METHOD AND APPARATUS FOR BANDING ARTICLES

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ABSTRACT

A method and apparatus for applying restraining bands to layered articles such as a stacks of paper towels in which the apparatus includes upper and lower conveyors with converging runs to compress the stacks prior to application through a band delivery gap between two upper conveyors of pre-cut sheets of banding material to the upper surface of the compressed stacks. The banding sheets are cut from a web by a cut-off knife. The knife and apparatus for feeding the web are controlled by micro switches located in the article feed path which energize driven timing cams which control web feed and the cut-off knife. In addition to applying bands to discrete stacks or articles, a succession of longitudinally spaced bands can be applied to elongated stacks or "logs" such as a bolt of paper toweling of a length corresponding to the web width of the paper supplied to a towel interfolding machine. The log can be subsequently cut between the bands. Novel means are provided to maintain stack compression as the band is wrapped thereabout during continued advance of the stack to a point of discharge.

32 Claims, 13 Drawing Figures
METHOD AND APPARATUS FOR BANDING ARTICLES

BACKGROUND OF INVENTION

Restraining bands are applied to stacks or articles such as paper towels to maintain an imposed compression and thus reduce shipping volume and facilitate handling. Applying a band to the top of a stack of uncompressed articles as with prior art banding apparatus and subsequently compressing the stack and completing the wrapping sequence, often results in a wrinkled band, uneven edges and improper joiner of the band ends.

SUMMARY OF INVENTION

The method and apparatus of the invention applies a single, smooth, properly centered restraining band around discrete articles or stacks. It can also apply multiple bands around a log length article as the articles are moved continuously along a linear feed path as by upper and lower spaced conveyors.

Compression of the articles in advance of application of the restraining bands, to thus overcome the deficiencies of prior art apparatus, is desirably provided by converging runs on upper and lower article transport conveyors. The converging runs are located in advance of a band delivery gap between two longitudinally aligned upper conveyors through which the bands are delivered to the upper surface of the advancing articles. The upper conveyor downstream of the band delivery gap has an entrance flare run to provide clearance above the upper leading edge of the article for admittance of the band sheets. The lower run of the upper conveyor upstream of the delivery gap, maintains the imposed compression of the article as the band sheets are applied to the upper surface of the article. The articles remain compressed throughout the band wrapping sequence as the band is subsequently folded along the sides and beneath the advancing articles. Sheets of banding material are delivered to the articles through the band delivery gap by inclined pairs of band delivery belts with the belts in each pair having contiguous runs which grip the band sheets.

The band sheets are cut from a web of roll-stock banding material which is fed to the band delivery belts by web feed apparatus which is energized by a micro switch having a feeler in the article feed path which engages the advancing articles. Thus, the timing of the feed of banding material is controlled by the advancing articles and the articles do not have to move at uniform spacing through the banding apparatus. A cut-off knife controlled by timing cams and associated limit switches cuts a measured band sheet from the web. When multiple bands are applied to a log length article, a second micro switch with an article engaging feeler in the article feed path initiates the control cycle to cut-off multiple band sheets which are applied at uniform intervals.

The invention further incorporates novel means to maintain stack compression as the band is wrapped thereabout during continued advance of the stack to a point of discharge.

Although the banding method and apparatus of the invention is particularly appropriate for applying restraining bands to compressible stacks, it also can be used to band non-compressible articles.

It is an object of the invention to provide a method and apparatus which produces a tight, neat package, automatically cuts off bands in register with the package, and in which the banded ends are joined squarely around the package.

It is a further object of the invention to provide an automated banding method and apparatus with straight through product flow which is self-actuated and independent of line speed or power, and in which a full parent roll width of a folded product may be banded and fed to a log saw.

It is an additional object of the invention to provide a banding method and apparatus with a high production rate, and thus a lower cost per article, and in which the band width may be varied as desired.

Further objects, features, and advantages of the invention will become apparent from the following disclosure.

DRAWINGS

FIG. 1 is a fragmentary diagrammatic perspective view of banding apparatus in accordance with the invention.

FIG. 2 is a fragmentary diagrammatic plan view showing the relation between the compression rollers illustrated in FIG. 1 and a partially banded sheet stack.

FIG. 3 is a diagrammatic perspective view of the clutch-brake unit and timing cams which control the feed of the band web and the cut-off knife.

FIG. 4 is an enlarged fragmentary diagrammatic side elevational view showing parts of the apparatus shown in FIG. 1.

FIG. 5 is a schematic diagram of the electrical circuit which controls the feed of banding web and the web cut-off knife.

FIG. 6 is a fragmentary end view of the idler roller mounting arrangement shown in FIGS. 1 and 4.

FIG. 7 is an enlarged fragmentary side view of a compression roller and roller mount as also shown in FIGS. 1 and 2.

FIG. 8 is a side elevational view of the lower conveyor assembly along the side of the apparatus opposite the side shown in FIG. 1.

FIG. 9 is a plan view of the lower conveyor assembly shown in FIG. 8.

FIG. 10 is a sectional view along line 10—10 of FIG. 9.

FIG. 11 is an enlarged fragmentary view taken along line 11—11 of FIG. 9.

FIG. 12 is an enlarged fragmentary sectional view taken along line 12—12 of FIG. 9.

FIG. 13 is an enlarged fragmentary sectional view taken along line 13—13 of FIG. 9.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Although the disclosure hereof is detailed and exact to enable those skilled in the art to practice the invention, the physical embodiments herein disclosed merely exemplify the invention which may be embodied in other specific structure. The scope of the invention is defined in the claims appended hereto.

Like parts are identified in the several views by like reference characters.
An infeed belt conveyor 8 delivers articles 14 such as stacks of paper towels to the banding apparatus 10. The paper sheets in the stack trap air and the stack is compressible in the vertical plane. The infeed conveyor 8 transfers the articles 14 to spaced upper and lower conveyor assemblies 18, 20 (FIG. 1, 4) which have opposed converging runs 22 and 24 (FIG. 4) which form an entrance throat and which progressively compress the advancing articles 14 to the desired height.

The compressed articles 14 move between parallel belt runs 26 and 28 of the belt conveyor assemblies 18, 20. The discharge end of belt conveyor 18 is spaced from the input end of following belt conveyor 32, thus to provide a band delivery gap 34 (FIG. 4) between the successive conveyors 18, 32. Conveyor 32 has a lower belt run 29 parallel with upper belt run 28 of the lower conveyor assembly 20. Run 29 has back-up means such as strip plate 30 or the like to maintain vertical compression on the stacks 14 as they travel therebeneath. Run 29 has an inclined lead-in run 31 which provides a clearance zone 33 between the run 31 and the top of the article 14, thus to facilitate application of the restraining band sheets 42 to the tops of article 14. Sheets 42 of band material are cut and fed to laterally spaced pairs 50, 52 (FIG. 1) of inclined band carrier belts 53 by means of web feed and cut-off apparatus 48 hereinafter described in detail. The pairs 50 and 52 of carrier belts are spaced laterally from each other a distance greater than the width of the article 14 and have contiguos runs which grip the margins of the band sheets 42 at zones laterally outwardly of the upper and lower conveyor assemblies 18, 20. Accordingly, the pairs 50, 52 of belts 53 do not interfere with article movement between the conveyors 18, 20, 32.

The band sheets 42 are delivered to the pairs 50, 52 of band belts in synchronization with the position of the article 14 as will presently be described, so that the band sheets 42 are applied to the upper surface 54 of the articles as the articles 14 move beneath the delivery gap 34 at a centered position between the fore and aft ends of the article and a medial position between the side margins, with wing portions 68 on the band sheets extending laterally of both sides of the article. As the band 42 is applied to the article, a glue applying roller 60 (FIG. 1) applies a stripe of glue or adhesive to the underside of the band sheet 42 along one margin.

As the continuously moving article 14 progresses between the belt conveyors 20 and 32, the laterally projecting wings 68 of the band sheet 42 engage fixed, downwardly inclined plows 64 (FIGS. 1, 9) which are located on opposite sides of the article feed path and which fold the band wings 68 downwardly along the sides 66 of the articles 14 to form band side panels.

The winds or side panels 68 are firmly pressed against the side of the article by paired batteries 70 and 72 of compression idler rollers 73 located on opposite sides of the linear article feed path. In a practical embodiment of the invention, there are eleven rollers 73 in each battery with the idler rollers 73 individually rotatably supported on bell crank brackets 75 (FIGS. 2, 7) which are mounted on pivot pins 71. The pivot pins 71 are carried by mounting blocks 78 which are pivotally connected to a swing plate 74 by horizontal pins 79. Thus the axes of the rollers 73 can be tipped in a vertical plane parallel to the vertical sides of the article. In use, the axis of pins 71 is desirably inclined in the direction of product flow as represented by arrow 79 at an angle A of approximately 7° from the vertical. Thus, in addition to compressing the band side panels 68 against the sides of the article, the inclined rollers 73 urge the wrap downward as the rollers 73 rotate about their inclined axes, induce vertical tension in the side panels 68 to remove wrinkles and snug the band around the stack 14.

The swing plates 74 are hinged on pins 76 to permit each battery 70, 72 to be swung laterally out of the article feed path for cleaning purposes, as suggested in broken lines in FIG. 1. The plate 74 is held in its normal, upright full line position by clamp nut 80. Springs 77 connected between the ends of the bell cranks and the swing plate 74 bias the rollers 73 against the stack and yield as the rollers 73 swing about the pins 71 when the rollers 73 engage the sides of the article.

As the stacks 14 move between the compression rollers 73, in the direction of arrow 67 (FIG. 8) the wing flaps 105, 114 extending from side band wing panels 68 (FIGS. 8, 12 and 13) are tucked beneath the article 14 by two longitudinally staggered bottom plows 82, 83 associated with the lower conveyor assembly 20 to form bottom panels. The arrangement is such that vertical stack compression is maintained throughout this process.

The lower conveyor assembly 20 has an inclined run 24 and a horizontal run 28 as previously described (FIGS. 4 and 8). The runs 24 and 28 are formed by two belts 89 and 91 which are laterally separated by a gap 93 (FIG. 9). The belt 89 is shorter than the belt 91 to provide a gap 95 between its discharge end at belt roller 86 and the input end of belt 106 at belt roller 119, thus to leave the zone 95 just ahead of plow 82 free of belts at the side of the assembly which is adjacent wing flap 105.

Article 14 is supported as it passes over the gap 95 at its side adjacent wing flaps 114 by the belt 91 and at its center and its side adjacent wing flap 105 by a table plate 97 which spans the gap 95 and includes a finger plate portion 80 which fills in the gap or space 93 between the belts 89, 91. The plate 97 is provided with a downturned lip 99 at the leading edge of gap 93 to afford smooth transfer of the article 14 onto the plate 97.

The leading edge 103 (FIGS. 1, 9 and 12) of the plow 82 is laterally outwardly offset from the edge of the plate 97 and from the side of the article 14 and band panel 68 to intercept and capture the wing flaps 105 as the article 14 comes abreast of plow 82 (FIGS. 8, 12).

The action of the plow 82 is illustrated in FIG. 12. The unglued margin or wing flap 105 of band side panel 68 is progressively folded in the gap 95 upwardly and inwardly from the generally vertical position shown in broken lines to the generally horizontal position in broken lines beneath the plate 97. During this progress, stack compression is maintained between top belt 29 and plate 97. Continued progress of the stack 14 causes the wing flap 105 to move into the narrow gap or throat 115 between the top of the plow 82 (FIG. 11) and the plate 97 and climb onto the leading end of following belt 106 and up against the bottom of stack 14. Belt 106 is located adjacent to an article support plate 109 which spans another gap 113 which is staggered with respect to gap 95 and which extends from the
discharge end of belt 91 and the input end of final compression belt 80.

Belt 80 has an input end reeved on a roller 121 on shaft 127 which also carries a belt roller 131 for the discharge end of belt 106. The adjacent ends of belts 91 and 106 are respectively reeved on rollers 117 and 118 which are carried by a common shaft 119 (FIG. 10). The undersurface of belt 91 is supported in the area of gap 95 by a plate 129 (FIG. 12) which is connected to plate 97 and has a tapered trailing edge 131 which leads into plow 82 (FIG. 9). Similarly, a plate 133 (FIG. 13) with a tapered edge 135 (FIG. 9) supports the belt 106 in the area of the gap 113.

The glued margin or wing flap 114 (FIG. 13) is folded upwardly and beneath plate 109 by plow 83 in gap 113 in the same manner as previously described for flap 105. (See FIG. 13). The leading edge 103 of plow 83 intercepts the flap 114 and folds it up against the undersurface of plate 109 and ultimately over belt 80 and against the undersurface of the article 14. The extreme glued margin of flap 114 comes into overlapping relationship with the unglued wing flap 105, thus gluing the flaps together. As the article 14 moves beyond the plate 109, the belt 80 presses the glued wing 114 against the wing 105 to complete the band by firmly uniting the overlapped wings 105 and 114.

Thus, the lower conveyor assembly 20 provides continuous and firm support for and maintains stack compression on article 14 throughout the length of the apparatus 10 and across the gaps 95, 113, thus permitting folding of the bottom flaps or wings 105, 114 without interference with the runs of any belts.

The web feed and cut-off apparatus 48 (FIGS. 1, 4 and 6) includes a movable knife 90 carried by a reciprocable knife bar 92 mounted in guides (not shown) and a bed knife or fixed knife 94 carried by bar 96. When the knife 90 moves against the bed knife 94, a hold down bar 98 with rubber buttons or feet clamps the web 116 of banding material against a web support plate 104. The hold-down bar 98 is yieldably mounted on guide rods or studs 100 which are received in apertures 101 in bar 92. Springs 102 arranged around the studs 100 yield as the holding bar 98 engages the web 116 against the web support plate 104. Knife bar 92 is actuated by fluid motor 112 for movement of the knife 90 between a cutting position and a retracted position as hereinafter explained.

Feed of the web 116 from a supply roll 107 (FIG. 1) to the cut-off knife 90 is provided by a driven friction roller 108 which rotates about a fixed axis, and an intermittently coacting idler roller 110 which is rotatably supported on a shaft 111 which is rotatably and eccentrically supported by a pair of spaced bearing discs 120 (FIG. 4, 6) which support the ends of the shaft 111. The bearing discs 120 are pivotally supported on the frame 125 by pintsles 123 (FIG. 6). The eccentric bearing discs 120 are adjustably mounted in clamp arms 22 (FIG. 6) which have cam followers 124 received in cam slots 126 in two interconnected curved follower levers 128 located at the ends of the idler roller 110.

The follower levers 128 are respectively connected by bushings 130 (FIGS. 1 and 4) to the ends of the knife bar 92. The other ends of the follower levers 128 are fixedly connected to a cross shaft 132 pivotally supported on frame 125. The levers 128 are adapted to swing about shaft 132. Thus, upward movement of the knife bar 92 causes upward movement of the ball joints 130 and swings the levers 128 clockwise about the pivot axis of shaft 132. This transmits corresponding clockwise movement to the clamp arms 122 about fixed pivot 123, thus swinging idler roller 110 downwardly against the web 116 and thence against the friction roller 108, whereby to feed the web forwardly to the pairs 50, 52 of band carrier belts 53.

Means are provided operable in response to engagement by the advancing articles to control movement of the idler roller 110 against the web 116 and the feed roller 108, thus to feed the web to the cut-off knife 90, and actuate the knife 90 to cut a measured length or band 42 from the web 116. In the disclosed construction, the means includes a clutch, brake unit 140 connected by gears 139 to friction roller 108 and provided with a clutch winding 141 and a brake winding 143 (FIG. 5) which operates from a dc power supply 153. The clutch-brake unit 140 has an output shaft 145 carrying three cams 142, 144, and 146. The cams 142, 144 and 146 respectively engage cam followers on activating levers of switches 148, 150, and 152. The shaft 145 and cams rotate one revolution as an article 14 moves one article length between the conveyors 18, 20. The fixed relationship between cam rotation and article movement permits equal spacing of consecutive bands on logs as presently described.

In operation, when an article 14 moves between conveyors 18 and 20, it initially engages the feeler 161 of a normally open micro switch 160 (FIGS. 4, 5). The feeler 161 is located in the article feed path. The micro switch 160 and a manual switch 162 are employed to apply multiple spaced bands to a bolt or log as hereinafter described.

When only separate and discrete articles are being supplied to the apparatus, the single cycle switch 159 is closed, and switch 162 is placed in an open position. Thus the micro switch 160 is ineffective and does not energize the clutch-brake unit 140 when its feeler 161 is contacted by an article. The advancing article 14 next engages a feeler 163 on a micro switch 164 which is normally open. When switch 164 is closed by engagement of an article 14 with feeler 163, it completes the circuit though normally closed micro switch 178 to energize a relay 166 (FIG. 5) and close normally open relay contacts 167 and 168 and open normally closed relay contacts 170. The closing of contacts 168 energizes the clutch winding 141 and the opening of the relay contacts 170 de-energizes the brake winding 143, thus to initiate rotation of shaft 145 and the cams 142, 144, and 146.

As the cam 142 rotates, the cam follower of the switch 148 comes out of the notch or recess 147 and closes the normally open switch 148. The now closed contacts 167 and closed switch 148 maintain current flow to the relay coil 166 as long as the cam follower is out of the recess 147 of cam 142. As the cams continue to rotate, the cam 146 closes normally open switch 152 which completes the circuit to a solenoid valve 174 which pressurizes the pneumatic cylinder 112 to raise the cut-off knife 90. As the knife 90 raises under influence of the cylinder 112, the levers 128 move the idler roller 110 against the drive roller 108 to commence feed of the web 116 of banding material to the pairs 50, 52 of the band carrier belts.
As the article 14 continues to advance between the conveyors 18, 20, 32, it engages the feeler 177 of normally closed micro switch 178, thereby opening the circuit path to the relay 166 and leaving the circuit maintained only through the microswitch 148 to the relay coil 166.

The web 116 continues to feed until an electric eye scanner (not shown) senses a printed spot on the band web 116, and closes relay contacts 180 which energize the solenoid 174 and fluid motor 112 to advance the knife 90 to cut off a band sheet 42 from the web 116. As the knife 90 is lowered, the idler roller 110 moves away from the drive roller to stop feed of the web 116. The buttons 99 concurrently clamp the web 116 against the plate 104 to positively stop web feed.

The switch 150 is actuated by the cam 144 which resets the electric eye relay for the next article. As the cam shaft 145 completes one revolution and the cam follower on switch 148 moves into the recess on cam 142, switch 148 opens to interrupt the other circuit to relay 166 and hence open contacts 168 to interrupt current flow to the clutch winding 141 and closes contacts 170 to energize the brake winding 143 to stop movement of the cams. The article 14 now advances to intercept the band sheet 42 and the circuit is ready for another article.

The micro switches 160, 164 and 178 are slideably mounted for longitudinal movement to afford adjustment of band position on the articles. Accordingly, the circuit synchronizes the actuation of the band cut-off and feed apparatus in time with article feed to insure application of the band to the article.

When banding a log length article with multiple bands, the manual switch 162 is closed and the single cycle switch 159 for applying a single band is left in the open position. The relay 166 will thus remain energized because the elongated log will span between and close both switches 160 and 164, thus maintaining a completed circuit through closed manual switch 162 to relay 166. With the circuit thus maintained to the relay 166, the timing motor shaft 145 keeps cycling the cams until the trailing end of the log passes beyond the feeler 161 of switch 160. Switch 160 then opens. Once the log moves past the feeler 161, the sequence of operations appropriate for applying single bands on spaced discrete articles, as previously described, continues until the last band is applied to the log.

9. The improvement of claim 7 wherein said intermittent means comprises a motor connected to said knife and said idler roller, a clutch-brake unit having an output shaft with timing cams and switches operatively associated with said cams, a first switch in the article feed path engageable with advancing articles, a circuit connected to said cam switches and said feed path switch to energize said timing motor and rotate the cams to energize said knife and roller motor to feed the web, cut off a band sheet from the web, and interrupt web feed.

10. The improvement of claim 8 including a second switch in said linear feed path to open a circuit path to said timing motor so that said timing motor is de-energized upon completion of one revolution of said cams.

11. The improvement of claim 8 including a third switch located in advance of said first switch and having a feeler engageable with the advancing articles to maintain current flow to said timing motor while said
feeler is in contact with an article to continue rotation of said cams and feed multiple band sheets to the article.

12. The improvement of claim 1 wherein said articles are advanced in spaced succession to said means for applying band sheets and including means associated with the article feed path to sense the position of the advancing articles to actuate the sheet applying means for successively applying individual band sheets to each of the advancing articles.

13. In apparatus for banding compressible articles, the improvement comprising means for compressing the advancing articles, means for applying band sheets to one face of the compressed articles, means for folding extending wing portions of the band sheets along the sides of the compressed article, and means for folding the ends of the band sheets inwardly about the compressed article to complete the band, and wherein said articles comprise layered logs and including means associated with the article feed path to sense the presence of the logs to actuate the sheet applying means and apply multiple spaced bands to the logs.

14. In apparatus for banding compressible articles, the improvement comprising means for compressing the advancing articles, means for applying band sheets to one face of the compressed articles, means for folding extending wing portions of the band sheets along the sides of the compressed article, and means for folding the ends of the band sheets inwardly about the compressed article to complete the band, and wherein said means for folding extending wing portions of the band sheets along the sides of the article comprises spaced plows and batteries of rollers downstream of the plows and located on opposite sides of the article feed path.

15. The improvement of claim 14 including roller support brackets and means for tilting said brackets to afford adjustment of the position of the axes of said rollers in a vertical plane parallel to the sides of the article.

16. The improvement of claim 14 wherein said rollers are inclined to induce vertical tension in the side panels of the band as articles advance between the compression rollers.

17. In apparatus for banding compressible articles, the improvement comprising means for compressing the advancing articles, means for applying band sheets to one face of the compressed articles, means for folding extending wing portions of the band sheets along the sides of the compressed article, and means for folding the ends of the band sheets inwardly about the compressed article to complete the band, and including a lower conveyor assembly having belts for advancing the articles being wrapped and wherein said means for folding the ends of the band sheets inwardly about the article to complete the band comprises first and second longitudinally staggered plows associated with said lower conveyor assembly.

18. The improvement of claim 17 wherein said lower conveyor assembly includes adjacent first and second conveyor belts with said first belt terminating at a point upstream from one said plow to provide a first folding gap free of belts and said second belt extending adjacent said first plow to advance the article past said first plow, a second folding gap downstream of said second belt and between said second belt and said second plow for folding the other band side panel beneath the article, a third belt longitudinally aligned with said first belt and said first gap and extending adjacent to said second plow, to move the article past the second plow.

19. The improvement of claim 18 including plates bridging said gaps to support the advancing articles.

20. The improvement of claim 19 wherein said plates are co-planar with said conveyor runs and spaced upwardly above the upper surface of the plows to provide clearance for movement of the folded wings beneath the plates and above the plows.

21. The improvement of claim 1 including means for applying glue to the margin of one of the wing portions of the band sheet prior to folding the wing portions along the sides of the article.

22. Apparatus for banding articles comprising first and second upper conveyors longitudinally aligned along a linear feed path and separated by a band delivery gap, a lower conveyor spaced below said upper conveyors, said upper and lower conveyors having converging runs for compressing the articles in advance of said band delivery gap and parallel runs for maintaining the articles in a compressed state during the band wrapping sequence, means for delivering sheets of banding material through the band delivery gap to the advancing articles, and means triggered by the articles on said conveyors for supplying the sheets of banding material to said sheet delivery means for application to the articles as the articles arrive at said band delivery gap.

23. Apparatus in accordance with claim 22 wherein said means for delivering sheets of banding material through the band delivery gap comprises spaced pairs of band carrier belts having contiguous runs for gripping band sheets.

24. Apparatus for banding articles comprising conveyors defining a linear article feed path, said conveyors including converging runs for progressively compressing the article as it advances along the feed path, band applying means, means in said feed path for sensing article position and a circuit connecting said sensing means to actuate web feed and web cut-off means to supply measured band sheets to said band applying means in time with movement of the articles with the leading edge of the band sheet initially engaging the articles at a predetermined location on the article and following portions of the band sheet subsequently and progressively contacting the articles as they advance.

25. Web feed and cut-off apparatus comprising a bed knife, a movable knife, a reciprocable knife bar carrying said movable knife, a motor connected to said knife bar for moving said knife bar between a retracted position and a cutting position, a drive roller, an idler roller, a frame, bearing discs rotatably connected to a said frame, said bearing discs eccentrically and rotatably supporting said idler roller, bearing clamps connected to said bearing discs and having cam followers,
a pair of follower levers, a cross shaft fixed to one end of said follower levers and pivotally supported on said frame, cam slots in said follower levers receiving said cam followers on said bearing clamps, and ball joints connecting said follower levers to said knife bar to afford movement of said idler roller toward said drive roller to clamp the web against the drive roller when said knife bar is in a retracted position and to move said idler roller away from the web when said knife bar is moved into a cutting position.

26. A method for banding compressible articles and comprising the steps of: advancing the articles to be compressed in a spaced longitudinal progression, progressively compressing the individual articles as the articles are advanced, applying a band sheet to the compressed article in time with the advancing article with the leading edge of the band sheet initially engaging the article at a predetermined location along the article and following portions of the band sheet subsequently and progressively contacting the articles as the article advances with a portion of the band sheet contacting the article and leaving a band sheet wing portion extending laterally on at least one side of the article, folding the wing portion of the band sheet along the side of the compressed article as the articles advance, and folding the end of the band sheet inwardly about the compressed article and upwardly against its bottom to complete the band.

27. The method of claim 26 including the steps of applying a second band sheet to the compressed article, folding the second band sheet along the side of the compressed article, and folding the end of the band sheet inwardly about the compressed article to complete the band.

28. The method of claim 26 in which a medial portion of the band sheet is applied to the article, leaving band sheet wings extending laterally at both sides of the article and folding both wings along the article sides and up against its bottom and into overlapped relation.

29. The method of claim 28 including the step of maintaining compression on the article throughout the folding steps.

30. A method for banding compressible articles and comprising the steps of: compressing the article, applying a band sheet to the compressed article with a portion of the band sheet contacting the article and leaving a band sheet wing portion extending laterally on at least one side of the article, folding the wing portion of the band sheet along the side of the compressed article, folding the end of the band sheet inwardly about the compressed article and upwardly against its bottom to complete the band, maintaining compression on the article throughout the folding steps by transferring support of the articles between traveling belts and slide plates in the course of folding said wings up against the article bottom.

31. The method of claim 30 in which the wings are threaded through gaps between the plates and belts to bring them into contact with the article bottom.

32. In apparatus for banding compressible articles, the subcombination of a lower conveyor assembly for overwrapping a glued side band panel flap upon an unglued side band panel flap comprising, first and second belts having co-planar upper runs, said first belt having a run shorter than said second belt, a first plow located downstream of said first belt and spaced from the end of said first belt to provide a first belt free gap for folding a band side panel flap beneath the article and said second belt extending along side first plow to advance the article past the first plow, a second plow for folding the other band side panel flap beneath the article, said second plow being spaced from the downstream end of said second belt to provide a second belt free folding gap for the other band side panel flap, a third belt having a run co-planar with said upper runs of said first and second belts and extending adjacent said second plow for advancing the articles past said second plow and plates co-planar with said upper runs of said first, second and third plates and bridging said gaps to support the articles as they move past said gaps, and throns beneath said plates and above said plows to afford movement of the folded panels between said plows and said plates and a fourth conveyor belt downstream of said third conveyor belt for compressing the glued panel against the unglued panel to complete the band.

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