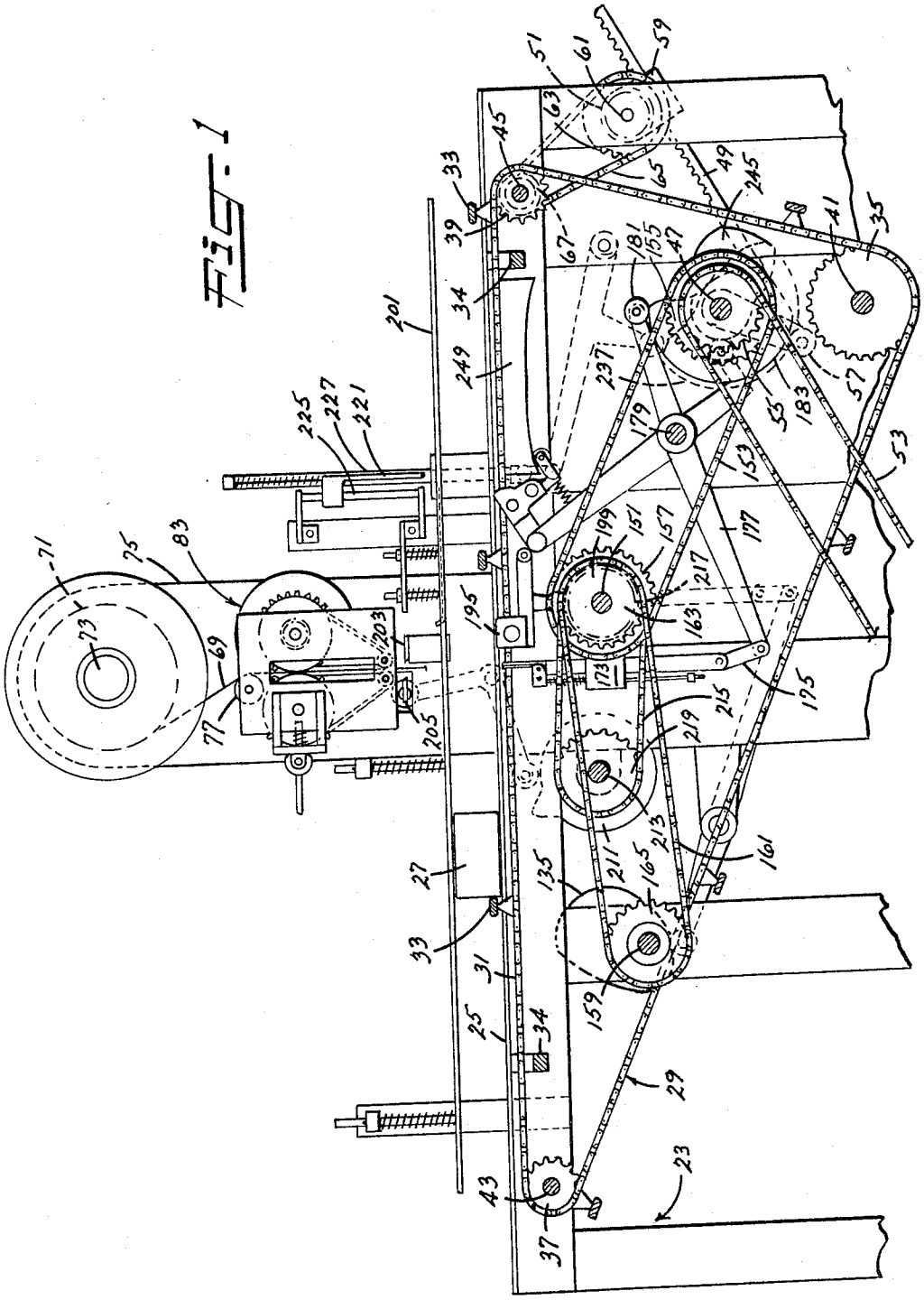
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BANDING APPARATUS

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FIG. 1

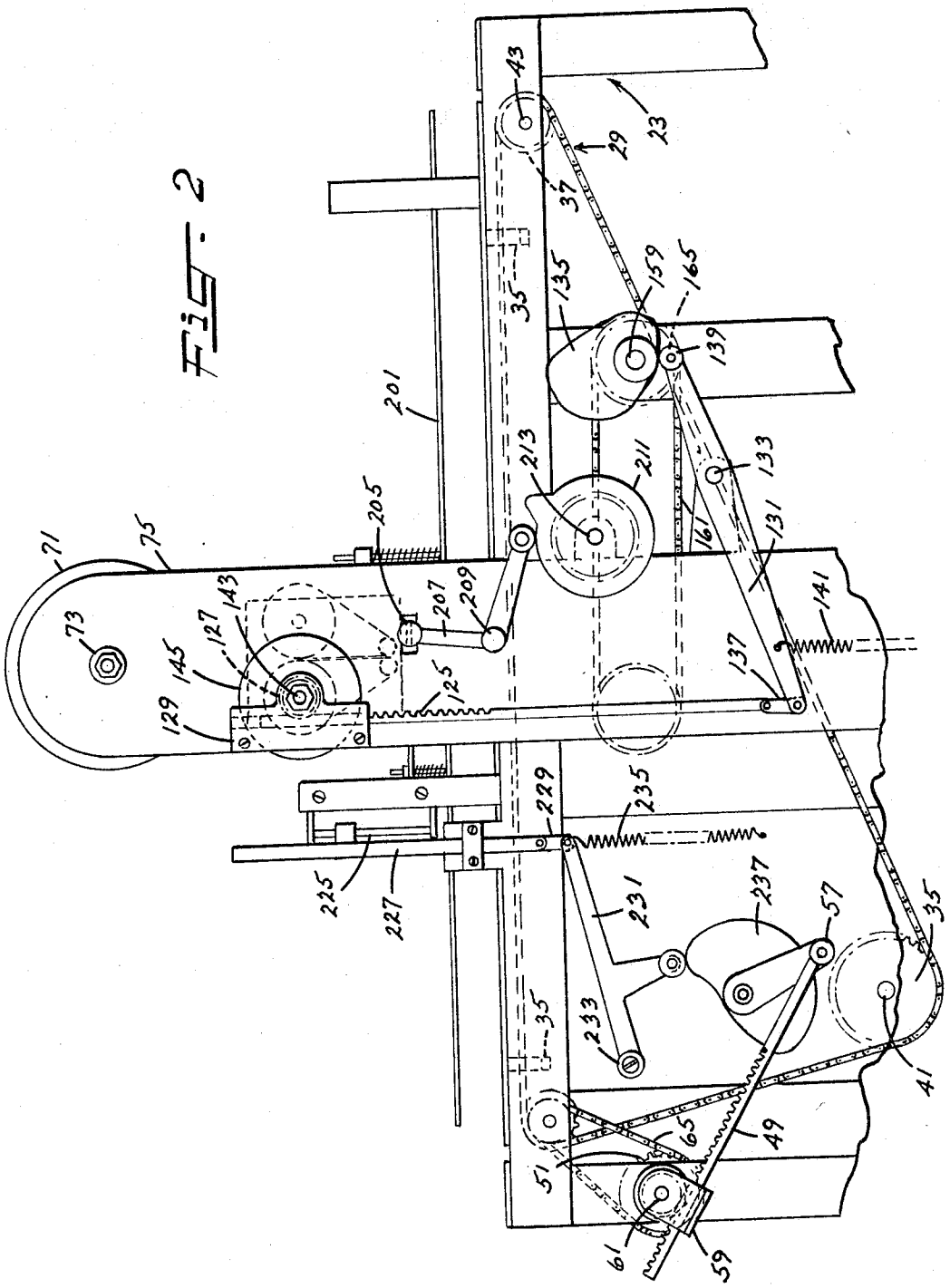


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Fig. 2



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BANDING APPARATUS

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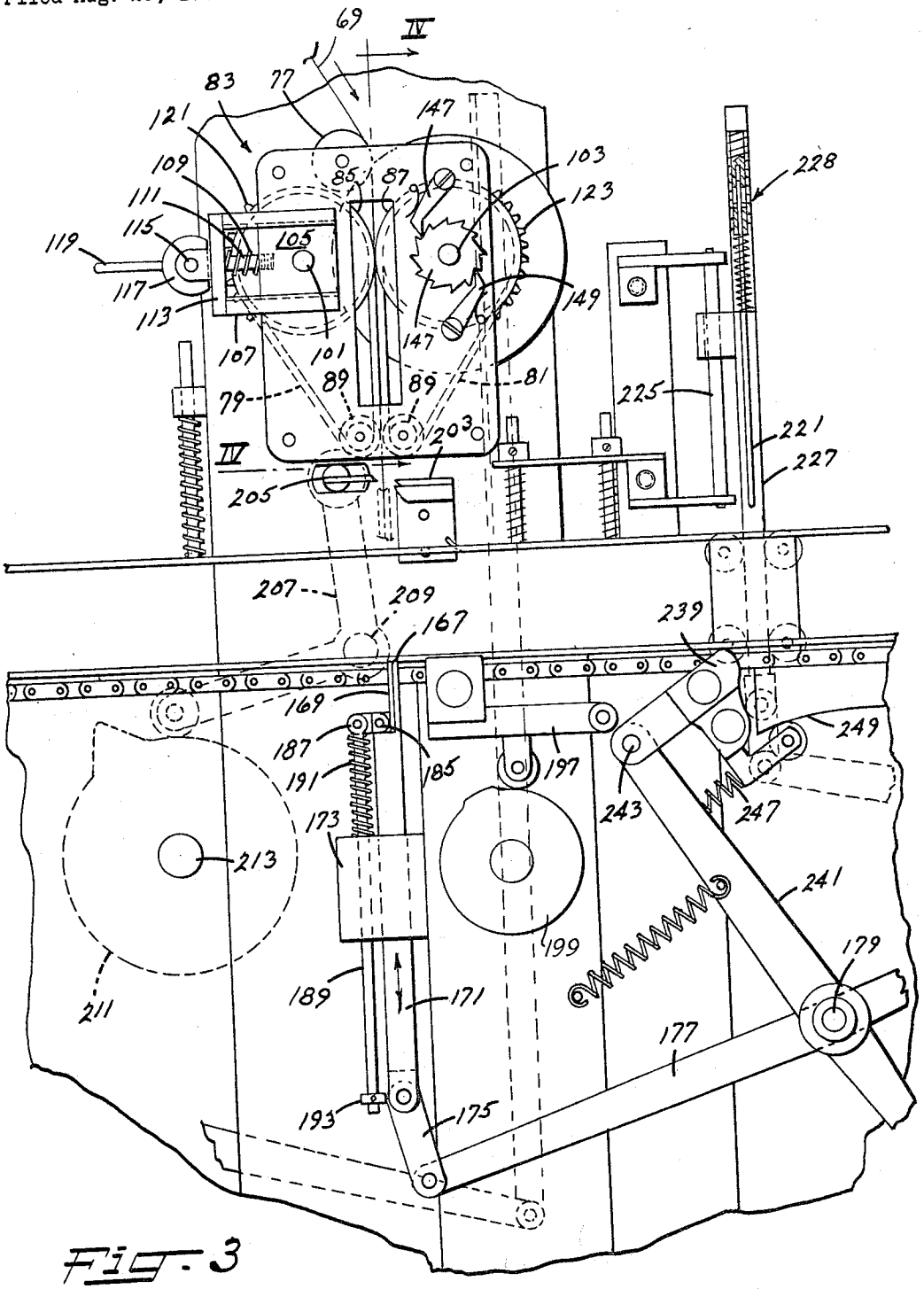
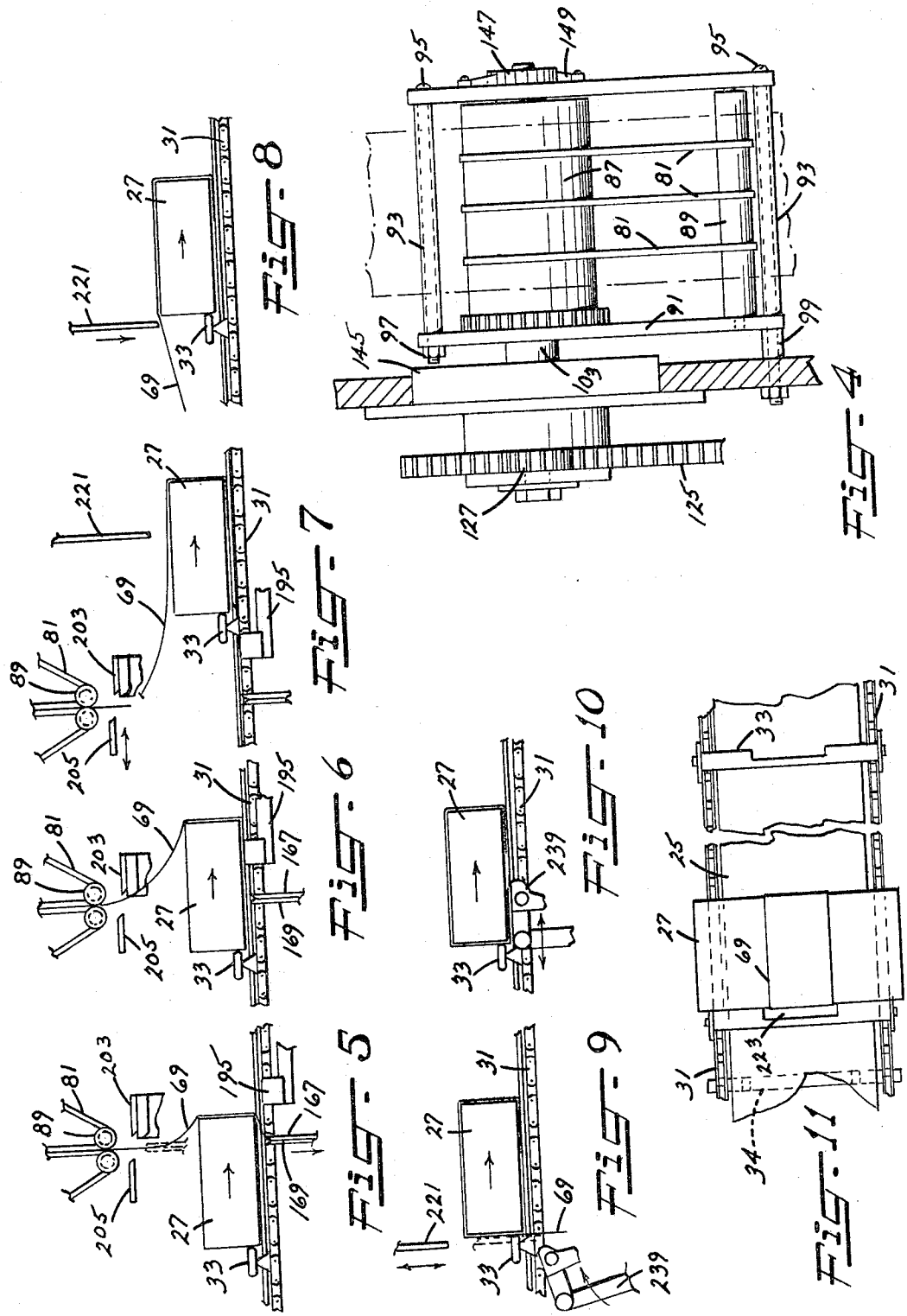


Fig. 3

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BANDING APPARATUS

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BANDING APPARATUS

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9 Claims. (Cl. 53—137)

The present invention relates to banding of articles, and more particularly to apparatus for applying a tape or other ribbon-like material partially about cartons and other like articles.

It is not uncommon to band individual articles, for example during special promotions or to render the articles more acceptable as gifts for holidays or other occasions. Such bands are generally applied as part of an article wrapper or during article wrapping operations and thus cannot be removed without destroying the function and/or appearance of the article overwrap. In some instances, the bands may be manually applied to wrapped articles. However, such operation is slow and expensive and often does not permit band removal without wrapper damage. Accordingly, a primary object of this invention is to provide a new or generally improved and more satisfactory apparatus for banding articles.

Another object is the provision of an apparatus for applying bands partially about individual articles.

Still another object is the provision of the apparatus for snugly wrapping and band partially about an article and sealing the same at only the ends thereof so as to permit the same to be easily removed.

Still further objects will appear from the following description.

The above objects are accomplished in accordance with the present invention by an apparatus wherein a continuous tape formed, for example, from cellophane coated with a heat sealable material is delivered from a supply source, gripped at its leading end, and then drawn away from the supply source concomitantly with the continued delivery thereof. An article which is to be banded is advanced against the tape with such force as to effect the release of the leading end thereof. This leading end of the tape is then sealed to the article. The length of tape which is necessary for completing the banding operation is severed from the supply source and sealed to the article at its trailing end.

The apparatus of the present invention is suitable for use with a variety of articles, such as packages and cartons which may be in a wrapped or unwrapped condition. For the sake of simplicity, however, the apparatus of the present invention is hereafter described as employed in banding of wrapped cartons.

In the drawing, FIGURE 1 is a side view of the apparatus of the present invention;

FIGURE 2 is a side view of the apparatus which is opposite to that shown in FIGURE 1;

FIGURE 3 is a view similar to FIGURE 1 illustrating a portion of the apparatus on an enlarged scale;

FIGURE 4 is a transverse vertical section taken along the line IV—IV of FIGURE 3;

FIGURES 5–10 are diagrammatic illustration showing the sequence of operations in banding cartons with the apparatus of the present invention;

FIGURE 11 is a plan view of a portion of the apparatus of the present invention.

Referring now more specifically to the drawing wherein like numerals indicate like parts throughout the several views, the apparatus of the present invention includes a supporting frame 23 and a table 25. Cartons 27 or other like articles which are to be banded are delivered to the apparatus by any suitable means, not shown, and are advanced along the table 25 by a conveyor 29 having a pair

of endless chains 31 and a series of carton push bars 33. As shown in FIGURES 1 and 11, the table 25 is in the form of an island which is supported from its under side by frame cross bars 34. With this arrangement, the conveyor push bars 33 are able to pass freely to and from a portion of their path of travel which is located above the table 25.

The conveyor chains 31 are each trained over corresponding sprockets 35, 37 and 39, which are fixed to shafts 41, 43 and 45, respectively, and are advanced from a main drive shaft 47 by a rack 49 and a cooperating pinion 51. The shaft 47 is driven continuously by a suitable motor, not shown, through a chain 53 and a sprocket 55 and is connected to one end of the rack 49 by a lever 57. The rack 49 is reciprocated relative to a guide 59 as the drive shaft 47 is turned and serves to oscillate the pinion 51 relative to its shaft 61. A sprocket 63 is fixed to the shaft 61 and is operatively connected to the pinion 51 through a conventional one-way clutch, not shown, for rotation in only a clockwise direction, as viewed in FIGURE 1. This rotary movement of the sprocket 63 is in turn transmitted through a chain 65 and a sprocket 67 to the shaft 45 and thus provides for intermittent advancement of the conveyor 29.

As an individual carton 27 is advanced along the table 25, its leading end engages with a tape or other ribbon-like material 69, as shown in FIGURE 5. The tape 69 may consist of any heat and pressure sealable material, such as coated cellophane, and is supplied as a roll 71 which is supported on a pin 73 projecting from a frame upright 75. From the roll 71, the tape 69 is led by a roll 77 inbetween endless belts 79 and 81 of a feed mechanism 83. Drums 85 and 87 receive the respective endless belts 79 and 81 and cooperate with idler rolls 89 in maintaining such belts engaged snugly with the opposite sides of the tape 69. As shown in FIGURE 4, a plurality of belts 79 and 81 are engaged with the opposite sides of the tape 69 to insure proper straightline feeding of the same.

The guide roll 77 and idler rolls 89 are rotatably mounted between bearing plates 91 which are separated by spacers 93 and held together by bolts 95 and nuts 97. Certain of the bolts 95 extend through and are connected to the frame upright 75 with additional spacers 99 being interposed between such upright and the adjacent bearing plate.

The drums 85 and 87 of the feed device 83 are also supported between the bearing plates 91 by their respective shafts 101 and 103. The shaft 101 of the drum 85 is carried by plates 105 which are slidably supported by the guides 107 and resiliently urged toward the drum 87 by spring 109. Movement of the drum 85 away from the drum 87, for example during lacing of the tape 69, is facilitated by rods 111 which project from the plates 105 and extend through a cross piece 113. A shaft 115 is supported between the ends of the rods 111 and carries cams 117 which serve to retract the rods 111 as the shaft 115 is turned by its handle 119.

The drum 87 rotates the drum 85 through meshing gears 121 and 123 and is itself driven from the main drive shaft 47 through a rack 125 and a cooperating pinion 127. As shown in FIGURE 2, the rack 125 is reciprocated relative to a guide 129 by a double lever 131 which is oscillated about its pivot 133 by a plate cam 135. One end of the lever 131 is connected to the rack 125 by a link 137, while at its opposite end the lever is provided with a follower 139 which is maintained in contact with the periphery of the cam 135 by a tension spring 141.

The pinion 127 is oscillated about its supporting shaft 143 as the cooperating rack 125 is reciprocated and, in turn, drives the shaft 103 of the feed drum 87. A con-

ventional one-way clutch 145 is interposed between the shaft 103 and the pinion 127 and facilitates movement of the drum 87 in only a tape feeding or clockwise direction, as viewed in FIGURE 2. As a precaution against feed back of the tape 69, a ratchet 147 is fixed to the shaft 103 and is engaged by spring loaded pawls 149 which permit rotation of the drum 87 in only the one desired direction.

As mentioned above, the drum 87 of the feed device 83 is driven from the main shaft 47. More particularly, an intermediate shaft 151 is driven from the main shaft 47 by means of a chain 153 and sprockets 155 and 157 and, in turn, drives a second shaft 159 through a chain 161 and sprockets 163 and 165. The plate cam 135 is fixed to rotate with the shaft 159 and, during each revolution thereof, causes the rack 125 to deliver a length of the tape 69 which is necessary for completing the banding of the one carton. In view of the configuration of the plate cam 135, it will be apparent that the tape 69 will be fed at different rates of speed during the various stages of the carton banding operation.

As the tape 69 is delivered by the feed device 83, a pair of jaws 167 and 169 nip the leading end thereof and draw the same across the path of an oncoming carton 27 and into a position below the table 25. The jaws 167 and 169 are located at one end of a rod 171 which is slidably supported by a guide 173. The rod 171 is connected by a link 175 to one end of a double lever 177 which is carried on a shaft 179. A follower 181 is carried at the opposite end of the lever 177 and rides along the periphery of the plate cam 183 which is fixed to the main drive shaft 47. As the double lever 177 is oscillated above the shaft 179 by the plate cam 183, the rod 171 is reciprocated and thus carries the jaws 167 and 169 into into their terminal positions, as shown in solid and broken lines in FIGURE 3.

The jaw 167 is formed as an integral portion of the rod 171, while the jaw 169 is in the form of a bell crank lever which is pivoted to the rod 171 by a pin 185. The jaw 169 is also pivoted at 187 to one end of a bar 189 which will, of course, travel with the rod 171 and is also slidably supported by the guide 173. A spring 191 resiliently urges the bar 189 upwardly relative to the guide 173 so that the jaw 169 is normally maintained in a closed position against the jaw 167. During the upward stroke of the rod 171, however, the jaw 169 is urged into an open position by a stop 193 which abuts against the guide 173 and arrests the movement of the bar 189 before the upward travel of the rod 171 is completed.

The plate cam 183 is designed to have the rod 171 dwell at its uppermost position so that a substantial length of the tape 69 can be advanced will inbetween the now open jaws 167 and 169. Under the force of the spring 191, the tape 69 is nipped by the jaws 167 and 169 as the rod 171 starts and continues through its downward stroke until it is carried to a position below the table 25. The tape feed device 83 remains in continuous operation during this downward travel of the rod 171 so that the jaws 167 and 169 exert little, if any, tension on the advancing tape.

The cam 183 also causes the rod 171 to dwell at its lowermost position during which time the conveyor 29 advances a carton 27 against and well beyond the path of the tape 69, as shown in FIGURES 5 through 8. As the carton 27 is moved from its position shown in FIGURE 5 to that shown in FIGURE 6, the force of the spring 191 is overcome so that the leading end of the tape 69 is gradually pulled from between the nipping jaws 167 and 169. The leading end of the tape 69 is then sealed to the underside of the carton 27 by an electrically heated shoe 195 which is carried at one end of a rocker arm 197. The shoe 195 is normally located below the surface of the table 25 and periodically elevated into operative position by a cam 199 which is fixed to the

shaft 151. Spring mounted abutment plates 201 are provided for yieldably holding the cartons 27 against the table 25 during this and subsequent operations.

The feed device 83 continues to advance the tape 69 during the above described movement of the carton 27 and until the carton assumes a position as shown in FIGURE 7. At this point, the tape 69 is severed by blades 203 and 205. The blade 203 is fixed to the frame upright 75, while blade 205 is carried at one end of a bell crank lever 207 which is pivoted to the supporting frame at 209. A plate cam 211 oscillates the lever 207 about its pivot and is carried by a shaft 213 which is driven from the shaft 151 by a chain 215 and sprockets 217 and 219.

As the carton 27 moves into a position as shown in FIGURE 8, the conveyor 29 is stopped. A tucker plate 221 then pulls the tape snugly about the carton 27 and urges its severed end downwardly between the trailing end of the carton 27 and a recessed portion 223 of the adjacent conveyor push bar 33. The tucker plate 221 is slidably mounted on fixed guide rods 225 and is vertically reciprocated by a slide bar 227 preferably through a conventional lost motion connection, as indicated at 228. As best shown in FIGURE 2, the slide bar 227 is connected by a link 229 to a lever 231 which is pivoted to the supporting frame at 233. A spring 235 maintains the lever 231 engaged with the periphery of a plate cam 237 which is fixed to the main drive shaft 47.

The cam 237 serves to oscillate the lever 231 and is designed to have the tucker plate 221 dwell at its lowermost position during which time the trailing end of the severed length of tape is sealed onto the underside of the carton 27. This sealing operation is effected, as shown in FIGURES 9 and 10, by a second electrically heated shoe 239 which is pivoted to one end of a double lever 241 by a pin 243. The lever 241 is oscillated about the shaft 179 by a cam 245 which is fixed to turn with the main drive shaft 47. A spring 247 urges the shoe 239 against a stationary plate cam 249 which permits a controlled upward movement of the shoe 239 concomitantly with its arcuate movement by the lever 241. The shoe 239 presses the severed end of the tape 69 upwardly against the carton 27 with a wiping action. It will be further noted that the lost motion connection 228 permits the tucker plate 221 to be deflected upwardly by the shoe 239 and thus enables this shoe to smooth or pull the tape taut as it moves past the adjacent carton corner.

The banded carton may be removed from the apparatus by any suitable means, not shown. From the above description, it will be apparent that the band or tape is affixed to the carton at only its ends and may be readily removed without damaging the carton or carton wrapper.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. Apparatus for banding a carton or like article including tape supply means, means for feeding a heat sealable tape from said supply means, means for nipping the tape with a predetermined force, means for moving said nipping means whereby the leading end of the tape may be drawn away from said feeding means, means for advancing a carton against the tape to pull the same from said nipping means, a heated shoe for sealing only the leading end of the tape to the carton, means operative after the leading end of the tape has been sealed to the carton for severing the tape from said supply means, and means including a heated shoe for sealing the trailing end of the severed tape to the carton.

2. Apparatus for banding a carton or like article including tape supply means, means for feeding a tape from said supply means, means for nipping the leading end of the tape with a predetermined force, means for moving said nipping means whereby the leading end of the tape

may be drawn away from said feeding means, a conveyor for advancing a carton against the tape with such force as to pull the leading end of the tape from said nipping means, means for sealing the leading end of the tape to the carton, means for severing the tape from the supply means, a tucker plate for urging the severed tape along the trailing portion of the carton and means for sealing the trailing end of the severed tape to the carton.

3. Apparatus as defined in claim 2 wherein said means for sealing the leading and trailing ends of the tape to the carton include heated pressure shoes.

4. Apparatus as defined in claim 2 in which said moving means serves to carry the nipping means toward and away from said feeding means and wherein said nipping means includes a pair of jaws, resilient means normally urging said jaws toward each other with a predetermined force, and means for urging said jaws into an open position as they are moved toward said feeding means.

5. Appartus as defined in claim 2 wherein said tape feeding means includes a pair of drums, endless belts laced over said drums for engaging with the opposite sides of the tape, rolls cooperating with said drums for directing the opposing reaches of said belts along substantially straight parallel paths, and means for together rotating said drums in opposite directions and at substantially the same rate of speed.

6. Apparatus for banding a carton or like article including a carton supporting table, tape supply means located along one side of said table, means for feeding a tape from said supply means, means for nipping the leading end of the tape with a predetermined force, means for moving said nipping means away from said feeding means and through an opening in said table to thereby carry the leading end of the tape through to the opposite side thereof, means for advancing a carton along said one side of the table and against the tape to pull the leading end thereof from said nipping means, a heated pressure shoe for sealing the leading end of the tape to the carton, means for severing the tape from said supply means, a tucker plate for urging the trailing end of the severed tape through a second opening in the table and to said opposite side thereof, and a second heated pressure shoe for sealing the trailing end of the severed tape to the carton.

7. Apparatus as defined in claim 6 in which said moving means serves to carry the nipping means toward and away from said feeding means and wherein said nipping means includes a pair of jaws, resilient means normally urging said jaws toward each other with a predetermined force, and means for urging said jaws into an open position as they are moved toward said feeding means.

8. Apparatus as defined in claim 6 wherein said tape feeding means includes a pair of drums, endless belts laced over said drums for engaging with the opposite sides of the tape, rolls cooperating with said drums for directing the opposing reaches of said belts along substantially straight parallel paths, and means for together rotating said drums in opposite directions and at substantially the same rate of speed.

9. Apparatus as defined in claim 7 wherein said tape feeding means includes a pair of drums, endless belts laced over said drums for engaging with the opposite sides of the tape, rolls cooperating with said drums for directing the opposing reaches of said belts along substantially straight parallel paths, and means for together rotating said drums in opposite directions and at substantially the same rate of speed.

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