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(54) **BAG MACHINE AND WINDER**

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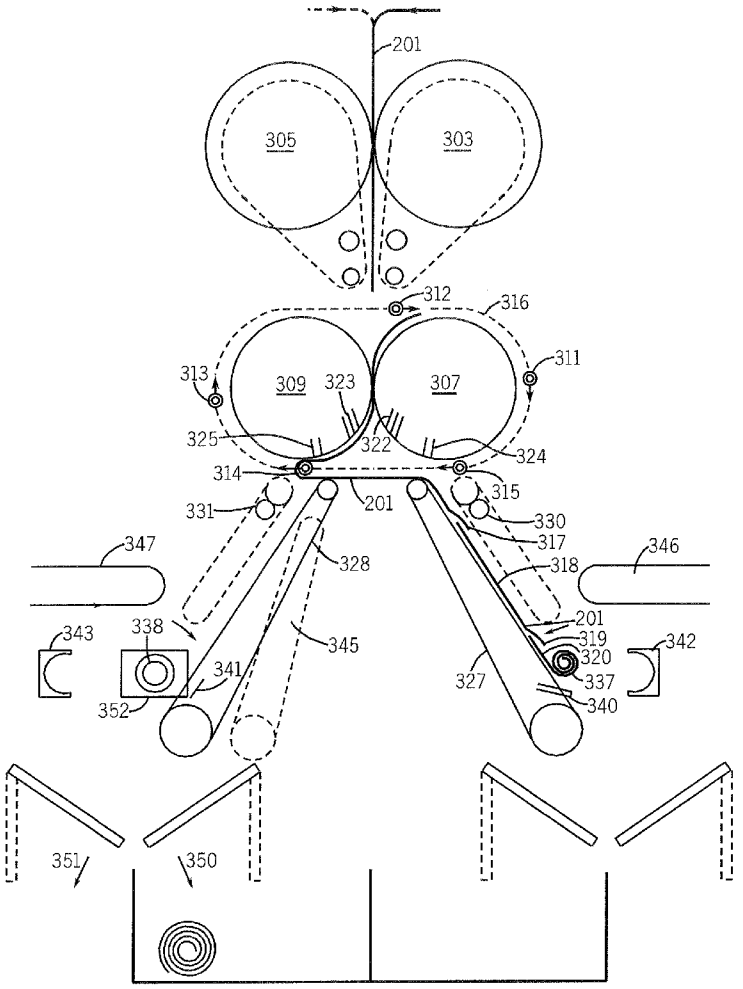
(57) **ABSTRACT**

A method and apparatus for making and winding bags is disclosed. The film approaches the infeed nip on the surface of a roller and on a film guide recessed in the roller for an arc of at least 10, 45, 60 or 90 degrees. The film is preferably guided to one of two alternative film paths. An over speed nip may be provided between the infeed nip and the alternative film paths to separate rolls or to separate all bags. An overlapper can be included. Rods that travel in an elliptical orbit, and/or air nozzles can be part of the overlapper. Air nozzles or a rotating brush can direct the film to the appropriate alternative path. Banders can be used, and can include a conveyor for providing tape to the spindle and two sources of air.



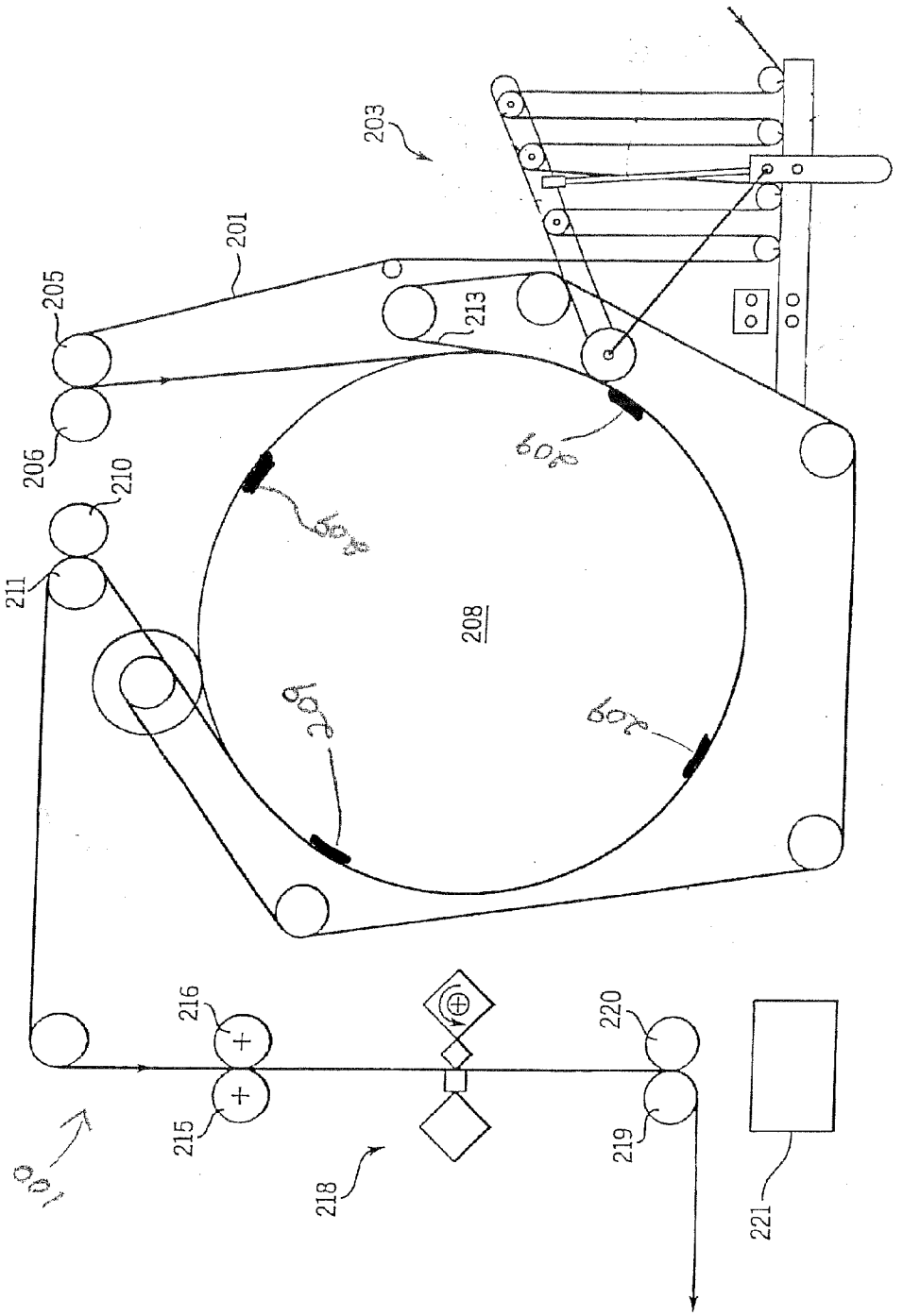
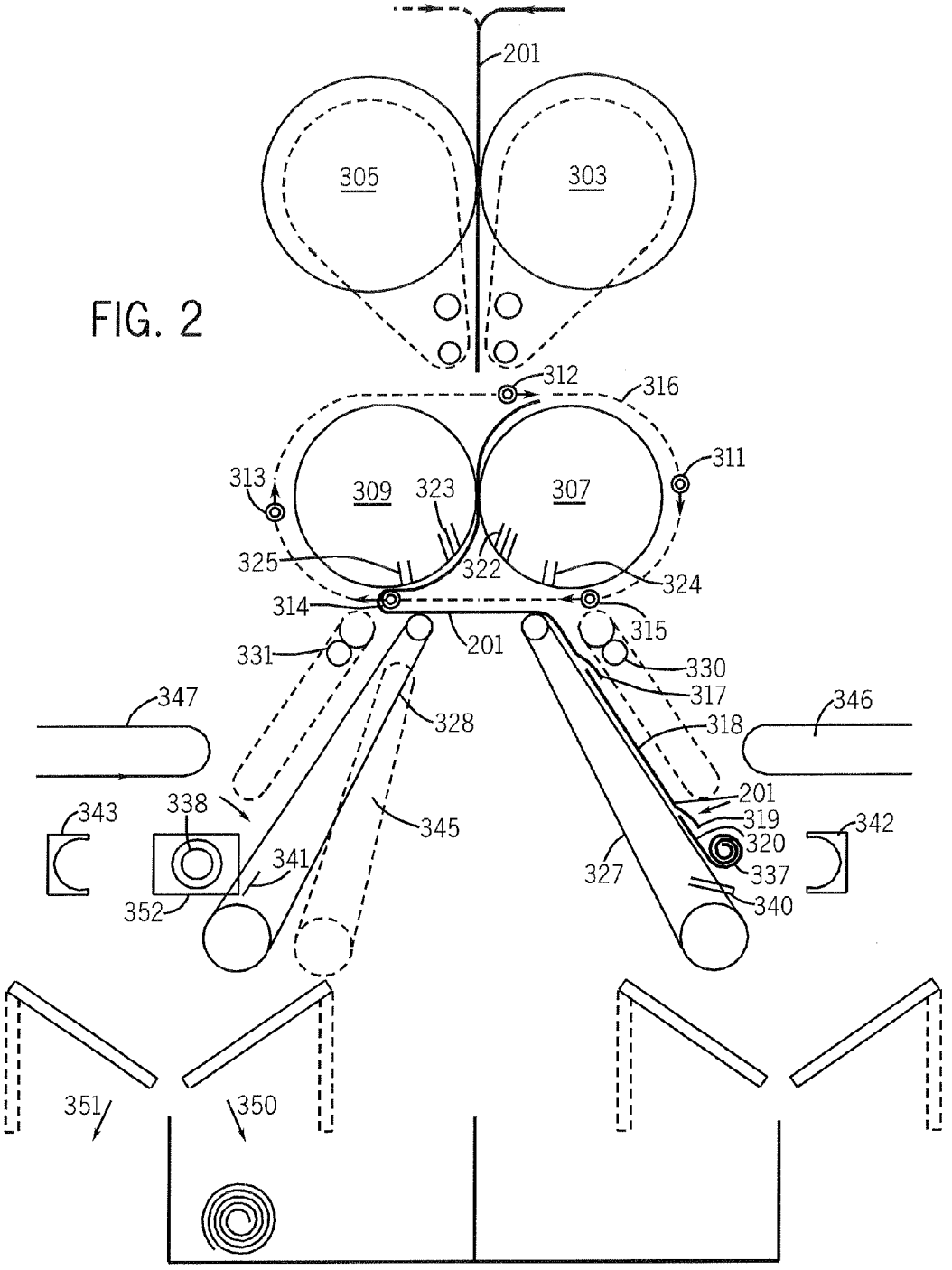


FIG. 1
PRIOR ART

FIG. 2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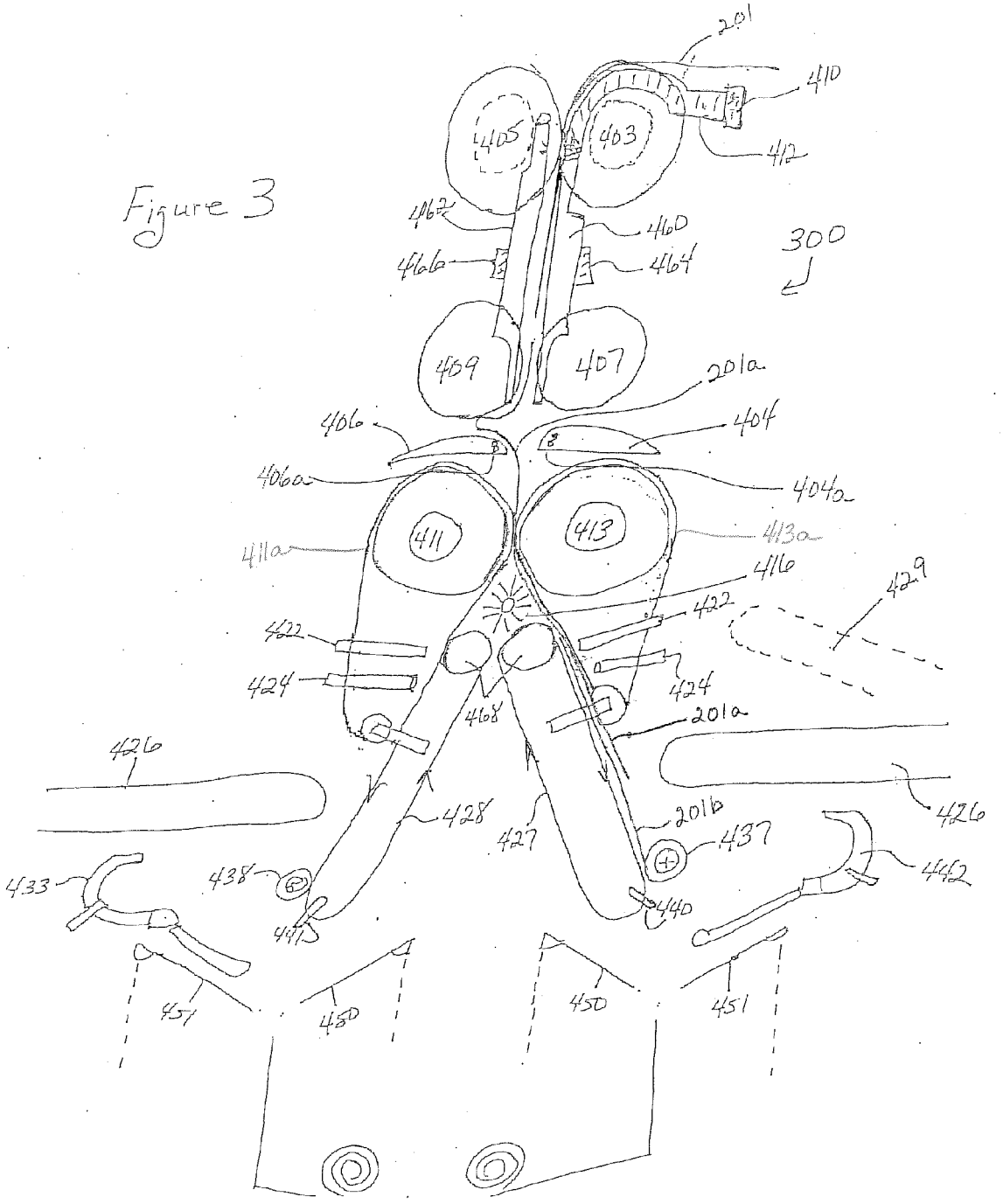
350

Figure 3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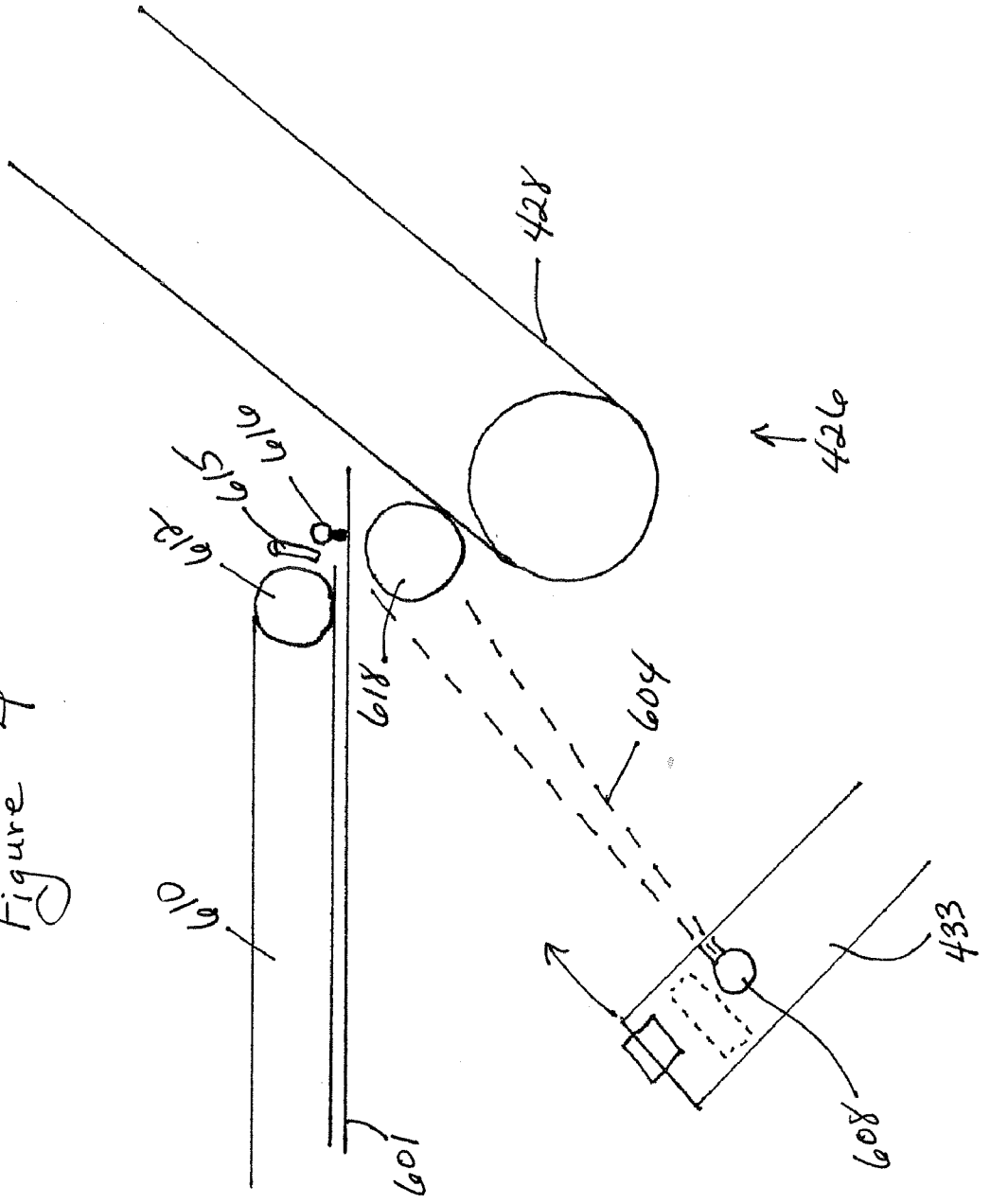

Figure 4

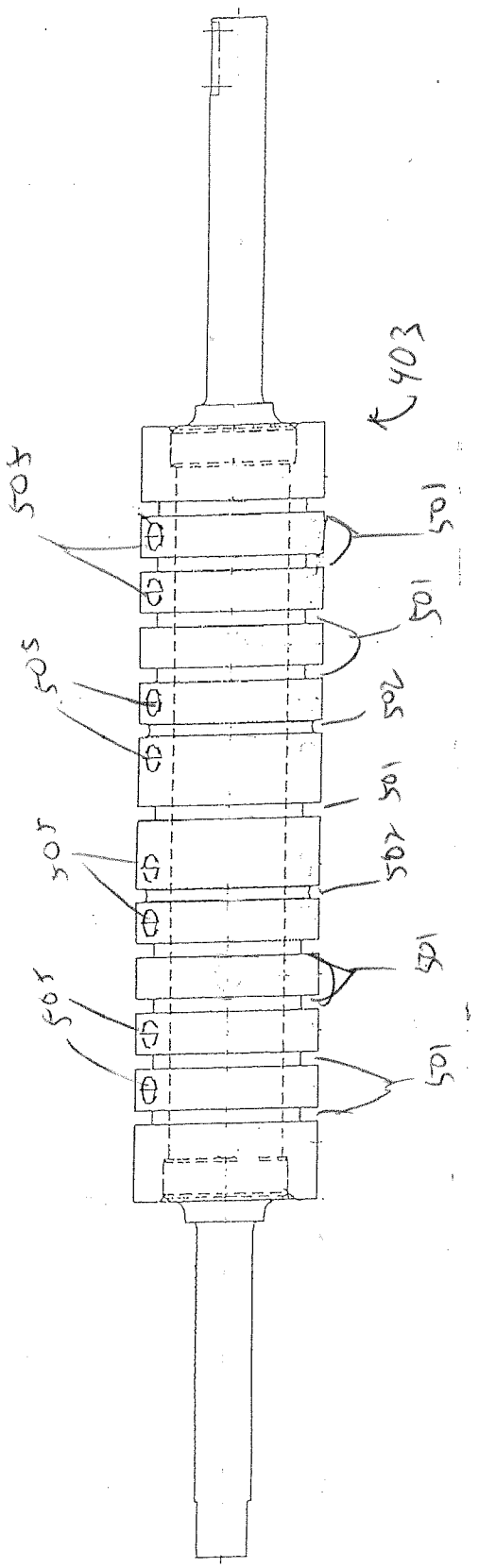

Figure 5

BAG MACHINE AND WINDER

BACKGROUND OF THE INVENTION

[0001] There are a variety of known bag machines used for making bags from a continuous film, such as a polyolefin film. Commercially available bag machines, winders, and folders include CMD® Models 3113, 1100 series, 1500, 4013RO series, and other machines described at www.cmd-corp.com. Examples of patented prior art bag machines include U.S. Pat. Nos. 6,117,058, 4,934,993, 5,518,559, 5,587,032 and 4,642,084 and US Patent Publication 20060084559 (each of which is hereby incorporated by reference).

[0002] Generally, those machines unwind the film from a roll. The film may be a single film, or folded film, or a (flat) tube. Bags are formed by placing seals on the film in desired locations. The seals may form the bottom/top and/or sides of the bag. Perforations may be included denoting sides or top/bottom of adjacent bags. Other operations may be performed such as separating and/or folding.

[0003] The bag machine shown in U.S. Pat. No. 6,117,058 is owned by the owner of this invention, and may be seen in FIG. **1**. Prior art rotary bag machine **100** continuously processes a web or film **201** using a dancer assembly **203**, a pair of drum-in rolls **205** and **206** (**203-206** are part of an input section), a sealing drum **208**, a pair of drum-out rolls **210** and **211**, a sealing blanket **213**, a pair of knife-in rolls **215** and **216**, a knife **218** (which could be any other web processing device such as a perforator, knife, die cutter, punching station, or folding station), a pair of knife-out rolls **219** and **220** (**210-220** are part of an output section), and a controller **221**. Input section or unwind section, as used herein, includes the portion of a bag machine where the web is received, such as an unwind and a dancer assembly. Output section, as used herein, includes assemblies that act on a web downstream of the seals being formed, such as perforators, winders, folders, etc.

[0004] The web is provided through dancer assembly **203** to a forming drum **208**. Drum **208** includes a plurality of seal bars **209**. The seals bars are heated and create the seals forming the bags from web **201**. Web **201** is held against drum **208** (and the seals bars) by a Teflon® coated blanket. End to end bags are formed with one seal from the drum, and side to side bags are formed with a pair of seals. The drum diameter may be adjusted and/or less than all of the seal bars turned on to determine the distance between seals, and hence bag size.

[0005] Generally, rotary motion machines register a downstream rotary knife to perforate between two seals, or beside a seal. The prior art of FIG. **1** provides that after web **201** leaves drum **208** it is directed to rotary knife **218**, which creates a perforation between bags, or could separate adjoining bags. When the bags are end to end bags, the perforation is placed close to the single seal such that when the bags are separated, the perforation and the perforated end is the top of one bag, and the seal is the bottom of the adjoining bag.

[0006] Controller **221** is connected to the various components to control speed, position, etc. Sensors may be used to sense print on the web to form the seals and/or register the perforation (place it in the correct location with respect) to the seal. Also, sensors may detect seals to try and create the perforation in the correct location.

[0007] Many bag machines include a winder after the knife. Examples of prior art winders include U.S. Pat. Nos. 4,667,890; 4,695,005; 6,186,436; and 5,899,403, hereby incorporated by reference. Prior art winders either have a rotating turret with multiple spindles or a single fixed spindle and web stopper. A desired number of bags is wound about the spindle, forming the roll. The roll is then pushed off, often using a push off palm. The roll may be paper banded, and unacceptable rolls may be culled. The prior art describes various ways to properly direct the leading end of the roll to the desired spindle, and to control the winding.

[0008] Multiple spindle prior art winders require rotating a turret to move the spindle to the starting and winding position. This adds complexity to the machine, and makes air connections difficult. Also, because the turret rotates, it is used with a push off palm that scrapes the spindle over only part of its circumference. Moreover, moving turrets, push off palms, and air horns can interfere with one another or crash. Stationary winders are limited in the speed because of the time it takes to remove a roll. Prior art winders typically cannot used pneumatic devices in applications over 30 cpm. Rather, such a winder capable of 40 cpm would require servo controlled devices.

[0009] Accordingly, a winder with stationary spindles that operates at higher speeds than prior art single spindle systems is desirable. Preferably such a winder can be used with pneumatic devices, and can receive air connections easily.

SUMMARY OF THE PRESENT INVENTION

[0010] According to a first aspect of the invention a winder for a bag machine comprises an infeed nip and two spindles. Each spindle is located along one of two alternative film paths.

[0011] According to a second aspect of the invention a method of winding bags from a continuous film includes feeding the film into a winder and alternately directing the film along a alternative paths to one of two spindles. The alternations occur after a plurality of bags, such as a roll, are wound.

[0012] According to a third aspect of the invention a bag machines includes an unwind section, a forming section, and a winder. The winder includes an infeed nip and two spindles, each located along a respective alternative film path.

[0013] The spindles are fixed position spindles in one alternative embodiment.

[0014] The alternative film paths are predominantly downward in other embodiments.

[0015] An over speed nip may be provided between the infeed nip and the alternative film paths.

[0016] The over speed nip operates in an intermittent mode and in an every bag mode, and/or has a user adjustable over speed, in various embodiments

[0017] The winder includes an overlapper between the infeed nip and the alternative film paths, in other embodiments. The overlapper can include a plurality of rods moved in an orbit that intersects the film path in at least two locations. The orbit can be generally elliptical.

[0018] The overlapper includes a plurality of air nozzles in other embodiments.

[0019] The over speed nip has air nozzles disposed to direct the film to one alternative film path, and other air nozzles disposed to direct the film to the other alternative film path.

[0020] The winder includes conveyor belts along the alternative film paths in other alternatives. The conveyor belts can pivot at an end closest the infeed nip.

[0021] The winder includes static pinners along the alternative film paths, that can be bipolar, in various embodiments.

[0022] The winder includes pop-up fingers disposed along the alternative film paths in other alternatives.

[0023] The winder includes paper banders near the spindles in various embodiments.

[0024] The winder is driven with pneumatic air in one embodiment.

[0025] The winder includes push off devices that scrape the spindles over substantially 360 degrees in other alternatives.

[0026] According to a fourth aspect of the invention a winder for a bag or sheet machine includes an infeed nip, a film guide or guides and spindle or spindles. The film approaches the infeed nip by following the surface of an infeed roller for an arc of at least 10 degrees. The film path is then through the nip and toward the spindle. The film guide is disposed along the film path for at least the arc on which the film wraps the infeed roll, and further along the film path downstream of the infeed nip. The film guide is recessed in the infeed roller at least along the arc.

[0027] According to a fifth aspect of the invention a method of winding bags from a continuous film includes guiding the film with a first infeed roller and at least one film guide recessed in the first infeed roller, along the surface of the first infeed roller for an arc of at least 10 degrees. Then guiding the film with the film guide and roller to an infeed nip. Then guiding the film to at least one winding station and winding the bags.

[0028] The film guide is stationary and touches the film along the arc according to one embodiment.

[0029] The film guide is further recessed below the surface of the roll at the infeed nip according to another embodiment.

[0030] The arc is at least 45, 60 and 90 degrees in various embodiments.

[0031] The winder includes a second spindle, and each spindle is on an alternative film path in another embodiment.

[0032] A rotatable brush is disposed at a location where the film path can follow either the alternative film path to direct the film to a selected path in another embodiment.

[0033] An over speed nip is located on the film path downstream of the infeed nip and upstream of the brush and/or a source of air blows to the film from one side and/or the other side and diverts film from the film path to take up excess film for overlapping adjacent bags in other embodiments. The sources of air are located upstream of the rotatable brush and downstream of the over speed nip in another embodiment

[0034] A finger/guide is disposed near the spindle or spindles to remove rejected bags in another embodiment.

[0035] There are three film guides extending across the film in another embodiment.

[0036] A second film guide is disposed on the opposite side of the film in another embodiment.

[0037] According to a sixth aspect of the invention a bander for a bag machine includes a conveyor for providing tape to a spindle and two sources of air. The tape approaches the spindle from a first direction and passes above the spindle, and wraps around a roll of bags wound about the spindle. One source of air is directed to support the tape as the tape approaches the spindle. The other source of air is directed to force the tape around the roll of bags as the tape passes over above the spindle, aiding the tape wrapping about the roll. The one source of air also supports the tape as it wraps about the roll of bags, thereby aiding the tape wrapping about the roll.

[0038] The first source of air is mounted on an air horn disposed to be moved to and away from the spindle in an alternative embodiment.

[0039] Other principal features and advantages of the invention will become apparent to those skilled in the art upon review of the following drawings, the detailed description and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0040] FIG. **1** is diagram of a prior art bag machine;

[0041] FIG. **2** is diagram of a winder in accordance with the present invention;

[0042] FIG. **3** is diagram of a winder in accordance with the present invention;

[0043] FIG. **4** is diagram of a bander winder in accordance with the present invention; and

[0044] FIG. **5** is diagram of an infeed roller in accordance with the present invention.

[0045] Before explaining at least one embodiment of the invention in detail it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments or of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and should not be regarded as limiting. Like reference numerals are used to indicate like components.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0046] While the present invention will be illustrated with reference to a particular bag machine, method and winder, it should be understood at the outset that the invention can also be implemented with other machines, methods, and winders, including draw tape machines, rotary overlap machines, intermittent machines, sheet machines and other known machines.

[0047] Generally, the present invention is described with respect to a winder that can be used with, or is part of, a prior art bag machine to make a roll of bags for easy packaging, transporting, dispensing, and use. The preferred embodiment is described with respect to a bag machine such as that shown in U.S. Pat. No. 6,117,058, or available commercially as the CMD® 1270 bag machine, or a modular bag machine. The invention is contemplated as a winder, a winder and separator, a winder, separator and overlapper, or an entire bag machine. Overlapper, as used herein, includes a device or section that overlaps succeeding bags. The bag machine prior to the winder is described below, since it can be the prior art machine described above. Other bag machines may be used as well.

[0048] The winder receives the formed bags as a film, and can separate them using an over speed nip. Over speed nip, as used herein, includes a nip wherein at least one driven roller has a circumferential speed greater than the speed of the film prior to the nip. The nip can operate in an every bag mode, or in an intermittent mode to separate bags only at the start/end of rolls. Every bag mode, as used herein, includes operating for every bag within a roll. Intermittent mode, as used herein, includes not operating for every bag within a roll, such as operating only at the beginning or end of a roll, or for a few bags within a roll. The bags can be overlapped in the every bag mode.

[0049] After separating, a film divertor directs the film to one of two spindles. Each winding spindle takes turns wind-

ing film, which eliminates bottlenecks and allows for higher speeds, higher cycle speeds, and lower count rolls. The film is directed by the divertor along one of two alternative film paths to one of the two spindles or winding stations. Film path, as used herein, is the path film takes through the bag machine or winder, excepting any area where film is accumulated for winding. Alternative film path, as used herein, includes a path followed by the film or bags a portion of the time the winder is in use.

[0050] The alternative paths are preferably predominantly downward, allowing rejected film or missed transfer film to be rejected to the floor in a convenient location. Predominantly downward, as used herein, includes more vertical (with gravity) than horizontal. The spindles are fixed position spindles. Fixed position spindles, as used herein, includes spindles that do not move from a location, such as in an orbit, but can rotate.

[0051] When the spindle in use is wound with a complete roll, the leading edge of the first bag of the next roll is directed along the other alternative path to the other spindle. Thus, the winder can wind immediately on the other spindle without moving the spindles, and without having to remove a roll before winding the next roll.

[0052] Various embodiments use one or more of the following features, which can be used alone, or in many combinations. Air can be used to direct the film as desired, and pop-up fingers and/or an air horn can be used to start the roll. Static pinning can be used to hold the bags to the spindle, and bipolar static pinning can be used to hold the tail of the last bag of a roll to the roll. Conveyors can be used to guide the film along the alternative paths, and the conveyor can pivot as the roll gets larger, to accommodate its growing diameter. A paper bander can be used and the drying time for the glue can be accommodated since the glue can dry while the other spindle is being used. A push off device can be used to remove rolls, and can scrape substantially 360 degrees around the circumference of the spindle since the spindles are fixed position spindles. Substantially 360 degrees, as used herein, includes over the entire circumference except for occasional small interruptions.

[0053] Turning now to FIG. **2**, a diagram of a winder **200** in accordance with the preferred embodiment is shown. Winder **200** may be downstream along the film path of bag machine **100** of FIG. **1**. Many of the alternatives mentioned above are shown, although as stated above, all need not be included.

[0054] Film **201** travels from perforator or knife **218** (FIG. **1**) to an infeed nip defined between rolls **203** and **205** (FIG. **2**), at least one of which is driven. The infeed nip draws or feeds the film into winder **200**. (Infeed nip can refer to the infeed for a machine or a section. Here it is used to refer too the infeed of the winder section.)

[0055] The preferred embodiment provides for a vertical feed of the web through the infeed nip. This allows the machine to be uni-handed with respect to an operator side, and can accommodate both left and right hand floor plans.

[0056] Film **201**, after leaving the infeed nip, is provided to an over speed nip defined between rolls **307** and **309**, at least one of which is driven. (Film **201** is provided to other stations directly, or indirectly after leaving the infeed nip in various embodiments). Preferably the over speed is servo driven and the over speed percent can be changed easily by the user for a wide perforation repeat distance, such as from 10" to 250" without changing parts.

[0057] In an intermittent mode it can run perforation-connected film and separate one of plurality of bags from its succeeding bag by running over speed only after a certain count is complete. In an every bag mode it can be an overlapper and separate and overlap each bag by running over speed all the time. (Every bag made includes not separating a few bags in each roll). The over speed nip can aid in diverting the web to the appropriate alternative path by not running over speed during the last bag of the overlapped roll. Perforation detection is not required (but can be provided) when separating bags.

[0058] An overlapper includes rods **311-315** mounted to move in a generally elliptical orbit that intersect the path of film **201** in two places (above and below the nip, preferably). Generally elliptical, as used herein, includes a non circular, non angular path. The orbit is shown clockwise in FIG. **2**, where the roll is being wound on a spindle **337**, located along one of the alternative film paths. The rotor reverses direction and moves the rods in a counter-clockwise direction when a spindle **338** (located along the other alternative film path) is being used. The rods pull the film laterally, and can aid in separating, although the over speed nip alone can be used to separate if the overlapper is not installed. The rods temporarily accumulate the film to allow for overlapping succeeding bags. Overlapped regions are shown as **317** and **318**, and **319** and **320**.

[0059] The rods are preferably 0.5" diameter steel rods supported on each end with a chain or timing belt, including a driven sprocket and a tensioner sprocket, preferably servo driven. This reduces the distance the web must jump where it is not supported. An air curtain or series of air nozzles may be used to help the film jump the gap created by the mechanical overlap rods. Alternatives includes using air for overlapping, using fewer or more rods, using a different orbit, or other known overlappers.

[0060] Over speed rollers **307** and **309** preferably include 0.25" wide grooves on a 1" repeat across the face of both roller faces, to provide clearance for a plurality of air nozzles **322-325** in each groove. Air nozzles **222-225** are used to direct the film to the desired spindle. The upper air nozzles **322** and **323** are used to divert the web to the opposite roller and the lower air nozzles **324** and **325** are used to divert the web down to a nearby conveyor belt **327** or **328**, disposed along the film path. As shown in FIG. **3**, air nozzles **322** and **325** are off, and air nozzles **323** and **324** are on, directing film **201** toward spindle **317**. Nozzles **322** and **325** are on, and nozzles **323** and **324** off, when the film is being directed toward spindle **318**.

[0061] When a roll is completed, and the nozzles had been directing the trailing edge of the roll to one spindle, the nozzles are then controlled to direct the leading edge of the next roll of bags to the other spindle. Thus, the nozzles alternately direct the film to one of two paths. The change in paths, or alternations, occur after a plurality of bags—a roll—are wound. If the separator is in an intermittent mode, then nozzles perform an alternation after separating. In the every bag (overlap) mode they perform an alternation after a given count.

[0062] The preferred embodiment provides that the right and left spindles and associated components are mirror images of one another, although this is not required. Thus, spindle **338** winds counter-clockwise and spindle **337** winds clockwise.

[0063] The web, as it travels to spindles **337** and **338**, is preferably held against conveyor belts **327** and **328** with a

series of round elastic ropes. Also, one embodiment provides for static pinners **330** and **331** to hold the film against conveyor belts **227** and **228**. Static pinners **330** and **331** can be bi-polar static pinners to not only hold the film against the conveyor, but to also cause the tail of the last bag of a roll to cling to the roll, by turning off the static neutralizer for the last few bags. Thus, the invention provides for statically pinning a tail of a last bag in a roll to the roll, to aid in manual handling of rolls, in automation handling of roll, and reduce the need to glue the tail of the last bag.

[0064] Conveyor belts **227** and **228** are preferably one wide belt or a series of narrower belts with a 1" gap there between. The gap allows for pop-up finger **340**, **341** (one or more in various alternatives) to help direct the leading edge of the first bag into an air horn **342**, **343**, and around the winding spindle. Pop up fingers **340** and **341** intermittently direct the film near the spindle and retract after the first bag is transferred. The gap between belts also allows hot melt tail gluing to be used with less chance of glue getting on a conveyor belt.

[0065] Conveyor belt **328** is preferably mounted such that it pivots at an end closest to the infeed nip, and away from fixed position spindle **338**, as shown by the dashed lines and arrow **345**, as the film roll grows in diameter. A like pivot is used for conveyor **327**.

[0066] Each winding station may have a paper bander **346**, **347**. Because one bander can be used while the opposite spindle is winding, two banders which each run 20 cpm allow the overall winder to cycle at 40 cpm. Also, because there are two winding stations, each cycling at 20 cpm, pneumatic devices may be used with an overall speed of 40 cpm.

[0067] The spindles preferably use a prior art CMD®-designed Teflon® sleeve or bead blasted/chromed design. Also, because the spindles are fixed position spindles, they can use a simple push-off device that does not need to pivot, and can scrape at substantially 360 degrees around the spindle circumference to remove film easier with less chance of binding. The fixed position also allows for simple air connections to the spindles.

[0068] Because there are two stations cycling at 20 cpm (counts per minute), the machine runs at 40 cpm, and more time is allowed for roll inspection, culling, and rejecting than is allowed by a single station 40 cpm machine.

[0069] An alternative embodiment of a winder **300** is shown in FIG. **3** and can include many of the features described above, including two winding stations. The various embodiments may be combined as desired, choosing features from each or the prior art that suit the needs of a particular application.

[0070] Winder **300** includes an infeed nip defined between a pair of infeed rollers **403** and **405**, a controllably over speed nip defined between a pair of rollers **407** and **409** for separating adjacent bags, and spindles **437** and **438**. Generally, winder **300** operates consistent with winder **200**, except as described below.

[0071] Film or web **201** approaches the infeed nip by wrapping or following along a portion of the surface of roller **403** before reaching the nip. The film rides on an arc equal to or more than 10, 45, 60, or 90 degrees in various embodiments.

[0072] A plurality of stationary film guides **412**, mounted on support **410**, are recessed in roller **403**. Preferably, the surface of guides **412** is flush with the surface of roller **403** such that the web rides on the film guides, ropes (not shown), and the surface of roller **403**. Recessed in a roller, as used herein, includes residing partially or completely in recessed areas on a roller. The recesses may be grooves or channels, and have a depth in the preferred alternative embodiment such that the web rides on both the film guides and the surface of roller **403**. Guides **412** are preferably comprised of metal with a slippery coating and fit closely within the recesses of roller **403**, such as clearance on the sides of no more 0.010 inches. This allows the film to lie flat without getting caught in spaces between the recesses and guides **412**.

[0073] Referring to FIG. **5**, one embodiment of roller **403** is shown with recesses **501** for film guides **412** and recesses **502** for ropes. This embodiment provides for nine guides and two ropes. Also, a plurality of air relief holes **505** (counterbored, ½" inch diameter by ⅛" deep) are provided to help the film lie flush on the surface of roller **403** (and on film guides **412**, not shown on FIG. **5**). There are corresponding holes on the opposite side (180 degrees away from holes **501**) on roller **403**.

[0074] A film follows the surface of a roller when it rests generally on the outer surface, and does not require the film to conform to the recesses etc. Film guide, as used herein, includes a structure used to support and guide the film, and does not require driving the film. Surface of a roller, as used herein, the surface of a roller that is substantially the same distance from the axis of the roller.

[0075] Film guides **412** may be co-extensive with the arc of roller **403** on which the film rides prior to the nip, or it may be more or less extensive. Preferably, film guides **412** and the arc are of sufficient extent to support or touch film **201** as it approaches the infeed nip. The inventors have found that the stationary film guides, along with approaching the nip from the side so the film **201** passes over guides **412**, ropes (not shown) and roller **403** allow for faster and more stable operation.

[0076] Film guides **412** extend through the infeed nip, but are recessed just below (1/16 inches, e.g) the surface of roller **403** closest to the film path at the nip, so as to allow the infeed nip to properly pinch film **201**. Surface of a roller closest to the film path, as used herein, is the surface of a roller that the film generally follows. Below a surface of a roller, as used herein refers to closer to the axis of roller than the surface of the roll that makes contact with film.

[0077] A plurality of film guides **460** are connected to film guides **412**, and mounted on a block **464**. Film guides **412** and **460** may be considered continuous film guides. A plurality of guides **462** are mounted on a block **466** and guide film **201** from the reverse side of film **201**. Film guides **460** and **462** are preferably spaced sufficient to allow the film to pass easily, such as a total of 1/16 inch therebetween. Guides **460** and **462** are recessed in rollers **403**, **405**, **407** and **409**, and at the infeed and over speed nips are recessed below the surface to avoid interfering with the nip (for example 1/32 inch each). Film guides **412**, **460** and **462** may be one or several individual guides.

[0078] Ropes that wrap rolls **403** and **407** (and in one embodiment **405** and **409**) are also used to move the film. Ropes are particularly helpful in driving thin films, such as 6 micron high density polyethylene, but are omitted for some applications, particularly for heavier films.

[0079] The preferred embodiment uses ropes toward the center of the film, and guides toward the edges for more support. For example, with a six inch web an arrangement of 3 film guides **412** (two of which are near the edges of film **201**, and one in the center), and two ropes, each between the film

guides, is used. More film guides are used for wider films (and/or more ropes may be used as needed).

[0080] Winder **300** may be operated in a continuous mode or an overlap mode. In the overlap mode film **201** is separated into adjacent bags by over speed rollers **407** and **409**. Rollers **407** and **409** may be intermittently brought together or intermittently sped up to separate film **201** into bags. (Other methods of separating adjacent bags may be used as well). FIG. **3** shows a bag **201***a* which has been separated from film **201**. When in a continuous mode rollers **407** and **409** may be run at film speed, left separated, or be idler rolls.

[0081] Guides **460** and **462** extend past the nip where bags are separated, to help film **201** jump the gap below rollers **407** and **409**.

[0082] Overlapping requires downstream the film move more slowly, and that excess film be taken up during the overlapping. The embodiment above (FIG. **2**) shows one way to separate film and take of film for overlapping. FIG. **3** shows another way of taking up excess film for overlapping. Down stream rollers **411** and **413** move the film slower than rollers **403** and **405** in overlap mode (they run at the same speed as rollers **403** and **405** in non-overlap mode).

[0083] Air sources or air nozzles/pipes **404***a* and **406***a* (mounted on supports **404** and **406**) divert the film from its path to take up excess film as the overlapping occurs. As shown on FIG. **3**, nozzle **404***a* is active, and diverts the film from the film path and to the left, thus taking up the excess film. Diverted from the film path, as used herein, refers to accumulating bag or film when the bag or film follows a path other than the film path. Nozzle **404***a* directs air at least partially in a cross direction, and toward the right side of the film on FIG. **3**. Nozzle **406***a* also directs air at least partially in a cross direction, but to the opposite (left) side of the film. Nozzles **404***a* and **406***a* may each be implemented with multiple nozzles, a single nozzle, and/or an air pipe.

[0084] Bag **201***a* then moves to a winding infeed nip between rollers **411** and **413**, which are under sped to account for overlapping. The preferred embodiment calls for under speeding them by 20%. Ropes **411***a* and **413***a* are provided around rollers **411** and **413** to help move and guide the film to one or more downstream conveyors **427**/**428**.

[0085] One embodiment provides for a single winding station. However, the alternative preferred embodiment of FIG. **3** provides for two windings stations, each having a spindle **437**/**438**, conveyor **427**/**428** wrapped about a roller **468**.

[0086] After leaving rollers **411** and **413**, bag **201***a* may be directed to the desired winding station a rotating brush **416**. Brush **416** is preferably a full width brush positioned to touch ropes **411***a*/**413***a* and/or belts **427**/**428**, and at a location where the film path can follow either a first alternative spindle film path to spindle **437** or a second alternative spindle film path to spindle **438**. FIG. **3** shows overlapped bags **201***a* and **202***b* going to winding station **437**, thus brush **416** is rotating clockwise. The preferred embodiment provides for rolls to be alternately wound on spindles **437** and **438**.

[0087] After being properly directed by brush **416** bags **201***a* and **201***b* are guided past an optional barrel pinner **422**, an optional hot glue applicator **424**, and an optional bander **426** (i.e., a station or device to apply a band about a roll of wound bags). A pair of airhorns **442**/**433** are used to facilitate starting a roll. A pair of sorting trays **450**/**451** direct wound rolls into a bin, or to the floor, depending if they are accepted or rejected. A pair of fingers/strippers **440** and **441** are disposed near spindles **437**/**438** to help remove rejected bags and/or rejected rolls.

[0088] One embodiment of bander **426** is shown in FIG. **4** and includes a conveyor **610** wrapped around a roller **612**, a film guard **619**, a source of air **616**, and a source of air **608** mounted on air horn **343**, which cooperate with the conveyor **428** to wrap a tape **601** about a wound roll of bags **618** on spindle **438** (FIG. **3**). Bander **426** is shown for the left bander on FIG. **3**, and the right bander will be a mirror image.

[0089] As tape **601** is moved by conveyor **610** to roll **618**, tape **601** passes over the top of roll **618**. Nozzles **608** direct air to tape **601** and help support the tape (i.e., keep it from falling before it reaches roll **618**. Guard **615** helps prevent tape **601** from wrapping around conveyor **610** and roll **612**

[0090] After tape **601** reaches roll **618**, nozzle **616** directs air to force tape **601** downward, around the right side of roll **618**, thereby aiding tape **601** wrapping about roll **618**. As tape **601** is wound about roll **618** air from nozzles **608** support the tape as it wraps about the bottom of roll **618**, thereby aiding tape **601** wrapping about roll **618**.

[0091] Nozzles **608** and **616** may each be single nozzles, an air pipe, or each a plurality of nozzles. Also, nozzles **608** may be mounted on any support, and need not be on airhorn **433**. Nozzles **616** may also be mounted on any support.

[0092] Numerous modifications may be made to the present invention which still fall within the intended scope hereof. Thus, it should be apparent that there has been provided in accordance with the present invention a method and apparatus for making and winding bags that fully satisfies the objectives and advantages set forth above. Although the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A winder for a bag machine or sheet machine comprising;

an infeed nip defined between a first and a second infeed rollers, wherein a film path approaches the first infeed roller, follows the surface of the first infeed roller to the infeed nip for an arc of at least 10 degrees, and then the film path is toward at least one winding station, and the film path includes a first spindle film path;

at least one film guide is disposed along the film path for at least the arc to the infeed nip, and further along the film path downstream of the infeed nip, wherein the at least one film guide is recessed in the first infeed roller at least to along the arc; and

a first spindle, located along the first spindle film path.

2. The winder of claim **1**, wherein the at least one film guide is stationary and recessed in the first infeed roller at least along the arc such that the film touches the at least one film guide and the first infeed roller.

3. The winder of claim **2**, wherein the at least one film guide is recessed in the first infeed roller at the infeed nip such that a surface of the at least one film guide closest to the film path is below a surface of the first infeed roller closest to the film path.

4. The winder of claim **3**, wherein the arc is at least 60 degrees.

5. The winder of claim **3**, wherein the arc is at least 90 degrees.

6. The winder of claim **3**, further comprising a second spindle, wherein the first spindle film path is a first alternative film path whereby the film, after leaving the infeed nip, can follow the first alternative film path nip to the first spindle to be wound about the first spindle, and the film path includes a second spindle film path, that is a second alternative film path, and a second spindle is located along the second alternative film path, whereby the film, after leaving the infeed nip, can follow the second alternative film path nip to the second spindle to be wound about the second spindle.

7. The winder of claim **6**, further comprising a rotatable brush disposed at a location where the film path can follow either the first or second alternative film path, and the film is directed to the first alternative film path when the brush rotates clockwise, and the film is directed to the second alternative film path when the brush rotates counterclockwise.

8. The winder of claim **7**, further comprising an over speed nip defined between two over speed rollers, located along the film path downstream of the infeed nip and upstream of the rotatable brush, and upstream of the first and second alternative film paths, wherein the film moves from the infeed nip to the over speed nip, then to the rotatable brush, and then to one of the first and second alternative film paths.

9. The winder of claim **8**, further comprising a first source of air directed at least partially in a first cross direction toward the film path and a first side of the film, whereby a part of the film is diverted from the film path, thereby taking up excess film for overlapping adjacent bags.

10. The winder of claim **9**, further comprising a second source of air directed at least partially in a second cross direction toward the film path and a second side of the film, whereby a second part of the film is diverted from the film path, thereby taking up excess film for overlapping adjacent bags.

11. The winder of claim **10**, wherein the first and second sources of air are located upstream of the rotatable brush and downstream of the over speed nip.

12. The winder of claim **6**, further comprising at least a first finger disposed near the first spindle to remove rejected bags and at least a second finger disposed near the second spindle to remove rejected bags.

13. The winder of claim **6**, wherein the at least one film guide is at least three film guides.

14. The winder of claim **7**, further comprising at least a second film guide disposed along the film path from upstream of the infeed nip to near the over speed nip, wherein the at least a second film guide is on an opposite side of the film from the at least one film guide.

15. A method of winding bags from a continuous film, comprising;

guiding the film with a first infeed roller and at least one film guide recessed in the first infeed roller, along the surface of the first infeed roller for an arc of at least 10 degrees;

then guiding the film with the at least one film guide and the first infeed roller to an infeed nip defined between the first and a second infeed roller;

then guiding the film to at least one winding station; and

winding the bags at the first winding station.

16. The method of claim **15**, wherein guiding the film with the first infeed roller and the at least one film guide includes having the film in contact with the at least one film guide and the first infeed roller at least along the arc.

17. The method of claim **16**, wherein guiding the film with the first infeed roller and the at least one film guide includes doing so along the surface of the first infeed roller for at least an arc of 60 degrees.

18. The method of claim **16**, wherein guiding the film with the first infeed roller and the at least one film guide includes doing so along the surface of the first infeed roller for at least an arc of 90 degrees.

19. The method of claim **16**, further comprising guiding the film a second winding station and winding the bags at the second winding station, wherein the film is guided to the first winding station until a first roll of bags is wound, and then the film is guided to the second winding station, until a second roll of bags is wound.

20. The method of claim **19**, further comprising rotating a brush clockwise to direct the film to the first winding station and rotating the brush counter clockwise to direct the film to the second winding station.

21. The method of claim **20** wherein the film is comprised of a series of bags formed with seals and perforations, comprising separating bags from adjacent bags in the film by providing the film to an over speed nip.

22. The method of claim **21**, further comprising blowing air at the film in a first cross direction toward a first side of the film to divert a part of the film from the film path, thereby taking up excess film for overlapping adjacent bags.

23. The method of claim **22**, further comprising blowing air at the film in second first cross direction toward a second side of the film, which is opposite the first cross direction, to divert a part of the film from the film path, thereby taking up excess film for overlapping adjacent bags.

24. The method of claim **15**, further comprising moving a finger to remove rejected bags.

25. The method of claim **7**, wherein then guiding the film with the at least one film guide and the first infeed roller to an infeed nip includes guiding the film between at least a second film guide and the at least one film guide.

26. A winder for winding bags from a continuous film, comprising;

means for guiding the film along the surface of a first infeed roller for an arc of at least 10 degrees to and through an infeed nip;

means for guiding the film to at least one winding station; and

means for winding the bags at the first winding station.

27. The winder of claim **26**, wherein the means for guiding film along the surface is in contact with the film the at least along the arc.

28. The winder of claim **26**, wherein the means for guiding the film along the surface guides the film for an arc of at least 45 degrees.

29. The winder of claim **26**, wherein the means for guiding the film along the surface guides the film for an arc of at least 90 degrees.

30. The winder of claim **29**, wherein the means for guiding the film to at least one winding station includes a means for guiding the film to the first winding station until a first roll of bags is wound, and means for guiding the film to the second winding station until a second roll of bags is wound.

31. The winder of claim **29**, further comprising means for directing the film to the first winding station or the second winding station.

32. The winder of claim **31**, wherein the film is comprised of a series of bags formed with seals and perforations, and further comprising means for separating bags from adjacent bags in the film.

33. The winder of claim **32**, further comprising means for taking up excess film and overlapping adjacent bags.

34. The winder of claim **33**, further comprising means for removing rejected bags.

35. A bander for a bag machine comprising;

a conveyor disposed to transport tape to a spindle, wherein the tape approaches the spindle from a first direction and passes above the spindle, and wraps around a roll of bags wound about the spindle;

a first source of air directed to support the tape as the tape approaches the spindle; and

a second source of air directed to force the tape around the roll of bags as the tape passes over above the spindle, thereby aiding the tape wrapping about the roll;

wherein the first source of air supports the tape as it wraps about the roll of bags, thereby aiding the tape wrapping about the roll.

36. The bander of claim **35**, wherein the first source of air is mounted on an air horn disposed to be moved to and away from the spindle.

37. A method of banding a roll of bags, comprising;

conveying tape to a spindle from a first direction, and moving the tape above the spindle, and wrapping the tape down and around a roll of bags wound about the spindle;

directing air to the tape from Jun. 8, 2008 the tape as the tape approaches the spindle, thereby supporting the tape; and

directing air to the tape from above as the tape passes over the spindle, thereby aiding the tape wrapping about the roll;

wherein the air directed to the tape from below supports the tape vertically as it wraps about the roll, thereby aiding the tape wrapping about the roll.

38. A bander for a bag machine, comprising;

means for conveying tape to a spindle from a first direction and above the spindle;

means for directing air to the tape from below the tape as the tape approaches the spindle, thereby supporting the tape; and

means for directing air to the tape from above as the tape passes over the roll, thereby aiding the tape wrapping about the roll;

wherein the means for directing air to the tape from below further supports the tape as it wraps about the roll, thereby aiding the tape wrapping about the roll.

39. The bander of claim **35**, wherein the means for directing air to the tape from below is mounted on an air horn disposed to be moved to and away from the spindle.

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