducing opening to reduce the friction between the film and the upper member as the film slides over the upper member.

14. The apparatus as in any of claims 9-13, wherein the upper member of the apparatus further comprises a plurality of friction-reducing openings.
15. The apparatus as in any of claims 9-14, wherein the upper member of the apparatus further comprises a friction-reducing component.

16. The apparatus as in any of claims 9-15, wherein the upper member further comprises a leading edge and a trailing edge, wherein the leading edge comprises a first portion and a second portion that are continuous.

17. The apparatus of claim 16, wherein the first portion of the leading edge of the upper member is perpendicular to the machine direction and the second portion is at an angle less than 90 degrees from the machine direction.

18. The apparatus as in claim 16 or 17, wherein the first portion of the leading edge of the upper member is perpendicular to the machine direction and the second portion is at an angle less than 90 degrees from the machine direction.

19. The apparatus as in any of claims 9-18, wherein the apparatus further comprises a filler plate that is coupled to the upper portion horizontally.

20. A method of controlling a film during a sealing process, comprising:
   feeding a film onto the system of claim 1, wherein the film comes into contact with the leading edge of the first arm and the leading edge of the second arm;
   transporting the film in a horizontal direction over the apparatus, wherein the film covers the apparatus; and
   creating an end seal on the film with the end sealer.

21. The method of claim 20, further comprising creating a side seal on the film with a side sealer.

22. The method as in claim 20 or 21, further comprising transporting a product on the conveyor, wherein the product is surrounded by the film controlled by the system of claim 1.

23. The method as in any of claims 20-22, wherein an end seal is made that is substantially free of wrinkles and multiple layers at the seal.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65B9/06

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
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<tbody>
<tr>
<td>Y</td>
<td>column 6, line 61 - column 8, line 10; figures 1, 2</td>
<td>1, 2, 5, 20-23</td>
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<td>3, 4, 6-8, 10, 12-15, 17-19</td>
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<td>X</td>
<td>EP 0 836 992 Al (FUJI PHOTO FILM CO LTD [JP]) 22 April 1998 (1998-04-22)</td>
<td>9, 11, 16</td>
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<tr>
<td>Y</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search: 16 June 2016

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Name and mailing address of the ISA:
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