

[54] IMBRICATED BAG LOADING MACHINE

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[51] Int. Cl.² B65B 43/36

[58] Field of Search 53/385, 384, 386, 187, 53/188

[56] References Cited

UNITED STATES PATENTS

3,552,090	1/1971	Roberts et al.	53/385 X
3,619,969	11/1971	Holcombe.....	53/385 X

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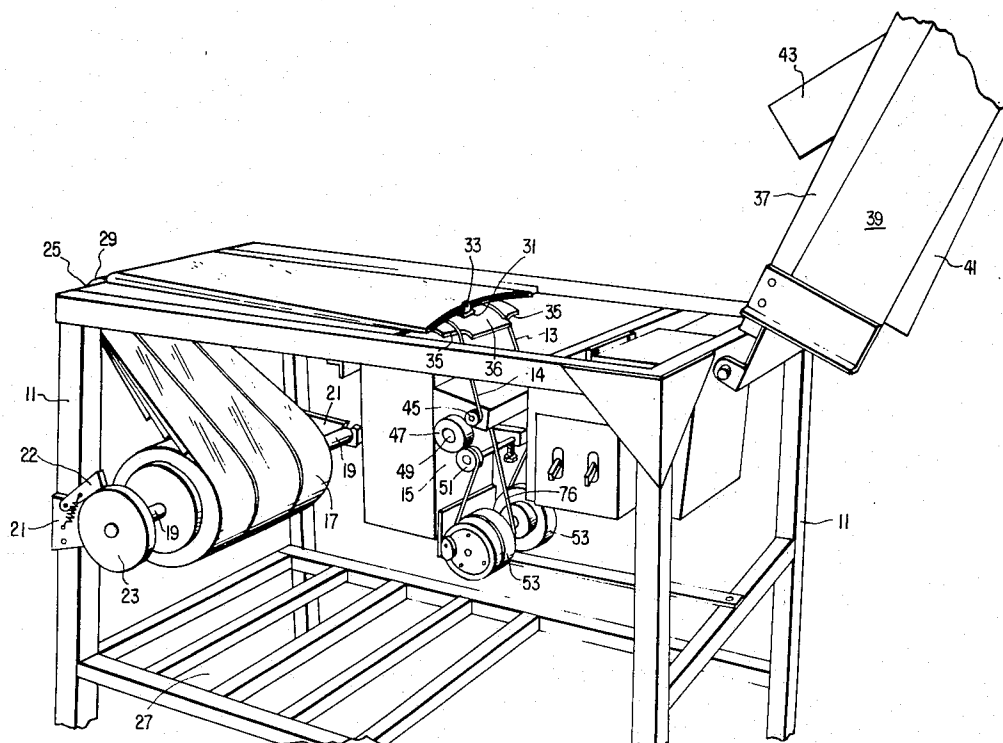
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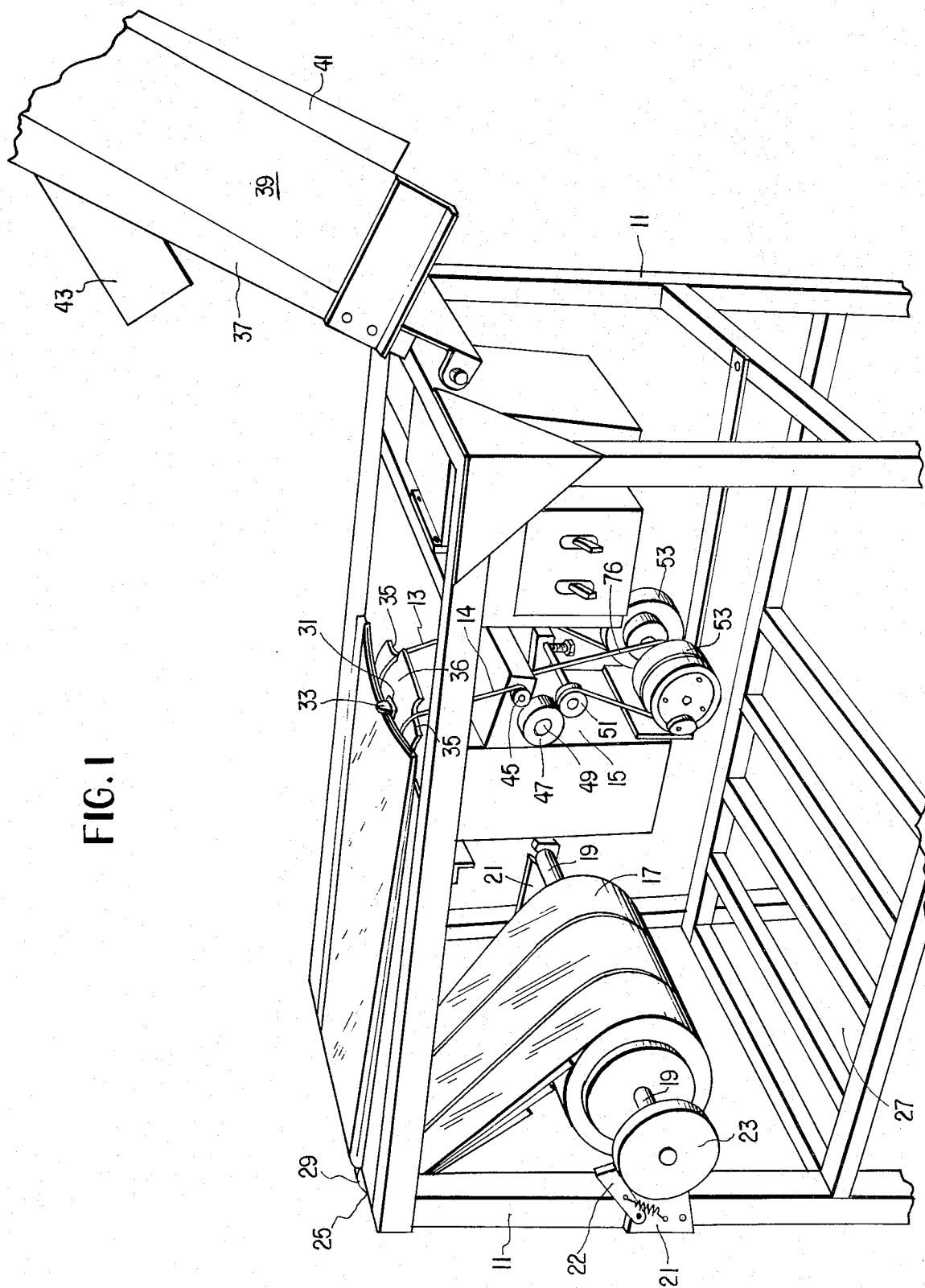
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ABSTRACT

A bag loading machine is disclosed for loading imbricated bags wherein the imbricated bags are removably secured to at least two parallel strips in overlying arrangement such that each preceding bag in a given direction overlies the top end of the following bag. The machine includes a frame having a bag support table releasably attached to the frame over which the imbricated bags are drawn into a loading position. The bags are drawn into the loading position by a pair of drive rollers which intermittently draw forward the strips to which the bags are attached. The strips are wound about a pair of drums with the drums and the drive rollers being capable of operation independently of one another so that orientation of the bags can be adjusted. When the bags are in a loading position, a product is loaded into the bag from a product table. As the bag is loaded, it is removed and the next succeeding bag is opened. Also upon removal of the loaded bag, the drive rollers are energized to move the opened, next succeeding bag into the loading position.

8 Claims, 4 Drawing Figures





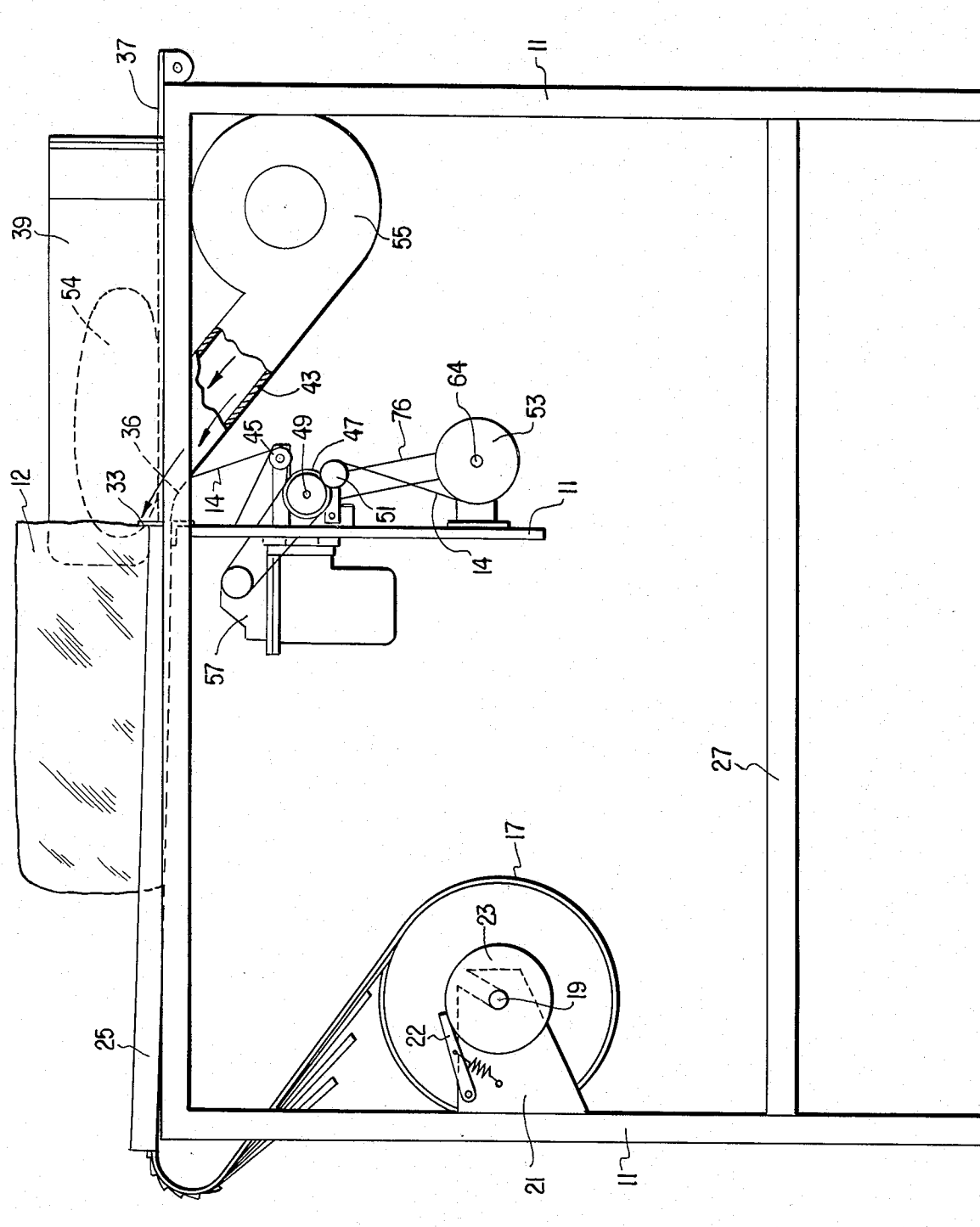


FIG. 2

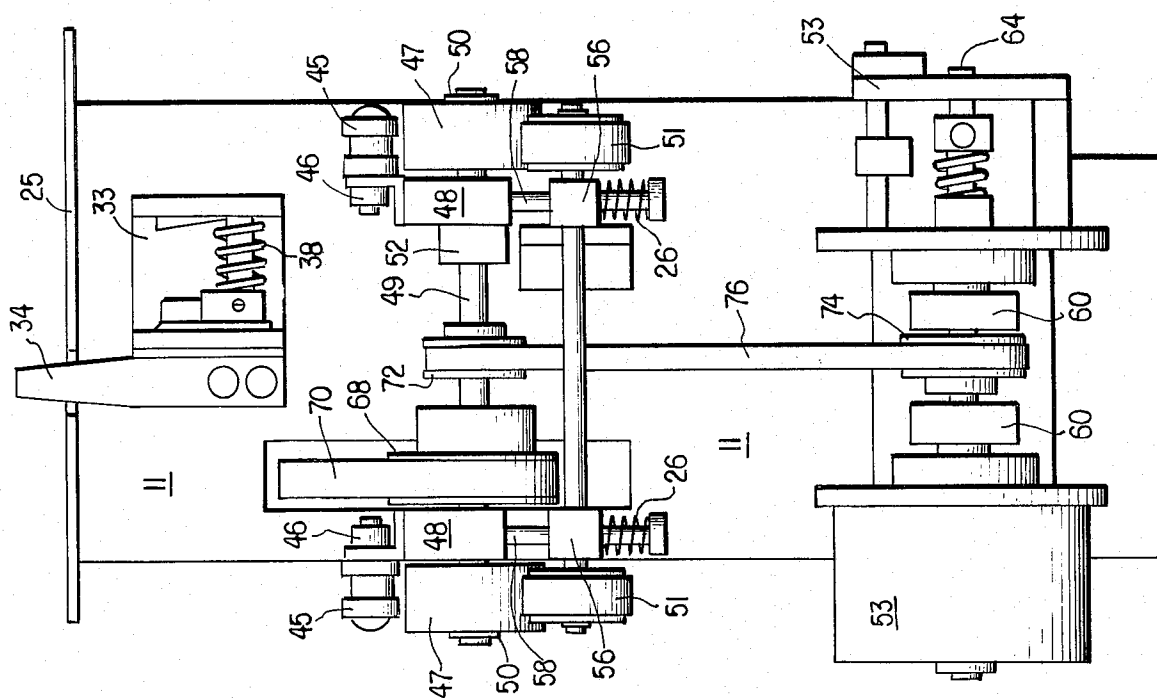


FIG. 4

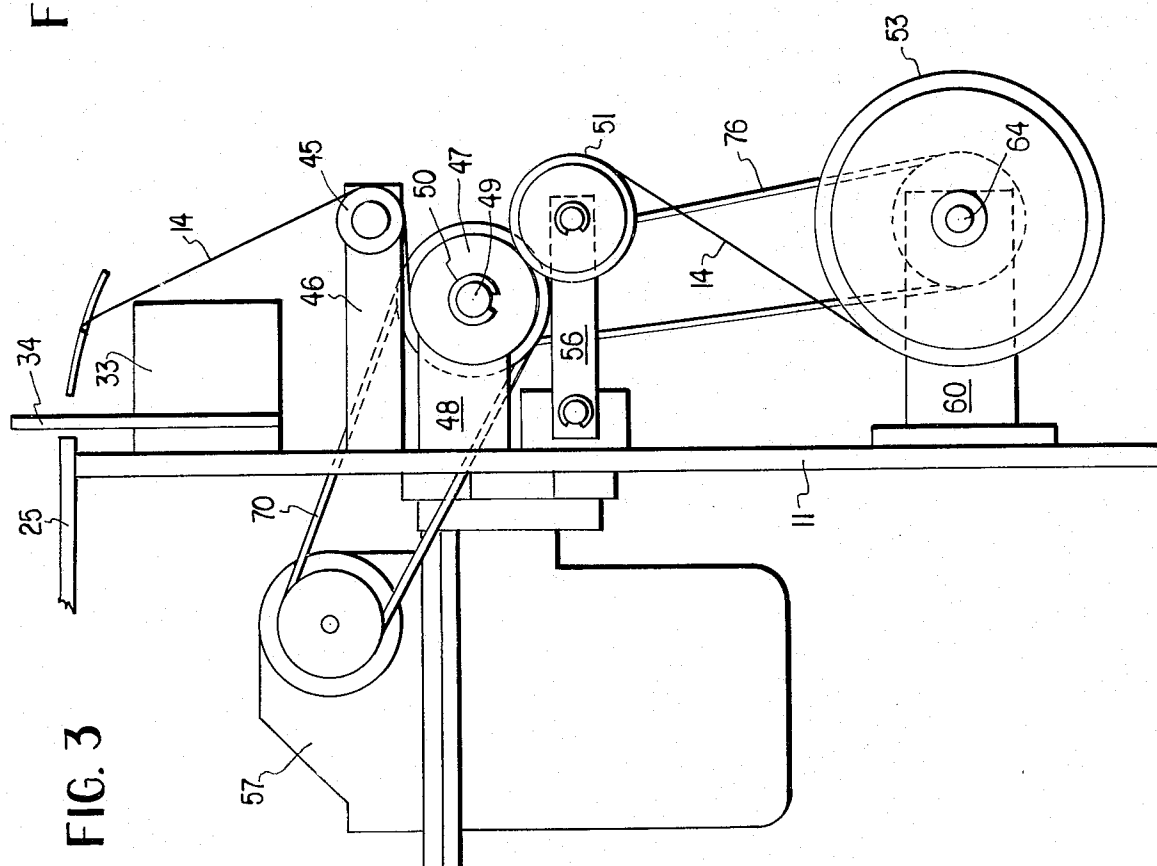


FIG. 3

IMBRICATED BAG LOADING MACHINE

CROSS-REFERENCE TO CO-PENDING PATENT APPLICATION

This application is related to a co-pending Patent application Ser. No. 512,853, filed Oct. 7, 1974 by Walter M. Farrelly and Sol J. Perlman and entitled "Imbricated Package of Closed-End Bags" and assigned to the assignee of the present application, the co-pending application being hereby incorporated herein by reference.

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved method and an apparatus for sequentially packaging items in imbricated bags and more specifically is directed to an improved method and apparatus for adjusting the orientation of the bags when in the loading position.

One of the problems existing under the mass merchandizing system of our present day commerce is a difficulty of packaging commercial products in a rapid and effective manner. Complicated electromechanical automatic packaging machines have been provided but these machines usually have been designed for a particular product or group of products. Thus, each time a new product or line of products have to be packaged new packaging equipment must be designed at great cost in terms of time and money. Therefore, a need has arisen in the past for a simple and inexpensive arrangement for packaging commercial products.

In the past, a number of developments have been made to provide a simple and inexpensive means for rapidly and efficiently packaging commercial items. One such bag packaging arrangement is disclosed in U.S. Pat. No. 3,331,182 issued to Hannon wherein a plurality of open-end bags are arranged along a member in an overlying arrangement with a portion of each bag being in contact with the supporting member. Each of the bags has its opening at the same end of the package with each preceding bag in a given direction along the strip overlying the opening of the following bag. An adhesive means is arranged between one side of each of the bags adjacent its opening and the supporting member for temporarily holding the bags to the supporting member. The strip is then moved in a given direction with the first bag being opened in the direction of movement of the strip when the first bag reaches a predetermined loading position. The bag is then loaded with a given product and the bag is removed from the strip. The strip is then advanced to position the opening of a second adjacent bag in position for being opened and loaded with the product. While this development was an improvement over the prior art, there was no provision made for properly orienting the imbricated bags with respect to the loading position.

In another development, Wing disclosed a packaging development in U.S. Pat Nos. 3,587,844 and 3,587,845 wherein a plurality of open-end bags was positioned one on top of the other in an overlapping relationship with each of the bags being secured to the next succeeding bag by means of an adhesive compound. The bags were then sequentially brought into a loading position and appropriately opened for insertion of a product thereinto. The bags were then separated from the next succeeding bag and the bags were again advanced to a loading position. In this development, it is difficult

to move the bags into a loading position since no strips are available for drawing the bags to the loading position. In addition, the bags are secured to one another thus creating a possibility that when one bag is separated from the next more than one bag may be pulled away from the group of bags forming the imbricated chain of bags.

In another development, Wing provided a packaging arrangement as disclosed in U.S. Pat. No. 3,587,843 wherein a plurality of open-end bags was secured to a pair of strips in an overlapping sequence so that each bag after the bottom bag relative to the strip is offset along the strip about three-quarters of an inch from the adjacent bag and overlies the opening of the underlying bag. The strips to which the bags are secured are pulled over a drive roller means and the tapes are then pulled together and squeezed together by gripping the tapes between the teeth of a pair of gears which pull the tapes in a stepwise fashion. The tape accumulates below the gears and can be periodically removed by severing the tape below the gears or by waiting until a run of bags is completed. However, should the bags be initially misaligned, there is no provision for adjusting the orientation of the bags so the bags are not canted from one side or the other.

Of somewhat similar design, is a development of Roberts et al. disclosed in U.S. Pat. No. 3,698,547 wherein imbricated open-end bags are sequentially pulled into a loading position by drawing the strip to which the bags are secured. As disclosed in the aforementioned Wing U.S. Pat. No. 3,587,843, the strips are secured together and then drawn by means of a gearing arrangement so that the bags are sequentially advanced on the loading table. This development has the same drawback as the aforementioned Wing development since no means are provided for adjusting the orientation of the bags at the loading position should the bags be canted to one side or the other.

It therefore is an object of this invention to provide a new and improved method and apparatus for rapidly and efficiently filling imbricated bags wherein means are provided for adjusting the orientation of the bags as they approach the loading position.

SUMMARY OF THE INVENTION

Accordingly, this invention relates to a bag loading machine for loading imbricated bags wherein the imbricated bags are removably secured to at least two parallel strips in overlying arrangement such that each preceding bag in a given direction overlies the top end of the following bag. The machine includes a frame member having a bag support table releasably attached thereto over which the imbricated bags are drawn into a loading position. Means are provided for drawing the bags over the bag support table into the loading position wherein the means include at least two drive rollers, one for each of the strips to which the bags are attached. The drive rollers are each rotatably mounted with respect to a common shaft with each drive roller having a one-way clutch for conveying the rotary motion of the shaft to the drive rollers so that the drive rollers can rotate in a forward direction but not in a reverse direction. The strips, after passing through suitable guides and the drive rollers, are each wound about an associated storage drum with the drums being rotatably mounted with respect to a common drum support shaft and driven with respect to the shaft by a least two

friction clutches, one for each drum. Thus, both the storage drums and the drive rollers can be rotated independently of each other so that one strip can be drawn independently of the other in order to adjust the orientation of the imbricated bags as they approach the loading position.

As the imbricated bags are being advanced over the bag support table to the loading position, a switch is actuated to stop the movement of the drive rollers. As the bag is loaded, it is stripped from the tape and the next succeeding bag is opened. Also upon removal of the loaded bag, the switch is returned to its closed position to thereby actuate the drive rollers to move the next bag into the loading position.

BRIEF DESCRIPTION OF THE DRAWING

Other objects, features and advantages of the present invention will become more fully apparent from the following detailed description of the preferred embodiment, the appended claims and the accompanying drawings in which:

FIG. 1 is a perspective view of the imbricated bag loading machine of the present invention;

FIG. 2 is an elevation view of the imbricated bag loading machine of FIG. 1;

FIG. 3 is a simplified side elevation view of the drive mechanism for drawing the imbricated bags over the bag support table into a loading position; and

FIG. 4 is a simplified end view showing the drive mechanism of FIG. 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Refer now to the drawings and in particular to FIG. 1 where there is illustrated a perspective view of the imbricated bag loading machine of the present invention. As illustrated, the operating components of the bag loading machine are supported on a frame member 11 which preferably is of an open structure in order to permit easy access to the components of the machine and to provide for easy threading of the tapes or strips 13, 14 to the draw mechanism generally designated by the numeral 15.

The imbricated bags are shown removably secured to two parallel strips 13 and 14 in an overlying arrangement such that each preceding bag overlies the top end of the following bag to thereby provide an overlapping or shingled arrangement of bags on the strips 13 and 14. The bags are secured to the strips in any suitable manner. However, in the preferred embodiment, the strips 13 and 14 have an adhesive compound on the upper surface thereof to which the bags are removably secured. The bags may be closed-end bags as described in the beforementioned co-pending patent application or open-end bags as described in the beforementioned U.S. Pat. Nos. 3,331,182; 3,587,844 or 3,587,845.

The bags in the embodiment illustrated are stored in the form of a roll 17 which is mounted on an idler shaft 19 which in turn is rotatably mounted with respect to the frame 11 by means of a pair of brackets 21. At one end of the idler shaft 19 is mounted a friction wheel 23 which cooperates with a spring biased friction arm 22 which bears against the friction wheel 23. This arrangement prevents unwanted unwinding of the tape bags and, in addition, assists in holding the bags flat on the bagging table 25.

Should the imbricated bags be stored in boxes or cartons rather than wrapped about a roll, a platform 27 is provided for supporting the box of imbricated bags from which the bags are drawn up over the bagging table 25.

As illustrated, the bagging table 25 is formed of a smooth, flat sheet of metal with the end 29 thereof curved so that the bags can be smoothly and easily pulled thereover from the roll 17. At the opposite end of the bagging table is a small cut-out 31 to accommodate a trigger switch 33. In addition, this end of the bagging table has an extended portion bent in the form of a smooth arc to approximately a 30° angle with respect to the horizontal in order to guide an air blast toward the mouth of the bag in order to open a bag for permitting the insertion of a product thereinto. As illustrated, the bagging table also has a pair of notches 35 cut on either side thereof to guide the tapes toward the draw mechanism 15. Preferably, this table is not permanently fastened to the frame but is laid on the frame and is supported in place by indexing tabs, not illustrated. The purpose of this is to permit easy access to the draw mechanism 15 and the bag roll 17 and easy cleaning and sterilization of the loading table, if desired.

A product table 37 is rotatably secured to the frame 11, and as illustrated in FIG. 1, is raised out of the way into an inoperative position for easy access to the draw mechanism 15 to permit threading of the strips or tapes 13 and 14 through the draw mechanism. The product table is formed from a smooth piece of metal plate, preferably of stainless steel, and has turned down flanges on each side thereof. On these flanges are mounted two flat flexible blades 39 and 41 which form product guides to guide the product into the open bags. These guides are of sufficient length to extend a short way into the mouth of the bag when it is opened. Also positioned to the bottom of the product table 37 is a guide chute 43 for guiding continuous, pressurized air from an air pump 55 (see FIG. 2), over the extended bent portion 36 of the bagging table and toward the mouth of the bag. When the product table 37 is rotated counterclockwise into the operative position, the chute 43 is coupled to the outlet orifice of the air pump to communicate air from the air pump to the mouth of the bag.

The draw mechanism includes a first pair of grooved, non-rotating, circular guides made of any material having a low coefficient of friction with respect to the non-coated side of tapes 13 and 14. Guides 45 are positioned on each side of the draw mechanism over which the strips 13 and 14 are drawn. A knurled drive roller 47 is provided on each side of the draw mechanism and is rotatably supported with respect to a common shaft 49 and driven with respect thereto by means of a pair of one-way clutches, not shown in FIG. 1. Against each drive roller 47 is biased a rubber-coated idler roller 51. Accordingly, as illustrated, tape 14 is wound about the knurled roller 47 with the adhesive side of the tape in contact with the knurl. The tape is wound about the knurled roller for greater than an 180° arc so that substantial contact is made between the strip 14 and the knurled drive roller 47. In addition, in order to insure strong contact between the knurled roller and the strip, the rubber-coated idler roller 51 is biased against the drive roller 47 to form a nip through which the strip 14 is drawn. Positioned below the drive roller 47 is a pair of storage drums 53 which is positioned to each side of

the draw mechanism. The storage drums are each mounted with respect to a common shaft 64 which is rotated in synchronism with the drive roller shaft 49 by means of a belt drive arrangement. It, however, should be understood that any other suitable arrangement could be utilized wherein the drums 53 are rotated in synchronism with the rotation of the drive roller 47. The rotational energy of the shaft to which the drums 53 are mounted is coupled to the drums by means of a pair of friction clutches, one for each drum. Thus, either one of the drums 53 can be rotated with respect to the other, if desired, in order to advance one of the strips or tapes 13 or 14 with respect to the other in order to adjust the orientation of the imbricated bags on the bagging table 25. In addition, since the drive rollers 47 are driven by the shaft 49 by means of overrunning one-way clutches, it can be seen that either one of the drive rollers 47 can be rotated with respect to the other in order to draw one or the other of the strips 13 or 14 through the draw mechanism and about the storage drums 53 in order to properly orient the imbricated bags on the bagging table with respect to the loading position.

Refer now to FIG. 2 which is a simplified side elevation view of the bag loading machine of FIG. 1. As illustrated, a roll of imbricated bags is rotatably secured with respect to the frame of the bagging machine by means of brackets 21 with free forward rotational movement of the roll 17 being inhibited by the cooperation of the friction wheel 23 and the friction arm 22. The bagging table 25 is shown releasably secured to the frame 11 with the left side of the bagging table being terminated in a smoothly curved end portion over which the imbricated bags move into position on top of the bagging table. It should be understood, however, that the left end of the bagging table could be terminated in a roller which extends across the width of the table to facilitate movement of the bags over the table.

At the opposite end of the frame, the product table 37 is shown rotated into an operative position with the side guides 39 and 41 shown extending into an open bag 12 to assist in inserting a product 54 into the bag 12. Positioned under the product table 37 is an air pump 55 of conventional design which directs a continuous blast of air through a chute 43, over the bent portion 36 of the bagging table and into the mouth of the bag 12 which is in the loading position as illustrated by the arrows in the drawings. This forced air maintains the bag 12 open during the loading process.

Shown positioned below the bagging table 25 is the draw mechanism generally designated by the numeral 15. An intermittently operated electrical motor of conventional design 57 is fixedly secured to the frame and is energized each time a loaded bag 12 is removed from the bagging table. Thus, when a bag 12 is removed from the table the switch 33 is returned to its closed position to energize the motor 57. With the motor energized, rotational motion is conveyed to the shaft 49 which supports the drive rollers 47. The rotary motion is conveyed to the shaft 49 by any suitable technique known in the art, such as, for example, a belt and pulley arrangement. The drive wheels 47 are rotated until the next succeeding bag 12 moves into position against the switch 33 to thereby open the switch and de-energize the motor 57. At this point, the motor 57 remains turned off until the bag 12 has been loaded and removed from the bagging table 25 after which the switch

33 is again closed and the motor 57 again energized to rotate the drive wheel 47. As aforementioned, the shaft 64 rotated in synchronism with the drive roller shaft 49 and the drive wheels 47 by means of a second belt and pulley arrangement 76. The storage drums 53, because of the drive ratio and the friction clutches rotate only as the tapes are fed to them by the drive wheels. The diameter of the storage drums 53 being greater than that of the drive wheel 47 keeps a tension constantly on the tapes and immediately removes any slack in the tapes that may develop as a result of an adjustment of either drive wheel to equalize the tape feed. It will, of course, be remembered that because of the friction clutches which convey rotary motion of the shaft 64 to the drums 53 each of the drums 53 can be rotated independently of the other in order to draw forward one of the tapes or strips with respect to the other in order to orient the imbricated bags with respect to the table 25 and the loading position at the switch 33.

Refer now to FIGS. 3 and 4 which are a more detailed illustration of the drawing mechanism 15 of the present invention. With reference to FIG. 3, the drive motor 57 is shown fixedly secured to a portion of the frame 11. The drive motor is controlled by a switch 33 which is operated by an extremely sensitive trigger 34 centrally located between the tapes 13 and 14 and extending slightly above the loading table. When a bag contacts this trigger, the switch 33 is thrown into the off position so that when the bag reaches the loading position the bag will not move further forward. As the bag is loaded, it is removed thereby resulting in the opening of the following bag. Thus, if the following bag is a closed-end bag, as described in the beforementioned co-pending patent application, it will be opened by the mechanism described in the patent application. As the bag is opened, it is inflated by the continuous blast of air from pump 55. If the following bag is an open-end bag, as described in beforementioned U.S. Pat. Nos. 3,331,182; 3,587,844; or 3,587,845, it will be opened by the continuous blast of air from pump 55 as the loaded bag above it is removed therefrom. Hence, whether the bags are closed-end bags or open-end bags, they are opened at a bag opening positioning and thereafter drawn forward to a bag loading position, the continuous blast of air keeping the bags open as they are drawn forward.

In order to effect the forward movement of the next succeeding bag from the bag opening position to the bag loading position, trigger 34 moves counterclockwise, as each loaded bag is removed, to close the switch 33 thereby energizing the motor 57 so that it can power the drawing mechanism 15 to pull the next succeeding bag into the loading position.

As illustrated in FIG. 4, the trigger 34 is spring biased by means of a spring 38 into a normally closed position and it is only when a bag moves against the trigger 34 that the trigger is rotated against the bias of spring 38 into an opened position.

Also secured to the frame 11 is the first pair of guides 45 which are spaced with respect to the frame 11 by means of an appropriate bracket 46. Also rotatably secured with respect to the frame 11 is drive roller pair 47 which preferably have a knurled surface to provide for an easy release of the tapes 13 and 14 once they pass through the nip between rolls 47 and 51. The drive rollers 47 are supported on a common shaft 49 which is rotatably supported with respect to the frame 11 by

means of a pair of brackets 48. Each of the drive wheels 47 are maintained in position at one end by means of the brackets 48 and at the other end by means of an appropriate retaining ring 50. Rotational energy from the common drive shaft 49 is conveyed to each of the drive rollers by a one-way clutch positioned between the shaft 49 and the drive roller 47. Since one-way clutches are well-known in the art, such as those made by the Torrington Co., the clutch will not be disclosed herein in detail in order to more clearly and concisely present the salient features of applicant's invention.

In order to prevent a reverse movement of the shaft 49, a second one-way clutch 52 is provided having one portion thereof secured to bracket 48 with the other portion secured to the shaft 49 so that the shaft can only rotate in the forward direction. A pair of rubber-coated idler wheels 51 are provided which are spring biased by means of springs 26 against the knurled drive wheels 47. The idler wheels 51 are movably supported with respect to the frame 11 by means of an arm 56 with the springs 26 being positioned between the arms 56 at one end and the end of a shaft 58 at the other end which shaft is connected to the fixedly positioned brackets 48. Thus, the combination of the rubber-coated idler wheels 51 and the knurled drive wheels 47 form a nip through which the tapes 13 and 14 must pass before being wrapped about the storage drums 53.

The storage drums 53 are shown fixedly secured to the frame 11 by means of brackets 60 which support the common shaft 64. The drums 53 are driven with respect to the shaft 64 by means of a pair of friction clutches which are of conventional design known in the art. Accordingly, the structure of the friction clutches would not be disclosed herein in detail. As aforementioned, the purpose for utilizing friction clutches to drive the drums 53 is so that each of the drums 53 can be rotated independently of the other, if desired, to draw one tape or strip with respect to the other. As illustrated in the figure, the drums are relatively wide in order to accommodate any spacing of the tapes as the width of the bags being loaded is varied to accommodate various product sizes.

In operation, when the motor 57 is energized, rotary motion is conveyed to a pulley 68 for driving shaft 49 by means of a belt 70. Rotary motion in turn is conveyed from shaft 49 to the drum shaft 64 by means of pulleys 72 and 74 having a second endless belt 76 positioned thereabout. Accordingly, shaft 64 will rotate in synchronism with the shaft 49 as the waste strips or tapes 13 and 14 are wound about the storage drums 53.

The preferred embodiment of applicant's invention described hereinabove has the meritorious advantage that should for any reason the waste tapes 13 and 14 become misaligned with respect to each other, thereby causing a disorientation of the imbricated bags on the loading table 25, by a simple rotation of either of the drive wheels 47 or the storage drums 53 with respect to drive wheel or storage drum on the opposite side of the drive mechanism the tapes can again be aligned and, hence, the imbricated bags can be appropriately oriented on the bagging table to permit easy and efficient loading thereof in a sequential order. Further, because the open frame structure and the fact that the product table 37 can be easily rotated into the inoperative position illustrated in FIG. 1 and since the bagging table 25 can be easily removed from the frame, these parts can be easily washed and sterilized in order to

provide for a sanitary loading of the bags with an appropriate product. Further, since the product table 37 can be rotated out of position and since the respective components of the draw mechanism 15 are positioned to each side of an open frame, the tapes or strips can be easily and efficiently threaded through the draw mechanisms and in addition, the tapes can be quickly disengaged from the draw mechanism in case it is desired to remove a particular batch of bags in order to change the size of the bags. It accordingly can be seen that the present invention is a substantial improvement over the prior art bagging arrangements.

While the present invention has been disclosed in conjunction with a preferred embodiment thereof, it should be understood that there may be other obvious modifications of applicant's invention which fall within the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. A bag loading machine for loading imbricated bags wherein said imbricated bags are removably secured to at least two parallel strips in overlying arrangement such that each preceding bag in a given direction overlies the top end of the following bag, said machine comprising in combination

a frame member,

a bag support table attached to said frame member over which said imbricated bags are drawn into a loading position,

means for drawing said bags over said bag support table into said loading position, said means including means for separately drawing each of said strips over said table, said strip drawing means being capable of drawing one strip independently of the other to thereby permit the adjustment of the orientation of said bags, and

means for opening said bags to permit loading thereof.

2. The bag loading machine of claim 1 wherein said means for separately drawing each of said strips over said table comprises

at least two drive rollers, one for each of said strips, said drive rollers being rotatably mounted with respect to a common shaft,

at least two one-way clutches, one for each drive roller, for conveying rotary motion of said shaft to said drive rollers, and

means for rotating said drive shaft when a bag is to be moved into said loading position.

3. The bag loading machine of claim 2 including means responsive to said strip drawing means for storing each of said strips separately of one another.

4. The bag loading machine of claim 3 wherein said means for storing said strips comprises

at least two drums, said drums being rotatably mounted with respect to a drum support shaft,

at least two friction clutches, one for each drum, for conveying the rotary motion of said shaft to said drum wherein each of said drums can be rotated with respect to the other, and

means for rotating said drum support shaft in synchronism with said drive roller support shaft.

5. The bag loading machine of claim 4 where the diameter of said drums is greater than that of said drive rollers.

6. The bag loading machine of claim 3 further comprising a product support table rotatably and releasably

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attached to said frame member through which the product to be filled into said imbricated bags is moved, said product support table having a pair of guide surfaces extending partially into an open bag, said product support table having an opening at one end thereof to permit the passage of air under pressure into the mouth of the bag in said loading position to thereby keep said bag open for the ingress of said product thereinto.

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7. The bag loading machine of claim 6 further comprising means for maintaining tension on said imbricated bags as said bags are drawn over said bag support table into said loading position.
8. The bag loading machine of claim 7 further comprising means for preventing the reverse rotation of said drive rollers.

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