CARTON SEALING MACHINE

Inventor: Tony Ku, Shenkang Hsiang (TW)

Correspondence Address:
ROSENBERG, KLEIN & LEE
3458 ELICOTT CENTER DRIVE-SUITE 101
ELICOTT CITY, MD 21043 (US)

Appl. No.: 10/990,473
Filed: Nov. 18, 2004

Publication Classification

Int. Cl. B65B 61/00 (2006.01)

ABSTRACT

A carton sealing machine includes a machine base, and two sealing mechanisms installed in the machine base at different elevations and controlled to seal sealing tapes to the two sides and four corners of the top and bottom panels of a carton, each sealing mechanism having two parallel conveyors and pairs of tape dispensers, front angle sealing tape setting mechanisms, rear angle sealing tape setting mechanisms and horizontal sealing tape setting mechanisms bilaterally symmetrically provided at an outer side relative to the conveyors.
Fig. 1
Fig. 6
CARTON SEALING MACHINE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

The present invention relates to the sealing of cartons and more particularly, to a carton sealing machine for sealing a carton with sealing tapes automatically.

[0002] 2. Description of the Related Art

After packing of products with a carton, the carton must be well sealed with sealing tapes. As shown in FIG. 1, the two sides of four corners of each of the top and bottom panels of the carton are sealed with sealing tapes 2, each sealing tape 2 having a front vertical end portion 2a, rear vertical end portion 2c, and a horizontal middle portion 2b sealed to the carton. Conventionally, this sealing job is done by labor. It takes much working time to seal a number of cartons with sealing tapes manually.

SUMMARY OF THE INVENTION

The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide a carton sealing machine, which seals cartons with sealing tapes automatically. According to one aspect of the present invention, the carton sealing machine comprises a machine base, an upper sealing mechanism and a lower sealing mechanism installed in the machine base at different elevations and controlled to seal sealing tapes to the two sides and four corners of the top and bottom panels of each carton delivered to the inside of the carton sealing machine. Each sealing mechanism comprises two parallel conveyers and pairs of tape dispensers, front angle sealing tape setting mechanisms, rear angle sealing tape setting mechanisms and horizontal sealing tape setting mechanisms bilaterally symmetrically provided at an outer side relative to the conveyers. According to another aspect of the present invention, the carton sealing machine further comprises comprising four transmission gears provided at the top side of a rack in four corners, a plurality of screw rods pivotally mounted in the rack and respectively coupled to the transmission gears, a rectangular open frame vertically movably suspending in the rack to carry the upper sealing mechanism to the desired elevation, and a plurality of transmission chains respectively vertically coupled between the transmission gears and the four corners of the rectangular open frame to keep the rectangular open frame in balance when lifting the rectangular open frame.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a carton sealed with sealing tapes.

FIG. 2 is a front plain view of a carton sealing machine according to the present invention.

FIG. 3 is a side plain view of the carton sealing machine according to the present invention.

FIG. 4 is bottom view of the upper sealing mechanism of the carton sealing machine according to the present invention.

FIG. 5 is a top view of the lower sealing mechanism of the carton sealing machine according to the present invention.

FIG. 6 is a perspective view of a part of the present invention, showing the arrangement of the rack and the rectangular open frame of the upper sealing mechanism in the rack.

FIG. 7 is a schematic drawing showing the operation of the front angle sealing tape setting mechanism (A: front angle top view; B: rear angle top view; C: horizontal rear view).

FIG. 8A is a perspective view of an alternate form of the horizontal sealing tape setting mechanism according to the present invention.

FIG. 8B is a rear plain view of the alternate form of horizontal sealing tape setting mechanism according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 2-7, a carton sealing machine is shown comprising a machine base 3, a lower sealing mechanism 200 provided at the machine base 3, a rack 4 mounted on the top side of the machine base 3, and an upper sealing mechanism 100 vertically movably suspending in the rack 4 above the lower sealing mechanism 200.

The upper sealing mechanism 100 comprises a rectangular open frame 5, two parallel conveyers 6 mounted in the rectangular open frame 5, and pairs of tape dispensers 30, front angle sealing tape setting mechanisms 12, rear angle sealing tape setting mechanisms 10 and horizontal sealing tape setting mechanisms 15 bilaterally symmetrically provided at an outer side relative to the conveyers 6. The tape dispensers 30 each comprise a front roller 31, a rear roller 32, and a cutter 33. The upper sealing mechanism 100 is controlled to seal two sealing tapes 2 to the two sides and four corners of the top panel of the carton such that each well-sealed sealing tape 2 has a front vertical end portion 2a, rear vertical end portion 2c, and a horizontal middle portion 2b sealed to the carton. The front angle sealing tape setting mechanisms 12 each comprise a rod member 13 and a flexible working strip 14 extending from the rod member 13 for pressing one end of a sealing tape 2 from one tape dispenser 30 onto one corner of the top panel of the carton, thereby forming the front vertical end portion 2a. The rear angle sealing tape setting mechanisms 10 each comprise a motor M1 and a flexible strip 11 extending from the output shaft of the motor M1 for pressing the other end of the sealing tape 2 from the respective tape dispenser 30 onto the other corner of the top panel of the carton, thereby forming the rear vertical end portion 2c. The horizontal sealing tape setting mechanisms 15 each comprise a motor M2 and two flexible working strips 16 extending from the output shaft of the motor M2 for pressing the middle part of the sealing tape 2 from the respective tape dispenser 30 onto the one side of the top panel of the carton, thereby forming the horizontal middle portion 2b. Further, air cylinders 23 are vertically provided between the machine base 3 and the rectangular open frame 5 of the upper sealing mechanism 100, and controlled to move the rectangular open frame 5 vertically upwards or downwards relative to the machine base 3.

As indicated above, the lower sealing mechanism 200 is provided at the machine base 3. Same as the aforesaid upper sealing mechanism 100, the lower sealing mechanism
200 comprises two parallel conveyors 6 mounted on the machine base 3, and pairs of tape dispensers 30, front angle sealing tape setting mechanisms 12, rear angle sealing tape setting mechanisms 10 and horizontal sealing tape setting mechanisms 15 bilaterally symmetrically provided at an outer side relative to the conveyors 6. The lower sealing mechanism 200 is controlled to seal two sealing tapes 2 to the two sides and four corners of the bottom panel of the carton such that each well-sealed sealing tape 2 has a front vertical end portion 2a, a rear vertical end portion 2c, and a horizontal middle portion 2b.

[0018] Further, the lower sealing mechanism 200 and upper sealing mechanism 100 each further comprise a plurality of air cylinders 101 or 201 set in horizontal and controlled to adjust the pitch in the respective pair of tape dispensers 30, front angle sealing tape setting mechanisms 12, rear angle sealing tape setting mechanisms 10 and horizontal sealing tape setting mechanisms 15 so that the carton sealing machine fits cartons of different sizes.

[0019] Further, four transmission gears 21 are provided at the top side of the rack 4 in the four corners and coupled to one another by screw rods 20. Transmission chains 22 are respectively vertically coupled between the transmission gears 21 and the four corners of the rectangular open frame 5 to keep the rectangular open frame 5 in balance when lifting.

[0020] Referring to FIGS. 3-7 again, the left and right tape dispensers 30, front angle sealing tape setting mechanisms 12, rear angle sealing tape setting mechanisms 10 and horizontal sealing tape setting mechanisms 15 of the lower sealing mechanism 200 and upper sealing mechanism 100 are adjusted to the desired pitch subject to the size of the carton 1, and then the carton 1 is placed on the two conveyors 6, and then the front rollers 31 of the tape dispensers 30 of the upper and lower sealing mechanisms 100 and 200 are operated to have the front end of each of the two sealing tapes 2 sealed to the front corners of the top and bottom panels of the carton 1 to form a respective front vertical end portion 2a at the carton 1 (see also FIG. 1), and then the conveyors 6 are operated to carry the carton 1 forwards and to have the respective sealing tapes 2 sealed to the two sides of each of the top and bottom panels of the carton 1 to form a respective horizontal middle portion 2b at the carton 1, and then the respective cutters 33 are operated to cut off the respective sealing tapes 2. At this time, the rear end of each of the applied sealing tapes 2 is not sealed to the carton 1 (see the dotted line in FIG. 1). When the carton 1 moved to the position where the front side of the carton 1 touches the flexible strips 14 of the front angle sealing tape setting mechanisms 12, the front angle sealing tape setting mechanisms 12 are forced to curve and to press the front end of each of the applied sealing tapes 2 on the carton 1 (see FIG. 7A), and therefore the front end of each of the applied sealing tapes forms a respective front vertical end portion 2a at the carton 1. When the rear end of each applied sealing tape 2 passed the respective rear angle sealing tape setting mechanism 10 after sealing of the front end of each applied sealing tape 2 during forward movement of the carton 1, the motor M1 of the respective rear angle sealing tape setting mechanism 10 is rotated to force the respective flexible strip 11 against the rear end of the respective sealing tape 2 and the carton 1, and therefore the rear end of each of the applied sealing tapes 2 forms a respective rear vertical end portion 2c at the carton 1. When the carton 1 moved over the horizontal sealing tape setting mechanisms 15 of the lower sealing mechanism 200 and upper sealing mechanism 100, the respective motors M2 are rotated to press the respective flexible strips 16 on the applied sealing tapes 2 against the carton 1, and therefore the middle part of each applied sealing tape 2 forms a horizontal middle portion 2b at the carton 1b.

[0021] FIGS. 8A and 8B show an alternate form of the horizontal sealing tape setting mechanisms. As illustrated, the horizontal sealing tape setting mechanism comprises two axes 43 arranged in parallel at different elevations, chain wheels 42 respectively mounted on two distal ends of each of the axes 43, two transmission chains 41 respectively vertically coupled between the chain wheels 42 at the axes 43, a brush 40 horizontally connected between the transmission chains 41, and a motor M3 coupled to one end of one axis 43. When started the motor M3, the brush 40 are moved to press the applied sealing tape to the carton, and therefore the applied sealing tape forms a horizontal middle portion 2b at the carton.

[0022] A prototype of carton sealing machine has been constructed with the features of FIGS. 2-8. The carton sealing machine functions smoothly to provide all the features discussed earlier.

[0023] Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

What the invention claimed is:

1. A carton sealing machine comprising:

   a machine base;
   
a rack mounted on said machine base; and

   an upper sealing mechanism vertically movably suspending in said rack, said upper sealing mechanism comprising a rectangular open frame, two parallel conveyers mounted in said rectangular open frame, and pairs of tape dispensers, front angle sealing tape setting mechanisms, rear angle sealing tape setting mechanisms and horizontal sealing tape setting mechanisms bilaterally symmetrically provided at an outer side relative to said conveyers, said tape dispensers each comprising a front roller, a rear roller, and a cutter, said upper sealing mechanism being controlled to seal two sealing tapes to two sides and four corners of the top panel of a carton such that each well-sealed sealing tape has a front vertical end portion, rear vertical end portion, and a horizontal middle portion sealed to the carton, said front angle sealing tape setting mechanisms each comprising a rod member and a flexible working strip extending from said rod member for pressing one end of a sealing tape onto one corner of the top panel of a carton to form a front vertical end portion at the carton, said rear angle sealing tape setting mechanisms each comprising a motor and a flexible strip extending from the output shaft of the motor for pressing a rear end of a sealing tape onto a carton to form a rear vertical end portion at the carton, said horizontal sealing tape setting mechanisms each comprising a motor
and two flexible working strips extending from the output shaft of the motor for pressing the middle part of a sealing tape onto a carton to form a horizontal middle portion at the carton;

a plurality of air cylinders vertically provided between said machine base and said rectangular open frame of said upper sealing mechanism and adapted to move said rectangular open frame vertically upwards or downwards relative to said machine base; and

a lower sealing mechanism provided at said machine base below said upper sealing mechanism, said lower sealing mechanism comprising two parallel conveyors mounted on said machine base, and pairs of tape dispensers, front angle sealing tape setting mechanisms, rear angle sealing tape setting mechanisms and horizontal sealing tape setting mechanisms bilaterally symmetrically provided at an outer side relative to the conveyers of said lower sealing mechanism, said lower sealing mechanism being controlled to seal two sealing tapes to two sides and four corners of the bottom panel of a carton such that each well-sealed sealing tape has a front vertical end portion, rear vertical end portion, and a horizontal middle portion seal to the carton.

2. The carton sealing machine as claimed in claim 1, further comprising four transmission gears provided at a top side of said rack in four corners, a plurality of screw rods pivotally mounted in said rack and respectively coupled to said transmission gears, and a plurality of transmission chains respectively vertically coupled between said transmission gears and the four corners of said rectangular open frame to keep said rectangular open frame in balance when lifting said rectangular open frame.